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THE MANAGEMENT

OF

THE ABORTION-PRONE PATIENT

VOLUME I

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I N T R O D U C T I O N

At Robroyston Hospital there is a ward reserved for the admission of patients suffering from abortion. While most of the admissions to this ward consist of patients with either threatened, inevitable or incomplete abortion, there were from time to time patients admitted for complete bed rest from just after the first missed menstrual period or as soon as pregnancy was confirmed. These patients generally had a depressing history of repeated abortion over several years; some of them had never carried a pregnancy to viability; others, in addition to several abortions, had a history of pregnancy terminating in a premature labour and resulting in either a stillbirth or a child which failed to survive the neonatal period. A few patients had perhaps only one surviving child from six or more pregnancies, and some patients had a history of long periods of infertility, primary or secondary, in association with a history of abortion.

These patients were regarded as being abortion-prone and were admitted to hospital, not because of having already threatened to abort, but because of their bad obstetric histories. They were prepared to spend, if need be, almost the whole of their pregnancy in bed. Some of them had been admitted to hospital in previous unsuccessful pregnancies for rest over the first few suppressed menstrual periods. They and their husbands were now prepared to have their home life disrupted for a long period if, by doing so, they might be able to have a successful pregnancy.

The obstetricians were prepared to allow such patients to occupy a bed in a ward for a long period - a bed which in such a ward, in a period of seven months, would normally have been used for over 40 patients.

Not all patients with such a history were able to avail themselves of the opportunity of a prolonged stay in hospital in the effort to save a pregnancy. In certain areas, where there was a shortage of hospital maternity beds, the opportunity of prolonged bed rest could perhaps not be offered to all such patients.

Because of these difficulties and in the face of the anxiety expressed by the patients, it was decided to explore the possibilities of other types of treatment, perhaps to be

used in conjunction with less prolonged stays in hospital.

Most workers in this field have tried to evaluate the effect of one particular type of treatment in the management of patients with a history of repeated abortion. It is unreasonable to expect to find a panacea in a condition which is held to have many causes, known and unknown. It was the author's intention to try to discover an appropriate treatment for each patient and it was expected that there would be several lines of approach depending on the history and clinical findings.

This work was begun in 1962 in the Maternity Unit of Robroyston Hospital, Glasgow, and was continued and developed from 1963 until 1966 at the Rankin Memorial Hospital, Greenock.

REVIEW OF LITERATURE ON RECURRENT ABORTION

AND THE ABORTION - PRONE WOMAN

Since the woman who is regarded as being subject to recurrent abortion has been studied from many aspects and since there is apparently little agreement in either the definition of recurrent abortion, the aetiology, the investigation and management or the interpretation of results of a multitude of methods of treatment, it has been decided that the review of the literature on the subject should be studied under the headings:

1. The likelihood of pregnancy ending in abortion
2. Definition of recurrent abortion
3. Aetiology of recurrent abortion
4. Selection of the abortion-prone patient
5. Investigation and treatment of the abortion-prone patient and results of treatment
6. Incidence of foetal abnormalities in the abortion-prone patient

1. The Likelihood of Pregnancy ending in Abortion

In 1938, Malpas calculated the likelihood of a successful pregnancy occurring after 1, 2 or more abortions. He assumed that 18 per cent of all pregnancies would end in abortion and showed from a study of 6000 pregnancies that abortion or stillbirth due to recurrent causes was under 1 per cent.

Eastman (1947) revised Malpas' figures of incidence of abortion and predicted new spontaneous cure rates after succeeding abortions. He believed that the incidence of abortion was 10 per cent of all pregnancies and of this abortion due to recurring factors was 0.4 per cent.

Their predictions of spontaneous cure rates are compared below:

No. of Previous Abortions	Spontaneous Cure — Rate per cent	
	Malpas (1938)	Eastman (1947)
1	78.4	86.8
2	62.0	63.1
3	6.0	2.0

There has been much criticism of the work of Malpas and Eastman with regard to their predictions of the spontaneous cure rate to be expected in recurrent abortion. King (1953) suggested that the calculations of Malpas and Eastman were invalid but drew attention to the fact that many authors had

since compared their results with these predictions. Speert (1954), while agreeing that the principle of Malpas' theory was valid, took issue with his numerical values, the fact that he made no distinction between abortions and stillbirths and particularly with his choice of a control series from results obtained from a selected group of gynaecological patients collected up to 30 years before. Speert also criticised Eastman's figures although he thought that the abortion rate of 10 per cent was more realistic. He felt that, as in Malpas' calculations, Eastman's source of material for the calculation of the abortion rate due to recurring factors was unsuitable owing to his selection criteria and a small sample.

Warburton and Fraser (1959) calculated the spontaneous cure rate after 3 abortions to be 26 per cent and in 1961 they criticised Malpas' and Eastman's figures and methods of prediction of the likelihood of abortion. They said that the calculations were based on unreliable estimates of the parameters used and a further criticism was of the absolute "classification of abortions into the two categories recurrent and non-recurrent".

Eastman (1962) replied to these criticisms and defended his method of assessment of risk of abortion in subsequent pregnancies but James (1962) also stated that Malpas' and Eastman's figures should be disregarded. Lewis (1964) agreed that the estimates of frequency of repeated abortion made by Malpas and Eastman were not in accordance with the observed frequency and stated that the observed results after a series of abortions were better than those predicted mathematically. Goldzieher (1964) criticised theoretical predictions of spontaneous cure rate and papers using these predictions as a comparison for better results.

In spite of strong and repeated criticism over the years, reports have nevertheless continued to appear in which other workers have compared their results with the predictions of either Malpas or Eastman (Davis, 1957; Rawlings and Krieger, 1958b; Tupper and Well, 1962).

Warburton and Fraser (1961) drew attention to the virtual impossibility of obtaining a large sample of patients with a series of consecutive untreated abortions but MacNaughton (1964) followed up 133 women whose first pregnancy had ended in abortion until they had had at least 4 pregnancies. He stated that, although the numbers were

small, they were not theoretical. His observations of spontaneous cure rates were:

<u>No. of Previous Abortions</u>	<u>Spontaneous Cure Rate per cent</u>
1	79.7
2	56.0
3	42.0

There is no indication of previous treatment in this group and, although perhaps no hormonal therapy was given, it is possible that some of the patients had more intensive antenatal care.

Summary

It is obvious that there are difficulties in predicting the likelihood of any pregnancy ending in abortion and in predicting the number of pregnancies which will end in abortion due to recurrent factors.

The incidence of spontaneous abortion is difficult to estimate. The patient may be unaware of an early abortion, and even if she is aware that abortion has occurred, she may not seek medical advice.

Estimates of the incidence of abortion in the population are of necessity approximate.

To obtain a large series of patients with consecutive

and completely untreated abortions is probably impossible.

There is little difference in the predicted "spontaneous cure rates" of Malpas (1938), Eastman (1947) and MacNaughton (1964) for patients after 1 or after 2 abortions. Their predictions differ markedly however for the patient with 3 or more consecutive abortions.

The older predictions are held by many workers not to be in accordance with the observed incidence of recurrent abortion.

2. Definition of Recurrent Abortion

When a review of the literature on the subject of recurrent, habitual or repeated abortion is undertaken, it becomes obvious at an early stage that there is no agreement regarding the number of abortions which should occur before the patient may be regarded as being subject to recurrent abortion - nor is there complete agreement in the definition of abortion.

It has already been noted that Malpas (1938), whose figures are still quoted by workers investigating the causes and treatment of recurrent abortion, included stillbirths along with abortions when calculating the incidence of recurrent factors in the problem of abortion.

Bevis (1951) confined his series to patients with 3 or more consecutive abortions and King (1953), in discussing the confusion which exists in the published literature on the subject, referred to "repeated abortion" and defined this as spontaneous abortion occurring in a woman who has already had 2 or more abortions - usually in succession - but who may have had an earlier or intervening term pregnancy.

In his paper criticising the predictions of Malpas (1938) and Eastman (1947), Speert (1954) regarded a woman who has had 3 consecutive abortions as being an habitual aborter and he distinguished between primary and secondary cases.

Alder and Krieger (1957) stated that the definition of habitual abortion was a condition in which 3 or more consecutive abortions occur without an intervening pregnancy reaching viability but they included in their series patients with 2 or more consecutive abortions so that their results could be compared with those of other investigators.

Goldzieher and Benigno (1958) found that there was a significant difference in abortion rate only after 4 consecutive abortions had occurred and felt that there was no justification for restricting the term recurrent or habitual abortion to women who had 3 rather than 2 consecutive abortions. They also were of the opinion that there was a significant difference in the prognosis for a pregnancy depending on whether the patient had already had a successful pregnancy, i.e. whether she was suffering from primary or secondary recurrent abortion.

In 1962, Jevett found no significant difference in the results of 2 groups of patients - the first with 3 or more consecutive abortions and the second with 2 consecutive abortions. He defined abortion as termination of pregnancy at or before 22 weeks and it would therefore appear that the abortion rate in his series of patients might be lower than that of a similar series where the definition of abortion was termination of the pregnancy before the 28th week. He also made little distinction between cases of primary and secondary recurrent abortion.

In 1963, Shearman and Garrett included patients with a history of 2 or more consecutive abortions in their series, as did Osmond-Clarke and Murray (1963).

MacNaughton (1964) stated that a woman who had 4 abortions and no viable pregnancies was the true primary habitual aborter but he believed that any woman after 2 abortions should be regarded as being abortion-prone. He believed that there was a much better prognosis in the secondary recurrent abortion group than in the primary and maintained that much of the confusion in the literature was due to the combination of the 2 groups in published studies.

Klopper and Macnaughton (1965), in a study on "Hormones and Recurrent Abortion", confined their selection of patients to primary recurrent aborters with a history of 2 or more abortions.

Cope and Emelife (1965) included in their study women with a history of 2 or more consecutive abortions and did not distinguish between primary and secondary aborters in their results. A similar selection of patients was made by Russell (1965) who found no difference in the outlook for the 2 groups. MacRae (1965) gave no indication of the number of abortions required to include a woman in his habitual abortion group.

Summary

There is no general agreement on the number of pregnancies which must end in abortion before a woman may be regarded as being in the recurrent, habitual or repeated abortion category. The number of abortions quoted by various authors is from 2 to 4. That these should be consecutive abortions is agreed but occasionally not made clear. Some investigators include patients who have had a viable pregnancy before a series of abortions without differentiating in any way between primary and

secondary recurrent aborters, while others are of the opinion that this leads only to further confusion and misunderstanding in the interpretation of results of various methods of management.

3. Aetiology of Recurrent Abortion

(a) Uterine Anomalies: Most workers are in agreement that there is an increased incidence of abortion and there may be recurrent abortion associated with developmental uterine anomalies. In a detailed review of 12 cases, Way (1945) found that the incidence of abortion in the pregnancies previously undertaken by these patients was 36.3 per cent. Three of the 12 patients had a history of 2 or more abortions. These patients also had a history of premature labours often associated with stillbirth.

Baker et al. (1953) also reported a high abortion rate in the presence of congenital uterine anomalies.

Greiss and Mauzy (1961) found a high incidence of abortion (29.1 per cent) in cases of uterus bicornis unicollis as opposed to an incidence of 12.5 per cent in cases of uterus arcuatus and subseptus.

Many workers exclude from their series of patients with recurrent abortion those with congenital uterine anomalies in the belief that, having excluded these conditions, usually along with others which are generally accepted as being associated with recurrent abortion, the remaining patients may then be investigated for other possible causes and/or various methods of treatment may be properly evaluated.

(Mann, 1959; Bender, 1960; Plotz, 1960; Cope and Enelife, 1965; Kloppe and Macnaughton, 1965).

The incidence of congenital uterine anomalies has been variously reported: 1 in 1,223 (Way, 1945); 0.3 per cent (Baker et al., 1953); 3.3 per cent (Greiss and Mauzy, 1961). The last figure includes cases where "pocketing" was noted in the cornual regions of the uterus at manual exploration of the uterine cavity after delivery.

(b) Cervical Incompetence: Since the publications of Lash and Lash (1950) and Shirodkar (1953), cervical incompetence has become generally accepted as a cause of middle-trimester abortion and, if uncorrected, may be associated with recurrent abortion. As in the case of uterine anomalies, many workers exclude these cases of cervical incompetence from their series of cases of recurrent abortion. Mann (1959) found the condition in 13 of 160 habitual aborters (8.1 per cent). Cox (1961) found 11 cases in 102 cases of "mid-term fetal loss" (10.7 per cent). Javert (1962) diagnosed the condition in 13.3 per cent of his 427 patients. Mostly however the actual incidence of cervical incompetence is not given since these patients, apparently having an obvious cause for aborting, are generally excluded from investigations into the causes of recurrent abortion.

(c) Hormonal Imbalance: If no obvious cause for a sequence of abortions were found, for example cervical incompetence, developmental uterine anomalies, chronic renal disease, fixed retroversion or retroflexion of the uterus, diabetes or syphilis, many workers proceeded to investigate these patients for the possible presence of a hormonal imbalance, usually a progesterone deficiency, as the reason for the recurrent abortions.

Alder and Krieger (1957), in an investigation into the significance of pregnanediol excretion in cases of recurrent abortion, suggested that it should not be forgotten that there might be a non-recurring cause for abortion in any sequence of recurrent abortion and therefore too hasty condemnation of any single method of treatment was to be deprecated.

Bovis (1951), in a review of 32 patients with 3 or more consecutive abortions estimated the pregnanediol excretion twice weekly. Nine of these patients had persistently low excretion levels and were given ethisterone 5 mg. 2 to 3 times weekly. The effect of this on the pregnanediol excretion was variable but all 9 patients had successful pregnancies.

Papanicolaou (1946) noticed a crystallisation pattern in slides of dried cervical mucus, most pronounced before

and at the time of ovulation and absent or much reduced at other parts of the cycle, during pregnancy or after the menopause.

In 1954, Zondek showed that the arborization, ferning or palm-leaf phenomenon seen on microscopic examination of the cervical mucus was dependent on oestrogen and progesterone, and Zondek and Rozin (1954) showed the significance of arborization of the cervical mucus in the determination of corpus luteum function in the normal menstrual cycle. Zondek and Cooper (1954) in a paper on "Cervical Mucus in Pregnancy" described the presence of an arborization pattern in 11.5 per cent of a series of patients seen in early pregnancy. There was a high incidence of abortion in this group. Arborization of the cervical mucus was normally absent in the premenstruum, indicating good corpus luteum function with adequate progesterone secretion. They showed that, if oestrone, oestriol or oestradiol monobenzoate was given in a dosage of 10 mg., the arborization pattern would appear.

Jacobsen (1957) found that ferning of the cervical mucus was present in 155 of 299 (52 per cent) unselected consecutive pregnant patients. Efstation and Schwalenberg (1960) found ferning in 11 per cent of 500 pregnant patients and of these with ferning 40 per cent subsequently aborted.

The methods of detecting hormonal imbalance in pregnancy are mainly:

- (i) estimation of urinary pregnanediol excretion
- (ii) detection of ferning of cervical mucus
- (iii) cytological examination of vaginal smears.

(i) Pregnanediol Excretion: The urinary pregnanediol excretion has been measured by Davis (1951), Alder and Krieger (1957), Rawlings and Krieger (1958a), Rawlings and Krieger (1959), Shearman and Garrett (1963), Rawlings (1963), Goldzieher (1964) and Russell (1965).

Shearman (1959) found that some cases of first trimester abortion were associated with a falling pregnanediol excretion level. Many of the above workers found the estimation of urinary pregnanediol excretion a valuable aid to the management of the abortion-prone woman.

Criticism of the value of the estimation of pregnanediol excretion levels is made by Plots (1960) who showed that endogenous progesterone production was already reduced in some cases where normal levels of pregnanediol were still present in the urine.

Robertson and Maxwell (1963) found the estimation of pregnanediol excretion in early pregnancy of no value in the prognosis of pregnancy in cases with a previous history of

abortion and MacRae (1965) in a study of vaginal cytology in abortion-prone women found that abnormal pregnancy smears were found in some patients who had normal excretion levels of urinary pregnanediol.

To be of any prognostic value the urinary excretion of pregnanediol must be estimated in abortion-prone women at frequent intervals from as soon after the first missed menstrual period as possible. As already noted, Bevis (1951) estimated the pregnanediol excretion levels at twice weekly intervals on 32 patients. Alder and Krieger (1957) performed the estimations at weekly intervals on 91 patients until the 36th week of pregnancy was reached. Some patients had 30 tests and over 1500 estimations were made altogether. Rawlings and Krieger (1958b) performed similar frequent tests in a series of 116 patients with a history of recurrent abortion.

Shearman and Garrett (1963) mentioned the delay in starting hormonal therapy in cases of low progesterone levels caused by the time taken for the pregnanediol excretion to be estimated and reported - about 6 days' delay in their series.

(11) Ferning of Cervical Mucus: The presence of sodium chloride crystals (variously described as ferning, arborization, palm-leaf pattern) has been accepted by other

workers as being an indication of progesterone deficiency in pregnancy associated with a poorly functioning corpus luteum and a high incidence of abortion. Macdonald (1963) confirmed the findings of cyclical changes in the cervical mucus first described by Seguy and Vimoux (1933) - cloudy, sticky and scanty mucus until about the 8th day of the menstrual cycle followed by an increase in amount until at ovulation it is profuse, clear and elastic with a reversion to the original state during the second half of the cycle. He also confirmed the occurrence of ferning in the first half of the menstrual cycle rising to a peak at mid-cycle and disappearing by the 22nd day of the cycle. He found that the presence of ferning in the cervical mucus in early pregnancy was associated with a high incidence of abortion, thus confirming the observations of Zondek and Cooper (1954). Macdonald found that there was a 50 per cent risk of abortion if ferning of the cervical mucus was present in early pregnancy. Just over 50 per cent of the pregnant patients in his series had ferning of the cervical mucus.

Foley (1963) preferred cervical mucus studies in the management of abortion-prone women to pregnanediol excretion estimations which he believed to be probably inaccurate and certainly time-consuming.

(iii) Vaginal Cytology: Vaginal cytology has been used as a guide to hormone balance and as a diagnostic aid in determining the presence of progesterone deficiency in early pregnancy. The taking and examination of vaginal smears is a simpler means of assessing the hormone balance than the biochemical estimation of pregnanediol excretion. Randall, Baets, Hall and Birch (1955) and Hochstaedt, Lange and Spira (1960) described the percentage cornification index in vaginal smears as being an indication of hormone balance - a raised index in the first half of pregnancy indicating progesterone deficiency. On this basis they found that of 140 patients with a history of 3 consecutive abortions, 118 (84.2 per cent) had evidence of progesterone deficiency.

McSweeney (1963) described a simple rapid staining technique for vaginal smears. Of 500 patients attending him in early pregnancy, 75 (15 per cent) were found to have smears indicating progesterone deficiency. In a study of vaginal smears taken from a series of patients with a history of either previous abortion, threatened abortion or habitual abortion, MacRae (1965) found an incidence of abnormal smears varying from 23 to 45 per cent. These findings are summarised as follows:

	No. of Patients	Normal Smears		Abnormal Smears	
		No.	Per cent	No.	Per cent
Previous abortion	194	149	77	45	23
Threatened abortion	110	87	80	23	20
Habitual abortion	29	16	55	13	45
T o t a l s	333	252	75	81	25

Fayad and Youssef (1963) described the presence of chorionic syncytial cells in the smears of certain patients who clinically were suffering from threatened abortion. If these cells were seen, the abortion was inevitable.

Osmond-Clarke and Murray (1963), reporting on work started in 1958, found vaginal cytology an apparently satisfactory method of regulating hormone therapy in abortion-prone patients and of predicting whether or not abortion was likely to occur in the presence of hormone administration.

Swyer and Little (1965) on the other hand are not convinced that vaginal cytology is of value as a guide to the prognosis and therapy in cases of habitual and threatened abortion.

An interesting comparison of the prognostic value of vaginal cytology and urinary hormone excretion in pregnancy was made by MacRae, Irani, Bowler and Longhurst (1964). They found vaginal cytology more reliable if there was a history of

previous abortions or if threatened abortion intervened. Commonly there was no correlation between the findings on cytological examination and excretion of pregnanediol and oestrogen in these cases.

Summary

The methods of detecting hormonal imbalance in pregnancy are mainly:

- (i) estimation of urinary pregnanediol
- (ii) detection of ferning of the cervical mucus
- (iii) cytological examination of vaginal smears.

There is disagreement on the value of all three methods but the simplest is the ferning test. Apart from the apparently simple staining technique of vaginal smears described by McSweeney (1963), cytological smears usually require special staining and expert interpretation.

Estimation of urinary pregnanediol levels is a time-consuming and complicated laboratory exercise and frequent estimations have to be performed on each patient before conclusions of any value can be reached.

(d) Other Aetiological Factors: A review of the prognosis for pregnancy following repeated abortion was carried out by Speert (1954). In case records of 17,490 patients, there were found to be 121 patients with a history of 3 or more abortions. He based his predictions on these cases and came to the conclusion that recurrent abortion depends on the laws of chance, but thought that the role of psychogenic factors should be given serious consideration. Speert's selection of patients - taken directly from case records - is perhaps not very satisfactory in so far as some had been given hormone therapy (28 per cent) and the antenatal supervision varied over the series.

In 1958 Rawlings and Krieger, while investigating the urinary pregnanediol excretion in cases of recurrent abortion, found that there were sometimes sudden unexpected falls in excretion and eventually these falls were found to be associated with temporary emotional upsets suffered by the patients. Rawlings and Krieger suggested that a possible explanation of the lowered excretion was a vaso-motor spasm temporarily causing a deficient utero-placental circulation. In a further paper in 1959 the same workers reported that emotional disturbances, anxiety syndromes and severe infections were associated with decreased pregnanediol

excretion and suggested that the frequency of abortion in patients with these conditions might be thus explained. They thought that anxiety in some of these cases might have been due to the previous history of abortion and found that the level of pregnanediol rose once the time of the previous abortion was safely passed.

Mann (1959), in an investigation into the rôle of emotional determinants in habitual abortion, found that once cases of developmental uterine anomalies and cervical incompetence were excluded, there was a high incidence of a history of nervous responses to previous stressful situations. Many patients had a long previous history of headaches and colitis. In addition, the past home-life of many was characterised by the presence of a dominant mother and a relatively weak father. In some cases the father had been absent during a large part of the earlier life of these patients. Mann reported on further psychological upsets in these women, including anxiety neuroses.

Bender (1960), after referring to the "unwarranted pessimism" in prognosis in cases of habitual abortion, suggested that, when general and local causes of any abortion were removed, the remaining cause of continuing abortion might be genetic. He said that there was a high incidence of

foetal abnormality in these pregnancies which progressed to viability. He did not believe that hormonal imbalance as an aetiological factor was proved and came to the "reluctant conclusion" that the most valuable therapy available for these women was psychological support.

Platz (1960) discussed the question of the rôle of genetic factors in abortion and suggested that a deficiency of progesterone action on the uterine mucosa might affect the nutrition of the newly implanted ovum to such an extent that embryonic and trophoblastic development would be adversely affected and the pregnancy would be prematurely interrupted.

It is certainly difficult to correlate claims for success attributed to various methods of treatment made by different authors if, as suggested by others, there is an underlying genetic defect, and the theory of Platz goes some way to explaining the discrepancy in the two schools of thought.

Gox (1961), in a paper on mid-term foetal loss, found that amniotitis was the most common cause of abortion at this time, followed by positional and morphological abnormalities of the placenta. The third condition listed was cervical insufficiency.

In 1962, Iffy and Kerner showed an increased incidence of abortion in cases where there was retarded fertilisation

and inadequate development of the endometrium in the luteal phase of the menstrual cycle. This is perhaps analogous to the findings of Plotz (1960).

Tupper and Weil (1962) found a high incidence of disturbed personality factors in women with a history of repeated abortion. Their findings were very much those of Mann (1954) and they believed that supportive psychotherapy is the most important factor in the prevention of recurrent abortion.

Goldzieher (1964) agreed with Shearman and Garrett (1963) that there was an 80 per cent spontaneous salvage rate in cases of recurrent abortion with a low pregnanediol excretion. He wondered whether a sequence of abortions was not perhaps due to the laws of chance (cf. Speert, 1954). A criticism of Goldzieher's theories and the manner of his selection of patients was made in an editorial comment in the Obstetrical and Gynaecological Survey (1965).

Summary

It would appear that there is a degree of agreement among investigators that personality defects and emotional disturbances are significant to a greater or less degree in the aetiology of recurrent abortion. There may or may not be associated hormonal imbalance.

An association between poor implantation conditions, possibly caused by luteal insufficiency, progesterone deficiency, retarded fertilisation and abortion has been postulated.

4. Selection of Patients

Most reports on the patient who is subject to recurrent abortion or who is abortion-prone are concerned with investigations into abortions due usually to one specific cause and the evaluation of one type of treatment.

Most workers postulating, for example, hormonal imbalance, excluded from their series patients whom they considered to have obvious cause for the abortion. The following summary shows the heterogeneity of selection of patients by various authors. It should be noted however that in most of these investigations the authors gave adequate explanation for their selection of patients. Nevertheless the differences in selection serve only to make a comparison of results difficult if not impossible.

<u>Author</u>	<u>Selection of Patients</u>
Bevis (1951)	Those with 3 or more consecutive abortions. No exclusions.
Speert (1954)	Those with 3 or more consecutive abortions. Excluded those with threatened abortion and those who had been attending gynaecological clinic.
Alder and Krieger (1957)	Those with 2 or more consecutive abortions. ? no exclusions.
Hodgkinson, Igna and Bukeavich (1958)	Threatened abortions only.

<u>Author</u>	<u>Selection of Patients</u>
Mann (1959)	Primary and secondary recurrent aborters with 3 or more abortions. Excluded uterine anomalies and cervical incompetence.
Hochstaedt, Lange and Spira (1960)	Those with 3 or more consecutive abortions seen within first 4 months of pregnancy.
Plotz (1960)	Primary and secondary habitual abortion - no further elucidation.
Javert (1962)	Primary and secondary aborters with 2 consecutive abortions and 3 or more abortions but defines abortion as pregnancy terminating at 22nd week.
Tupper and Weil (1962)	Those with 3 or more abortions - presumably consecutive - seen because of threatened abortion. No exclusions.
Foley (1963)	<ul style="list-style-type: none"> a) Those with 3 or more consecutive abortions. b) Those with 2 previous consecutive abortions. c) Those with 1 previous abortion who subsequently threatened to abort or who had positive cervical mucus test. d) Miscellaneous group of previous unsuccessful pregnancies. May have excluded cases of retroversion and congenital uterine anomalies but this is not absolutely clear.

<u>Author</u>	<u>Selection of Patients</u>
Hansen, Nilsson and Zottergren (1963)	Threatened abortion only.
Macdonald (1963)	Those with a positive pregnancy test and (a) 2 and (b) 3 or more consecutive abortions, and (c) 1 previous abortion after period of infertility. Excluded cases of threatened abortion and those who had previously aborted after 15 weeks.
McSweeney (1963)	Those with cytological evidence of hormone deficiency in early pregnancy regardless of previous history. Excluded those who had threatened abortion at initial visit and those with monilial or trichomonal vaginitis.
Osmond-Clarke and Murray (1963)	Those with 2 or more abortions (primary and secondary recurrent cases). No exclusions.
Rawlings (1963)	Those with 2 or more consecutive abortions and those with 1 previous abortion or bad obstetric history who subsequently threatened to abort. No exclusions.
Shearman and Garrett (1963)	Those with 2 or more consecutive abortions. Excluded those with uterine anatomical abnormalities and those with normal urinary pregnanediol levels.

AuthorSelection of Patients

Goldzieher (1964)

Those cases of primary and secondary recurrent abortion with a minimum of 2 abortions and pregnanediol level below 5 mg. per day before the 8th week and/or less than 7 mg. per day by 14th week. No exclusions.

Levine (1964)

Those with 3 or more consecutive abortions.

Cope and Emelife
(1965)

Those with (a) 2 consecutive abortions and (b) 3 or more. Exclusions: chronic hypertension, severe diabetes, rhesus isoimmunisation, previous stillbirth after 28 weeks, obvious cervical incompetence or uterine abnormalities.

Govaerts-Videtzky,
Martin and Hubinont
(1965)

Those with:

- a) Spontaneous threatened abortion before 20th week.
- b) Positive pregnancy tests - biological and immunological.
- c) Desire to maintain pregnancy and accept investigation and treatment.

Exclusions: those with previous treatment with steroids or anti-spasmodics and those with evidence of infection.

<u>Author</u>	<u>Selection of Patients</u>
Klopper and Macnaughton (1965)	Those cases of primary recurrent abortion with 2 or more abortions. Excluded all cases with causes for abortion other than hormonal and all cases over 10 weeks pregnant.
MacRae (1965)	Those with (a) threatened abortion, (b) 1 previous abortion and (c) habitual abortion - no further definition.
Russell (1965)	Those with 2 or more previous abortions. Subdivided into 2 groups - 2 or more abortions and 3 or more abortions. Excluded diabetes and cases of rhesus incompatibility.

Summary

Because of the varying nature of investigations undertaken in the management of abortion-prone patients and those subject to recurrent abortion and as there is no general agreement on the definition of these conditions, it follows that the selection of patients for investigation and treatment will almost always vary from one author to another. In the few instances where there is some measure of similarity of selection, for example in reports where patient selection is confined to those with 3 or more consecutive abortions, there is a difference in reporting the cases. Some authors do not

distinguish between primary and secondary recurrent aborters while others do. Those who do, however, do not always report the two groups separately.

Goldzieher (1964) made a plea for a re-examination of the criteria for patient-selection, emphasising that cases of recurrent abortion are few. He believed that it was unlikely that any one investigator could amass a sufficient number of cases to prove the efficacy of any particular type of treatment.

When the abortion-prone patient who has not yet progressed in her obstetrical career into the recurrent abortion category is considered, there is further confusion in the criteria for patient-selection.

5. Investigation, Treatment and the Results of Treatment of the Abortion-Prone Patient, including those in the Recurrent Abortion Group

The multiplicity of criteria for the selection of the abortion-prone patient is equalled (and surpassed) only by the multitudinous methods of treatment offered on her behalf. Interpretation of the results of treatment is equally confusing, each worker emphasising the salient features of his own investigations.

Perhaps the best way of summarising the various methods of treatment and their results is to consider each main group separately:

- (1) Those investigated for hormonal imbalance and/or given hormonal therapy with or without an untreated control group
- (2) Those investigated and treated from a psychological viewpoint
- (3) Those given no hormonal or (apparent) psychological support.

(1) Patients investigated and treated for Hormonal Imbalance

Bevis (1951) : 32 patients with 3 or more consecutive abortions. All had pregnanediol excretion estimated twice weekly. Those with low levels were given ethisterone. Others - bed rest at suppressed menstrual period.

Pregnanediol	No.	Result		
		Abortion	Neonatal Death or Stillbirth	Success
Normal level	21	3 (14.3%)	3 (14.3%)	15 (71.4%)
Low level	9	-	-	9 (100%)
T o t a l	32	3	3	26 (81.2%)

From these figures Bevis concluded that the treatment of these patients with bed rest alone at the suppressed menstrual period was as successful as any other type of treatment.

Alder and Krieger (1957) : 144 patients with 2 or more consecutive abortions. Pregnanediol excretion estimations performed throughout pregnancy. Patients divided into 4 groups.

Group	No. of Patients	Treatment	Results Abortions
I	44	None	9 (20.0%)
II	53	Stilboestrol	20 (38.0%)
III	29	Ethisterone	6 (20.6%)
IV	18	Ethisterone Stilboestrol	4 (22.2%)
Totals	144		39 (27.0%)

They found that a significantly larger number of pregnancies continued to viability among the group of patients with normal pregnanediol excretion and there was a higher abortion rate among the patients with a low pregnanediol excretion. In this latter group the results obtained after corpus luteum therapy were better than those obtained from the untreated group.

They concluded that, although urinary pregnanediol excretion tests were "complex and time-consuming", they were a useful method of controlling corpus luteum therapy in patients with recurrent abortion.

Hodkinson, Igna and Bukesvich (1958) found, in treating patients with threatened abortion with 17 α -hydroxy progesterone caproate, that pregnancy continued in 31 per cent of cases.

Plotz (1960) : 90 patients with primary and secondary habitual abortion were given 50 mg. - 100 mg. progesterone intramuscularly 3 to 5 times weekly. He stated that "the material was not uniform". Twenty-one patients with primary habitual abortion were given 17 α -hydroxy progesterone caproate 500 mg. weekly. In addition, 6 patients with uterine fibroids and a history of habitual late abortion were given 17 α -hydroxy progesterone caproate 500 mg. twice weekly.

No. of Patients	Therapy	Results	
		Successful Pregnancy	Abortion Rate
90	Progesterone	71%	?
21	17 α H.P.C.	16 (76%)	?
6 (Fibroids)	17 α H.P.C.	6 (100%)	

Plotz concluded that progestogen therapy in habitual abortion was promising but that the choice of agent and the dosage given were of fundamental importance.

Foley (1963) : 122 cases with results available from 120.

Cervical mucus studies were performed in some of the patients.

All patients given 17 α -hydroxy progesterone caproate.

Result of Pregnancy			
No.	Abortion	Stillbirth and Neonatal Death	Success
120	10	12	98 (81.6%)
Result of Previous Pregnancies			
298	218	34	46 (15%)

Foley concluded that, since these patients were anxious to have a successful pregnancy and in the absence of common causes of abortion, progestogen therapy should not be withheld. He believed that the presence of ferning in the cervical mucus did not necessarily indicate that abortion was likely and he thought that pregnanediol excretion estimations were time-consuming and of little prognostic value. He saw no reason why the previous obstetric performances of these patients should not have been used as controls in the assessment of a particular method of treatment.

Hansen, Nilsson and Zettergren (1963) : 253 patients suffering from threatened abortion were divided into 2 groups - one group to act as controls and receive a placebo and sedatives, the other group to have progestogen therapy. They found no difference in the results of the two groups - 60 per cent continuing to viability.

Macdonald (1963) : 30 patients with bad obstetric history and showing ferning of the cervical mucus were given injections of 17α -hydroxy progesterone caproate. Twenty-six patients with ferning of the cervical mucus were followed up but no hormonal therapy was given because they were not considered, by virtue of their previous obstetric history, to be abortion-prone. Of the former group, the result of 24 pregnancies was known - 6 being undelivered at the time of the report.

No. of Patients	Treatment	Result of Pregnancy	
		Abortion	Successful
26	-	4 (15.4%)	22 (84.6%)
24	17α H.P.O.	2 (8.3%)	22 (91.7%)

Macdonald concluded that patients with recurrent ferning have only a 50 per cent chance of having a successful pregnancy, while those with recurrent ferning and a bad obstetric history have probably about a 25 per cent chance of success unless

given progestogen therapy.

McSweeney (1963) : 500 patients investigated for hormone imbalance by vaginal cytology. 75 cases (15%) showed hormone deficiency, 21 of whom showed a deficiency of both oestrogen and progesterone and were considered unsalvageable. All aborted. Of remaining 54 cases, all were given stilboestrol and progestogen therapy.

No. of Patients	Therapy	Result	
		Abortion	Success
54	Stilboestrol Progestogen	8 (14.8%)	46 (85.2%)
21	Stilboestrol for 2 weeks	21	-
Total 75		29 (38.6%)	46 (61.4%)

McSweeney did not persist with hormonal therapy in the 21 cases whom he considered unsalvageable and this selection of cases makes comparison with other series even more difficult than average.

Osmond-Clarke and Murray (1963) : 135 patients with 2 or more recurrent abortions were investigated for hormonal imbalance as indicated by vaginal cytology. Of these, 36 had normal smears and 99 had abnormal smears. Those with

abnormal smears were subdivided into 2 groups - 35 receiving no hormonal therapy and 64 receiving norethisterone 10 mg. - 15 mg. daily.

Type of Smear	No.	Result of Pregnancy		
		Abortion	Stillbirth or Neonatal Death	Successful
Normal	36	4 (11.0%)	-	32 (89.0%)
Abnormal (no hormones)	35	18 (51.4%)	2 (5.8%)	15 (42.8%)
Abnormal (hormones)	64	17 (26.5%)	3 (4.8%)	44 (68.7%)
T o t a l	135	39 (28.8%)	5 (3.8%)	91 (67.4%)

Osmond-Clarke and Murray in an analysis of their results said that in the group given hormone therapy 13 of the 17 who aborted showed a satisfactory cytological response. The remaining 4 showed a response only while hormones were being given and at the time they considered it too late (16th-22nd week) to restart hormone therapy when the smears became abnormal. It seems possible that their abortion rate might have been further reduced if therapy had been continued.

Rawlings (1963) : 100 abortion-prone patients were given injections of medroxy-progesterone. Pregnanediol excretion tests done but not of much value since medroxy-progesterone is not excreted as pregnanediol. The abortion rate in this group was 20 per cent and the salvage rate 80 per cent. Rawlings believed this result to be of significance and progestogen therapy worthwhile in these patients.

Shearman and Garrett (1963) : 50 abortion-prone patients with low pregnanediol excretion were chosen for a double-blind study of the effect of 17 α -hydroxy progesterone caproate.

No. of Patients	Treatment	Result of Pregnancy	
		Abortion	Successful
27	Solution A	5 (18.5%)	22 (81.5%)
23	Solution B	5 (21.7%)	18 (78.3%)

Quoting Warburton and Fraser (1959) who found that the risk of abortion in patients with a history of 2 and 3 previous abortions was from 23 to 26 per cent, Shearman and Garrett indicated that specific treatment in the abortion-prone woman should, if it were of value, be associated with an abortion rate lower than this. They concluded that the

results of their double-blind trial proved that there was no evidence to support the claims that 17- α -hydroxy progesterone caproate was effective in the management of the abortion-prone patient.

Foley (1963), writing in the British Medical Journal, criticised the conclusions of Shearman and Garrett (1963), based as they were on a very small sample. He felt that the 80 per cent salvage rate obtained after discontinuing therapy by the 24th week suggested that this salvage rate would have been obtained in this particular series without any progestational therapy.

Goldzieher (1964) : 54 patients with a minimum of 2 consecutive abortions and pregnanediol excretion below 5 mg. and 7 mg. per day before the 8th and 14th weeks respectively were chosen for a double-blind trial of medroxy-progesterone. These patients were then further subdivided into 2 groups - one in which the pregnanediol excretion was decreased (32 patients) and one in which there was no decrease in secretion (22 patients). He further subdivided the patients into groups of primary and secondary recurrent abortion.

His findings are summarised in the following table:

Pregnanediol Excretion Decreased				
Abortion Type	Treatment	No.	Result Abortion	Successful
Primary	Placebo	13	3	10
	Hormone	8	1	7
Secondary	Placebo	5	2	3
	Hormone	6	1	5
T o t a l		32	7	25
Pregnanediol Excretion not Decreased				
Primary	Placebo	8	0	8
	Hormone	6	2	4
Secondary	Placebo	5	0	5
	Hormone	3	1	2
T o t a l		22	3	19

Goldzieher said that none of these results was statistically significant but that they confirmed the findings of Shearman and Garrett (1963) that there was a spontaneous salvage rate of 80 per cent in patients with a history of recurrent abortion and low pregnanediol excretion.

Levine (1964) : 30 patients with a history of 3 or more consecutive abortions were chosen for a double-blind trial of 17α -hydroxy progesterone caproate. The dosage was 500 mg. weekly from before the 16th until the 36th week of pregnancy.

No. of Patients	Treatment	Result	
		Abortion	Success
15	17aH.P.C.	4	11 (73%)
15	Placebo	8	7 (47%)

There is no statistical difference in the results of these 2 groups but once more this is a small sample.

Gope and Imelife (1965) : 55 patients with a history of 2 or more consecutive abortions were given 17α -hydroxy progesterone caproate 250 mg. weekly until the 22nd or 30th week, depending on whether the previous abortions had occurred before or after the 22nd week.

No. of Patients	Treatment	Result		
		Abortion	Stillbirth	Success
55	17aH.P.C.	7 (12%)	2	46 (83.6%)

The only conclusion made by these authors is that prior to treatment these patients had an abortion rate of 79.2 per cent

and with treatment the rate was 12.7 per cent. They commented that the literature abounded in high success rates regardless of treatment.

Klopper and Macnaughton (1965) : 74 patients, subject to primary recurrent abortion with at least 2 previous abortions, were the subject of the study. 33 of these patients formed the subject of a double-blind trial of the oral progestogen Enol Luteovis (the cyclopentyl enol ether of progesterone) and the remaining 41 patients, apart from "non-specific therapy - bed rest, etc." (a regimen which was applied to all 74 patients), received neither hormone nor placebo. They did not report the result of pregnancy in the group receiving no specific therapy but the result of the therapeutic trial showed that there was a success rate of 67 per cent in those receiving the placebo and of 56 per cent in those receiving Enol Luteovis.

No. of Patients	Treatment	Result	
		Abortion	Success Rate
15	Placebo	5	67%
18	Hormone	8	56%

Of the 56 patients who did not receive Enol Luteovis (15 patients who received the placebo and 41 not included in the

clinical trial), 16 aborted - an abortion rate of 28.3 per cent and a success rate of 71.7 per cent, provided there was no perinatal mortality.

Klopper and Macnaughton felt that much of the success claimed for progestogen therapy was due to the fact that proper therapeutic trials of the various preparations had not been conducted and that treatment had been started in many cases once the risk of abortion had passed.

MacRae (1965) : 333 abortion-prone patients, including 110 with threatened abortion, were investigated in a study on the value of vaginal cytology as a guide to progestational therapy. Patients with normal smears were not given any hormonal treatment. A proportion of those with abnormal smears were treated but the nature of the progestational agent was not divulged.

In the group of 252 (75 per cent), patients with normal vaginal cytology, there were 20 abortions (8 per cent). Of the 29 (11 per cent of the whole group) with a history of habitual abortion, 16 patients had normal vaginal smears and in this sub-group the abortion rate was 25 per cent.

Normal Smears (not treated)

Abortion Type	No. of Patients	No. of Abortions
1 previous abortion	149	7 (5%)
Threatened abortion	87	9 (10%)
Habitual abortion - ? 2 previous abortions	16	4 (25%)
T o t a l	252	20 (8%)

Of the 81 patients (25 per cent of total) who had abnormal smears, 66 were given progestational therapy and 15 were untreated. The abortion rate in the treated group was 21 per cent and in the untreated group 73 per cent.

Abnormal Smears

Abortion Type	Treated		Untreated	
	No. of Patients	Abortions No. %	No. of Patients	Abortions No. %
1 previous abortion	40	8 20	5	5 100
Threatened abortion	14	3 21	9	5 55
Habitual abortion	12	3 25	1	1 100
Totals	66	14 21	15	11 73

From these results MacRae concluded that vaginal cytology showed that hormonal therapy was of no value in the majority of women threatening to abort or in those with a history of previous abortion but said that the results suggested that, if progestational drugs were administered in the presence of a poor pregnancy smear, more of the pregnancies would continue. Once more it should be noted that conclusions are made, especially in the case of patients with recurrent abortion, on results from a small sample.

Choice of Progestogen

There has been criticism of the treatment of threatened and recurrent abortion with progestogens because of the incidence of masculinisation of the female foetus associated with this form of therapy (Brit. med. J., 1960). Plotz (1960), Foley (1963) and Macdonald (1963) found no evidence of masculinisation of the female foetus after using 17 α -hydroxy progesterone caproate and in a review of the literature on the "virilising action of progestogens on the female foetus" (Brit. med. J., 1961) it was stated that only the 17 α -hydroxy progesterone esters given parenterally had apparently no virilising effect.

Reifenstein (1958) described the characteristics of 17 α -hydroxy progesterone caproate which he believed to be of value in the control of pregnancy with particular reference to

habitual abortion - high potency, prolonged action, solubility in oil permitting high dosage, minimal local irritation.

Suchowsky and Junkmann (1961), in a study of the action of various progestogens, found that the 17 α -hydroxy progesterone caproate group was the most potent.

Rawlings (1963) found no evidence of virilisation of the female foetus in his series of patients treated with intra-muscular injections of medroxy-progesterone.

Klopper and Macnaughton (1965) used the cyclopentyl enol ether of progesterone (Enol Luteovis) as it is the only artificial gestogen which is metabolised to pregnanediol. This drug is given orally.

(2) Patients investigated and treated from a Psychological Viewpoint

Mann (1959) : 70 patients free of "gynaecologically discernible abortigenic conditions" and with a history of 3 or more consecutive abortions had a previous abortion rate of 91 per cent. Each had psychotherapeutic treatment aimed at "translating material desires into expectancies and then at maintaining her motivation toward motherhood at a sufficiently high level to withstand regressive tendencies." This treatment was started before conception and continued afterwards.

The abortion rate after treatment was 19.1 per cent.

Javert (1962) : 427 patients with a history of 2 or more consecutive abortions formed the basis of this study. 284 of the patients had a history of 3 or more abortions. This number of patients was collected over a period of 20 years. A regime of early antenatal care, high citrus diet, intensive mineral, vitamin C and vitamin K supplements was instituted and in addition Javert emphasised the importance of development of a good doctor/patient relationship. In the second decade of the series he instituted "dynamic psychotherapy" and pre-conceptual care. The previous abortion rate in these patients was 86 per cent. After treatment the

abortion rate was 23.5 per cent but, as already noted, Javert defined abortion as termination of pregnancy at the 22nd week.

An interesting feature of Javert's report is that he requested all his patients to undertake as many pregnancies as had been previously lost by abortion - presumably in an attempt to obtain a control series of pregnancies. He says some patients refused to agree to this request. It is perhaps a tribute to the good doctor/patient relationship developed that in fact so many of his patients did embark on a series of subsequent pregnancies - 289 of the original 427 patients undertook 496 subsequent pregnancies, 80 patients becoming pregnant again 3 or more times.

The abortion rate in the patients followed up remained between 20 per cent and 25 per cent.

Tupper and Weil (1962) : 19 patients with a history of 3 or more abortions and originally seen because of threatened abortion were selected for an investigation into the value of intensive psycho-therapy in the management of recurrent abortion. A control group of 19 patients with a similar history had no treatment.

Tupper and Weil had originally noticed personality factors in cases of threatened abortion which suggested to them that

certain women were more abortion-prone than others. There were 2 main types:

- (a) immature women who were unable to accept the responsibility of motherhood
- (b) "independent, frustrated" women who regarded motherhood, "the greatest reward of the female world," as inferior to the rewards of the male world.

They found stress patterns, some of which were similar to those of Mann (1959). The patients seemed to feel that there was a lack of interest shown in their pregnancy problems by their husbands, relatives, friends and medical attendants.

The 19 patients chosen for the study were seen originally because of threatened abortion. Apart from routine general medical and obstetrical examinations they were given psychological tests and had psychiatric interviews. When they were discharged from hospital they continued with weekly psychiatric interviews, the patients' general practitioners and the psychiatrist collaborated and the husbands were interviewed by the psychiatrist. In addition the patients were encouraged to telephone the psychiatrist at any time between interviews.

Group	No.	Result		
		Abortion	Neonatal Death	Success
Experimental	19	2	1	16 (84%)
Control	19	13	-	6 (31%)

Hormone therapy was not used in this study at all.

Once more the samples are small but Tupper and Weil concluded from these results that supportive psychotherapy was of greater value than "any other form of treatment" in the management of the patient with a history of habitual abortion.

(3) Patients given no hormonal or (apparent) psychological support

Bevis (1951) : It has already been shown that Bevis investigated 32 patients with 3 or more consecutive abortions for evidence of progesterone deficiency. Those with a low level of primary pregnanediol excretion were given ethisterone and the 21 patients with a normal level of excretion were given no treatment apart from bed rest at the suppressed menstrual period. The abortion rate in this group was 14.3 per cent and the perinatal mortality 14.3 per cent. Foetal salvage was 71.4 per cent.

All 9 patients in this group given ethisterone had successful pregnancies. The 2 groups of 21 and 9 patients respectively are small and, although pregnanediol excretion was quite different between the groups, Bevis concluded that the results with treatment kept to a minimum and the patient prescribed bed rest at the suppressed menstrual periods were as good as those obtained from any other form of therapy.

Speert (1954) : From case records of 17,490 patients, Speert found 121 with a history of 3 or more consecutive abortions. He found that 28 per cent of these had been given hormonal therapy. The remainder he described as being untreated. Unfortunately, in tabulating the results of pregnancy in these cases, he did not separate those given hormones from those "untreated" nor is it known if the remaining patients were given more intensive antenatal care. He did subdivide the patients into primary and secondary recurrent aborters.

Abortion Type	No.	Result of Pregnancy	
		Abortion	Viable
Primary	76	20 (26%)	56 (74%)
Secondary	45	3 (7%)	42 (93%)
T o t a l	121	23 (19%)	98 (81%)

Speert did not indicate if all of the 98 viable babies delivered survived and the foetal salvage is thus not known. He concluded that a patient with a history of secondary recurrent abortion had a better prognosis in a subsequent pregnancy than the patient who had never had a viable pregnancy. He believed however that hormone therapy was of no apparent value in the management of these cases and that recurrent abortion was due to the laws of chance, the good results attributed to various types of therapy being "predicated on an unfounded pessimism" over the outcome of pregnancy in the untreated patient.

Russell (1965) : 51 patients with a history of 2 or more consecutive abortions were the subject of this study of observations of events "when progestogens are not given." While Russell was unimpressed by the results of hormone therapy in these cases and stated that the "emotional attitude of the mother may be critical," it is not clear what methods he employed to favour the "normal natural forces to operate without hindrance" but he obviously tried to improve the patients' general well-being, encouraged them to rest and to attain a calm state of mind. The patients had repeated estimations of their urinary oestriol and pregnanediol excretion but progestogen therapy was given to only 2 - in

the form of norethynodrel with mestranol (Enavid) and norethisterone (Primolut N). Russell was unable to relate the urinary excretion levels of oestriol and pregnanediol to any disturbances of the pregnancies.

The patients were subdivided into 2 groups - those with 2 or more unsuccessful pregnancies (51) and those with 3 or more (32). Further subdivision was made in each group but no obvious difference was noted in the results of each main group.

Outcome after 2 or more Unsuccessful Pregnancies

Previous History	Result		
	No.	Success	Failure
Abortions only	18	13	5
Abortions with stillbirths and neonatal deaths (no living child)	11	9	2
Abortions with stillbirths or neonatal deaths but at least one child alive	22	20	2
T o t a l s	51	42 (82%)	9 (18%)

The "failures" comprised:

1. Recurrent placental insufficiency 5
2. Recurrent abortion 3
3. Anencephaly 1

Having obtained an 82 per cent success rate, Russell concluded that, if progestogens were to be declared of value in the treatment of these patients, the success rate in any series would have to be significantly greater. He said that this group of patients was too heterogeneous for help to be obtained from clinical trials and maintained that each patient must have individual treatment, and investigations into the reasons for failure must be undertaken in the first three months of pregnancy.

Summary

The investigation of these patients is directed mainly towards the detection of hormonal imbalance or mental instability and personality defects. Some workers believe that the abortion rate is uninfluenced by specific therapy and maintain that equally good results are obtained if the patients are not specifically investigated.

There is no agreement about the prognostic value of pregnanediol excretion or the value of progestogen therapy.

The different series vary in number from 30 to 427.

Because of the many methods of investigation, the different types of treatment offered and the varying interpretations of results, only the broadest summary of results of investigations and treatment can be made. In

making even this summary one must also bear in mind the fact that there are so many variations in the selection of patients. The success rates from hormonal therapy alone, psychological or psychotherapeutic support and "expectant" treatment, in general show little difference - a figure of 70 to 80 per cent being reported by most workers.

6. Incidence of Foetal Abnormalities in the Abortion-Prone Patient

The variety of approach by the various workers to the problem of the management of the abortion-prone woman results in the report of many incidental findings. Different workers emphasise different aspects of the problem but perhaps that most commonly reported on is the incidence of foetal abnormality.

Bevis (1951) in his series of 32 patients with a history of recurrent abortion reported that 1 foetus was grossly abnormal at term but no foetal abnormality was noted in any of the 3 abortions. In 1954, McMahon, Hertig and Inglis commented on their finding of a greatly increased incidence of foetal abnormality in mothers who aborted over the age of 40 years. They reported that normal foetuses comprised a negligible percentage in this age group while in those under 25 years one-third of the foetuses were normal. They suggested that in view of this it might perhaps be wise to take the age of the mother into account in clinical studies of prognosis of threatened abortion. Alder and Krieger (1957) on the other hand found no evidence of foetal or placental abnormality in the abortions in their series. As already noted, they suggested that poorly developed trophoblastic

cells initially might produce enough gonadotrophin to support the corpus luteum but the pregnancy might fail later owing to an insufficient amount of progesterone being produced by the developing placenta. Substitutional therapy would be of value in these cases before there were signs or symptoms of abortion. Plotz (1960) in a review of reports on the incidence of embryonic abnormalities in cases of habitual early abortion discounted genetic factors as the main cause and suggested that the nutrition of the freshly implanted ovum could be affected by a deficiency of progesterone-action on the decidua leading to faulty development of the embryo and trophoblast. In his series of 21 cases of primary habitual abortion, the products of conception had been previously examined in 9 cases and malformation of the embryo or abnormal chorionic villi had been noted in 8. He suspected also a high incidence of abnormality in the other cases. All 21 patients were given 17 α -hydroxy progesterone caproate in the pregnancies under consideration in the series and 16 had live babies.

Javert (1962) reported a 3.7 per cent incidence of foetal abnormality in his series prior to treatment and 1.6 per cent after treatment.

Hansen, Nilsson and Zettergren (1963) in a report on a controlled series of 253 cases of threatened abortion treated

with progesterone preparations and a placebo noted that there was a high incidence of children with talipes.

Asanti and Tuulikki (1963) reported an increased incidence of foetal abnormality in cases of threatened abortion, the incidence increasing with the severity and duration of the bleeding. About half of the patients who continued to term had received progestogen therapy but there was no relation between the type of abnormality and the therapy.

Macdonald (1963) and Shearman and Garret (1963) reported on the examination of material aborted. Macdonald examined the products of conception in both his cases of abortion and found 1 blighted ovum. The products of conception in 6 of the 10 cases of abortion were recovered in Shearman and Garret's series and they noted 3 blighted ova and 1 exomphalos.

Cope and Imelife (1965) reported 2 cases of foetal abnormality (4 per cent) in 47 deliveries.

Summary

Varying reports of the incidence of embryonic and trophoblastic abnormalities are available and various theories are propounded as to the cause of these.

Alder and Krieger (1957) and Plots (1960) are in agreement

about the possibility of hormonal deficiency resulting in embryonic and/or trophoblastic abnormalities due to poor implantation.

The incidence of foetal abnormality in pregnancies which proceed to viability does not seem to be unduly high.

MATERIAL AND METHODS

I. SELECTION OF ABORTION-PRONE PATIENTS IN THIS SERIES

For various reasons 109 patients were selected in this series and were regarded as being abortion-prone. Some of them were seen in more than one pregnancy and thus a total of 120 cases has been collected.

1. Primary and Secondary Recurrent Abortion

It is obvious that a woman who has never carried a pregnancy to viability but who has a history of 3 or more abortions should be regarded as being abortion-prone. Similarly, any patient who, after one or more successful pregnancies, had a series of 3 or more consecutive abortions, was also included.

2. Two Previous Consecutive Abortions

Patients with a history of 2 previous consecutive abortions were also regarded as being abortion-prone.

3. Threatened Abortion immediately following a Previous Abortion or Premature Delivery

Since it has been shown by Macnaughton (1964) that there is an increased likelihood of a second abortion following a first pregnancy which has ended in abortion, any patient who, having aborted in her first pregnancy, presented with a

threatened abortion in her second pregnancy was also classified as being abortion-prone.

4. History of Infertility and Abortion in First Pregnancy

Patients who, after a period of primary infertility, had aborted in their first pregnancy were regarded as being abortion-prone, regardless of whether they suffered a threatened abortion in their second pregnancy.

5. History of 1 Previous Abortion in the Elderly Patient

It has been shown that, as the age of the patient increases, so does her chance of abortion (Javert, 1962). In view of this, patients aged 35 years or over, with or without a period of infertility, were selected as being abortion-prone if the first pregnancy had ended in abortion.

6. Patients previously included in any of the above Categories whose Pregnancies had been Successful

A certain number of patients were selected for a second or third time in the series, even although a successful pregnancy had resulted after their first course of antenatal therapy. There seemed no reason to suppose that these patients, having been once regarded as abortion-prone, were no longer so simply because of one eventually successful pregnancy.

7. Patients previously regarded as being Abortion-Prone and treated with Success in Another Unit

For the same reasons as in Group 6, patients who had been diagnosed as abortion-prone in any previous pregnancy and who had been given special therapy in any other unit with success were included.

8. Miscellaneous

Five patients were included in this group. They were regarded as being abortion-prone but could not be included in Groups 1 to 7. A brief summary of their previous obstetric histories is given below and in Table 2.

Case 57 : 34 years : married 10 years : parity 2 + 3

After a first pregnancy which resulted in a neonatal death at term, she had 3 pregnancies ending in abortion. In her 5th pregnancy she threatened to abort at the 8th week but eventually delivered at term and the child survived. There was then a period of 4 years' infertility before she again became pregnant.

Case 59 : 36 years : married 13 years : parity 2 + 0

After 2 pregnancies ending in premature delivery with neonatal death of both infants, she was thought likely to have a similar outcome in her 3rd pregnancy and was therefore included in the series. She had previously been found to

have a positive Wassermann Reaction and, although the Reiter Test was negative, it was advised, as apparently had been done in her previous pregnancies, that a course of penicillin 1 mega unit daily for 10 days be given.

Case 69 : 22 years : married 4 years : parity 2 + 0

The first pregnancy ended in premature delivery at the 30th week. The child survived. The second pregnancy ended at the 26th or 28th week with delivery of a stillborn foetus weighing 1 pound 8 ounces. In view of her two previous very premature deliveries, it was decided to regard her as being abortion-prone or at least liable to have a further premature labour with resultant risk to the foetus.

Case 82 : 35 years : married 12 years : parity 4 + 4

The 1st, 3rd and 5th pregnancies ended in successful full-time deliveries. The 2nd and 4th pregnancies ended in 1st trimester abortion, as did the 6th and 7th. In her 8th pregnancy she threatened to abort between the 10th and 12th weeks but the pregnancy had a successful outcome. In view of her history of abortion and particularly the history of the last 3 pregnancies, she was included in the series.

Case 115 : 26 years : married 4 years : para 1 + 0

The 1st pregnancy was successful but abortion threatened at the 6th and 14th weeks and she was admitted to hospital in

another area. Injections of 17 α -hydroxy progesterone caproate were given initially on admission and when bleeding stopped she was found to have ferning of the cervical mucus. The injections were continued until the 32nd week of the pregnancy. She attended the clinic at the 10th week of her 2nd pregnancy, having had a threatened abortion at the 8th week treated by her general practitioner with bed rest and 2 injections of 17 α -hydroxy progesterone caproate 250 mg. Because of the 2 episodes of threatened abortion in the 1st pregnancy and the noted occurrence of ferning, she was included in the series after the episode of threatened abortion in the 2nd pregnancy.

Table 1 shows the number of patients in each category. No patient who could be classified in any of the above groups was excluded from the series for any reason. Those who had in addition anatomical abnormalities of the genital tract were included, as were those who had threatened to abort before being seen by the author.

Patients with a history of abortion after the 24th week of pregnancy were not excluded, nor was any patient who had a history of chronic disease such as hypertension, diabetes, renal disease or tuberculosis. Some patients had a history of previous operations on the genital tract, for example

myomectomy, oophorectomy, salpingo-oophorectomy.

Table 3 shows the incidence of complicating obstetrical or gynaecological factors and Table 4 the incidence of complicating medical conditions.

There were 7 patients (5.8 per cent) with a history of previous gynaecological operations excluding diagnostic curettage and infertility investigations. These operations are summarised in Table 5. It is seen from this table that 5 patients had a history of ovarian operations.

II. SPECIAL CLINIC

When this investigation started, some of the patients were attending the ordinary antenatal clinics run in connection with the Obstetric Unit at Robroyston Hospital while others were originally seen in hospital, having been admitted because of threatened abortion or who, because of a previous history of several abortions, had been taken into hospital for bed rest during at least the first few months of their present pregnancy. These latter patients were eventually asked to attend the ordinary antenatal clinic after discharge from hospital, if their pregnancy had continued. At all attendances they were seen by the author.

It was not long however before the numbers of these patients attending the ordinary clinics became too great for adequate investigation and supervision to be undertaken, and it was found necessary to create a special clinic. The advantages of having a special clinic were almost immediately obvious. In the first place an excellent appointments system was easily introduced. The actual number of patients attending each clinic was relatively small when compared with the other busy antenatal clinics but each of these patients required much more time for interview and examination than the average pre-natal patient.

Another advantage of the special clinic, which at first had been regarded as possibly undesirable, was that the patients met each other. It had been thought that they might find this depressing but they obviously derived great benefit and reassurance when they spoke to each other and compared histories. Javert (1962) found similar advantages in giving several patients the same appointment time. Many patients in this series came before their appointment time and others waited after their interview just to meet other patients and discuss progress.

In many instances the patients said that the knowledge that someone was willing to take a sympathetic interest in their particular problem made them feel that the pregnancy under review would be successful. Many of them in the past had been told, rather casually, they felt, that they should not become pregnant again or had been dismissed with the wish that they would have "better luck next time." They felt that they had been discarded by their medical advisers as failures.

Although there was no intention originally of giving these patients any conscious psychological or psychotherapeutic support, it will be seen from the foregoing observations that this was an important feature of the special clinics arranged for these patients. This point is discussed later.

In 1963 the author was transferred to the Greenock area but was able to arrange a personal follow-up of the Glasgow patients then attending at Robroyston Hospital until the completion of their pregnancies. This "running-down" of the Glasgow clinic took place over a period of six months. Meanwhile a new clinic was started in Greenock although again the patients were seen initially at the ordinary antenatal clinics.

The patients were referred either from the other antenatal clinics run by the hospital staff or directly by their general practitioners. Some were also transferred from the gynaecological out-patient department or from the gynaecological unit if they had been in hospital with a threatened abortion.

Later, an average of 25 patients attended at each clinic and the time taken for these patients to be seen was about three hours.

The clinic was held in the Rankin Memorial Hospital. It was staffed by two midwives, one auxiliary nurse and the author. The staff, apart from holiday times, did not change.

Duration of Pregnancy when Patients included in Series

No patients were excluded from the series because they were seen after the pregnancy had progressed beyond a specified stage. Since in many cases the duration of previous

pregnancies, when abortion had intervened, was variable, it was believed that the patient might still be abortion-prone even after, say, the 16th week of pregnancy. Nevertheless, the majority of patients were seen in early pregnancy as shown in Table 6.

Seventy-six patients (63 per cent) were seen before the end of the 10th week, 97 (81 per cent) before the end of the 12th week and 23 (19 per cent) after the end of the 12th week.

III. INVESTIGATIONS

The abortion-prone patients were selected as already described and referred to the special clinic where they were interviewed and the plan of management was outlined, along with an explanation to the patient of why she had been asked to attend the clinic.

A complete medical and obstetrical history was obtained and the patient was given a general medical and obstetrical examination. All patients were investigated for progesterone deficiency as evidenced by the presence of ferning of the cervical mucus and for cervical incompetence.

An assessment of the patient's mental stability and attitude to the pregnancy was made.

(1) Interview at First Visit

The patients were interviewed at the first visit and the reason for their having been asked to attend the special clinic was explained.

Those who were recurrent aborters readily accepted that they had been selected to attend but those who had been asked to attend because of their inclusion in some of the other categories previously mentioned (see Table 1) sometimes did not so readily appreciate why they had been selected.

The recurrent aborter knows that she is abortion-prone and in many cases her attitude to each successive pregnancy becomes progressively more hopeless. These patients were told that they had been asked to attend the clinic so that there would be an opportunity of observing the progress of their pregnancy more often and more closely than is usually possible at one of the busier routine antenatal clinics. In this way it was hoped firstly to recognise any possible disturbance in the normal progress of the pregnancy as quickly as possible and secondly to try to take steps to avoid any further accident.

A similar talk was given to patients who had been selected for reasons other than recurrent abortion but in these cases the author was careful to avoid any suggestion to the patient that she might be abortion-prone. The emphasis was placed on the extra antenatal care which was more readily available at the special clinic.

The patients were asked to attend at weekly intervals and were told that these frequent visits would be necessary for the greater part of the pregnancy.

On many occasions at this stage of the interview the patient with a history of recurrent abortion asked if she were sure to have a successful pregnancy if she co-operated fully. Whether or not this question was asked, all patients were told

that there could be no guarantee of success even if the pregnancy progressed past the date of previous abortions but a successful result was hoped for and expected.

The reaction of the patients to this first interview is discussed later.

Each patient was given a short initial talk on the importance of diet in pregnancy and the need for taking extra milk and iron and vitamin supplements. They were told that they should have adequate rest and sleep but the emphasis was on the fact that they need make no unreasonable change in their daily lives.

The patients were informed that part of the routine weekly examination would be the taking of a cervical smear and the reason for this was explained simply.

(11) General Examination

All patients had a general medical examination at the first visit to the special clinic. If any abnormality requiring further medical investigation were detected, such as a cardiovascular or respiratory lesion, the patient was referred for a physician's opinion. The blood pressure was recorded, urinalysis carried out and specimens of blood were obtained for estimation of haemoglobin, ABO and rhesus grouping, and for assessment of Wassermann and Kahn Reactions.

The height and weight were recorded. This medical examination was in no way different from the routine examination which takes place at any of the other antenatal clinics associated with the Maternity Units at Robroydon Hospital, Glasgow, or the Rankin Memorial Hospital, Greenock.

Table 4, to which reference has already been made, shows the associated conditions found in the series of 120 pregnancies under review, and Table 5, also referred to previously, shows the incidence of previous gynaecological operations (excluding diagnostic curettage or infertility investigations).

(iii) Obstetric Examination

At the first visit to the clinic, the size of the uterus was estimated and it was noted whether or not the uterine size was in accordance with the duration of amenorrhoea. The size of the uterus was determined either by abdominal palpation or by bimanual pelvic examination if the duration of pregnancy was under 3 months or if for any reason it was thought desirable to check or confirm the abdominal findings.

If the pregnancy was of less than 3 months' duration and pelvic examination was therefore contemplated, a preliminary speculum examination was made, the cervix inspected and a cervical smear taken. The technique of taking the cervical

omear is described in a later paragraph.

(iv) Uterine Retroversion

The position of the uterus was noted in early pregnancy. The incidence of retroversion of the uterus is shown in Table 3. One hundred and one patients were seen before the 14th week and of these 7 were noted to have a uterine retroversion.

(v) Developmental Uterine Abnormalities

Any developmental abnormality of the uterus which was found on routine palpation was noted. The incidence of uterine abnormality found in this series is shown in Table 3. The abnormality was demonstrated at operation (either caesarean section or manual removal of the placenta in 4 of the 7 cases).

(vi) Uterine Growth

The growth of the uterus was noted at each visit to the clinic and the expected height of the fundus for the duration of amenorrhoea was compared with the actual fundal height. This was originally routine observation without any special significance being placed upon it but later in the series it was noted that the size of the uterus was in some cases smaller than expected for the duration of amenorrhoea. Moreover, this discrepancy in expected and actual size of the uterus occurred not only at different stages in different

pregnancies but in the same patient it was sometimes noted at different times throughout the pregnancy. In certain cases the uterus seemed smaller than expected from as early as 10 to 12 weeks and remained so until term. In other cases there seemed to be an increased rate of growth and the actual size eventually approximated to the expected size. In yet other cases, the uterus, which had seemed of normal size when the patient was first seen, was found later to be smaller than expected and sometimes remained so until delivery of the baby. In other cases the rate of growth increased after a few weeks.

Table 7 shows the number of patients who were noted to have a smaller-than-expected uterus and the duration of pregnancy when this was first noted. Patients were included in this table only when the impression of a small uterus was confirmed at the next visit to the clinic - in almost all cases, one week later. This table also shows the associated incidence of placental infarction in these cases, a point which will be discussed later.

(vii) Ferning of Cervical Mucus)

Reference has already been made to the descriptions of an arborization or ferning pattern in dried cervical mucus. Zondek (1954) showed the presence of this ferning pattern in pregnancy to be associated with a hormonal dysfunction and

high incidence of abortion. He also proved that the presence of ferning in the intermenstruum and the absence of ferning in the pre-menstrual phase were associated with normal corpus luteum function and dependent on oestrogen and progesterone production.

Macdonald (1963) confirmed these changes in the cervical mucus in the menstrual cycle and also found a high incidence of abortion in pregnant patients who had ferning of the cervical mucus in the first trimester. He concluded that the ferning in these cases could be related to a relative progesterone deficiency.

Examination of cervical mucus for the presence of ferning is a simple procedure which occupies only a few minutes. The result of the test is immediately available while the patient is still at the clinic. Its simplicity gives the test an advantage over any method involving vaginal cytology for estimation of the cornification index as described by Randall et al. (1955) and by Swyer and Little (1965), or even the simplified smear of McSweeney (1963).

The estimation of urinary pregnanediol excretion as an indication of progesterone excretion is complicated and time-consuming. Tests have to be made frequently and facilities were not available for these estimations to be done routinely at Robroyston and the Rankin Memorial Hospitals.

It was decided to use the cervical mucus test as an indication of progesterone deficiency.

Method of obtaining Smear of Cervical Mucus: With the patient in the supine position, knees and hips flexed and thighs abducted, a Gusco's bivalve speculum without any prior lubrication was inserted into the vagina. In the majority of cases a good view was obtained of the cervix. In only a very few cases was it found necessary to examine the patient in Sim's position.

If there was excessive discharge at the external cervical os, it was gently wiped away with a cotton wool mop. An ordinary swab-stick with plain cotton wool at one end was then rotated gently round the external cervical os and the specimen of mucus thus obtained was smeared on to a glass slide using horizontal strokes one below the other. Thin smears were found to be preferable to the thick smear advocated by Macdonald (1963).

The slide was found to dry quickly and could be examined almost at once. Even the minimum ten-minute period advised by Macdonald for the drying of the slide was not found to be necessary. Neither was any advantage found in making two smears at each examination, although this was done at the start of the series. Macdonald preferred two smears to be taken as he found occasionally that the first swab did not collect a

satisfactory specimen of mucus.

Examination of the Slide: The slide was examined under the low power of the microscope. The author found it essential, if ferning were not immediately seen, to examine the whole area of the smear. Ferning was at times found only in one small area, the remainder of the smear being of relatively normal appearance. It is possible that some of the first patients in this series, in whose smears ferning was not found, might have had a few isolated areas of ferning which were missed. Any appearance of ferning on a slide was regarded by the author as being of significance.

The crystals varied in appearance from patient to patient and at different times in the same patient but occasionally a varying pattern was seen in a single smear.

The incidence of ferning of the cervical mucus in this series is shown in Table 8, and in Tables 9 and 10 the incidence of ferning in cases of primary and secondary abortion respectively. In the whole series, ferning was seen in 82.5 per cent of cases, in 76 per cent of cases of primary abortion and in 86 per cent of cases of secondary abortion. There is no statistical difference between the 2 latter results.

(viii) Cervical Incompetence

Any patient who described the occurrence in a previous pregnancy of the syndrome of abortion in the middle trimester of pregnancy associated with a sudden spontaneous rupturing of the membranes followed by expulsion of the products of conception with little or no pain was suspected of having an incompetent cervix. In addition, a few patients with a history of first trimester abortion had a successful pregnancy after insertion of a cervical suture in other units and they too were suspected of having cervical incompetence.

All patients were observed for premature effacement and dilatation of the cervix but special attention was paid to those with a history suggestive of the condition. It was found necessary to insert a cervical suture in 9 cases - 7.5 per cent of the series. The further investigation, treatment and management of patients giving such a history in a previous pregnancy is discussed later, along with those who developed the condition apparently for the first time.

Assessment of Mental Stability

The majority of the patients selected as being abortion-prone seemed to be neither more nor less nervous at their first visit to the clinic than any other antenatal patient attending a routine clinic for the first time.

In some cases however it was immediately apparent that the patient was apprehensive to an unusual degree. Others were obviously depressed about the possibility of another unsuccessful pregnancy.

The author did not intend at first to investigate the mental attitude or emotional background of these patients and indeed little in the way of active investigation was done. Nevertheless, it became obvious early in the series that many of these patients were under a considerable emotional strain. As already noted, this was not always apparent at the first visit but as the patients were seen frequently - at least at weekly intervals initially - they very quickly became familiar with the clinic routine and a rapport was developed between them and the clinic staff. It was at this point - usually the second or third visit - that many of those who had not appeared to be particularly nervous or over-anxious would quite suddenly express anxiety about the pregnancy. Some said that they felt as if they could "never do anything right." Others asked if they were "going to fail again" or,

more hopefully, if they "might not fail again." One patient, a para 0 + 3 (Case 32) expressed feelings of guilt about a procured abortion prior to her marriage. Some patients spoke of home difficulties and many of these women seemed still to be dependent to a large extent on their mothers who obviously played a still dominant role in their lives. In general, the husbands did not appear to provoke any agitation or feelings of anxiety about the pregnancy but, to the author's knowledge, four of the patients had unsympathetic husbands. Two of these husbands were alcoholics; one husband of a para 1 + 3 objected to his wife attending the clinic as he said it was "obvious she would never carry another child" and she had "more important things to do than waste time at a hospital." Another was the patient's second husband; she had 7 successful pregnancies in her first marriage but 3 abortions during 18 months of marriage to the second husband. He was of the opinion that she did not want to have any more children and was "getting rid of them."

A previous psychiatric history was obtained from 3 patients. One, a para 1 + 3 (Case 45), when first seen by the author had been under the care of a psychiatrist on several occasions. She had a history of depressive illnesses and attended the clinic at the ninth week of her fifth pregnancy. She was readmitted to a mental hospital at the 13th week and aborted

at the 16th week. She was next seen (Case 89) at the 10th week of her 6th pregnancy. Throughout this pregnancy she required psychiatric supervision but delivered a live baby at the 38th week.

One patient (Case 67), a para 0 + 3, exhibited hysterical symptoms during the pregnancy in which she attended the clinic for the first time. This pregnancy was successful but her symptoms returned during the next pregnancy (Case 105) which was also successful. During both of these pregnancies she was seen by a psychiatrist.

Two other patients (Cases 16 and 66) also exhibited hysterical symptoms and each was seen on 2 occasions by a psychiatrist.

The further management and treatment of these patients is described fully in the next section.

IV. TREATMENT AND MANAGEMENT

General Management

The patients attended the antenatal clinic at much more frequent intervals than those attending a routine clinic. Initially each patient attended at weekly intervals and these frequent visits continued in some cases for the greater part of the pregnancy.

These abortion-prone patients were not routinely admitted to hospital unless a threatened abortion or some other complication of pregnancy intervened. In the Greenock area only 25 beds were available for gynaecological patients and it was not possible or practicable to admit cases of recurrent abortion for long periods of rest or even for rest over a suppressed menstrual period.

Routine Antenatal Care

The patients were seen as early as possible in their pregnancies (Table 6). The general outline of their proposed management, along with the principles of routine antenatal care, were explained. They were given literature to read at home on the course of normal pregnancy, antenatal care, labour and delivery, and the care of the child. In this way, apart from the much more frequent clinic visits, they were treated as ordinary antenatal patients and from their first visit

realised that they were expected to have a successful pregnancy. The author believes that it is important however to avoid the extraction by the patient of any promise from the nursing or medical staff that the pregnancy will be successful but an air of cheerful optimism is equally important and desirable and anxiety allayed as much as possible by explanation, discussion and reassurance.

General Medical Examination

As at all the antenatal clinics in Renfrewshire and at Robroyston Hospital, Glasgow, it is simple to refer any patient in whom is discovered any evidence or suggestion of disease such as cardiovascular or respiratory lesions, essential hypertension, chronic renal disease, diabetes, etc., for the opinion of a consultant physician. Table 11 shows the reason for referral of patients in this series.

Haematological Examination

A specimen of blood was obtained at the first visit for estimation of haemoglobin, blood grouping and rhesus factor, and for determination of the Wassermann and Khan Reactions. Thereafter the haemoglobin level was estimated at or about the 14th, 20th, 28th, 34th and 38th weeks of the pregnancy. If a patient was found to be rhesus negative, blood was taken for further examination for the presence of rhesus antibodies

at the 26th, 32nd-34th and 38th week. In this series there was only one case of rhesus isoimmunisation (Case 10, a para 1 + 2). Obviously, if antibodies were present in any case, the frequency of antibody estimation and further management of the patient, possibly including amniocentesis, would be different from the foregoing plan.

Treatment of Anaemia

Thirty patients had a haemoglobin level of 12 grammes per cent or over when they were first seen; 69 a value of 10-11.9 grammes per cent; and 21 patients a value below 10 grammes per cent (Table 12). These results compare with the haemoglobin levels found at other antenatal clinics in the Greenock area and the incidence of 17.5 per cent below 10 grammes per cent is the same as Scott's (1962) findings in the Glasgow area.

Oral iron in the form of ferrous gluconate 300 mg. thrice daily was routinely prescribed but, if the haemoglobin level was found to be under 11 grammes per cent, the patient was asked to double her intake of oral iron and the haemoglobin level was again estimated after three weeks. If there had been a response to oral iron, she continued on the increased dosage until the haemoglobin level reached 11.5 grammes per cent then reverted to the maintenance dosage of 1.2 grammes of ferrous gluconate daily.

If there was little or no response to oral iron, or if the haemoglobin level fell further, the haematologist was asked to examine a blood film for the presence of anisocytosis and microcytosis as further evidence of iron-deficiency anaemia, as suggested by Scott (1962), and a course of Inferon, an intramuscular iron-dextran complex, was given or, more recently, the iron-sorbitol-citric acid complex with dextran - "Jectofer." The dose given was 100 mg. daily and the total amount given depended on the patient's weight and haemoglobin level. The dose was according to that recommended by the manufacturers, Astra-Hewlett, for each individual case.

One patient had difficulty in arranging to attend her general practitioner or the hospital for these injections. She was admitted to hospital for 24 hours for a total-dose intravenous infusion of Inferon in normal saline.

If, following these measures, the haemoglobin level did not rise, folic acid 10 mg. thrice daily was prescribed whether or not there was evidence of megaloblasts in a blood film. The haemoglobin response to this therapy was noted as was the reticulocyte response.

There were 4 patients who did not respond to iron therapy and were given folic acid (3.3 per cent of total in the series). In 2 of these patients megaloblasts were found in the peripheral blood. All 4 responded well to the

administration of folic acid.

Rhesus Isoimmunisation

Rhesus isoimmunisation occurred in only 1 of 17 patients who were rhesus negative and the baby was not severely affected and did not require exchange transfusion.

Wassermann and Khan Reactions

Blood was taken from every patient for investigation of the Wassermann and Khan Reactions. If a positive result was obtained, a further specimen of blood was sent for repeat testing. In the event of a second positive result being reported, further serological investigations were undertaken, including the Reiter Test. A positive result was obtained in one case in the series (Case 59, a para 3 + 0 with a history of 3 premature stillbirths). Penicillin in a dosage of 1 mega unit daily for 10 days was given in this case.

Vaginal Discharge

Any patient who complained of vaginal discharge and any patient in whom a pathological degree of discharge was found to be present had a high vaginal swab taken and sent for bacteriological examination. The treatment of such discharges depended on the result of the bacteriological examination and on the clinical impression of the nature of the discharge, especially if the swab were reported negative.

Monilia infection, which was not uncommon, was treated with a course of Nystatin pessaries and, if necessary, Nystatin cream was applied locally to the vulvar area 2 or 3 times daily.

Trichomonal infections were treated with a course of Flóraquin pessaries, 1 pessary being inserted into the vagina twice daily for 2 weeks. Metronidazole (Flagyl) tablets were not prescribed for trichomonal infections in pregnancy.

Mixed infections were treated with various pessaries - neomycin, penicillin, penicillin and sulphonamide, etc. - as indicated by the bacteriological reports.

Progesterone Deficiency

The occurrence of progesterone deficiency in this series, as evidenced by the presence of ferning of the cervical mucus, was treated by the administration of intramuscular injections of 17α -hydroxy progesterone caproate (Primolut Depot : Schering). In a dosage of 250 mg. 17α -hydroxy progesterone caproate is closely allied to naturally-occurring progestogens and it is long-acting. Platz (1960) described the advantages of this progestogen over progesterone given parenterally. There was a slow rise in plasma radio-activity when the substance was tagged, the maximum occurring at 5 days after administration. This level was followed by a gradual fall and the concentration

in the uterus was found to be 5 times greater than that obtained with progesterone. Because of its long action, fluctuations in the uterine concentrations are less likely to occur than with a quicker-acting progestogen such as progesterone itself. Cope and Enelife (1965) also gave this as one of their reasons for using 17 α -hydroxy progesterone caproate in the treatment of habitual abortion.

Davis and Wold (1957) showed that relatively large quantities of progesterone were required therapeutically before a secretory picture was obtained in oestrogen-primed endometrium, and MacDonald (1963) also reported that a minimum dosage of 250 mg. 17 α -hydroxy progesterone caproate was necessary.

17 α -hydroxy Progesterone Caproate : Dosage Scheme

A cervical smear was taken from each patient at weekly intervals and examined for the presence of ferning crystals. If ferning was present, 17 α -hydroxy progesterone caproate 250 mg. was given. If ferning was absent, 17 α -hydroxy progesterone caproate was not given. If ferning was present on a second consecutive week, 2 injections each of 250 mg. were given, the second injection 3 days after the first. If ferning persisted into the 3rd week, 3 injections were given that week, 1 every other day. This dosage was maintained and the cervical smear examined at weekly intervals until ferning

disappeared.

Once ferning disappeared, the cervical smears were still taken at weekly intervals until 6 weeks after the crystals had been seen. This was found necessary because it was not unusual for ferning to disappear for 1 or 2 weeks after a course of 17 α -hydroxy progesterone caproate only for the phenomenon to return. At the beginning of the series, smears were taken from 30 patients at weekly intervals throughout pregnancy. In no case did ferning recur after an absence of 6 weeks. Because of this, it was decided that after 6 weeks with negative results, this examination need not be made and treatment with the drug would no longer be required.

The time of first occurrence of ferning of the cervical mucus and the duration of its presence varied greatly in this series. Table 13 illustrates this point and suggests that progesterone deficiency in pregnancy is sometimes due to corpus luteum deficiency alone (ferning only in first trimester), to placental insufficiency (later ferning) or in some cases to both factors (ferning throughout pregnancy).

Ferning was noted in this series in 99 cases (82.5 per cent). Table 8 refers. Macdonald (1963) reported ferning in 76 of his 132 patients (57 per cent) and suggested that this incidence, which was higher than any previously reported, might have been due to the fact that many of the patients

were referred to him because of a history of infertility or previous abortions.

The high incidence of ferning of the cervical mucus in this series was probably due to the same reason, all of the patients having been selected because they were considered to be abortion-prone. Also, as seen in Table 13, ferning was noted for the first time in the second trimester in 17.1 per cent of the cases in this series and occurred for the first time in the third trimester in 2 per cent. Macdonald (1963) excluded from his series patients with a previous history of abortion after 15 weeks.

Cervical Incompetence

As already stated, all patients suspected from their previous obstetrical history of suffering from cervical incompetence were observed closely for any sign of development of the condition. In addition, a few patients with a history of first trimester abortion had a successful pregnancy after insertion of a cervical suture in other units and they too were suspected of having cervical incompetence. Some patients gave a history of previous abortion in both first and second trimesters and thus there was no definite history suggestive of abortion due to cervical incompetence.

It was therefore decided that, since these patients were seen at weekly intervals for examination of the cervical mucus, it would be reasonable to observe them for premature effacement and/or dilatation of the cervix and they should not be admitted routinely to hospital for insertion of a cervical suture. If premature effacement of the cervix was noted, the patient was admitted immediately for further observation and if the condition progressed, a cervical suture was inserted. A brief summary of the history of each patient in whom a cervical suture was inserted is given below.

Case 7 : 32 years : married 4 years : para 2 + 3

1st pregnancy	Spontaneous vertex delivery at term. Weight 5 lbs. 9 ozs.
2nd "	14 weeks abortion
3rd "	10 weeks abortion
4th "	10 weeks abortion
5th "	Cervical suture inserted at 10th week. Spontaneous vertex delivery at term. Weight 7 lbs. 9 ozs.

She attended the clinic at the 9th week of the 6th pregnancy. The external os and cervical canal admitted one finger. The internal os was closed. No ferning of the cervical mucus was noted. A cervical suture was inserted at the 16th week.

Case 8 : 23 years : married 3 years : para 1 + 1

1st pregnancy	8 weeks abortion
2nd "	30 weeks : spontaneous delivery - stillbirth

She attended the clinic at the 14th week of her 3rd pregnancy. There had been slight vaginal bleeding for the preceding 3 weeks. The cervix remained closed until the 24th week when there was slight dilatation and some effacement. A cervical suture was inserted at the 24th week. Ferning of the cervical mucus was not seen at any time.

Case 11 : 29 years : married 8 years : para 0 + 3

1st pregnancy 5 months abortion
 2nd " 6 months abortion
 3rd " Cervical suture inserted about 12th week : 27 weeks abortion

She attended the clinic at the 7th week of her 4th pregnancy. There was ferning of the cervical mucus at the 9th, 11th, 14th and 17th weeks of the pregnancy. 17 α -hydroxy progesterone caproate was administered in a dosage of 250 mg. each time ferning was seen. At the 16th week, slight dilatation of the cervix occurred and a cervical suture was inserted between the 16th and 17th weeks.

Case 15 : 24 years : married 6 years : para 0 + 3

1st pregnancy 27 weeks abortion
 2nd " 27 weeks abortion
 3rd " 24 weeks abortion

She attended the clinic at the 14th week of her 4th pregnancy. Ferning of the cervical mucus was noted at the 14th, 15th, 16th, 17th and 21st weeks of pregnancy. In all, 10 injections of 17 α -hydroxy progesterone caproate 250 mg. were given. At the 21st week there was noted to be slight dilatation of the cervix and a cervical suture was inserted in the 22nd week.

Case 19 : 35 years : married 3 years : para 0 + 1

1st pregnancy 10 weeks abortion

She attended the clinic at the 11th week of her 2nd pregnancy. There had been slight vaginal bleeding from the 6th to the 8th weeks and heavier bleeding at the 9th week. Ferning of the cervical mucus was noted at the 14th and 15th weeks and 3 250 mg. injections of 17 α -hydroxy progesterone caproate were given. At the 17th week the cervix was tightly closed but slightly dilated by the 18th week, although the canal admitted only a fingertip. At the 23rd week there was thought to be some effacement of the cervix and a cervical suture was inserted.

Case 20 : 25 years : married 7 years : para 1 + 3

1st pregnancy 6 weeks abortion

2nd " Spontaneous vertex delivery at term.
Weight 6 lbs. 10 ozs.

3rd " 24 weeks abortion

4th " 24 weeks abortion

She was admitted to hospital for rest by another obstetrician at the 22nd week of her 5th pregnancy and was seen by the author at the 24th week. There was marked ferning of the cervical mucus and 17 α -hydroxy progesterone caproate 250 mg. was given twice in the 25th week. The cervix was noted to be slightly dilated 2 weeks later. There was some doubt about the advisability of inserting a suture at this stage of the pregnancy but this was done at the 27th week.

Case 21 : 40 years : married 13 years : para 1 + 9

1st pregnancy	12 weeks abortion
2nd	" 6 weeks abortion
3rd	" 12 weeks abortion. Trachelorrhaphy 6 months afterwards
4th	" 12 weeks abortion
5th	" 12 weeks abortion. Trachelorrhaphy 3 months afterwards
6th	" 12 weeks abortion
7th	" 20 weeks abortion
8th	" 30 weeks premature labour. Weight 2 lbs. 14 ozs. Rested in hospital for 6 months and had progesterone implant
9th	" 6 weeks abortion
10th	" 20 weeks abortion

She attended the clinic at the 7th week of her 11th pregnancy. There were bilateral cervical lacerations. At the 17th week the cervical canal admitted one finger and she was admitted to hospital and a cervical suture inserted. Fœtling was not seen at any time.

Case 26 : 32 years : married 12 years : para 4 + 7

1st pregnancy	Spontaneous vertex delivery at term. Weight 7 lbs.
2nd	" 12 weeks abortion
3rd	" 26 weeks abortion
4th	" 8 weeks abortion
5th	" 27 weeks abortion
6th	" Spontaneous vertex delivery at term. Stillbirth.
7th	" 36 weeks spontaneous delivery : spastic
8th	" 24 weeks abortion
9th	" 12 weeks abortion

10th pregnancy Spontaneous vertex delivery at term.
Weight 6 lbs.
11th " 20 weeks abortion

She attended the clinic at the 13th week of her 12th pregnancy. Ferning of the cervical mucus was noted at the 13th, 14th, 17th, 18th, 22nd, 24th and 29th weeks. Nine injections of 17 α -hydroxy progesterone caproate 250 mg. were administered. The cervix was tightly closed when she was first seen but in the 19th week it was found to be slightly dilated and a cervical suture was inserted at the 20th week.

Case 42 : 20 years : married 4 years : para 0 + 5

1st pregnancy 18 weeks abortion
2nd " 10 weeks abortion
3rd " 22 weeks abortion
4th " 6 weeks abortion
5th " 24 weeks abortion : attended special
clinic : no ferning seen.

She attended the clinic at the 18th week of her 6th pregnancy. No ferning was seen at any time. In view of her previous history she was admitted to hospital in the 20th week of pregnancy and a cervical suture inserted at the 22nd week. There was no evidence of effacement of the cervix but the external os was patulous and the canal did admit a fingertip.

The result of these pregnancies is seen in Table 44 and a more detailed summary is given in the chapter on Results of Personal Investigations.

Ferning of the Cervical Mucus in the presence of Cervical Incompetence

From the foregoing summaries it is seen that ferning of the cervical mucus was found in 5 of the 9 cases of cervical incompetence. It was of variable duration (Table 14).

Technique of Insertion of Cervical Suture

Under general anaesthesia sponge-holding forceps were applied to the anterior and posterior lips of the cervix. Traction was applied and a purse-string suture of braided tantallum wire was inserted round the cervix at the level of the internal os. A trocar pointed needle was used and generally 4 "bites" of the cervix were taken.

The patient was sedated heavily for the next 48 hours, sodium amytal 200 mg. 4 to 6 hourly being administered. Thereafter sedation was reduced to twice daily doses of the drug for 2 days and the patient was allowed up gradually and allowed home after 1 week.

Uterine Retroversion

As already noted (Table 3), 101 of the 120 cases in this series were seen before the 14th week of pregnancy. The incidence of noted retroversion in this group was 6.9 per cent (7 patients). A summary of the previous history of these patients is as follows:

Case 6 : 30 years : married 5 years : para 0 + 2

1st pregnancy 12 weeks abortion

2nd " 8 weeks abortion

She attended the clinic at the 7th week of her 3rd pregnancy. The uterus was retroverted. She complained of lower abdominal pain. No ferning was seen at any time. The position of the uterus corrected spontaneously by the 12th week.

Case 40 : 36 years : married 7 years : para 2 + 3

1st pregnancy Full time normal delivery

2nd " Full time normal delivery

3rd " 10 weeks abortion

4th " 28 weeks - foetus macerated

5th " 10 weeks abortion

She attended the clinic at the 9th week of her 6th pregnancy. The uterus was retroverted at the 9th and 10th weeks but thereafter was in a normal position. Ferning was seen at the 9th week and the 10th week.

Case 57 : 34 years : married 9 years : para 2 + 3

1st pregnancy Full time normal delivery. Weight 7 lbs.

2nd " 6 weeks abortion

3rd " 6 weeks abortion

4th " 6 weeks abortion

5th " Full time normal delivery. Weight 10 lbs.

Four years later she attended the clinic at the 6th week of her 6th pregnancy. Ferning was present. The Ascheim - Zondek Test was reported negative. The uterus was retroverted but corrected spontaneously by the 11th week.

Case 68 : 38 years : married 9 years : para 0 + 5

1st pregnancy 8 weeks abortion
 2nd " 10 weeks abortion
 3rd " 10 weeks abortion
 4th " 8 weeks abortion
 5th " 10 weeks abortion

After 4 years she attended the clinic at just over 7 weeks' duration in her 6th pregnancy. Ferning was noted at the 8th and 9th weeks. The uterus was retroverted but had corrected spontaneously by the 10th week. In addition a fundal fibroid was noted. This gradually increased in size in the first few weeks of her clinic attendance until it was estimated to be about 2 inches in diameter by the 12th week.

Case 87 : 24 years : married 3 years : para 0 + 2

1st pregnancy 17 weeks abortion
 2nd " 20 weeks abortion

She attended the clinic at the 10th week of her 3rd pregnancy. She had previously attended the gynaecological out-patient department with a complaint of dysmenorrhoea and had been found to have a uterine retroversion. The position of the uterus was corrected and a Hodge pessary inserted to maintain the uterus in a position of anteversion. The Hodge pessary should have been removed 2 months later but she became pregnant in the interval. The pessary was allowed to remain in situ until the 14th week of pregnancy. Ferning was noted at the 11th and 12th weeks. 17 α -hydroxy progesterone caproate 250 mg. was given 3 times.

Case 104 : 26 years : married 6 years : para 1 + 3

1st pregnancy	Full time normal delivery
2nd "	12 weeks abortion
3rd "	10 weeks abortion
4th "	10 weeks abortion

This patient was seen by a colleague at an ante-natal clinic on the Island of Bute when she was 7 weeks pregnant in her 5th pregnancy. He arranged for her admission to the Rankin Memorial Hospital, Greenock, because of her previous history and because of uterine retroversion. She was seen by the author 2 days later.

The uterus was retroverted and there was ferning of the cervical mucus. She was asked to lie prone as much as possible but was allowed up for meals. The retroversion corrected spontaneously at the 12th week. Ferning persisted and was noted at the 9th, 14th, 20th, 25th, 29th, 32nd, 34th and 36th weeks. She was a very nervous, highly-strung woman. Abortion threatened at the 11th week but with bed rest the bleeding settled. 17 α -hydroxy progesterone caproate 250 mg. was administered 51 times. In this case the usual dosage was not strictly adhered to because the patient returned to her home in Bute after the 13th week and was unable to attend the clinic regularly.

Case 114 : 27 years : married 4 years : para 1 + 2

1st pregnancy	10 weeks abortion
2nd "	10 weeks abortion
3rd "	Full time Forceps delivery. Had ferning of cervical mucus and 5 injections of 17 α -hydroxy progesterone caproate.

(Case 49)

She attended the clinic at just over 8 weeks in her 4th pregnancy. The uterus was retroverted and there was marked

ferning of the cervical mucus. She was advised to lie prone for 2 hours each day and also to try to sleep in this position. The retroversion corrected spontaneously by the 12th week. Ferning was noted at the 9th, 10th, 13th, 14th, 17th, 18th and 23rd weeks. In all 16 injections of 17 α -hydroxy progesterone caproate 250 mg. were administered.

In only one of these cases was the retroversion corrected manually and a pessary inserted, and in this case (Case 87) the pessary was inserted before the patient became pregnant. In all the other cases the patients were advised to lie prone as much as possible and in all cases the retroversion corrected spontaneously.

Ferning in the Presence of Retroversion of the Uterus

From the foregoing summaries it is seen that ferning of the cervical mucus was found in 6 of the cases of retroversion of the uterus. As seen in Table 15, the ferning was of variable duration.

If the retroversion of the uterus was a factor in any of the previous abortions suffered by these patients, it would appear that progesterone deficiency might also have played a part.

Threatened Abortion and Retroversion of the Uterus

Threatened abortion occurred in only 1 of the cases (Case 104). This patient was already in hospital when vaginal bleeding occurred at the 11th week but with bed rest (in the prone position as much as possible) and mild barbiturate sedation (phenobarbitone 30 mg. thrice daily and sodium amytal 200 mg. at night) the bleeding stopped after about 3 days. At this time too there had been ferning of the cervical mucus for 3 consecutive weeks and the ferning persisted during the following 3 weeks in spite of 17 α -hydroxy progesterone caproate being given in a dosage of 250 mg. thrice weekly.

Uterine Fibroids and Retroversion of the Uterus

A fibroid of the uterus was noted in 1 of the patients who had a retroversion (Case 68). This was situated in the fundus of the uterus and caused no trouble throughout the pregnancy.

It is quite possible that fibromyomata, either sub-mucous or intramural, were present in other patients in this group but this was the only case where the condition was diagnosed and here too there was ferning of the cervical mucus although noted only at the 8th and 9th weeks of the pregnancy.

Developmental Uterine Abnormalities

As noted earlier and in Table 3, developmental abnormalities of the uterus were found in 7 patients in this series (5.8 per cent). These patients had a history of 28 previous pregnancies, 22 of which had ended in abortion. The abortion rate in this small group was thus 78.5 per cent. A summary of these cases follows.

Case 47 : 20 years : married 2 years : para 0 + 2

1st pregnancy 6 weeks abortion
2nd " 9 weeks abortion

She had bleeding per vaginam with the passage of blood clots about the 10th week of her 3rd pregnancy and remained in bed at home for 2 weeks. She attended the clinic at the 15th week and at this time a diagnosis of uterus bicornis unicollis was made. The pregnancy appeared to occupy the left horn. No ferning was seen at any time. In this case the anomaly was not confirmed other than by abdominal palpation.

Case 72 : 20 years : married 2 years : para 0 + 2

1st pregnancy 6 weeks abortion
2nd " 8 weeks abortion

She was admitted to hospital as a case of threatened abortion at just past the 11th week of her 3rd pregnancy. 17 α -hydroxy progesterone caproate 250 mg. was given on the day after admission and again one week later. The bleeding settled quickly and she was discharged from hospital 2 weeks later. She then attended the clinic at weekly intervals.

There was further slight bleeding at the 15th week and a further injection was given but she was not admitted to hospital. At this time the uterus was noted to be bicornuate. Ferning was first seen at the 21st week and again at the 25th, 29th, 31st and 33rd weeks. In all 10 injections of 17 α -hydroxy progesterone caproate were given. At the 33rd week the uterus was tense, she complained of abdominal discomfort and was admitted to hospital. In this case the anomaly was confirmed when the placenta was manually removed.

Case 75 : 36 years : married 15 years : para 1 + 4

1st pregnancy	10 weeks abortion
2nd	" 10 weeks abortion
3rd	" 40 weeks - elective section - generally contracted pelvis
4th	" 18 weeks abortion
5th	" 8 weeks abortion

She first attended the clinic at the 13th week of her 6th pregnancy. From the operation notes made at her previous caesarean section, it was noted that she had a bicornuate uterus. Ferning of the cervical mucus was not found at any time. There was slight vaginal bleeding at the 30th week and this persisted for 2 weeks. She was admitted for rest at the 31st week.

Case 76 : 36 years : married 15 years : para 3 + 3

1st pregnancy	Full time normal delivery. Weight 6 lbs.
2nd	" Full time normal delivery. Weight 8 lbs.
3rd	" 6 weeks abortion
4th	" Full time normal delivery. Weight 9 lbs.

5th pregnancy 26 weeks abortion

6th " 16 weeks abortion

She attended the clinic for the first time at the 8th week of her 7th pregnancy. A diagnosis of bicornuate uterus was made at the 14th week. Ferning of the cervical mucus was noted at the 8th, 9th and 10th weeks of the pregnancy. There was bleeding per vaginam at the 11th week. She was admitted to hospital for rest and discharged 2 weeks later. There was further bleeding at the 14th week and she was readmitted until the 16th week. During this time she was given weekly injections of 17 α -hydroxy progesterone caproate 250 mg.

Ferning was again seen at the 17th, 18th, 20th, 21st, 22nd, 25th, 27th and 29th weeks. In all 32 injections were given. Further bleeding occurred at the 31st week and she was readmitted to hospital.

X-ray placentography at the 34th week showed a degree of placenta praevia. The lie was transverse and remained so until the 37th week when, because of further bleeding, caesarean section was performed. The presence of a uterus bicornis unicollis was confirmed at operation.

Case 92 : 34 years : married 6 years : para 1 + 2

1st pregnancy Full time normal delivery. Weight 6 lbs. 9ozs.

2nd " 8 weeks abortion

3rd " 12 weeks abortion

She first attended the clinic at the 11th week of the 4th pregnancy. Ferning of the cervical mucus was seen at the 12th, 14th and 16th weeks. Three 250 mg. injections of 17 α -hydroxy progesterone caproate were given. A diagnosis

of bicornuate uterus was made by abdominal palpation about the 18th week of the pregnancy but the anomaly was not otherwise confirmed.

Case 109 : 35 years : married 9 years : para 0 + 4

1st pregnancy	8 weeks abortion
2nd "	8 weeks abortion
3rd "	14 weeks abortion
4th "	20 weeks missed abortion

This patient who developed diabetes at the age of 19 years first attended the clinic when she had just passed the 13th week of her 5th pregnancy. There was marked ferning of the cervical mucus at the 15th, 16th, 18th, 19th, 20th, 22nd, 23rd, 24th, 25th, 29th and 31st weeks of the pregnancy. Twenty-eight injections of 17 α -hydroxy progesterone caproate 250 mg. were given. A developmental uterine anomaly was not suspected but at caesarean section she was found to have an arcuate uterus. The left tube was rudimentary and there was no evidence of ovarian tissue on the left side. The right tube was normal and the right ovary, although otherwise of normal appearance, was enlarged to about 3 times normal size.

Case 111 : 23 years : married 6 years : para 1 + 5

1st pregnancy	24 weeks abortion
2nd "	Full time normal delivery. Weight 4 lbs. 4 ozs.
3rd "	10 weeks abortion
4th "	6 weeks abortion
5th "	24 weeks abortion (cervical suture inserted at 12th week)
6th "	6 weeks abortion

She attended the clinic for the first time in her 7th pregnancy when she had reached the 8th week. There had been vaginal bleeding at the 6th and 7th weeks. Ferning of the cervical mucus was present and was again seen at the 10th week. Vaginal bleeding occurred at the 11th-12th weeks but settled with bed rest and sedation. Ferning was again seen at the 14th, 15th, 17th, 18th, 23rd, 24th, 26th, 27th, 28th and 29th weeks. In all, 28 injections of 17 α -hydroxy progesterone caproate 250 mg. were given. The uterus was palpable abdominally only at the 14th week and was smaller than expected until the 30th week of the pregnancy, when more rapid growth seemed to occur. A diagnosis of bicornuate uterus was made by abdominal palpation about the 18th week of pregnancy but was not otherwise confirmed although the impression of 2 horns remained throughout the pregnancy.

From the foregoing summaries it is seen that the uterine anomaly was confirmed at operation, either at caesarean section or manual removal of the placenta, in 4 of the 7 cases. In one of these (Case 109) the anomaly had not been diagnosed in the antenatal period.

Ferning of the Cervical Mucus in the presence of Developmental Uterine Anomalies

Ferning was noted in 5 of the 7 cases and, as found in the cases of uterine retroversion, was of variable duration (Table 16).

Threatened Abortion and Uterine Anomalies

Vaginal bleeding occurred in 4 of the 7 cases (Cases 47, 72, 76 and 111) before the 12th week. In none of these cases (except Case 111) did the bleeding occur at a previous abortion time. In Case 47 the bleeding occurred at the 10th week and settled before the patient was seen.

Case 72 was admitted to hospital with bleeding at the 11th week. She was discharged after 2 weeks.

Case 76 was admitted at the 10th week for 18 days and again at the 14th week for 2 weeks because of bleeding.

Case 111 had bleeding at the 7th week before she attended the clinic and there was again slight bleeding at the 11th week.

In all these cases of threatened abortion the regime described later under the heading of "Treatment of Threatened Abortion" was instituted.

Antepartum Haemorrhage in the presence of Uterine Anomalies

Of the 7 patients in this group, antepartum haemorrhage occurred in the following 3:

Case 75 (para 1 + 4) : Bleeding occurred at 30 weeks but settled after admission to hospital. No definite cause for this bleeding was found.

Case 76 (para 3 + 3) : Two episodes of threatened abortion. Bleeding recurred at the 37th week and was due to Type I

placenta praevia.

Case 109 (para 0 + 4) : Bleeding occurred after speculum examination at 32 weeks. A diagnosis of mild revealed accidental haemorrhage was made in retrospect as there was no evidence of placenta praevia at caesarean section later.

These patients were admitted to hospital when the haemorrhage occurred and were treated expectantly.

Premature Labour and Uterine Anomalies

The spontaneous onset of premature labour occurred in only 1 of the 7 cases (Case 72, para 0 + 2). She delivered spontaneously at the 35th week.

Caesarean section was performed at just over 37 weeks in Case 76 (para 3 + 3) because of antepartum haemorrhage, and at the 33rd week in Case 109 (para 0 + 4) because of severe diabetes, antepartum haemorrhage, moderately severe pre-eclamptic toxæmia and a sudden noted irregularity in the foetal heart rate.

Uterine Growth

Cases of Smaller-than-Expected Uterus for the Duration of Amenorrhoea

The estimation of the size of the uterus and its correlation with the expected size for the duration of amenorrhoea is in many cases difficult, particularly after the 18th to 20th weeks of pregnancy. In the author's experience, however, the rate of growth of the uterus is easier to determine when the patient is seen frequently throughout the pregnancy.

Under the heading "Uterine Growth" in the preceding section on Investigations and in Table 7 it was seen that 27 of the 120 patients in this series (22.5 per cent) were noted at varying times in their pregnancies to have a uterus which was, from palpation, apparently smaller than should have been expected for the duration of amenorrhoea.

When the records of these patients were reviewed, it was found that in some cases the uterine growth appeared to "catch up" later in the pregnancy with the size one would expect for the duration of amenorrhoea while in others the uterine size remained smaller than average during the remainder of the pregnancy. In most of these latter cases labour was induced between the 38th and 40th week of pregnancy as it was felt that a degree of placental

insufficiency must be present. The patient's age and whether ferning of the cervical mucus and/or threatened abortion had been features earlier in the pregnancy were also noted when the question of possible poor placental function was considered in these cases.

These patients have been divided into 3 groups for purposes of study --

Group I (Table 17) : Small uterus first noted in
1st trimester

Group II (Table 18) : Small uterus first noted in
2nd trimester

Group III (Table 19) : Small uterus first noted in
3rd trimester

Group I : Patients with Smaller-than-Expected Uterus first
noted in 1st Trimester (Table 17)

Spontaneous Termination of Pregnancy

Case 74 aborted at the 24th week of pregnancy.

The onset of labour was spontaneous at the 38th-39th weeks in Cases 22, 23, 28 and 111.

Premature labour occurred at the 32nd week in Case 26. Thus, in 6 of the 7 cases where the uterus was found to be smaller than expected in the 1st trimester of pregnancy, the pregnancy terminated spontaneously before the 39th week.

Induction of Labour

In Case 48 it was decided that labour should be induced at just over 38 weeks' duration since the episode of threatened abortion at the 8th week, the persistence of ferning of the cervical mucus until the 36th week and the noted smaller-than-expected uterus until the 30th week suggested the probability of the presence of placental insufficiency.

Group II : Patients with Smaller-than-Expected Uterus first noted in 2nd Trimester (Table 18)

There were 10 patients in this group. Apart from one patient (Case 70, para 1 + 3) who was delivered of a live premature child at the 26th week, all the patients were delivered between the 38th and 43rd weeks.

Ferning of the cervical mucus was found in 9 of the 10 patients but again was variable in its duration.

Induction of Labour

In Cases 12, 16 and 104 the uterus remained smaller than expected until the 38th week and in addition pre-eclamptic toxæmia developed in Case 16. Ferning of the cervical mucus was a feature of all 3 cases although it was seen only once in Case 16, was of 7 weeks' duration in Case 12 and 32 weeks' duration in Case 104. It was decided that labour should be

induced in these cases as placental insufficiency was suspected. Induction was successful in Case 104.

Failed Induction

Case 12 : 30 years : para 1 + 2 : The foetal head was free at term and the cervix long and tightly closed. An attempt at induction of labour by syntocinon infusion failed at the 41st and 42nd weeks. An attempt at surgical induction with caesarean section to follow if labour was not established after 24 hours was planned at the 43rd week but the patient went into labour spontaneously.

Case 16 : 25 years : para 2 + 3 : An attempt at surgical induction of labour failed at term and caesarean section was performed after 14 hours because of increasingly severe pre-eclamptic toxæmia.

Induction of labour was decided upon in one other case in this group -

Case 65 : 37 years : para 1 + 2 : It was 10 years since she had a successful pregnancy and uterine growth was poor from the 20th to the 30th weeks. Although there was an increased rate of growth after the 30th week it was felt that placental function might be impaired and labour was induced at term.

The remainder of the patients in this group went into labour spontaneously.

Group III : Patients with Smaller-than-Expected Uterus first noted in 3rd Trimester (Table 19)

From Table 19 it is seen that there were 9 patients in this group. Pregnancy terminated spontaneously before term in 3 cases (Cases 29, 71 and 90) - all at or about the 37th week of pregnancy.

Concealed accidental haemorrhage occurred at the 36th week in Case 2 and caesarean section was performed.

Because of a noted impression of arrest in foetal growth in Cases 31, 47 and 60 and a failure of these patients to go into labour spontaneously by the 38th-40th weeks, an attempt at induction of labour by artificial rupture of the membranes was made. This was successful in 2 of the patients but in Case 60 the attempt at rupture of the membranes failed. This patient (para 0 + 1) was 33 years of age, had been married for 5 years and had threatened to abort at the 14th week. In addition there had been persistent ferning of the cervical mucus from the 18th to the 37th weeks of the pregnancy, necessitating 21 injections of 17 α -hydroxy progesterone caproate. She had been in hospital from the 31st week of pregnancy for rest. Placental insufficiency was probable and elective caesarean section was performed.

In Case 81 (para 0 + 2) there was the added complication of moderately severe pre-eclamptic toxæmia. Artificial rupture of the membranes was performed at the 39th week but caesarean section was performed just under 24 hours later as labour had not ensued and the toxæmic symptoms were increasing.

In Case 108 (para 0 + 1) a degree of essential hypertension was present in addition to the noted slow foetal growth-rate after the 29th week. Surgical induction of labour at the 39th week was successful.

Admission to Hospital before Delivery

The following patients were admitted to hospital for reasons other than induction of labour or delivery in the antenatal period:

Group I

Case 22 : 22 years : para 0 + 1 : Admitted for 10 days at 21 weeks' duration because of threatened abortion.

Case 26 : 32 years : para 4 + 7 (3 live children, 1 of whom was spastic) : Admitted at 19+ weeks' duration for insertion of cervical suture. In hospital for 9 days.

Case 28 : 25 years : para 0 + 2 : Admitted at 7+ weeks for 3 weeks - threatened abortion. Readmitted at 34+ weeks - cervix effaced, 2 finger-breadths dilated and

membranes bulging. Not in labour. Remained in hospital until delivered at 38th week.

Case 48 : 27 years : para 1 + 2 : Admitted at 34+ weeks -
? early labour. Had frequent episodes of apparently
painful uterine contractions until labour established
at 38th week. The cervix remained closed until the
onset of labour.

Case 74 : 23 years : para 0 + 4 : Admitted at 16th week for
10 days because of complaint of uterine contractions.
The uterus was noted to be tense.

Group II

Case 12 : 30 years : para 1 + 2 : Admitted at 9th week for
rest because of previous history. Discharged after
10 days and not re-admitted until term.

Case 16 : 25 years : para 2 + 3 : Admitted at 14th week
with urinary infection. Remained in hospital for
2 weeks. Re-admitted at 19th week with complaint
of lower abdominal pain and depression. Remained
in hospital for 4 weeks. Psychiatric opinion
obtained - previous history of hysteria. Re-admitted
at 26th week - recurrence of depression - remained in
hospital for 2 weeks. Re-admitted at 37th week with
history of persistent vomiting and increasing oedema.
Remained in hospital until delivered at term.

Case 36 : 33 years : para 1 + 3 : Admitted at 32nd week
because of prolapse of cervix beyond introitus.
Remained in hospital until delivered at 39th week.

Case 104 : 26 years : para 1 + 3 : Admitted at 7+ weeks' duration with uterine retroversion. Threatened to abort at 11th week. Discharged at 14th week.

Group III

Case 2 : 30 years : para 1 + 4 : Admitted at 8th week for 10 days - threatened abortion. Re-admitted at 33 weeks - 7 premature rupture of membranes. No liquor drained after admission. Remained in hospital until 36th week when caesarean section performed because of concealed accidental haemorrhage.

Case 29 : 31 years : para 1 + 2 : Admitted at 16th week - complaint of lower abdominal pain. Discharged at 19th week.

Case 31 : 30 years : para 1 + 4 : Admitted at 38th week - pre-eclamptic toxæmia.

Case 60 : 33 years : para 0 + 1 : admitted at 31st week for rest - uterus noticeably tense. Remained in hospital until delivery at 38th week.

Case 81 : 27 years : para 0 + 2 : Admitted at 38th week - pre-eclamptic toxæmia.

The treatment of patients who were found to have a smaller-than-expected uterus for the duration of amenorrhoea may be summarised as follows:

Ferning of Cervical Mucus

Ferning of the cervical mucus was noted and appropriate treatment with 17 α -hydroxy progesterone caproate as already described was given.

Cervical Incompetence

A watch was kept for the development of cervical incompetence and this was treated where possible by insertion of a cervical suture. One patient (Case 28, para 0 + 2) developed cervical incompetence with effacement and dilatation of the cervix and bulging membranes at the 32nd week of the pregnancy. She was admitted to hospital for complete bed rest. A suture was not inserted.

Threatened Abortion

Vaginal Bleeding : Unless vaginal bleeding was very slight or had occurred and completely cleared prior to the first clinic visit or had been present and cleared between visits to the clinic, the patients were admitted to hospital for bed rest and sedation.

Pain : Patients complaining of pain in association with even very slight vaginal blood-staining were admitted to hospital for rest. In the absence of any staining, if the uterus was noted to be tense on examination, the patients were admitted to hospital for bed rest and sedation.

Threatened Premature Labour

Similar signs and symptoms occurring after the 28th week of pregnancy were regarded as being evidence of threatened premature labour and the patients were admitted to hospital.

Induction of Labour

Where the foetus seemed "small-for-dates" after the 36th week, labour was induced where possible at the 38th week. It was thought advisable that all cases of smaller-than-expected uterus should be delivered by the 40th week. It was believed that the failure to grow was an indication of poor placental function. Any additional factors which suggested that placental insufficiency were an even greater risk, for example prolonged ferning of the cervical mucus, previous threatened abortion, pre-eclamptic toxæmia, were an indication for delivery at the 38th rather than the 40th week of pregnancy.

It is interesting to note that labour occurred spontaneously between the 37th and 40th weeks of pregnancy in 12 of the 26 patients in this group of cases where the uterus was noted to be smaller-than-expected for the duration of amenorrhoea.

Mental Instability

As already stated under the heading "Assessment of Mental Stability," there was at first no intention of investigating the previous mental background of the patients in this series nor was it appreciated that there would be any great need for psychiatric investigation or advice in the treatment of these patients. The author was certainly not qualified to investigate the patients from this aspect in any detail but it was soon apparent that many of them were excessively nervous and apprehensive about their repeated abortions and required constant reassurance.

The histories of the patients who were referred for a psychiatric opinion are summarised below.

Case 16 : 25 years : para 2 + 3

Already discussed as one of the group with a smaller-than-expected uterus in the 2nd trimester of pregnancy, this patient had 2 successful pregnancies in 1958 and 1960 followed by 3 abortions, each at the 18th week of pregnancy in 1961, 1962 and 1963. She had a long previous history of lower abdominal pain and had 2 laparotomies - one for ? appendicitis and one for ? ectopic pregnancy. At neither operation was any lesion found. She had attended her general practitioner

on several occasions over the previous 7 years (in fact, since her marriage) for treatment of depression and latterly various tranquillisers had been prescribed. About 3 years previously she had developed symptoms of fainting attacks which had been attributed to hysteria.

She became very depressed at the 19th week of the pregnancy under consideration and complained of lower abdominal pain. No cause for the pain was found and in view of the continuing severe depression a psychiatrist's opinion was obtained at the 22nd week. She was considered to have an "unstable personality." She was seen again by the psychiatrist when re-admitted at the 26th week with a recurrence of depression.

No specific treatment was prescribed but this patient required a great deal of support throughout the pregnancy. After delivery by caesarean section she improved greatly and there were no further problems. She requested sterilisation and this was performed at the time of delivery.

She was seen 6 weeks after delivery when she seemed very cheerful and declared that she had "never felt better." Her general practitioner however referred her for a gynaecological opinion just over a year after delivery. Her complaint then was of lower abdominal pain and fainting attacks. No

gynaecological lesion was found and she was referred for a physician's opinion. He was unable to find a cause for the fainting attacks and once more she was considered to have hysterical manifestations. It was thought that this patient's husband was drinking rather heavily.

Case 45 : 32 years : para 1 + 3

She had a history of a broken home in childhood and had been under psychiatric care on several occasions for repeated depressive illnesses. She was a trained nurse and midwife.

- 1960 : 10 weeks abortion
- 1962 : Threatened abortion at 10 weeks.
Spontaneous delivery at term - child well.
- 1963 : 9 weeks abortion
- 1963 : 10 weeks abortion followed by "nervous breakdown." Admitted to mental hospital.

In her 5th pregnancy she was re-admitted to a mental hospital at the 13th week and aborted at the 16th week. She was seen again in her 6th pregnancy (Case 89) at the 10th week and throughout this pregnancy had numerous episodes of severe depression. She was under constant psychiatric supervision and had to be admitted to hospital because of her depression at the 27th week for 3 weeks. This pregnancy was successful and she improved a little after delivery but attempted suicide in the 5th week of the puerperium by barbiturate overdosage.

The psychiatrist was of the opinion that she was very unstable and would remain so but he thought that her attempt at suicide was not serious but provoked, at least on this occasion, by her husband's religious mania. At this time the husband was also having psychiatric treatment.

Case 66 : 35 years : para 2 + 3

1958 : Normal delivery at term - child stillborn
1959 : 12 weeks abortion
1960 : 36 weeks spontaneous delivery - child alive
1961 : 20 weeks abortion
1964 : 12 weeks abortion

This patient was very nervous throughout her pregnancy. She trembled noticeably during her first few visits to the clinic and was often depressed, at times weeping when asked how she was keeping. She developed hypertension at the 29th week (blood pressure 160/100 mm.Hg.) and was admitted to hospital. The hypertension settled somewhat after admission and she was allowed up. She complained that she was having difficulty keeping her balance and staggered when walking in the ward or corridor. No neurological or other abnormality was found. She continued to be unable to walk steadily without support and agreed to a psychiatric interview. Again the diagnosis was of an unstable personality with hysterical symptomatology. It was felt that a successful outcome to

the pregnancy would result in a cure. She required much reassurance and psychotherapeutic support. The blood pressure again rose sharply at the 34th week and she had to be confined to bed. There was also some oedema. This produced even greater anxiety than before, which was not very well controlled even with barbiturate sedation in the order of sodium amytal 200 mg. 6-hourly. Her future mental state was feared for when at the 36th week of the pregnancy she developed a severe mixed accidental haemorrhage. Caesarean section was performed and fortunately a live child was delivered. As predicted, this patient improved almost beyond recognition after this pregnancy and her behaviour in the puerperium was apparently completely normal.

Case 67 : 33 years : para 0 + 3

Her previous obstetric history was of 3 abortions at the 10th, 12th and 16th weeks of pregnancy in 1951, 1953 and 1958. An ovarian cyst had been removed in 1959 and the first pregnancy thereafter was in 1963. This patient was noted to be very excitable when seen early in pregnancy and expressed great anxiety about the outcome of her 4th pregnancy. She talked rapidly and to excess at every visit to the clinic but was also prone to burst into tears for no apparent reason.

From the 20th week she suffered from apparently severe headaches and at the 24th week complained of loss of sensation and weakness in the right arm. No cause for this was discovered. She complained of a "numbness" in her right leg below the knee at the 29th week and there was loss of sensation to pain and light touch below the knee of a stocking distribution.

She developed symptoms of pre-eclamptic toxæmia at the 31st week and was admitted to hospital. While in hospital an opportunity was taken to have her interviewed by a psychiatrist. These hysterical symptoms disappeared quickly after this interview and she remained reasonably stable during the remainder of the pregnancy although she was still noticeably excitable and rather easily upset. She required much sympathy and understanding from the medical and nursing staff.

This patient attended the clinic again in her 5th pregnancy (Case 105) when she was again noticeably unstable. From the 24th week onwards she complained of frequent "black-outs" and chest pain. She was admitted to hospital and examined by a consultant physician. No abnormality of the central nervous, cardiovascular or other systems was found and once more the diagnosis was of hysteria. She was

seen several times by a psychiatrist but did not improve until after delivery.

The author interviewed this patient's husband on several occasions and formed the opinion that he was of a somewhat inadequate personality and was dominated by his wife. This of course was an impression gained quickly and may have been erroneous.

It is thus seen that 4 patients in this series were seen by a psychiatrist. Since 2 of these patients are included in the series twice, the incidence of mental instability requiring psychiatric investigation in this series was 6 in 120 or 5 per cent.

These patients were examined - as all others in this series - for evidence of ferning of the cervical mucus. This was found to be present in 5 of the 6 cases but was of varying duration in each case, as shown in Table 20. It was a persistent factor in 3 of these cases (Cases 45, 89 and 66) although with the dosage scheme of 17 α -hydroxy progesterone caproate already discussed it should be noted that ferning was not present each week, sometimes being absent for 3 or more weeks only to recur in the following 2 or more consecutive weeks.

In addition to the foregoing patients who required psychiatric attention during their pregnancies, the author

was impressed by the amount of repeated reassurance and explanation required by many of the patients in the series. They expressed anxiety and apprehension frequently and, particularly in the early stages of the pregnancy, were in many cases noticeably depressed. They seemed however to derive much benefit from the knowledge that they could feel free to speak to any member of the clinic staff, if need be at length, and they frequently volunteered the information that they no longer felt so depressed ("worried," "hopeless," etc.) as before. On several occasions various patients said that they were helped by meeting others at the clinic with similar histories to their own.

(One of the outstanding features noted in many of these abortion-prone women was the despondency induced by a further pregnancy. They seemed to hope that the pregnancy would be successful but at the same time there was often a hopelessness in their attitude towards it. Most of them had never heard of anyone else similarly afflicted and their morale was immediately raised as soon as they realised that theirs was not a unique problem. They became interested in each other's progress and the author is convinced that a type of group psychotherapy took place spontaneously in the waiting room.

So many patients in the series expressed at least some anxiety during the pregnancy that it has not been possible to determine the incidence of ferning of the cervical mucus in

this group. The incidence was probably that of the whole series - 82.5 per cent (Table 8).

It has been suggested that psychotherapy may improve hormone balance in these cases by action on the hypothalamus and thence the pituitary ovarian axis. Cope and Emelife (1965) and Rawlings and Krieger (1959) showed that emotional disturbances were associated with a fall in the pregnanediol excretion level. Javert (1962) found a high incidence of psychic conflicts in a review of over 400 habitual abortion patients. The suggestion has also been made by Macdonald (1963) and Cope and Emelife (1965) that hormone therapy itself may be psychotherapeutic.

The author believes that the presence of ferning of the cervical mucus in any of these cases of abortion-prone women is an indication for progesterone therapy and, if the injection itself has in addition a psychotherapeutic effect, the resultant action on the hypothalamus may well result in a further restoration of hormone balance which may take place before the maximum effect arises from the hormonal therapy.

Threatened Abortion

Threatened abortion was regarded as any uterine bleeding which occurred before the 28th week of pregnancy whether or not this bleeding was associated with pain. Patients

complaining of pain which might have been due to uterine contractions were not included in this group of patients with threatened abortion unless there was associated bleeding.

Mention has already been made of several patients who threatened to abort in the series but the total incidence of threatened abortion, its treatment and management will now be considered.

In all, 51 of the 120 cases (42 per cent) threatened to abort at least once in the pregnancy (Table 21). Nine of these patients had threatened to abort early in pregnancy before being referred to the special clinic and had been treated at home by their general practitioners - being advised to remain in bed and most of them having mild barbiturate sedation prescribed. One patient was also given 17 α -hydroxy progesterone caproate injections empirically. These 9 patients settled on this treatment and then, because of their previous obstetric histories, were referred to the special clinic. A summary of each of the previous histories follows:

- Case 17 : 33 years. Secondary aborter, 1 successful pregnancy then 5 consecutive abortions.
- Case 19 : 35 years. One previous abortion. Relative infertility.
- Case 23 : 31 years. Secondary aborter. One successful pregnancy then 4 consecutive abortions.

- Case 47 : 20 years. Primary aborter - 2 previous abortions.
- Case 60 : 33 years. First pregnancy ended in abortion, then period of 4 years' infertility.
- Case 61 : 38 years. Secondary aborter. Seven successful pregnancies (first marriage), then 2 consecutive abortions (second marriage).
- Case 64 : 36 years. Para 3 + 1. First 2 pregnancies resulted in neonatal deaths; third pregnancy successful; fourth pregnancy ended in abortion at 10th week.
- Case 100 : 32 years. First pregnancy resulted in neonatal death. Second pregnancy successful. Third pregnancy - abortion at 12th week.
- Case 111 : 23 years. Para 1 + 5. First pregnancy ended in abortion at 24th week; second pregnancy successful - term delivery. Next 4 pregnancies ended in abortion between 6th and 24th weeks in spite of cervical suture inserted in 5th pregnancy.

A further 7 patients were referred by their general practitioners to the special clinic because of bleeding and they too were included in the series because of their previous histories. All of them came into one or other of the categories regarded as being abortion-prone and are listed in Table 1.

Seventeen patients threatened to abort at some point during their pregnancies after starting to attend the special clinic.

In addition 18 patients were first seen by the author when they were admitted to hospital with threatened abortion. All these patients had a previous history suggesting that they were abortion-prone and were thus included in the series.

Treatment and Management of Threatened Abortion

Patients with vaginal bleeding in the 1st or 2nd trimester of pregnancy were generally admitted to hospital. Exceptions to this rule were those patients who had stopped bleeding prior to attending the clinic for the first time and a few who threatened to abort between clinic visits, stayed in bed at home and had settled by the time they next attended the clinic. The cervical mucus of these patients was examined at weekly intervals for the presence of ferning crystals.

Hospital Regime

Abortion-prone patients admitted to hospital with threatened abortion were managed differently, depending on whether they had already been attending the special clinic or not.

(a) Clinic Patients

Complete bed rest : mild barbiturate sedation - phenobarbitone 30 mg. thrice daily and amylobarbitone 100-200 mg. at night : 17 α -hydroxy progesterone caproate 250 mg. intramuscularly thrice weekly whether or not ferning of the cervical mucus had already been found.

(b) Non-clinic Patients

As above but 17 α -hydroxy progesterone caproate injections given only if bleeding had not stopped after 24 hours on rest and sedation regime.

Thereafter both groups of patients were managed similarly. When bleeding had been absent for 48 hours, the patients were allowed up to sit in a chair for a short period and, provided bleeding did not recur, they were gradually allowed up for longer periods and within 3 days were ambulant. Usually, within 7 to 9 days of cessation of bleeding, they were discharged from hospital and requested to attend the special clinic within 1 week when the cervical mucus was examined for the presence of ferning.

Ferning of the Cervical Mucus in Cases of Threatened Abortion

The incidence of ferning of the cervical mucus in cases of threatened abortion in the series was 74.5 per cent. This is not significantly different from the general incidence of 82.5 per cent in the whole series since some of the patients had been given 17 α -hydroxy progesterone caproate empirically when abortion threatened and it is possible that ferning might have been present before the bleeding occurred.

In the presence of any marked blood loss per vaginam, no attempt was made to obtain a specimen of cervical mucus as it has been shown (Macdonald, 1963) that the red cells prevent the formation of ferning crystals. The incidence of ferning in these cases refers to the phenomenon being found either before or after the episode of threatened abortion.

Ferning in Cases Successfully Treated prior to Attendance at the Clinic

One of the 9 patients thus treated (Case 17 : para 1 + 5) had been given injections of 17 α -hydroxy progesterone caproate by her general practitioner when abortion threatened between the 8th and 12th weeks of her 7th pregnancy. She was referred to the special clinic at the 15th week and ferning of the cervical mucus was found intermittently from the 15th to the 20th weeks.

Of the remaining 8 patients in this group, 7 were found to have ferning for varying periods (Table 22).

Ferning of Cervical Mucus in Cases not attending Special Clinic, admitted to Hospital with Threatened Abortion

There were 18 patients in this group (Table 21). In 5 the bleeding settled within 24 hours and 17 α -hydroxy progesterone caproate was not therefore administered. Ferning of the cervical mucus was not found subsequently in these cases.

The remaining 13 patients were given 17 α -hydroxy progesterone caproate injections thrice weekly until they were discharged from hospital. Ferning was subsequently found at the special clinic in 11 of these cases (Table 23). When found, the ferning was of varying duration but in 9 of the 11 cases it persisted intermittently over a period of 8 to 29 weeks.

Ferning of Cervical Mucus in Cases referred to Clinic because of Threatened Abortion

Of the 7 patients who were referred to the special clinic because of vaginal bleeding, ferning of the cervical mucus was found subsequently in 4 cases. Only 1 of the 7 patients was admitted to hospital when first seen, the bleeding in the other cases having almost stopped by the time they came to the clinic. In 1 of the cases (Case 22) the bleeding was so

slight that the formation of ferning crystals was not inhibited (Table 24). In 3 of the 4 cases where ferning was seen it was fairly persistent.

Ferning of Cervical Mucus in Cases where Abortion Threatened for the First Time during Attendance at Special Clinic

Threatened abortion occurred for the first time in 17 cases after they had started to attend the special clinic. Ferning of the cervical mucus was found in 15 and it is seen from Table 25 that ferning preceded the threatened abortion in all but 1 case (Case 25). Two of the patients in this group are included twice. Case 13 (para 1 + 5) and Case 77 (para 2 + 5) refer to the same patient. It is interesting to note that the pattern of ferning and threatened abortion was almost the same in both pregnancies. During the 2nd pregnancy (Case 77) the dosage of 17 α -hydroxy progesterone caproate was increased and, although abortion threatened, the bleeding was slight and admission to hospital was not necessary.

Cases 58 (para 0 + 3) and 74 (para 0 + 4) refer to one patient. The ferning and threatened abortion pattern are different but as will be seen later this patient aborted on both occasions.

Case 104, already discussed in the section on cases of uterine retroversion, has been included in this group although

she did not attend the special clinic prior to the episode of threatened abortion. Since she was admitted to hospital by a colleague because of her previous history and the presence of uterine retroversion, and also as her home was on the Island of Bute, it was thought reasonable to include her in this group since she would have been allowed to attend the clinic as an out-patient if her home had been in Greenock.

RESULTS OF PERSONAL INVESTIGATIONS

General Method of Analysis

In this series, 120 pregnancies of consecutive patients selected as being abortion-prone were studied. These patients attended a special antenatal clinic as already described. Nine of the patients attended the clinic during 2 pregnancies and 1 patient attended during 3 pregnancies. Thus the number of patients in this study of 120 pregnancies was 109.

Each pregnancy was given a Case Number and for most purposes in the analysis of results each pregnancy was considered separately. It was obviously necessary however when calculating the previous abortion rate not to include the same patient twice (for example, a para 0 + 3 at the first attendance would be either a para 1 + 3 or 0 + 4 in her next pregnancy). If a patient were included twice in a calculation of abortion rate, a falsely high rate would be calculated.

In a work on the management of abortion-prone patients it was thought that valuable information might be made available from a detailed study of recurrent pregnancies in the same

patient and it was for this reason that each pregnancy has been numbered separately to a total of 120. Table 68 shows the age, parity, whether ferning of the cervical mucus was found or a cervical suture inserted, previous treatment and the result of pregnancy in the 120 cases.

Previous Abortion Rate compared with New Abortion Rate

The 109 patients when seen at the special clinic for the first time had a total of 420 previous pregnancies, 302 of which had ended in abortion. The abortion rate for these patients was thus 71.9 per cent. Of these 109 patients, 7 aborted.

While this figure gives an abortion rate for the first pregnancies supervised at the special clinic of 6.4 per cent, for statistical purposes a new abortion rate was calculated for the total number of pregnancies undertaken by these patients.

Previous abortion rate = 71.9 per cent

New abortion rate = 58.8 per cent

$$\frac{\text{Number of previous abortions} + \text{Abortions in present series}}{\text{Number of previous pregnancies} + \text{Pregnancies in present series}} \times 100 = \frac{302 + 7}{420 + 109} \times 100$$

There is a statistically significant difference in these two rates as well as in the more obvious difference in abortion rate for this series compared with the previous abortion rate of these patients. Of the 120 pregnancies collected in the whole series, 8 ended in abortion giving an abortion rate of 6.6 per cent - a similarly significant result.

Result of Pregnancy in Cases of Primary Abortion

There were 46 cases in which the patient had never carried a pregnancy to viability. In fact, 44 patients were in this group, 2 patients appearing twice in the list having aborted when attending the clinic for the first time, but since the abortion rate in this group of primary abortion cases was 100 per cent prior to investigation, the analysis is not affected by each case being considered separately except when calculating the new abortion rate. In this group there were 13 patients who had only 1 previous abortion but were included in the abortion-prone group for reasons already stated (Table 1 : see also Table 26).

Table 27 shows in detail the number of previous abortions which had occurred in the 46 cases in this group. It is seen that 17 patients had a history of 3 or more previous abortions.

These patients were investigated and treated as already described. Before any detailed analysis of the various findings is made, the result of pregnancy in these cases might be considered. While avoidance of abortion is the aim in treatment of the abortion-prone patient, it is useful to record the number of cases which ended in stillbirth or neonatal death and the overall success rate. The cases have

been grouped as seen in Table 28, those with 1 or more abortions (i.e. the 46 patients in this primary abortion group), those with 2 or more and so on. It is seen from this table that the abortion rate rose from 10.8 per cent in those with 1 or more abortions to 25 per cent in those with 4 or more abortions but there is no statistically significant difference. There is also no difference in the overall success rate in the 4 groups - the range being from 84.7 per cent in those with 1 or more abortions to 75 per cent in those with 4 or more abortions.

The previous abortion rate in this group was of course 100 per cent - 44 patients having a history of 102 pregnancies ending in abortion. The new abortion rate, taking the previous history into account was 72.3 per cent

$(\frac{102 + 5}{102 + 46} \times 100)$. This result is statistically significant as is the difference in the abortion rate for this series of 10.8 per cent compared with the previous 100 per cent result.

Result of Pregnancy in Cases of Secondary Abortion

There are 58 cases of secondary abortion considered in this series. In fact, there were only 56 patients, 1 patient (Case 45) having aborted during the pregnancy in which she attended the clinic for the first time and having returned

(Case 89) when pregnant again, and another (Case 44) having had a successful pregnancy after her first clinic attendance and having returned in a subsequent pregnancy (Case 106) with a history of one intervening abortion.

As before, however, each case was considered separately apart from the calculation of the overall abortion rates of this group before and after investigation and treatment at the special clinic.

Table 29 shows the number of previous consecutive abortions which occurred in this group. It is seen that there was a history of 3 or more abortions in 24 of the cases.

There were 10 patients with only 1 abortion since a viable pregnancy. They were included because they were in one of the categories outlined in Table 1, but a more detailed analysis of the reasons for their inclusion is seen in Table 30. It is seen from this table also that the age of the patients in this group was higher than average.

There were 141 consecutive abortions since a pregnancy of more than 28 weeks' duration in this series of 56 patients with a history of secondary abortion but for statistical purposes the overall abortion rate in this group has been calculated and compared with the new abortion rate after attendance at the special clinic.

The total number of pregnancies previously undertaken by these patients was 283 of which 192 had ended in abortion, giving a previous abortion rate of 67.8 per cent. After the patients attended the clinic, 3 pregnancies ended in abortion thus giving a new overall abortion rate for this group of patients of 57.5 per cent ($\frac{192 + 3}{283 + 56} \times 100$).

Previous abortion rate = 67.8 per cent

New abortion rate = 57.5 per cent

There is a statistically significant difference in these 2 rates as well as in the obvious difference in abortion rate for the total number of cases of secondary abortion in this series (58 pregnancies, 3 of which ended in abortion). The abortion rate in this group in the series was 5.17 per cent.

As in the group of patients with a history of primary abortion, the result of pregnancy in these cases might now be considered and reference made to Table 31. In addition to the abortions which occurred, the stillbirth and neonatal death rates were recorded and the overall success rate calculated. So that the results in the 2 groups might be more easily compared, the cases of secondary abortion were tabulated according to the number of previous consecutive abortions which had occurred (Table 29) and not to the total number of previous abortions.

From Table 31 it is seen that there was a history of 3 or more abortions in 24 of the 58 cases (41.3 per cent). The abortion rate rose from 5.2 per cent in those with only 1 abortion to 11.1 per cent in those with 4 or more abortions since a viable pregnancy. The difference in abortion rate according to the number of previous consecutive abortions is not statistically significant nor is the difference in the overall success rate which ranged from 84.4 per cent in those cases with 1 or more previous abortions (i.e. the overall success rate for the whole group) to 77.7 per cent in those cases with 4 or more abortions.

Comparison of Abortion Rates in Primary and Secondary Abortion Group

The 46 cases of primary abortion and the 58 cases of secondary abortion are now considered rather than the 44 and 56 patients respectively in each group.

From Table 32 it is seen that 10.87 per cent of primary aborters and 5.17 per cent of secondary aborters again aborted.

Statistically there is no difference between the abortion rates of these two populations. If there is indeed a difference it is hidden in the above sample and a larger sample would be required to reveal it.

Comparison of Success Rates in Primary and Secondary
Abortion Group

Success in these cases means that the patient not only failed to abort but was delivered of a foetus which survived. To discover if there was any difference in the success rate between the primary and secondary abortion group, a further analysis was made and at the same time separate figures were taken out in each of the 2 groups with reference to the number of previous abortions which had occurred. In the case of the secondary abortion group, the number of previous consecutive abortions following the last viable pregnancy was used rather than the total number of previous abortions. Table 33 shows the plan of this analysis.

From Table 34 it is seen that 84.7 per cent of primary aborters and 84.4 per cent of secondary aborters had successful pregnancies.

Statistically there is no difference between the success rates in the primary and secondary abortion groups nor is there any significant difference in the success rates in either group with the increasing number of previous abortions. - not even between columns 1 and 2 of Table 33. If there is a difference, a larger sample would be required to reveal it.

A similar Table analysing the abortion rate rather than the success rate in the 2 groups would have the same statistical result.

Result of Pregnancy in Other Cases

There were 16 cases in the group of 120 which could not be included under the heading of either primary or secondary abortion. They were included in the abortion-prone category however by reason of their previous history. Summaries have already been given of some of these cases, viz. Cases 57, 59, 69, 82 and 115, but for clarity a brief summary of the reason for inclusion of the 16 cases in this group is given below:

<u>Case No.</u>	<u>Parity</u>	<u>Age</u>	<u>Reason for Inclusion</u>
7	2 + 3	32	1st pregnancy successful, then 3 abortions followed by insertion of cervical suture in 5th pregnancy with successful result.
8	1 + 1	23	1st pregnancy ended in abortion; 2nd pregnancy ended in stillbirth at 30th week.
33	2 + 1	22	1st pregnancy ended in abortion; 2nd pregnancy ended in stillbirth at 32nd week and 3rd pregnancy ended at 30th week with neonatal death.

<u>Case No.</u>	<u>Parity</u>	<u>Age</u>	<u>Reason for Inclusion</u>
57	2 + 3	34	1st pregnancy - spontaneous delivery at term - neonatal death. Next 3 pregnancies ended in abortion. Threatened abortion occurred in 5th pregnancy but eventually had spontaneous term delivery of live child. Period of 4 years' infertility before she again became pregnant.
59	2 + 0	36	Both pregnancies resulted in premature deliveries with neonatal deaths. Wassermann Reaction positive - ?false - but previously treated in both pregnancies.
69	2 + 0	22	1st pregnancy ended in premature labour at 30th week; 2nd pregnancy ended at 26th or 28th week - macerated foetus.
73	1 + 0	27	Infertile for first 2 years of marriage. 1st pregnancy - spontaneous delivery at term; period of 4 years' infertility then threatened abortion at 11th week of 2nd pregnancy.
77	2 + 5	27	First 2 pregnancies ended in abortion. Third pregnancy successful (spontaneous delivery at term). Next 3 pregnancies ended in abortion. Attended special clinic in 7th pregnancy - ferning of cervical mucus, given 17 α -hydroxy

<u>Case No.</u>	<u>Parity</u>	<u>Age</u>	<u>Reason for Inclusion</u>
			progesterone caproate. Successful outcome.
82	4 + 4	35	2nd, 4th, 6th and 7th pregnancies ended in abortion and had threatened abortion in 8th pregnancy.
90	3 + 2	32	1st and 2nd pregnancies normal; 3rd and 4th pregnancies ended in abortion. Threatened abortion in 5th pregnancy and was given 17 α -hydroxy progesterone caproate. Successful outcome.
91	3 + 2	34	1st pregnancy normal; 2nd pregnancy terminated prematurely at 28 weeks (child survived); 3rd and 4th pregnancies ended in abortion at 12 and 20 weeks; 5th pregnancy terminated in premature labour at 35 weeks - had been in hospital for several months for rest.
105	1 + 3	34	1st 3 pregnancies ended in abortion. Attended clinic in 4th pregnancy - psychiatric support required - successful outcome.
112	1 + 2	32	1st 2 pregnancies ended in abortion. Threatened abortion in 3rd pregnancy. Given hormone therapy in hospital - successful outcome.

<u>Case no.</u>	<u>Parity</u>	<u>Age</u>	<u>Reason for Inclusion</u>
114	1 + 2	27	1st 2 pregnancies ended in abortion. Attended clinic in 3rd pregnancy. Ferning seen - given 17 α -hydroxy progesterone caproate - successful outcome.
115	1 + 0	26	Threatened abortion in 1st pregnancy. Given 17 α -hydroxy progesterone caproate and ferning found later. Injections continued until 32nd week. Successful outcome.
118	3 + 3	31	Abortion in 1st pregnancy. Normal full-time deliveries in 2nd and 3rd pregnancies. Abortion in next 2 pregnancies. Attended special clinic in 6th pregnancy - had ferning - given 17 α -hydroxy progesterone caproate. Successful outcome.

The result of pregnancy in these cases is seen in Table 35 where again in addition to the number of pregnancies carried to viability, the number in which stillbirth or neonatal death occurred has been noted and an overall success rate calculated in addition to the abortion rate.

In this group the total number of previous pregnancies was 62 and the number of previous abortions 31, giving an abortion rate of 50 per cent. No abortions occurred in the 16 pregnancies under consideration and thus the new abortion

rate for the group was 39.7 per cent ($\frac{31 + 0}{62 + 16} \times 100$).

Old abortion rate = 50 per cent

New abortion rate = 39.7 per cent

The difference in these two rates is not significant statistically. This could be so because the sample is small.

The previous overall success rate in this series (i.e. number of babies who survived) was 24 out of the 62 pregnancies (38.7 per cent).

Of the 16 pregnancies under consideration, 14 resulted in the birth of babies who survived - a success rate of 87.5 per cent. This figure results in a new overall success rate for this group of 48.6 per cent.

Old success rate = 38.7 per cent

New success rate = 48.6 per cent

The difference in these 2 rates is again not statistically significant. Owing to the small sample there is not even a definitely significant difference when the previous success rate of 38.7 per cent is compared with the success rate of 87.5 per cent for this series alone.

Result of Pregnancy in Patients treated for
Progesterone Deficiency

Ferning of the cervical mucus was found at some stage of pregnancy in 99 of the 120 cases (82.5 per cent) - Table 8. As already stated, this finding was considered to be a manifestation of progesterone deficiency and an indication for the administration of 17 α -hydroxy progesterone caproate.

So that an analysis of the result of pregnancy in the progesterone-deficient group might be made and compared with the result of pregnancy in the general group of cases with a history of primary abortion, secondary abortion and the miscellaneous group (Tables 28, 31 and 35), the cases where ferning was found have been similarly classified as primary abortion, secondary abortion and miscellaneous.

From Table 9 it is seen that in 35 of the 46 cases of primary abortion (76 per cent), ferning was present and from Table 10 it is seen that ferning was found in 50 of the 58 cases (82.2 per cent) of secondary abortion.

It is seen from Table 36 that 14 of the 16 cases (87.5 per cent) included in the miscellaneous group had ferning of the cervical mucus.

There is no significant difference in the incidence of progesterone deficiency as evidenced by the presence of

ferning of the cervical mucus in these 3 groups.

In addition to the cases where ferning was found, 17 α -hydroxy progesterone caproate was administered empirically to a few patients (3 in the primary abortion group and 3 in the secondary abortion group) who threatened to abort. One of the secondary abortion group (Case 93, para 1 + 2) had cramping lower abdominal pain and epistaxes at the 11th-12th weeks, but no vaginal bleeding, and is not included in the study of cases who threatened to abort. These few cases did not subsequently show any evidence of ferning of the cervical mucus. The total number of cases given 17 α -hydroxy progesterone caproate in each group is seen in Tables 37, 38 and 39.

Thirty-eight cases (82.5 per cent) of primary abortion, 53 cases (91.3 per cent) of secondary abortion and 14 cases (87.5 per cent) included in the miscellaneous group were given 17 α -hydroxy progesterone caproate. From Tables 40, 41 and 42 the result of pregnancy in the 3 groups of abortion-prone cases is seen.

The overall success rates of 86.8 per cent, 86.5 per cent and 85.8 per cent in the primary, secondary and miscellaneous groups treated for progesterone deficiency are almost identical. Because of the variation in size of the 3 samples

no definite conclusions can be made about the differences in abortion rates - from nil to 10.5 per cent.

Result of Pregnancy in Patients not treated for Progesterone Deficiency

There were 15 cases in the whole series where there was no evidence of progesterone deficiency as evidenced by ferning of the cervical mucus and who in addition did not receive empirical treatment with 17 α -hydroxy progesterone caproate at any time during the pregnancy. In fact, there were 14 patients - one patient (Case 41) returning very quickly after the abortion to the clinic, pregnant again (Case 42). A brief summary of the previous histories of these patients is seen in Table 43 along with the result of the pregnancy under consideration.

It is seen from Table 43 that the 14 patients in this group had a previous history of 61 previous pregnancies, 49 of which had ended in abortion. (Case 42 being the same patient as Case 41 has been excluded from this calculation). Two abortions occurred in these cases in the series.

Abortion rate for this series (14 patients)	14 per cent
Abortion rate for this series (15 cases)	13 per cent
Previous abortion rate	80 per cent
New overall abortion rate	67 per cent

There is no statistically significant difference in the old and new abortion rates but if the trend were the same in a larger sample a difference would be found.

Summary of Results

In the whole series there was a significant difference between the previous abortion rate, the rate for the series and the new calculated abortion rate. In the larger groups, for example primary and secondary abortion-prone cases, there was a significant difference between the previous abortion and success rates and the rates obtained in this series, but perhaps more significant is the fact that there was a difference between the previous rates and the new rates which include the previous pregnancies and those of the study.

There was no difference between the success and failure rates of the series when the primary abortion-prone group was compared with the secondary abortion-prone group and there was apparently no difference in the success and failure rates in either group as the previous number of abortions increased.

Statistically significant differences in the abortion or success rates in the smaller sub-groups could not be demonstrated but the trend in these groups is similar to that in the larger groups when previous rates are compared with those for the series.

Result of Pregnancy in Cases after Insertion of
Cervical Suture

There were 9 patients who developed signs of cervical incompetence. Table 44 shows the result of pregnancy in this group. The previous number of pregnancies undertaken by these patients was 44 of which 35 ended in abortion, an abortion rate of 79.5 per cent.

None of these patients aborted when under supervision at the clinic and thus a new overall abortion rate of 66 per cent was achieved while the abortion rate for the pregnancies under consideration was nil.

<u>Old abortion rate</u>	=	79.5 per cent
<u>Abortion rate for series</u>	=	Nil
<u>New overall abortion rate</u>	=	66 per cent

There is no statistically significant difference between the previous abortion rate and the new overall abortion rate, probably owing to the smallness of the sample.

Five of the 9 patients were also found to have ferning of the cervical mucus. The duration of this ferning is described in detail in the case summaries of these patients on pp. 103-107 and in Table 14. Seven of the pregnancies were successful but 2 ended in stillbirth (Table 44).

Case 8 : 23 years : para 1 + 1

This patient's first pregnancy ended in abortion at the 8th week and the second pregnancy in a stillbirth after a spontaneous delivery at the 30th week. There was no history, apart from the previous premature labour, to suggest that she might have had an incompetent cervix but, because of effacement and some dilatation of the cervix at the 24th week, a cervical suture was inserted. This was removed 1 week before term. The pregnancy had progressed apparently normally although the uterus seemed smaller than expected for a greater part of the pregnancy. On the day following removal of the suture, she had a severe concealed accidental haemorrhage and the foetal heart beat stopped. The foetus (at 39+ weeks) weighed 5 pounds 10 ounces (2550 G.) and the placenta, which was grossly infarcted, 1 pound 2 ounces (510 G.).

Case 26 : 32 years : para 4 + 7

The duration of this patient's previous pregnancies was 40, 12, 26, 8, 27, 40, 36, 24, 12, 40 and 20 weeks respectively. She had 3 live children, one of whom was a spastic. Because of slight dilatation of the cervix at the

19th week of her 12th pregnancy, a cervical suture was inserted. As already noted, ferning of the cervical mucus was present. She had a mixed accidental haemorrhage at the 32nd week and premature labour occurred. The suture was removed. She delivered a fresh stillborn female foetus weighing 2 pounds 14 ounces (1300 G.). The placenta was infarcted and there was a large retro-placental clot. In this case too the uterus had been noted to be smaller than expected from the 14th week of pregnancy.

The 2 stillbirths in these cases of incompetent cervix were thus due to abruptio placentae.

Result of Pregnancy in Cases of Uterine Retroversion

There were 7 cases of noted retroversion of the uterus in this series. Table 45 shows the result of pregnancy in this group. The previous number of pregnancies undertaken by these patients was 27 of which 20 had ended in abortion, an abortion rate of 74 per cent. There were no abortions in the present series, thus giving a new overall abortion rate of 58.8 per cent.

Ferning of the cervical mucus was found in 6 of the 7 patients. The duration of this ferning is described in detail in the case summaries of these patients on pages 109 to 112. One pregnancy ended in a stillbirth (Case 40).

Case 40 : 36 years : para 2 + 3

This patient had a previous history of 3 abortions after 2 successful pregnancies. The retroversion corrected spontaneously between the 10th and 11th weeks of her 6th pregnancy which then continued normally until the 36th week when she was admitted to hospital because of a variable lie. The lie was stable by the 38th week. At this time the foetal heart beat, which had previously been easily heard, was found to be absent. She went into labour spontaneously 4 days

later and delivered a macerated female foetus weighing 6 pounds 4 ounces (2840 G.). The placenta weighed 1 pound 2 ounces (510 G.). There was infarction of the placenta but no evidence of retro-placental clot. Post mortem examination of the foetus failed to reveal any cause for the intra-uterine death.

Result of Pregnancy in Cases of Developmental
Uterine Anomalies

There were 7 cases in which a developmental uterine anomaly was found. Table 46 shows the result of pregnancy in this group. The previous number of pregnancies undertaken by these patients was 28 of which 22 ended in abortion, giving a previous abortion rate of 78.5 per cent.

No abortions occurred in the present series, thus giving a new overall abortion rate of 62.8 per cent.

The sample is too small for statistical analysis of these 2 abortion rates although the difference between the previous abortion rate and that of the present series is obviously significant.

Ferning of the cervical mucus was found in 5 of the 7 patients. The duration of this ferning is described in detail in the case summaries on pages 114 to 118 and in Table 16.

From Table 46 it is also seen that caesarean section was performed in 3 of the 7 cases.

Case 75

This patient had a generally contracted pelvis and had previously had a caesarsan section.

Case 76

Caesarean section was performed at the 37th week for severe ante-partum haemorrhage. The lie was transverse. A Type 1 posterior placenta praevia was found at operation.

Case 109

This diabetic patient developed severe pre-eclamptic toxæmia at the 33rd week which did not respond at all to sedation.

Result of Pregnancy in Cases with a Smaller-than-Expected Uterus

As already stated, 26 of the 120 patients in the series (22.5 per cent) were noted at some part of their pregnancies to have a smaller-than-expected uterus for the duration of amenorrhoea.

So that Tables 17, 18 and 19 which refer to various findings in relation to the duration of pregnancy

- (a) at the first visit to the special clinic
- (b) when the smaller-than-expected uterus was noted
- (c) when ferning, if present, was noted
- (d) when abortion threatened in certain cases
- (e) when pregnancy terminated

may again be consulted and continuity maintained, the patients have again been sub-divided into 3 groups depending on whether the uterus was first noted to be smaller-than-expected in the 1st, 2nd or 3rd trimester of pregnancy.

The result of pregnancy in these cases is seen in Tables 47 (Group I), 48 (Group II) and 49 (Group III). The total number of pregnancies previously undertaken by these patients was 90, 67 of which ended in abortion, giving an abortion rate of 74.4 per cent. One abortion occurred in the present series

in group I (Case 74) and another patient in group II delivered a live child at the 26th week of pregnancy (Case 70). This child died after 14 hours.

For the purpose of calculation of a new overall abortion rate this case of neonatal death is included as an abortion.

The new overall abortion rate for these patients is 59.4 per cent.

Abortion rate for this series = 7.6 per cent

Previous abortion rate = 74.4 per cent

New abortion rate = 59.4 per cent

There is a statistically significant difference between the previous and the new abortion rates.

Ferning of the cervical mucus was noted in 23 of the 26 cases, i.e. in 88.4 per cent. This incidence of ferning is not significantly different from that of the whole series (82.5 per cent).

Threatened abortion occurred in 12 cases (5 in group I, 2 in group II and 5 in group III).

The incidence of threatened abortion in the group of patients with a smaller-than-expected uterus at some point in their pregnancies was thus 46.1 per cent.

The overall incidence of threatened abortion in the series of 120 was 42 per cent and these 2 results are not significantly different. If, however, the 26 patients in whom the uterus was smaller-than-expected are removed from the main series we find that the incidence of threatened abortion in cases where the uterine size was in accordance with the duration of amenorrhoea was 40.4 per cent. Again, no statistically significant difference is present.

The placental state is reported in Tables 47, 48 and 49 and the weights of the babies are also shown. The incidence of placental infarction and abnormality and the weights of babies in the whole series and in various groups is reported later in this chapter.

Mental Instability : Result of Pregnancy in Cases
referred to Psychiatrist

It is not possible to report on the result of pregnancy in the cases where psychotherapeutic support was given to the patient merely by attending the special clinic, meeting the other patients or by the rapport developed between the patient and nursing or medical staff at the clinic. In many cases this support was incidental or inadvertent. It certainly was not measurable.

The result of pregnancy in the 6 cases seen by a psychiatrist is seen in Table 50.

Since only 4 patients were included in this group (2 of them being included twice in the table), the sample is very small indeed and no valid conclusions can be reached. One abortion occurred in this series and this patient (Case 45) subsequently had a successful pregnancy.

The calculation of the previous abortion rate in this group is from Cases 16, 66, 89 and 105. These patients had a total of 19 previous pregnancies, 13 of which had ended in abortion, an abortion rate of 68.4 per cent. The new overall abortion rate was 56.5 per cent.

Incidence of Previous Gynaecological Operations in the Series
and Result of Pregnancy in these Cases

From Table 5 it is seen that 5 of the 109 patients in the series gave a history of having had a previous gynaecological operation excluding diagnostic curettage and tubal insufflation - an incidence of 4.58 per cent. Table 51 shows the result of pregnancy in these cases, the type of operation performed and whether ferning of the cervical mucus was a feature. A more detailed summary of each case is given below although some of the cases have already been summarised under different headings.

These 5 patients had a previous history of 19 pregnancies, 16 of which had ended in abortion, giving an abortion rate of 84.5 per cent. All the pregnancies in the present series were successful, thus giving a new overall rate of 66.6 per cent.

Ferning of the cervical mucus was present in 3 of the 5 cases but as seen from Table 51 both the duration and time of onset were different in each case.

Case 21 : 40 years : parity 1 + 9

The duration of her previous pregnancies was 12, 6, 12, 12, 12, 20, 30, 6 and 20 weeks respectively. After the 3rd abortion, trachelorrhaphy was performed and again after the 5th abortion. Her 8th pregnancy, the first successful

one, ended in premature delivery at the 30th week. She had been in bed in hospital for the preceding 24 weeks and had had a progesterone implant. She was seen at the 7th week of her 11th pregnancy. A cervical suture was inserted at the 18th week. She remained in hospital for 9 days. She was readmitted with vaginal bleeding at the 31st week. Bleeding continued intermittently. At the 38th week the suture was removed under anaesthesia, a central placenta praevia was found and caesarean section was performed. The placenta was adherent and removed piecemeal. The child, a male weighing 6 pounds 4 ounces (2840 G.) was limp at birth but responded to resuscitation.

Case 37 : 27 years : parity 0 + 3

The duration of her previous pregnancies (all in U.S.A.) was 6, 10 and 13 weeks respectively. A year after the first abortion, laparotomy was performed and a chocolate cyst removed from the right ovary. Her appendix was also removed. Her next 2 pregnancies ended in abortion and 1 year after the last abortion laparotomy was again performed. This time the left ovary was removed because of endometriosis and a bilateral salpingostomy performed. There were apparently many adhesions in the pelvis. She then came to this country with her husband who was in the U.S. Navy and 10 months after

her last laparotomy attended the special clinic at the 12th week of her 4th pregnancy. Ferning was seen at the 13th, 15th, 16th and 17th weeks and 7 injections of 250 mg. 17 α -hydroxy progesterone caproate were given. The pregnancy progressed without incident. She went into labour spontaneously at the 38th week and was delivered of an active male child weighing 7 pounds 10 ounces (3460 G.). The placenta appeared normal and weighed 1 pound 2 $\frac{1}{2}$ ounces (510 G.).

Case 50 : 33 years : parity 0 + 1

The previous pregnancy ended in abortion at the 12th week. At this time she had been married for 2 years and contraception had not been practised. She failed to become pregnant again and in 1962, 3 years after the abortion, she had a myomectomy and Gilliam sling operation performed. The fibroid was apparently situated at the uterine fundus and was about 2 inches in diameter. Two years later she again became pregnant and attended the clinic at the 9th week. The uterus was retroposed but corrected spontaneously to a position of anteversion by the 11th week. Ferning was noted at the 11th, 13th, 16th, 17th and 26th weeks of pregnancy. The uterus seemed smaller-than-expected from the 17th to 39th

weeks of pregnancy (Tables 18 and 19). She was admitted in labour at the 39th week of pregnancy but labour failed to become properly established and caesarean section was performed after 24 hours. A live male child weighing 5 pounds 14 ounces (2665 G.) was delivered. The placenta was markedly infarcted.

Case 59 : 36 years : para 2 + 0

The duration of the previous pregnancies was 37 and 36 weeks respectively. Both babies had died, the first a female weighing 4 pounds 5 ounces (1960 G.), after 24 hours, and the second, a male weighing 4 pounds (1830 G.) on the 3rd day after birth. Prior to these 2 pregnancies and after 7 years of infertile marriage the patient had an operation for removal of a simple ovarian cyst in 1958. The 2 unsuccessful pregnancies were in 1960 and 1962. She was found to have a positive Wassermann Reaction and in the first pregnancy was fully investigated. The impression was that the result was a false positive but a course of penicillin was given. This course was repeated in the second pregnancy. She attended the clinic at the 24th week of the 3rd pregnancy in September 1964. As already reported, the Wassermann and Khan Reactions and Reiter Test were positive. A further course of penicillin was given. Fœtting was noted at the 24th, 25th, 28th, 30th, 31st and 35th weeks of pregnancy and

9 injections of 250 mg. 17 α -hydroxy progesterone caproate were given. The uterus was noted to be tense and contractile at the 30th week. Pre-eclamptic toxæmia developed at the 36th week and elective caesarean section was performed at the 37th week, an active male child weighing 5 pounds 13 ounces (2635 G.) being delivered. The placenta was markedly infarcted. Both ovaries were seen to contain numerous small cysts. The baby progressed satisfactorily and when examined later at the paediatric out-patient clinic the Wassermann Reaction was negative. No signs of congenital syphilis were present.

Case 67 : 33 years : para 0 + 3

The duration of the previous pregnancies was 10, 12 and 16 weeks respectively. Several months after the 3rd abortion she was admitted to hospital for removal of a right-sided ovarian cyst. At operation a right oophorectomy was performed, a dermoid cyst being present. Four years later she became pregnant for the 4th time and attended the clinic at the 18th week. Ferning was not noted at any time. She was extremely nervous and unstable. Pre-eclamptic toxæmia developed at the 31st week and she was admitted to hospital where she remained until labour was induced at the 37th week

because of continuing pre-eclamptic toxemia. An outlet forceps delivery was performed. The child, a female weighing 5 pounds $4\frac{1}{2}$ ounces (2383 G.), was active at birth. The placenta weighed 15 ounces (424 G.). Only a few small infarcts were seen.

Result of Pregnancy in Cases where Threatened Abortion Occurred

There were 51 cases where abortion threatened and vaginal bleeding occurred in the series of 120. The result of pregnancy in these cases is seen in Table 52.

The total number of previous pregnancies undertaken by the 51 patients who threatened to abort was 189 of which 144 ended in abortion, giving a previous abortion rate of 76 per cent. There were 7 abortions in this series.

<u>Abortion rate for series</u>	=	13.7 per cent
<u>Previous abortion rate</u>	=	76 per cent
<u>New overall abortion rate</u>	=	63 per cent

These abortion rates are significantly different on statistical analysis.

The 4 sub-groups in Table 52 are too small for statistical analysis to be of much value but the difference in final success rate between those successfully treated at home before attending the clinic (100 per cent) and the success rate in those who developed threatened abortion while therapy had been started at the special clinic (59 per cent) is interesting. Both groups had the same incidence of progesterone deficiency. Perhaps the dosage of 17 α -hydroxy progesterone caproate was inadequate in the latter group.

Incidence of Pre-eclamptic Toxaemia and its Association
with Farning of the Cervical Mucus

In this series pre-eclamptic toxaemia was noted in 20 of the 120 cases, an incidence of 16.6 per cent. Of these 20 cases of pre-eclampsia, the toxaemia was moderately severe or severe in only 8 (6.6 per cent of series). The incidence and severity of the toxaemia is noted in Table 53.

The general incidence of pre-eclamptic toxaemia in the Greenock area in 1966 was 8.8 per cent. Of 1000 consecutive cases attending the antenatal clinics, 88 patients developed some degree of pre-eclampsia. The degree of severity was: mild - 3 per cent; moderate 3.8 per cent; severe - 2 per cent. Thus the incidence of moderately severe and severe cases of pre-eclamptic toxaemia was 5.8 per cent. There is no significant difference in the incidence of the more severe forms of the disease in the series or in the local pregnant population. It is quite possible that the difference in incidence of mild degrees of toxaemia is explained by the very close observation to which the patients in the abortion-prone series were subjected.

Farning of the cervical mucus was present in all but 2 of the cases of pre-eclampsia in this series, an incidence of 90 per cent. One case (Case 43) was given injections of

17 α -hydroxy progesterone caproate because of threatened abortion. In the 100 non-toxaemic cases in the series, ferning was present in 81 cases (81 per cent). There is no significant difference in the incidence of ferning of the cervical mucus in the toxaemic and non-toxaemic groups in this series.

Tables 53 and 54 show the duration and time of first occurrence of ferning of the cervical mucus in relation to the severity of pre-eclamptic toxaemia. In the 12 cases of mild pre-eclamptic toxaemia, ferning of the cervical mucus was present in 11. In 6 cases it was present only in the 1st trimester and in only 1 case was it present throughout pregnancy. In the 8 cases of moderately severe and severe pre-eclampsia, ferning was present in 7 cases and generally was of longer duration than in the mild cases. The sample is small however and no statistically valid conclusions can be made. Nevertheless, there did seem to be a trend towards ferning being of shorter duration in the milder cases.

Incidence of Accidental Haemorrhage and its Relation
to Ferning of the Cervical Mucus

In this series, severe accidental haemorrhage occurred in 5 of the 120 cases, an incidence of 4.16 per cent.

The incidence of severe accidental haemorrhage in 1000 consecutive cases admitted to the Rankin Memorial Hospital, Greenock, in 1966 was 0.2 per cent. There is a significantly increased incidence of accidental haemorrhage in this series of abortion-prone patients.

From Table 55 it is seen that ferning of the cervical mucus was a feature in 3 of the cases of accidental haemorrhage and a cervical suture was inserted in 2 of the cases. The sample is too small for any valid conclusions to be made regarding the incidence of ferning of the cervical mucus and/or cervical incompetence in cases which develop accidental haemorrhage. It is also seen that pre-eclamptic toxæmia was present in only 1 of the 5 cases of accidental haemorrhage.

Incidence of Premature Labour and/or Delivery in the Series

For convenience, the spontaneous onset of labour before the 38th week of pregnancy was considered as premature. In most cases which progressed beyond the 38th week, labour was induced at or before term because the author believed that placental insufficiency was present in many of these pregnancies. In relation to this, the state of the placenta and weights of the babies delivered is reported later in this chapter.

All cases delivered before the 38th week are reported regardless of the weight of the child. A proportion of the babies delivered after the 38th week were premature by weight.

Table 56 shows the number of cases of premature labour in the series, along with any associated ferning of the cervical mucus, presence of cervical incompetence, whether labour was induced and the method of delivery. From this table it is noted that caesarean section was performed in 4 cases to effect elective premature delivery and labour was induced in 1 case.

Twenty-three cases were delivered before the 38th week of pregnancy, 19.1 per cent of the whole series. Of these, the onset of labour was spontaneous and uncomplicated by accidental haemorrhage in 14 cases, 11.6 per cent of the total number of cases in the series. When the 4 cases of

accidental haemorrhage are included, the incidence of spontaneous premature labour and/or delivery is 15 per cent.

It should be noted that the number of babies weighing 5 pounds 8 ounces (2500 G.) or less -- and including one set of twins -- was 13, thus giving a true incidence of prematurity for this group of premature deliveries of 56.5 per cent. In other words, just over half of the babies born before the 38th week were premature by weight.

Placental infarction was noted in 15 of the 23 cases (65.1 per cent) and in 8 of the 13 cases of premature-by-weight babies (61.5 per cent).

Foetal Loss

There were 2 abnormal babies -- one anencephalic and one hydrocephalic -- in this group.

The remaining 2 stillbirths in the group were associated with accidental haemorrhage at the 32nd and 30th weeks respectively.

In addition to the cases tabulated, there were 2 cases where neonatal death occurred owing to prematurity but both of these deliveries took place at the 26th week of pregnancy (Cases 56 and 70) and it was thought reasonable to exclude them from this group.

Previous Incidence of Prematurity

The 109 patients in the series of 120 cases had previously had 118 pregnancies which reached viability. Of the 118 viable pregnancies, 15 (12.7 per cent) ended in delivery before the 38th week of pregnancy. In the present series 112 pregnancies reached viability and 23 of these ended in delivery before the 38th week (20.5 per cent). To discover whether the incidence of premature delivery was different in these 23 cases from before, their previous pregnancies were studied. The 23 cases had a previous total of 35 viable pregnancies, 6 of which had ended before the 38th week (17.1 per cent).

A. Incidence of prematurity in previous viable pregnancies in whole series	<u>12.7 per cent</u>
B. Incidence of prematurity in viable pregnancies in present series	<u>20.5 per cent</u>
C. Incidence of prematurity in previous viable pregnancies of 23 cases of prematurity in present series	<u>17.1 per cent</u>

There is no difference statistically between (1) A and B or (2) B and C.

Perinatal Mortality in Premature Deliveries

In the 15 cases of premature delivery which occurred in 118 previous pregnancies in the whole series, there were 6 cases of stillbirth or neonatal death. In the 6 cases of premature delivery which occurred in the 35 previous viable pregnancies of the 23 patients who had premature deliveries in the present series, 3 resulted in stillbirth or neonatal death.

Owing to deficiencies and inaccessibility of some of the previous records, it has not been possible to estimate accurately the number of previous spontaneous premature labours as opposed to induced labour, nor has it been possible to ascertain the incidence of accidental haemorrhage but an analysis of the foregoing results shows the perinatal mortality in the 3 groups to be as follows:

Perinatal mortality rate in 15 premature deliveries which occurred in 118 previous viable pregnancies	<u>40.0 per cent</u>
Perinatal mortality in 6 premature deliveries which occurred in 35 previous viable pregnancies of present premature group	<u>50.0 per cent</u>
Perinatal mortality in 23 premature deliveries of present series	<u>17.3 per cent</u>

In spite of these apparent differences, no statistical difference in variation between the 3 groups is present.

Perinatal Mortality in Series of 120 Abortion-Prone Cases

There were 6 stillbirths and 3 neonatal deaths in the series, thus giving a perinatal mortality of 7.5 per cent. There were, as already stated, 109 patients in the series of 120 cases. The total number of previous pregnancies undertaken by these patients was 420 of which 14 resulted in either stillbirth or neonatal death - a previous perinatal mortality of 3.3 per cent.

The new overall perinatal mortality rate for these patients was 4.26 per cent ($\frac{14 + 9}{420 + 120} \times 100$). There is no significant difference between the previous perinatal mortality rate and the new overall rate but there is a significant difference in the rate of 7.5 per cent for this series and the previous rate of 3.3 per cent.

In acknowledging this increased rate, attention must be paid to the much greater difference in abortion rates.

Table 57 shows the cause of stillbirth or neonatal death in the series and also shows whether or not ferning of the cervical mucus was present. Summaries of most of the cases have already been given under various headings but once more brief summaries are given so that reference to Table 57 may be simplified.

Case 8 : 23 years : para 1 + 1 : Threatened abortion at 14th week. Cervical suture inserted at 25th week, removed at 39th week and followed next day by severe concealed accidental haemorrhage. No symptoms or signs of pre-eclamptic toxæmia. No ferning of cervical mucus.

Case 26 : 32 years : para 4 + 7 : Uterus small for dates (Table 17). Cervical suture inserted at 19th week. Mixed accidental haemorrhage and premature labour at 32nd week. No symptoms or signs of pre-eclamptic toxæmia. Ferning of cervical mucus from 13th to 29th weeks. Ten injections of 17 α -hydroxy progesterone caproate given.

Case 40 : 36 years : para 2 + 3 : Uterus retroverted at 9th and 10th weeks but corrected spontaneously by 11th week. Admitted to hospital at 36th week because of unstable lie. Foetal heart beat present until 2 weeks before term. Macerated foetus delivered at 39th week. Apart from placental infarction, there was no abnormality. No symptoms or signs of pre-eclamptic toxæmia. Ferning seen only at 9th and 10th weeks, and 3 injections of 17 α -hydroxy progesterone caproate given.

Case 54 : 38 years : para 4 + 3 : The uterus seemed large for the duration of amenorrhoea throughout the pregnancy. Seen first at 11 weeks - uterus palpable abdominally. At 13 weeks' duration the uterus was 16 weeks size. At 27 weeks' duration hydramnios noted. At 29 weeks x-ray showed poorly calcified foetal skull. Amniocentesis was performed at 34 weeks owing to increasing hydramnios. Labour started spontaneously at the 37th week. The presentation was breech. The foetal heart beat stopped

during labour. Perforation of cranium had to be performed to allow delivery of the hydrocephalic foetus. Ferning was seen at 12th, 14th, 19th, 20th, 25th, 27th, 28th, 29th and 32nd weeks. Eleven injections were given - none after the 29th week.

Case 56 : 40 years : para 0 + 3 : The 3 previous pregnancies ended in abortion at the 12th, 21st and 23rd weeks respectively. First seen at 9th week and progressed normally until 19th week when abortion threatened. She was admitted to hospital and bleeding continued intermittently for the next 3 weeks. Ferning was seen at the 10th, 15th, 16th, 17th and 18th weeks but bleeding recurred at the 25th week and continued until the 26th week when labour became established. The child died after 26 hours.

Case 69 : 22 years : para 2 + 0 : The 2 previous pregnancies ended at the 30th and 26th or 28th weeks respectively. The first child survived; the second child was macerated. First seen at 29th week. Ferning was seen at the 32nd and 33rd weeks and 3 injections of 250 mg. 17 α -hydroxy progesterone caproate were given. Labour began at the 34th week and a stillborn anencephalic female foetus was delivered.

Case 70 : 23 years : para 1 + 3 : The previous pregnancies ended at the 8th, 40th, 24th and 16th weeks respectively. First seen at 5th week. Ferning present at 5th, 6th, 9th, 10th, 12th, 14th, 15th, 16th, 19th and 20th weeks and 18 injections of 250 mg. 17 α -hydroxy progesterone caproate were given. There was slight bleeding at the 23rd week. The uterus was noted to be smaller-than-

expected for the duration of amenorrhoea from the 16th to the 22nd week of pregnancy (Table 18). Labour began spontaneously at the 26th week. The baby survived for only 14 hours. See notes on follow-up cases - page 222.

Case 78 : 22 years : para 0 + 2 : The previous pregnancies ended at 24 weeks and 7 weeks respectively. First seen at 13th week. Ferning was present at the 13th, 14th, 20th, 22nd and 25th weeks and 6 injections of 17 α -hydroxy progesterone caproate were given. The pregnancy progressed without incident and at term labour was induced by artificial rupture of the membranes. Labour was established within 5 hours of the membranes being ruptured and progressed quickly. Meconium staining of the liquor amnii was noted when the cervix was half dilated and there was transient slowing of the foetal heart rate to 110 beats per minute from 140 per minute. Just before the cervix was fully dilated the foetal heart beat was reported to have stopped. A fresh stillborn female child was delivered. Apart from some calcification, the placenta appeared normal. The duration of labour was: 1st stage - 7 hours; 2nd stage - 30 minutes. A post mortem examination revealed no abnormality in the foetus and death was due to unexplained intra-uterine asphyxia.

Case 117 : 38 years : para + : The previous pregnancies ended at the 40th, 8th, 8th, 8th, 8th, 20th, 18th and 24th weeks respectively. First seen at the 13th week when admitted to hospital because of threatened abortion. Three injections of 250 mg. 17 α -hydroxy progesterone

caproate were given and the bleeding settled. She went home at the 15th week but was readmitted at the 16th week with further bleeding which settled after 4 injections of 17 α -hydroxy progesterone caproate in the next 10 days. She was again discharged after 2 weeks and there was no further bleeding. Ferning of the cervical mucus was seen at the 20th, 21st, 23rd and 24th weeks and was not seen again although the cervical mucus was examined at weekly intervals. She was readmitted to hospital at the 30th week with a mixed accidental haemorrhage. Labour started soon after admission and she was delivered of a male child which survived for only a few hours. The placenta was infarcted and weighed 9 ounces.

The causes of stillbirth and neonatal death in the series were thus:

Stillbirths

Foetal abnormality	2
Concealed accidental haemorrhage - asphyxia	1
Mixed accidental haemorrhage - asphyxia - prematurity	1
Unexplained intra-uterine death	
(a) before labour	
(? placental insufficiency)	1
(b) during labour	1

Neonatal Deaths

Prematurity (1 associated with
accidental haemorrhage)

3

It is also noted that accidental haemorrhage was a
feature in 3 of the 9 cases of stillbirth or neonatal death.

Incidence of Foetal Abnormality

Abnormalities of the foetus were present in 5 of the 112 cases in the series where the pregnancy reached viability. The incidence of foetal abnormality was thus 4.4 per cent. The products of conception were examined macroscopically in the 8 cases which aborted. In 4 of these (Cases 41, 16, 74 and 98) abortion occurred after the 16th week and in each case the foetus seemed to be normal. In the remaining 4 cases of abortion the sac was seen in only one (Case 102). There was no recognisable foetus within the sac and a diagnosis of blighted ovum was made.

The foetal abnormalities found in the series were:

Anencephalus	1
Hydrocephalus	1
Hypospadias	1
Talipes	2

Thus, in only 2 cases in the series was there an abnormality which was incompatible with survival of the foetus.

Ferning of the cervical mucus was seen in 4 of the 5 cases. In Cases 4 and 105 (both delivered babies with unilateral talipes), it was present on only one occasion and in Case 69 (anencephalus) it was present only at the 32nd and 33rd weeks. Thus there was persistent and marked ferning

in only one of the cases of foetal abnormality (Case 54 - hydrocephalus). In this case ferning was noted at the 12th, 14th, 19th, 22nd, 25th, 27th, 28th, 29th and 32nd weeks of the pregnancy.

These findings are summarised in Table 58.

Placental Infarction and Calcification

The placenta was noted to be infarcted in many of the cases in the series. Unfortunately, owing to oversight on some occasions at delivery the presence or absence of infarction of the placenta was not noted in all the cases. The author inspected most of the available placentae personally and in the few cases where this was not possible but where a note of the placental state was made, the placenta was inspected by a senior member of the nursing or medical staff.

(The placentae were weighed as soon after delivery as possible but in cases of delay in weighing the result was ignored since fluid loss is rapid and the weights would thus have been inaccurate).

Total number of placentae	112
Number of cases in which placental state noted	86
Number of cases in which infarction noted	55
Number of cases where the placenta was noted to be healthy	31

Even if the placenta was healthy in the 26 cases where no note was made, the incidence of placental infarction in the series was at least 49.1 per cent. It should be stated

that this was a moderate or major degree of white infarction, the presence of only one or two small areas of infarction being ignored for the purposes of this record.

A record was also kept of any major degree of calcification present. This was seen in 7 cases and was associated with infarction in 2 of the cases.

Ferning and Placental Infarction

Ferning of the cervical mucus was present in 46 of the 55 cases in which placental infarction was noted - a ferning incidence of 83.6 per cent.

Ferning of the cervical mucus was present in 29 of the 31 cases where the placenta was noted to be healthy, and in 18 of the 26 cases where no note of the placental state was available. If these 18 cases are regarded as having had normal placentae, the incidence of ferning in 57 cases of presumed healthy placentae was 82.4 per cent.

There was no significant difference in the incidence of ferning in cases where the placenta was infarcted and in those where the placenta was presumed to be healthy.

Placental Abnormalities excluding Infarction

A number of abnormalities of development and position of the placenta was noted in the 112 cases which reached viability. Table 60 shows the incidence of the various conditions which were noted.

Placenta Praevia

Placenta praevia was noted in 3 cases (Cases 21, 26 and 76). The true incidence may have been greater as Type 1 placenta praevia may not have been diagnosed in some cases.

Case 21 : 40 years : para 1 + 2 : (Summarised already under

sections on cervical suture). She had 7 pregnancies ending in abortion between the 6th and 20th week. In her 8th pregnancy she entered hospital at the 6th week and remained in bed for 6 months. A progesterone implant was inserted at the 8th week. This pregnancy ended in premature labour at the 30th week. The child survived. She then had 2 more abortions at the 6th and 20th weeks of pregnancy and was seen at the special clinic at the 7th week of her 11th pregnancy.

No ferning of the cervical mucus was seen but a cervical suture was inserted at the 17th week. Vaginal bleeding occurred later in the pregnancy and she was admitted to hospital at the 28th week. Bleeding continued intermittently until the 38th week when the suture was removed under general anaesthesia. She was found to have a central placenta praevia and a live child weighing 6 pounds 4 ounces (2840 G.) was delivered by caesarean section.

Case 26 : 32 years : para 4 + 7 : (Summarised already under sections on cervical suture). Her 7 previous abortions had occurred between the 8th and 24th weeks of pregnancy. Her 6th pregnancy resulted in a stillbirth at term. She had 3 live children, one of whom was a spastic. She was seen at the 13th week of her 12th pregnancy. Ferning of the cervical mucus was noted intermittently until the 29th week. A cervical suture was inserted at the 20th week. At the 32nd week she had sudden vaginal bleeding and pain in the uterus, and labour began spontaneously. There was a Type II placenta praevia and also accidental haemorrhage with a retro-placental clot. The child weighed 2 pounds 14 ounces (1300 G.) and was stillborn.

Case 76 : 36 years : para 3 + 3 : (Already summarised under section on uterine anomalies). The duration of her previous pregnancies was 40, 40, 6, 40, 26 and 16 weeks respectively. She was seen at the 8th week of her 7th pregnancy. Ferning of the cervical mucus was present intermittently until the 29th week. She threatened to abort at the 10th and 14th weeks and was admitted to hospital for about 2 weeks on each occasion. There was further bleeding at the 31st week and she was again admitted. Bleeding was slight but continued intermittently over the next few weeks. There was heavier bleeding at the 37th week. The lie was transverse. At caesarean section she was found to have a Type I posterior placenta praevia. The upper part of the placenta was situated in the left horn of the uterus. The child was alive and weighed 6 pounds 14 ounces (3120 G.).

Placenta Circumvallata

A gross degree of circumvallate placenta was noted in 4 cases. Brief summaries of these cases are given below:

Case 31 : 30 years : para 1 + 4 : (Previously discussed in section on smaller-than-expected uterus and included in Table 19). Her previous pregnancies had terminated at 40, 8, 6, 6 and 8 weeks respectively. She was first seen at the special clinic at the 6th week of her 6th pregnancy. Ferning of the cervical mucus was present at the 6th, 9th, 13th, 14th, 15th, 16th, 17th and 18th weeks. There was very slight vaginal blood-staining on one occasion in the 11th week. The uterus was smaller-than-expected from the 28th week onwards and pre-eclampsia developed at the 37th week. Labour was induced at the 39th week and a live female child weighing 5 pounds 11 ounces (2580 G.) was delivered. The placenta was circumvallate and weighed 1 pound (454 G.).

Case 36 : 33 years : para 1 + 3 : (Previously discussed in section on smaller-than-expected uterus and included in Table 18). Her previous pregnancies had terminated at 12, 12, 40 and 12 weeks respectively. A cervical suture had been inserted in her 3rd pregnancy. She attended the clinic at the 6th week of her 5th pregnancy. Ferning of the cervical mucus was noted at the 6th, 7th, 11th, 14th, 15th, 19th, 20th, 24th, 28th, 29th and 30th weeks. The uterus was noted to be smaller-than-expected from the 23rd to the 32nd weeks. At the 32nd week the cervix prolapsed beyond the introitus and she was admitted for rest. There was no bleeding during the

pregnancy. Labour started spontaneously at the 39th week and she had a spontaneous delivery of a live female child weighing 6 pounds 5 ounces (2860 G.). The placenta was markedly infarcted and circumvallate and weighed 1 pound (454 G.).

Case 100 : 32 years : para 2 + 1 : The previous pregnancies had ended at 40, 40 and 12 weeks respectively. The first child died in the neonatal period. She attended the special clinic at the 14th week of her 4th pregnancy. There had been vaginal bleeding at home in the previous 2 weeks but this had settled with rest in bed. Ferning of the cervical mucus was present at the 15th, 16th, 20th, 25th, 26th, 27th and 30th weeks. There was slight vaginal bleeding at the 33rd to 34th weeks and she was admitted to hospital. Examination under anaesthesia at the 38th week failed to reveal evidence of placenta praevia and the membranes were ruptured. Labour quickly ensued and she was delivered of a live male child weighing 7 pounds (3180 G.). The placenta weighed 1 pound 2 ounces (510 G.) and was markedly infarcted and circumvallate.

Case 119 : 24 years : para 0 + 5 : The previous pregnancies ended at 8, 6, 6, 10 and 24 weeks respectively. She had attended the special clinic in the 4th and 5th pregnancies (Cases 58 and 74). She was seen at the 6th week of the 6th pregnancy. Ferning was noted at the 7th, 13th, 19th and 22nd weeks. From time to time the uterus seemed tense on abdominal palpation, particularly from the 18th to the 21st weeks. The pregnancy progressed satisfactorily and the membranes were ruptured

artificially at term. Meconium stained liquor was obtained and as she failed to go into labour within 12 hours and in view of her previous history, caesarean section was performed. A live female child weighing 7 pounds 4 ounces (3290 G.) was delivered. The placenta was markedly circumvallate and weighed 1 pound 2 ounces (510 G.).

Velamentous Insertion of Umbilical Cord

A velamentous insertion of the umbilical cord was seen in 2 cases:

Case 3 : 32 years : para 0 + 7 : This patient's previous pregnancies had ended in abortion at 16, 8, 8, 10, 8, 8 and 8 weeks' duration respectively. In her 8th pregnancy ferning was noted from the 8th to the 24th week. Abortion threatened at the 7th week and she was in hospital for 2 weeks. The pregnancy then progressed satisfactorily and labour began spontaneously at the 39th week. She had a spontaneous vertex delivery of a live male child weighing 6 pounds 4 ounces (2837 G.). The placenta weighed 1 pound (454 G.). There was no evidence of infarction.

Case 107 : 29 years : para 0 + 1 : (Previously discussed under section on smaller-than-expected uterus and included in Table 18). The previous pregnancy ended in abortion at the 7th week. The patient was infertile. She attended the special clinic at the 7th week of her 2nd pregnancy. Ferning was not noted at any time. The uterus was noted to be smaller-than-expected from the

14th to the 30th weeks but from then on increased markedly in size and she had a spontaneous vertex delivery of a live male child weighing 8 pounds 13 ounces (4000 G.). The placenta was healthy and weighed 1 pound 11 ounces (764 G.).

Battledore Insertion of Umbilical Cord

There was a battledore insertion of the umbilical cord in 1 case:

Case 103 : 38 years : para 0 + 2 : The previous pregnancies had ended in abortion at the 10th week. She had attended the clinic when pregnant for the 2nd time and ferning of the cervical mucus was seen at the 8th week. The sac was inspected when she aborted and there was no evidence of a foetus. She had been infertile for 12 years before the 1st pregnancy. She was seen at the clinic at the 6th week of her 3rd pregnancy. Ferning was seen at the 9th and 13th weeks. The pregnancy progressed without incident and the membranes were ruptured artificially at term. Foetal distress developed in the 2nd stage of labour and she was delivered by forceps of a live male child weighing 7 pounds 3 ounces (3260 G.). The placenta was healthy and weighed 1 pound 7 ounces (650 G.).

Succenturiate Lobe

Placenta succenturiata was noted in 1 case:

Case 5 : 26 years : para 0 + 5 : The previous pregnancies had ended in abortion between the 7th and 12th weeks. She was admitted to hospital at the 11th week of her 6th pregnancy because of threatened abortion, and remained in hospital until the 16th week. Fœtling was not seen at any time. The pregnancy progressed satisfactorily and she was delivered at term of a live female child weighing 5 pounds 12 ounces (2610 G.). The placenta was small and infarcted and there was a succenturiate lobe. The placental weight was not recorded.

A summary of some of the associated findings in cases where there was an abnormality of the placenta is seen in Table 59. There was a total of 11 cases of noted abnormality in the 86 cases where the state of the placenta was recorded. This gives an incidence of 12.7 per cent but this may be a falsely high figure as the placental state was not recorded in 26 cases. The true incidence of placental abnormality in this series thus lay somewhere between 9.8 per cent and 12.7 per cent.

The various types of abnormality did not occur often enough in the series for any statistical significance to be attached to the associated findings but it may be noted that

ferning of the cervical mucus was present in all cases of circumvallate placenta and was of 12 to 24 weeks' duration. Threatened abortion occurred in 2 cases of circumvallata but in 1 of the cases the bleeding was very slight and did not last for more than about 1 hour.

Weights of Babies

All babies were weighed soon after birth. Early in the series it seemed that in many cases the babies born at or near term were smaller than average. Babies born at or after the 38th week were grouped together and for purposes of analysis these deliveries were regarded as mature. Deliveries prior to 38 weeks were regarded as premature. Seventy-one patients with ferning of the cervical mucus were delivered at or after 38 weeks' maturity. Fourteen patients who did not have ferning of the cervical mucus were delivered at or after 38 weeks' maturity. The weight distribution of babies born to these patients is approximately the same.

Weight Interval	71 Patients with Ferning	14 Patients with no Ferning
4 lb. (1816 G.) - 5 lb. 7 oz. (2466 G.)	6 (8.4%)	1 (7.1%)
5 lb. 8 oz. (2500 G.) - 6 lb. 15 oz. (3150 G.)	38 (53.5%)	7 (50%)
7 lb. (3180 G.) - 8 lb. 7 oz. (3830 G.)	22 (30.9%)	5 (35.7%)
8 lb. 8 oz. or over (3860 G.)	5 (7%)	1 (7.1%)

The weights of babies born within 2 weeks of term to patients with ferning of the cervical mucus and of those born to patients in whom ferning was not seen were essentially similar.

So that a comparison could be made with a group of patients who were not abortion-prone, the records of 500 consecutive normal patients were consulted. These patients had been admitted to the Rankin Memorial Hospital, Greenock, for their confinements. Only primigravidae and gravidae 1 and 2 were selected so that the 2 groups would be reasonably similar and these patients did not have a history of abortion, pre-eclamptic toxæmia, ante-partum hæmorrhage, diabetes or any condition which might have had a bearing on the weights of the babies.

Weight Interval	500 Normal Patients No. Per Cent	
4 lb. - 5 lb. 7 oz. (1816 g.) (2466 g.)	14	2.8
5 lb. 8 oz. - 6 lb. 15 oz. (2500 g.) (3150 g.)	116	23.2
7 lb. - 8 lb. 7 oz. (3180 g.) (3830 g.)	273	54.6
8 lb. 8 oz. or over (3860 g.)	97	19.4

A comparison of these results is seen in Table 61. The difference in the distributions of the number of babies against the weight is statistically significant.

The mean weight of babies of abortion-prone mothers	= 6 pounds 13 ounces (3090 G.)
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The mean weight of babies of "normal" mothers	= 7 pounds 9 ounces (3440 G.)
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The difference in these mean weights is statistically significant.

Duration of Labour

A striking finding in this abortion-prone group of patients was the short duration of many of their labours. It has already been noted that many of these patients were particularly apprehensive in the antenatal period and, although the majority were apparently in a more relaxed mental state as the pregnancy progressed, one might have expected a high incidence of prolonged labour or at least that the duration of labour would have been of average length. The low mean weight of babies in the series might have been a contributory factor in the short duration of labour.

When the duration of labour was extracted from all cases of vaginal delivery, it was found that only 2 patients, delivered vaginally, were in labour for over 24 hours - 1

virtual primigravida being delivered after $24\frac{1}{2}$ hours and a gravida 1 + 2 being delivered after 25 hours 15 minutes. Caesarean section was performed in 1 case for prolonged labour (Case 4, para 0 + 3). In this case the cervix was only 2 finger-breadths dilated after 24 hours. In 1 other case (Case 95, para 0 + 2) foetal distress developed after 20 hours in labour and caesarean section was performed. This last case has been excluded from Table 62 which summarises the duration of labour in the patients delivered vaginally. From this table it is seen that labour was of under 12 hours' duration in 73.8 per cent of cases (in 60.6 per cent of virtual primigravida and 80.3 per cent of multigravid patients).

Method of Delivery

In the series of 112 cases delivered after the 28th week, vaginal delivery was achieved in 86 and caesarean section was performed in 26 cases (23.2 per cent).

Table 63 shows the incidence of spontaneous and assisted vaginal deliveries and caesarean section.

Caesarean Section

The indications for delivery by caesarean section are seen in Table 64. The operation was performed because of the previous history in only 1 case (2 neonatal deaths at the 36th and 37th weeks of pregnancy).

Biological Pregnancy Tests

Some workers excluded from their series of patients with recurrent abortion those with negative biological pregnancy tests (Macdonald, 1963; Govaerts-Videtsky et al., 1965).

When the study was started the routine pregnancy test performed both at Robroyston Hospital and at the Rankin Memorial Hospital was the Aschoim-Zondek Test.

Specimens of urine were not sent from every patient for this test and unfortunately the records of the numbers of tests sent are incomplete. In general, urine was not sent for a pregnancy test if the uterus could be palpated abdominally, unless growth appeared to be retarded. Tests were not performed after 14-15 weeks. The number of negative results recorded was 8 and all proved to be continuing pregnancies. Because the records of these tests are not complete, it is not possible to estimate accurately the incidence of false negative results in this series but it was at least 10 per cent and almost certainly a good deal greater. Table 65 shows the cases in which the pregnancy test was reported negative and the result of the pregnancy. It is seen that ferning of the cervical mucus was not a constant factor either in presence or duration in these cases.

Admission to Hospital

One of the aims when the series was started was to discover if the abortion-prone patient could be managed successfully without her spending prolonged periods resting in a hospital bed. In general these patients were not admitted to hospital because of their previous obstetric history but only if some intervening complication of pregnancy necessitated admission.

Duration of Stay in Hospital

Of the patients in this series of 120 cases, 43 (35.8 per cent) were admitted to hospital during the first 2 trimesters for various reasons. The remaining 77 were not admitted until later in the pregnancies, either because of late obstetric complications of pregnancy or for delivery.

Of the 43 patients admitted in the first 2 trimesters, 5 were admitted on more than 1 occasion. The main indication for admission to hospital was threatened abortion.

The reasons for admission are as follows:

Threatened abortion	26 (includes 3 who had cervical suture)
Insertion of cervical suture	6
Rest and observation	5
Mental instability	3
Hyperemesis	1
Urinary infection	1
Acute appendicitis	1

The total number of admissions to hospital in this group of 43 patients was 50 and the average stay in hospital on each occasion was 16.5 days. The shortest stay was 3 days and the longest was 60 days.

Summary

Just over one-third of the cases in this series of 120 patients spent an average of a little over 2 weeks in hospital in the first 2 trimesters of pregnancy. The remaining two-thirds of the cases were not admitted to hospital until in labour, for induction of labour or because of some complication of later pregnancy.

Follow-up Cases

Throughout this study reference has been made to the fact that 109 patients were seen in 120 pregnancies. A comparison of findings in succeeding pregnancies and the results of these pregnancies will now be made. In addition, information is included which was obtained from a simple questionnaire sent to patients 1 year after they had successfully or otherwise completed a pregnancy.

In all, 28 patients became pregnant again. Three of these patients are still pregnant. The total number of subsequent pregnancies undertaken by these 28 patients is 33. Three patients had 2 further pregnancies and a fourth had 3 pregnancies.

Table 66 shows the treatment given to these 28 patients when they attended the clinic for the first time and the result of the pregnancy. It is seen that 20 patients had ferning of the cervical mucus and were given injections of 17 α -hydroxy progesterone caproate. In addition, 2 patients with ferning also developed cervical incompetence and a cervical suture was inserted. A further 2 patients did not show evidence of ferning but had a cervical suture inserted, and 4 patients had neither ferning of the cervical mucus nor evidence of cervical incompetence. They attended the clinic

at 1 to 2 weekly intervals, however, throughout their pregnancies and 1 of these 4 patients (Case 43) was given 9 injections of 17 α -hydroxy progesterone caproate because of threatened abortion. There were 6 abortions, 2 stillbirths and 1 neonatal death, and 19 successful pregnancies.

All 6 patients who aborted attended the special clinic in their next pregnancy. Five had successful pregnancies but 1 (Case 58) aborted again, although on this occasion the pregnancy continued until the 24th week (her 3 previous pregnancies had ended in abortion in the 1st trimester). She became pregnant for the 5th time, attended the special clinic and this time there was a successful outcome.

A brief summary of the subsequent pregnancies undertaken by these 28 patients is given below. These findings may be compared with those of the pregnancies during the patient's first attendance at the special clinic as seen in Table 66.

Subsequent Pregnancies

- Case 4 : 1. No antenatal care. Aborted at 6 weeks.
 2. Attended special clinic at 6th week (Case 30).
 Ferning at 7th and 9th weeks. Three injections
 of 17 α -hydroxy progesterone caproate. Success.
- Case 5 : 1. Attended another antenatal clinic. No special
 treatment. Success.
- Case 7 : 1. Attended another clinic. Cervical suture
 inserted. Success.

Subsequent Pregnancies

- Case 8 : 1. Attended another clinic. Cervical suture inserted. Success.
- Case 12 : 1. Attended another clinic. No special treatment. Premature stillbirth.
- Case 13 : 1. Attended special clinic (Case 77). Fernald from 6th to 37th weeks. 56 injections of 17 α -hydroxy progesterone caproate. Success.
- Case 14 : 1. No antenatal care. Aborted at 14th week.
- Case 15 : 1. Attended another clinic. Injections of 17 α -hydroxy progesterone caproate given empirically and cervical suture inserted. Success.
- Case 19 : 1. No antenatal care. Aborted at 14 weeks.
- Case 32 : 1. Attended general practitioner. Injections of 17 α -hydroxy progesterone caproate given empirically. Success.
- Case 34 : 1. Attended special clinic. Fernald present from 8th week. Having injections of 17 α -hydroxy progesterone caproate. Now 6 months pregnant.
- Case 40 : 1. No antenatal care. Aborted at 10th week.
- Case 41 : 1. Attended special clinic (Case 42). Cervical suture inserted. Success.
2. Attended another clinic. Cervical suture inserted. Success.
- Case 43 : 1. Attended another clinic. No special treatment. Success.

Subsequent Pregnancies

- Case 44 : 1. No antenatal care. Aborted at 12th week.
2. Attended special clinic (Case 106). Ferning from 18th to 33rd week. Eleven injections of 17 α -hydroxy progesterone caproate given. Success.
3. Attended another clinic. Injections given empirically. Success.
- Case 45 : 1. Attended special clinic (Case 89). Ferning from 10th to 36th week. Twenty-five injections of 17 α -hydroxy progesterone caproate given. Psychiatric care. Success.
- Case 46 : 1. Attended special clinic (Case 118). Ferning from 11th to 26th week. Nine injections of 17 α -hydroxy progesterone caproate given. Success.
- Case 49 : 1. Attended special clinic (Case 114). Ferning from 8th to 23rd week. Sixteen injections of 17 α -hydroxy progesterone caproate given. Success.
- Case 58 : 1. Attended special clinic (Case 74). Ferning from 9th to 13th week then threatened to abort. Eleven injections of 17 α -hydroxy progesterone caproate given. Aborted at 24th week.
2. Attended special clinic (Case 119). Ferning from 7th to 22nd week. Seven injections of 17 α -hydroxy progesterone caproate given. Success.

Subsequent Pregnancies

- Case 60 : 1. Attended another clinic. No special treatment. Success.
- Case 62 : 1. Attended special clinic (Case 111). Ferning from 8th to 29th week. Twenty-eight injections of 17α -hydroxy progesterone caproate given. Success.
- Case 63 : 1. Attended special clinic. Ferning seen from 9th to 11th week. Has had 4 injections of 17α -hydroxy progesterone caproate. Now 5 months pregnant.
- Case 67 : 1. Attended special clinic (Case 105). Ferning seen at 13th week and 1 injection of 17α -hydroxy progesterone caproate given. Psychiatric help required. Success.
- Case 70 : 1. Attended another clinic. Injections of 17α -hydroxy progesterone caproate given empirically. Success.
- Case 83 : 1. Attended special clinic. Ferning from 10th to 28th week. Twenty-eight injections of 17α -hydroxy progesterone caproate given. Success.
- Case 85 : 1. Attended special clinic. Ferning from 9th to 13th week. Five injections of 17α -hydroxy progesterone caproate given. Success.
- Case 102 : 1. Attended special clinic (Case 103). Ferning from 9th to 13th week. Five injections of 17α -hydroxy progesterone caproate given. Success.

Subsequent Pregnancies

Case 112 : 1. Attended special clinic. Ferning seen from 11th week. Having injections of 17 α -hydroxy progesterone caproate. Now 18 weeks pregnant.

A summary of these follow-up pregnancies is seen in Table 67. Seventeen pregnancies were followed up at the special clinic. Of these, 1 ended in abortion, 13 were successful and 3 pregnancies are continuing satisfactorily.

Three patients were given injections of 17 α -hydroxy progesterone caproate at other clinics or by their general practitioner and 3 patients had a cervical suture inserted at other hospitals. One patient had a cervical suture and injections of 17 α -hydroxy progesterone caproate at another hospital. These 7 patients had successful pregnancies.

Nine patients either had no antenatal care at all or attended a routine antenatal clinic and did not receive any special care. Five of these patients aborted, 1 had a premature stillbirth and 3 had successful pregnancies.

From Table 67 it is seen that patients in 24 subsequent pregnancies were given special therapy. Of these, 20 were successful, 1 ended in abortion and 3 patients are still pregnant. Since the results of 3 pregnancies are not yet known, although the patients are progressing satisfactorily,

only the 21 completed pregnancies are now considered.

Abortion rate in 21 treated
subsequent pregnancies = 4.76 per cent

Success rate = 95.24 per cent

Abortion rate in 9 untreated
subsequent pregnancies = 55.50 per cent

Success rate = 33.30 per cent

The difference in these 2 success rates is statistically significant.

Of the 17 subsequent pregnancies studied at the special clinic, ferning of the cervical mucus was seen in 16. Ferning had been seen in previous pregnancies in all but 1 (Case 67) of these patients. In another 4 subsequent pregnancies where ferning had previously been noted, the patients attended either another clinic or their general practitioner and injections of 17 α -hydroxy progesterone caproate were given empirically, with a successful result in each case.

In 7 subsequent pregnancies in cases where ferning had previously been noted, no special antenatal treatment was given and there was only 1 successful pregnancy.

The 4 patients who had previously had a cervical suture inserted undertook 4 subsequent pregnancies. A cervical suture was re-inserted in 3 of these patients and each had a successful pregnancy. The remaining patient aborted at the 14th week (Case 19).

DISCUSSION

Predictions of "Spontaneous Cure" Rates

Various predictions have been made about the likelihood of abortion recurring after one or more previous abortions. Malpas (1938) and Eastman (1947) based their predictions on theoretical calculations since proved fallacious (King, 1953; Speert, 1954; Warburton and Fraser, 1959; James, 1962). Warburton and Fraser (1959) and Macnaughton (1964) have also estimated the probability of recurrent abortion and the spontaneous cure rate. Their predictions of a spontaneous cure rate after 3 consecutive abortions are 26 per cent and 42 per cent respectively.

In the calculation of spontaneous cure rates, a series of patients who have been untreated throughout their sequence of abortions must obviously be chosen. This is well-nigh impossible. "No treatment" should mean that the patient did not attend either her general practitioner or an antenatal clinic prior to abortion occurring. While this is quite likely in a first pregnancy if abortion occurred early, it is unlikely as the abortion sequence progresses.

It is difficult to imagine that many women after, say, 2 consecutive spontaneous abortions, would fail to seek advice as early as possible in the 3rd pregnancy and it is the author's impression that, even after 1 abortion, advice is sought on many occasions at an earlier than average stage of pregnancy.

As soon as a woman with a history of preceding abortions or who is anxious about a pregnancy because of even only 1 previous abortion attends her general practitioner or hospital clinic, she is very likely to have a line of treatment prescribed with regard to the pregnancy under consideration. One might accept that these patients could be included in any review of untreated patients if no special advice were given and they were asked to attend a routine antenatal clinic with no more frequent than monthly appointments in the early stages of the pregnancy. This will undoubtedly be the case in some instances but, especially after more than 2 consecutive abortions, most women are at least advised to rest more at home and are seen more frequently by their medical advisers in the early stages. When one antenatal patient is advised to regulate her life in any way differently from the majority of such patients, a certain degree of treatment has been instituted. More frequent visits to her medical adviser should result in a

better doctor/patient relationship and, when this happens, it can be argued that, wittingly or unwittingly, psychological or psychotherapeutic forces are being brought to bear on the problem.

These cases of repeated abortion are not common. In Speert's (1954) search of 17,490 case records over a period of 4 years, there was an incidence of 0.7 per cent of patients with a history of 3 or more consecutive abortions.

Speert criticised the theoretical calculations of Malpas (1938) and Eastman (1947) and their selection of cases either for the basis of calculations or for control purposes. In spite of this, Speert, noting that 28 per cent of his cases of recurrent abortion received hormone therapy and that the antenatal supervision had varied, grouped all the patients together in reporting the results of pregnancy. It is only because of the relatively small number of cases of recurrent abortion that he failed to arrive at yet another prediction of the prognosis for a future pregnancy after 3 consecutive abortions.

The problem of obtaining adequate numbers of untreated patients with the required history is also cited by Plotz (1960), Warburton and Fraser (1961) and Goldzieher (1964), and is illustrated in the reports of Mann (1959) where, over

a period of $3\frac{1}{2}$ years, only 70 patients with a history of 3 consecutive abortions were available for study in a subsequent pregnancy, and Javert (1962) who reported on 284 patients with 3 or more consecutive abortions, a series gathered over a period of 20 years. The present series confirms this difficulty in that only 41 such cases were available for study in a period of almost 4 years.

Predictions based on small samples are generally statistically suspect and Goldzieher (1964) discussing the problem of therapy in cases of recurrent abortion suggested that, before any valid conclusions could be reached, 1078 patients with such a history would have to be divided equally into test and placebo groups. He added that it was unlikely that this could ever be done. From a review of the literature and the findings in the present series, it would apparently take one worker 75 to 100 years to amass such a number of patients.

The Definition and Aetiology of Recurrent Abortion
and the Selection of Patients

There is little agreement on the definition of recurrent abortion. Some investigators distinguish between recurrent abortion (2 or more consecutive abortions) and habitual abortion (3 or more consecutive abortions); others make no such distinction. In some reports there is careful distinction between the patient suffering from primary recurrent abortion and the patient with secondary recurrent abortion (Bevis, 1951; Goldzieher and Benigno, 1958). Goldzieher and Benigno believed that there was a better prognosis if the patient had already had a successful pregnancy. On the other hand, Mann (1959) and Javert (1962) did not believe that there was any difference in prognosis in the groups.

Goldzieher and Benigno (1958) found that the abortion rate increased significantly only after the patient had 4 consecutive abortions and therefore did not see any point in distinguishing between patients with a history of 2 consecutive abortions and those with 3 when defining habitual abortion.

Different opinions are expressed in almost every published investigation on this subject and it is because of this that the selection of patients for any one series differs

from that of any other series, thus making comparisons of the results of various authors very difficult indeed.

In this series, patients regarded as being abortion-prone have been studied. Macnaughton (1964), while stating that the woman with 4 abortions and no viable pregnancies should be regarded as the true primary habitual aborter, showed that any woman after a series of 2 consecutive abortions was abortion-prone. He also showed that there was an increase in the abortion rate after a woman had even 1 abortion.

Because so many workers include women with 2 or more consecutive abortions (primary and secondary) in their series, and also because of Macnaughton's findings of an increased abortion rate after 1 abortion, it was decided that in addition to patients with a history of 2 abortions, any patient threatening to abort in a pregnancy which was preceded by one which had ended in abortion should be included in this study. This would not prevent extraction of various groups, for example primary and secondary recurrent or habitual aborters, from the whole series and an opportunity would thus be obtained to compare results in the various groups.

Further confusion arises on reviewing the literature owing to the different criteria employed in the selection of patients apart altogether from the major differences due to

definition of habitual abortion.

Certainly, most workers have been trying to estimate the therapeutic effect of one particular type of treatment and in doing so have tried to restrict their series to patients who have had no discernible medical or gynaecological cause for occurrence of abortion. Unfortunately this has led to further controversy and confusion as, in almost every survey, different groups of patients have been excluded. Speert (1954) excluded from his survey of patients with 3 or more abortions all those who had a threatened abortion, while Tupper and Weil (1962) included only those patients with 3 or more abortions who were seen because of threatened abortion. Macdonald (1963) and McSweeney (1963) also excluded those patients with threatened abortion but their other selection criteria differed markedly.

Patients with retroversion of the uterus, developmental anomalies of the genital tract, cervical incompetence, chronic disease, trichomonal infection, rhesus iso-immunisation or negative pregnancy tests, or any one or more of these conditions have been included and excluded from various series. (Speert, 1956; Mann, 1959; Macdonald, 1963; McSweeney, 1963; Cope and Emelife, 1965; etc.).

Again, because of the differing beliefs as to which patients should be excluded and which included in a series, it was decided that any woman whose history suggested that she was abortion-prone should be included in the present series, regardless of her previous medical or gynaecological history and regardless of the findings on general examination.

If patients with obvious reasons for abortion, for example uterine anomalies, cervical incompetence, threatened abortion, diabetes, chronic renal disease, are removed from any group under study, it might be argued that the eventual success rate in that group would be higher than it might otherwise be if these patients were included. It seems unrealistic to expect only one cause for abortion in each abortion-prone patient, particularly when such general aetiological factors as hormonal deficiencies or emotional factors are regarded by almost all workers in this field as being of cardinal importance.

It is understandable that, if the effect of a certain progestogen is being investigated, the patients are selected so that only those with a hormonal deficiency are included, but it should be remembered that hormonal deficiencies are not necessarily confined to those patients with, for example, a normally developed uterus in a position of anteversion.

Equally, emotional conflicts are not confined to any single group of pregnant patients. Indeed, both hormonal deficiencies and emotional instability might well be present in the same patient. Rawlings and Krieger (1958) have shown that there was evidence of an unexpected fall in pregnanediol excretion when some of their patients were going through a period of even transient emotional conflict and Macdonald (1963) and Cope and Emelife (1965) commented on the possibility of hormone therapy having a psychological influence on the patient.

It has already been shown in this series that there may be a multiplicity of causes of abortion in any one abortion-prone woman. The author is convinced from observation that the majority of these patients are psychologically upset and that such upset is a factor in the aetiology of recurrent abortion. It has been shown in this series that there is a high incidence of psychological disturbance in the presence of progesterone deficiency as evidenced by ferning of the cervical mucus or vice versa. Ferning of the cervical mucus was found in 5 of the 6 pregnancies during which patients had to be referred for psychiatric help.

In a recent survey in Russia, Rozovskii and Zmanovskii (1966) reported that functional disorders of the hypothalamic-pituitary-ovarian system were among the main aetiological

factors in early abortion. They found associated decreased pregnanediol and oestriol excretion.

Some instances of possible multiplicity of aetiological factors noted in this series are as follows:

Cervical incompetence and progesterone deficiency	5
Uterine retroversion and progesterone deficiency	5
Uterine retroversion, threatened abortion and progesterone deficiency	1
Developmental anomalies and progesterone deficiency	1
Developmental anomalies, progesterone deficiency and threatened abortion	3
Developmental anomaly and threatened abortion	1
Developmental anomalies, progesterone deficiency and severe diabetes	1
Threatened abortion and progesterone deficiency	38
Cases referred to psychiatrist : femur present	5

In the face of the heterogeneity of selection of patients for study, it is little wonder that the results obtained in various series are contradictory, especially when one remembers that the beliefs held by various workers regarding

the aetiology of recurrent abortion vary from the laws of chance (Bevis, 1951; Goldzieher, 1964) to hormone deficiency (Alder and Krieger, 1957; Macdonald, 1963).

The methods of detecting hormone deficiency also vary and the reliability of urinary pregnanediol excretion as an indication of the circulating progesterone level has been questioned by many. Macnaughton (1966) stated that the measurement of urinary oestriol and pregnanediol levels was of no value either as an aid in predicting the occurrence of abortion or in the management of recurrent abortion.

The presence of ferning crystals in the cervical mucus is easy to detect and the result is immediately available. Previous workers have reported varying incidences of ferning of the cervical mucus. Ullery and Shabanah (1957) reported that ferning was present in 30 per cent of pregnant women at all stages of pregnancy and, although they believed that isolated appearances of such crystallisation did not necessarily indicate that the prognosis for pregnancy in these cases was poor, they did believe that, if the ferning crystals persisted or recurred intermittently, the pregnancy was in danger. Jacobsen (1957) examined cervical smears in 312 unselected consecutive pregnant patients and found ferning in 52 per cent. He found this significant as far

as the outlook for the pregnancy was concerned in 30 per cent of these positive cases. He believed that 2 successive negative smears indicated that the pregnancy would almost certainly continue to a successful conclusion.

Macdonald (1963) reported that 50 per cent of a series of 16 patients with abnormal smears aborted and he found the general incidence of ferning of the cervical mucus to be 57 per cent in a group of patients, many of whom were seen because of a previous history of infertility or abortion.

The incidence of ferning of the cervical mucus (82 per cent) in this series is very high. This is perhaps partly explained by the fact that only patients considered to be abortion-prone were selected but it may also be due to the practice adopted of examining the entire area of each smear. On occasions, large areas of the slide showed no evidence of ferning but the crystals were well formed in some quite small areas. A random search of isolated fields might well have resulted in a positive slide being regarded as negative. The presence of ferning was considered to be of possible significance with regard to prognosis when seen for the first time in any pregnancy in the present series, and 17 α -hydroxy progesterone caproate was administered. If there was no recurrence, the patient received only one injection. In the

99 cases in which ferning was noted, it was seen on one occasion only in 10 cases, on 2 occasions in 2 cases and persisted intermittently during at least 2 trimesters in 61 cases. This suggests that progesterone deficiency might have been a major factor in 60 per cent to 90 per cent of the cases in this series with ferning of the cervical mucus.

17 α -hydroxy progesterone caproate is a potent progestogen. Its effect is prolonged and high levels can be maintained in the uterus (Platz, 1960). It does not cause masculinisation of the female foetus. The dose administered in this series varied from 250 mg. to 750 mg. weekly (in divided doses of 250 mg.) and an attempt was made to relate the dosage to the occurrence of ferning crystals in the cervical mucus. In other words, the presence or absence of ferning controlled the dose administered in any week. If there was no ferning and therefore no evidence of progesterone deficiency, it seemed reasonable to withhold the progestogen.

Various dosage schemes have been advocated. Sometimes the injections have been given empirically (Cope and Emelife, 1965) and sometimes only in the presence of evidence of progesterone deficiency, the dose not necessarily being related to the persistence or otherwise of evidence of deficiency (Foley, 1963).

In the management of the abortion-prone case, the obstetrician is confronted by a patient who is anxious and often desperate to have a successful pregnancy. While it is important to investigate all possible causes of abortion and various methods of treatment, the individual patient is perhaps more important and, because of the multiplicity of causes, it seems obvious that no single factor, for example progestogen, cervical suture, psychotherapy, etc., should be expected to be successful in every case but each patient should be investigated and treated as an individual.

Prolonged rest in bed gives good results in many but not by any means in all cases. For various reasons, domestic and otherwise, many patients are unable or unwilling to spend long periods in bed and in some areas hospital beds cannot be made available for a long period to every patient with a history of recurrent abortion.

Results of Treatment

It has been noted by the majority of workers in this field that the success rate is about 80 per cent in almost all regimes of management.

It is not satisfactory to compare the results obtained in different series for the reasons already discussed - variations in definition, selection of patients, investigations, treatment - and also because of the different methods of reporting results. Sometimes the abortion rate only is reported and sometimes the success rate. In some cases the success rate refers only to the numbers who did not abort, no report being given of perinatal mortality. If abortion is avoided to a great extent in a series of pregnancies in abortion-prone women, the management of these patients cannot be held to be satisfactory if there is a high incidence of perinatal mortality due to prematurity.

The numbers of cases reported are often small and sometimes the cases have been obtained from a review of records over a period of many years. In spite of this, and no other results being available, a summary of the results of various workers has been made where possible with regard to both abortion and success rates and including those patients with 2 or more previous consecutive abortions.

Hormonal Therapy

Author	No. of Patients	Abortion Rate %	Success Rate %
Bevis (1951)	9	Nil	100
Alder & Krieger (1957)	100	30	
Plotz (1960)	90 21		71 76
Foley (1963)	120	8.3	81.6
Macdonald (1963)	24	8.3	91.7
McSweeney (1963)	54	14.8	85.2
Osmond-Clarke & Murray (1963)	64	26.5	68.7
Shearman & Garrett (1963)	50	20	80
Goldzieher (1964)	23	21	79
Levine (1964)	15	27	73
Cope & Enelife (1965)	55	12	83.6
Klopper & Macnaughton (1965)	18	44	56
MacRae (1965)	12	25	

The results obtained from hormonal therapy show a variation in abortion rate from zero to 44 per cent and in success rate from 56 per cent to 100 per cent - this latter

result depending on the pregnancies of only 9 patients and the former on the pregnancies of 18 patients.

"Psychotherapeutic" Regimes

Author	No. of Patients	Abortion Rate %	Success Rate %
Mann (1959)	70	19.1	
Javert (1962)	427	23.5	
Tupper & Weil (1962)	19	10	84

Dynamic psychotherapy as advised by Javert (1962) without recourse to hormone therapy may be adequate treatment for many of these patients but his programme of psychiatric support is one which would be difficult to achieve in this country. It is probably much more difficult to persuade a patient in this country, who believes that she is mentally normal, to attend a psychiatrist than it is in the United States.

No Specific Therapy

Author	No. of Patients	Abortion Rate %	Success Rate %
Devis (1951) - Bed rest	21	14.3	71.4
Speert (1954) - 28% had hormonal therapy	121	19	
Russell (1965) - ? psychological treatment	51	18	32

Again the results vary, but less so than in the series in which hormonal therapy was given.

For comparison, the results obtained in the present series for patients with a history of 2 or more consecutive abortions are as follows:

No. of Cases	Abortion Rate %	Viability %	Success Rate %
81	8.6	91.4	85.2
and for the whole series			
120	6.6	93.4	85.8

In this series, all patients presenting for treatment were included regardless of incidental findings. Over 80 per cent of the patients were seen by the 12th week of pregnancy.

Klopper and Macnaughton (1965) stated that any series comprising a high proportion of patients seen after the 10th week was bound to show a high success rate. The success rate for the 76 cases seen before the end of the 10th week in the present series was 86.8 per cent and that of the 44 cases seen later was 84 per cent. There is therefore no significant difference in this series between the 2 success rates.

The results obtained by different workers cannot be statistically compared, owing to the many variations in all aspects of the selection, treatment and management of the patients. Similarly, there can be no statistical comparison between the results obtained in this series and those of any other. It would appear however that the results of individual management, as outlined in the present series, compare favourably with most others, especially when it is considered that most other workers have excluded certain groups of patients with conditions which would increase their chance of abortion.

Shearman and Garrett (1963) stated that, to be of proved value, any specific treatment in patients with a history of 2 or more abortions should be associated with an abortion rate lower than that of 23 per cent predicted by Warburton and Fraser (1959) for such patients. The abortion rate of 8.6

per cent for this group of patients in the present series is appreciably less.

Further improvement in results should always be expected. MoSweeney (1963) regarded 38 per cent of a series of pregnant patients with hormone deficiency as unsalvable; he withheld treatment and all aborted. In the follow-up series in the present review, increased progestogen dosage was apparently associated with success in 4 patients who had previously aborted.

Another patient who developed a severe accidental haemorrhage after removal of a cervical suture had the suture re-inserted in the subsequent pregnancy in another unit and elective caesarean section was planned for the 37th week. On the morning of operation she had a further but smaller accidental haemorrhage and an emergency section resulted in the birth of a live baby.

It is possible that one stillbirth in the present series (Case 78, para 0 + 2) might have been avoided. If more attention had been paid to the presence of foetal distress (meconium staining of the liquor and a slowing of the foetal heart rate when the cervix was half dilated), caesarean section at that stage would probably have resulted in the birth of a live child.

There would thus seem to be good reason for expecting eventual success in most patients.

Placental Insufficiency and Dysmaturity in the Abortion-Prone Patient

Few of the reports reviewed on the abortion-prone woman or on the patient subject to recurrent or habitual abortion commented on the state of the placenta at delivery or on the presence of placental abnormalities.

Rawlings and Krieger (1958), in a study of pregnanediol excretion curves in patients with recurrent abortion, suggested that a placental thrombosis might have occurred in patients found to have a sudden fall in excretion followed by a sharp rise when given therapy. They further suggested that the remainder of the placenta took over the function of the whole. They assumed that, in cases where the pregnanediol level was very low and maintained at a satisfactory excretion level only by continuous hormone therapy, there was permanent damage to a large part of the placenta.

In 1959, Shearman related low pregnanediol excretion to small placentae and small babies, and in 1963 Osmond-Clarke and Murray reported several small babies born at term to a group of women with a history of recurrent abortion. These patients had abnormal vaginal cytological findings throughout

the pregnancy. Robertson and Maxwell (1963) agreed with Shearman (1959) in relating pregnanediol urinary excretion levels to placental weights and birth weights of the babies. As their numbers were small however they reached no definite conclusions.

Foley (1963) on the other hand reported in his series that the babies born were larger than average, although not significantly so, and he explained his finding of healthy placentae by suggesting that progestogen therapy decreased the severity of pre-eclamptic toxæmia; there was no marked placental infarction and a better utero-placental circulation was achieved. Russell (1965) reported a high incidence of placental insufficiency.

Unfortunately, in the present series a complete record of all placentae was not kept but the incidence of moderate to severe infarction was high and there was a significant difference in the birthweights of babies born to abortion-prone mothers and of babies born to "normal" mothers. Those in the series born after the 38th week weighed on average 12 ounces (340 G.) less. The small-for-dates babies were thin and the skin was dry and wrinkled.

There was not an unduly high incidence of pre-eclamptic toxæmia in patients in this series compared with the normal local incidence. As was shown, there was a greater number

of cases of mild toxæmia but it is thought that this was the result of noting very mild symptoms and signs in these patients, signs which might very well have been missed or passed over in other patients. If, of course, this is not the explanation, then there was an increased incidence of mild pre-eclamptic toxæmia in these abortion-prone patients.

From close observation of the patients however the impression is that pre-eclamptic toxæmia, while perhaps accounting for some of the dysmature babies and placental insufficiency, was not the main cause. It seems probable that progesterone deficiency as evidenced by persistent ferning of the cervical mucus for part or the whole of the pregnancy is an indication of a damaged or poorly functioning placenta.

Ferning of the cervical mucus would appear to be associated with small-for-dates babies and placental insufficiency, and thus in this respect analogous to the low-pregnenediol urinary excretion described by Shearman (1959) and Robertson and Maxwell (1963) and to the abnormal vaginal cytological findings of Osmond-Clarke and Murray (1963).

Wigglesworth (1966) suggested that ischaemic changes in the chorionic villi noted in the presence of foetal growth retardation might be an indication of a primary placental

abnormality.

Since placental insufficiency appears to be an important factor in these pregnancies undertaken by the abortion-prone woman, it is suggested that delivery should be achieved about the 38th week and certainly not later than term. As most of the patients are seen early in pregnancy, there is rarely any doubt about the date of the last menstrual period and the obstetrician can therefore make a reasonably accurate estimate of the expected date of delivery.

Placental Abnormalities

There was in this series an apparently high incidence of placental abnormality - particularly of placenta circumvallata. This was noted in 4 of the 86 cases in which a description of the placenta was available and placenta praevia was present at least in 3 of the 112 cases which reached viability.

In these 2 types of abnormality we have examples of faulty implantation. Whether the velamentous insertion of the umbilical cord found in 2 cases and the battledore insertion of the cord are of significance is problematical.

The incidence of such placental abnormalities, apart from placenta praevia, has not been noted by other workers in the literature reviewed on the abortion-prone patient.

Accidental Haemorrhage

There was a significantly greater incidence of severe accidental haemorrhage in this series (4.16 per cent) than occurred generally among the patients attending the routine antenatal clinics (0.2 per cent). Foley (1963), in his series of 120 abortion-prone patients, reported 4 cases of accidental haemorrhage (3.3 per cent), but this was the only reference in the literature reviewed to the association of this obstetric disaster and the abortion-prone woman, although Hibbard and Hibbard (1963) reported that 247 patients with abruptio placentae had a previous history of just over 30 per cent unsuccessful pregnancies. Only 6.8 per cent of these pregnancies however had ended before the 28th week.

Foetal Abnormality

The incidence of foetal abnormalities in cases of successful pregnancy in the abortion-prone patient has been variously reported but it is not unduly high. Foetal abnormality noted in this series was 4.4 per cent but in 3 of the 5 cases the abnormality was slight and relatively easily correctable. The incidence of foetal abnormalities reported and as found in this series is certainly not of such an order that one would wish to withhold supportive therapy of any kind from these patients.

Duration of Stay in Hospital

It has been shown in this series that, although just over one-third of the patients were admitted to hospital at least once during the first 2 trimesters of pregnancy, the duration of stay in hospital was relatively short. In the past many of them would have spent long periods in hospital and many others, being unable to do so, would have attended routine antenatal clinics. When it is considered that the best results claimed for bed rest or for no particular type of therapy give an abortion rate of about 20 per cent, there would appear to be no doubt of the value of the regime outlined in this study.

Subsequent Pregnancies

From this series it has been found that, if ferning of the cervical mucus has been present in one pregnancy, it will almost certainly recur in the following pregnancy and generally the duration of ferning will be similar to before.

It has also been shown that unless the abortion-prone patient, after a successful pregnancy, receives similar supportive therapy in a subsequent pregnancy, she is once more likely to abort (Tables 66 and 67 and pages 218-225).

Statistical Analysis

From a review of the literature it has been shown that there is lack of agreement and confusion of thought over all aspects of the subject of recurrent abortion and the abortion-prone patient - definition, aetiology, selection of patients, treatment and management, interpretation of results - and there is no uniformity in the method of reporting results.

Conclusions are often drawn from results of treatment of very small numbers of patients. It has been shown that no single worker can expect to collect other than a fairly small series of patients subject to recurrent or habitual abortion.

There seems little point in continuing in this confusion. These patients may be few in number but their distress of mind and the problem they provide for their obstetricians must not be ignored. If agreement could be reached on the selection of patients, and if the results of various types of therapy were uniformly reported, it should then be possible for results of various methods of treatment or of controlled clinical trials of drugs to be collected and statistically compared, perhaps using the method suggested by Solari and Wheatley (1966).

CONCLUSIONS

7/1/53

There is no doubt that the subject of habitual and/or recurrent abortion is still one of the unsolved obstetrical problems. This is due to a greater or lesser extent to the confused thinking in the past and the individualistic approach of nearly all workers in this field.

It would seem reasonable to regard the patient with 2 previous abortions as a recurrent aborter and, while it might be of importance to distinguish between those patients with 2 abortions and those with 3 or more, it seems that there is no need to confine series of investigations to the so-called "habitual" aborter - the patient with 3 or more abortions.

In the present study, a plan is suggested for selecting abortion-prone patients and it is seen that this does not prevent the reporting of results in various groups - either so-called recurrent and habitual aborters - or in primary and secondary recurrent abortion.

It is suggested that the exclusion of patients with obvious causes for abortion from any series under study will result in a falsely high success rate. It has been shown that there is often a multiplicity of causes for abortion in one patient.

An unexpectedly high incidence of ferning crystals in the cervical mucus was found in this series of 120 consecutive abortion-prone patients. Since it is not known when ferning is found at first whether it is going to be a persistent feature, it is suggested that progestogen therapy be started at once.

From the results obtained in this series it seems that ferning crystals in the cervical mucus are a good indication of the presence of progesterone deficiency and the abortion-prone patient with ferning responds well to 17 α -hydroxy progesterone caproate therapy.

Most of these patients can be managed successfully as out-patients and there is no need for prolonged stays in hospital on the grounds of previous poor history alone.

The author is convinced that there is a need for psychological support in the management of all abortion-prone patients regardless of the need for progestogen therapy or cervical suture and unless sufficient attention is paid to this aspect of treatment and adequate time spent with these women, the success rate in pregnancy will be relatively low.

1. The purpose of the study was to discover for all abortion-prone women a method of management which would result in a successful pregnancy without the need for prolonged periods of rest in bed in hospital.
2. A review of the literature on recurrent and habitual abortion and the abortion-prone patient is made.
3. A series of 120 consecutive abortion-prone cases is selected and an abortion rate of 6.6 per cent and an overall success rate of 85.8 per cent reported.
4. The progestogen, 17 α -hydroxy progesterone caproate was used where there was progesterone deficiency as evidenced by ferning of the cervical mucus, and all patients were given psychological support.
5. It seems that this method of management compares favourably with any others reported but the difficulties of comparison of various series are shown.
6. Suggestions are made about future selection of patients and reporting of results so that statistical analysis of various therapies may be compared.

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For the final form of this thesis I accept full
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THE MANAGEMENT
OF
THE ABORTION-PRONE PATIENT

VOLUME II

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TABLE 1 : PATIENTS REGARDED AS BEING ABORTION-PRONE

1. Recurrent abortion	41
(a) Primary	17
(b) Secondary	24
2. Two previous consecutive abortions	40
(a) Primary	16
(b) Secondary	24
3. Threatened abortion immediately following previous abortion	11
4. Infertility history + 1 abortion or threatened abortion	8
5. Elderly patient (35 years or over) + 1 abortion	1
6. Previously included in series with successful result	7
7. Previously given special therapy elsewhere with successful result	7
8. Miscellaneous : Cases 57, 59, 69, 82 and 115	5

TABLE 2 : CATEGORY 8 - MISCELLANEOUSREASON FOR INCLUSION OF PATIENTS IN THIS CATEGORY
OF ABORTION-PRONE GROUP

<u>Case No.</u>	<u>Parity</u>	<u>Age</u>	<u>Reason for Inclusion</u>
57	1 + 3	34	1st pregnancy - spontaneous delivery at term - neonatal death. Next 3 pregnancies ended in abortion. Threatened abortion occurred in 5th pregnancy but eventually had spontaneous term delivery of live child. Period of 4 years' infertility before she again became pregnant.
59	2 + 0	36	Both pregnancies resulted in premature deliveries with neonatal deaths. Wassermann Reaction positive - ? false but previously treated in both pregnancies.
69	2 + 0	22	1st pregnancy ended in premature labour at 30th week; 2nd pregnancy ended at 26th or 28th week - macerated foetus.
82	4 + 4	35	2nd, 4th, 6th and 7th pregnancies ended in abortion and had threatened abortion in 8th pregnancy.
115	1 + 0	26	1st pregnancy threatened abortion. Admitted to another unit. Given 17 α -hydroxy progesterone caproate and ferning found later. Injections continued until 32nd week - successful outcome. 2nd pregnancy threatened abortion at 8th week.

TABLE 3 : COMPLICATIONS OF PREGNANCY IN THIS SERIES

	<u>No. of Cases</u>	<u>Per cent</u>
Threatened abortion	51	42.0
Pre-eclamptic toxæmia	11	9.1
Uterine retroversion	7	6.9 *
Developmental uterine abnormalities	7	5.8
Accidental hæmorrhage	4	3.3
Megaloblastic anaemia	4	3.3
Urinary infection	5	4.2
Rhesus sensitisation	1	0.8
Hyperemesis gravidarum	2	1.6
Hydramnios	3	2.5
Prolapse of cervix beyond vaginal introitus	1	0.8

* Percentage incidence calculated from 101 patients seen
before the 13th week of pregnancy.

TABLE 4 : DISEASES ASSOCIATED WITH PREGNANCY IN THIS SERIES

	<u>No. of Cases</u>	<u>Per cent</u>
Nervous disorders (necessitating psychiatric advice)	6	5.0
Previous history of tuberculosis (extragenital)	5	4.2
Fibroids	2	1.6
Severe bilateral varicose veins and vulvar varicosities	2	1.6
Acute appendicitis	1	0.8
Diabetes	1	0.8
Psoriasis	1	0.8
Thrombocytopenic purpura	1	0.8
Previous thyroidectomy	1	0.8

**TABLE 5 : PATIENTS WITH PREVIOUS HISTORY OF GYNAECOLOGICAL
OPERATION (EXCLUDING INFERTILITY INVESTIGATIONS)**

<u>Endometriosis:</u>	<u>No. of Patients</u>	
Bilateral resection of chocolate cysts of ovaries	1	} 1.6%
(Left oophorectomy		
(Partial right ovarian resection	1	
(Bilateral salpingostomy		
Ovarian cystectomy (simple ovarian cysts)	2	1.6%
Right oophorectomy	1	0.8%
Multiple myomectomy and Gilliam sling operation	1	0.8%
Trachelorrhaphy	1	0.8%

It is seen from the above table that 5 patients (4.58%)
had a history of ovarian operations.

**TABLE 6 : DURATION OF PREGNANCY WHEN PATIENTS WERE INCLUDED
IN THIS SERIES**

<u>Duration in Weeks</u>	<u>No. of Patients</u>
5 - 6	21
7 - 8	31
9 - 10	24
11 - 12	21
13 - 14	9
15 - 16	5
Over 17	9

**TABLE 7 : DURATION OF PREGNANCY WHEN UTERUS FIRST NOTED TO
BE SMALLER THAN EXPECTED IN 120 CASES**

	NUMBER OF PATIENTS	PLACENTAL INFARCTION
1st Trimester	7 (5.8%)	2
2nd Trimester	10 (8.3%)	6
3rd Trimester	9 (7.5%)	6
T o t a l	26 (21%)	14

TABLE 8 : INCIDENCE OF FERNING OF CERVICAL MUCUS

Total No. of Cases	Cases with Ferning	Per Cent
120	99	82.5

**TABLE 9 : INCIDENCE OF FERNING OF CERVICAL MUCUS
IN CASES OF PRIMARY ABORTION**

Total No. of Patients	Patients with Ferning	Per Cent
46	35	76

**TABLE 10: INCIDENCE OF FERNING OF CERVICAL MUCUS
IN CASES OF SECONDARY ABORTION**

Total No. of Patients	Patients with Ferning	Per Cent
58	50	86.2

**TABLE 11 : REASON FOR REFERRAL OF CASES FOR OTHER SPECIALIST
OPINION**

Case No.	Complication	Specialist
4	Hiatus hernia	Physician
30	Hiatus hernia (same patient)	Physician and Surgeon
20	Previous pulmonary tuberculosis	Chest physician
66	Previous pulmonary tuberculosis	Chest physician
51	Dermatitis	Dermatologist
59	Positive Wassermann	Venereologist
63	Prolapsed intervertebral disc	Orthopaedic Surgeon
67	Temporary loss of vision (hysterical)	Physician : Ophthalmologist
83	Thrombocytopenic purpura	Endocrinologist
99	Acute appendicitis	Surgeon
100	Colles fracture (2 days' duration)	Orthopaedic Surgeon
109	Diabetes	Physician

TABLE 12 : HAEMOGLOBIN VALUES NOTED AT FIRST VISIT TO CLINIC

<u>Haemoglobin in grammes per cent</u>	<u>No. of Patients</u>	<u>Per Cent</u>
12 or over	30	2.5
10 to 11.9	69	57.5
Below 10	21	17.5

TABLE 13 : TIME OF FIRST OCCURRENCE AND DURATION OF FERNING
IN 99 PATIENTS

	<u>No. of Patients</u>	<u>Per Cent</u>
First trimester only	19	19.2
First and second trimester	29	29.2
First, second and third trimester	20	20.2
Second trimester only	17	17.2
Second and third trimester	12	12.1
Third trimester only	2	2.0

**TABLE 14 : INCIDENCE OF FERNING OF CERVICAL MUCUS IN CASES
OF CERVICAL INCOMPETENCE**

SB = Stillbirth

Case	Parity	Duration of Previous Pregnancies in Weeks	Duration of Ferning in Weeks
7	2 + 3	40, 14, 10, 10, 40	-
8	1 + 1	8, 30 (SB)	-
11	0 + 3	? 20, ? 24, ? 27	9th - 17th
15	0 + 3	27, 27, 24	14th - 21st
19	0 + 1	10	14th - 15th
20	1 + 3	6, 40, 24, 24	24th - 25th
21	1 + 9	12, 6, 12, 12, 12, 20, 30, 6, 20	-
26	4 + 7	40, 12, 26, 8, 27, 40 (SB), 36, 24, 12, 40, 20	13th - 29th
42	0 + 5	18, 10, 22, 6, 24	-

**TABLE 15 : INCIDENCE OF FERNING OF CERVICAL MUCUS IN CASES
OF UTERINE RETROVERSION**

Case	Parity	Duration of Previous Pregnancies in Weeks	Duration of Ferning in Weeks
6	0 + 2	12, 8	-
40	2 + 3	40, 40, 10, 28*, 10	9th - 10th
57	2 + 3	40, 6, 6, 6, 40	6th
68	0 + 5	8, 10, 10, 8, 10	8th - 9th
87	0 + 2	17, 20	11th - 12th
104	1 + 3	40, 12, 10, 10	7th - 36th
114	1 + 2	10, 10, 40*	8th - 23rd

* = missed abortion

** = hormone therapy

**TABLE 16 : DURATION OF FERNING IN WEEKS ASSOCIATED WITH
DEVELOPMENTAL UTERINE ANOMALIES**

Case	Parity	Duration of Previous Pregnancies in weeks	Duration of Ferning in Weeks	Anomaly
47	0 + 2	6, 9	-	Bicornuate
72	0 + 2	6, 8	21st - 33rd	Bicornuate
75	1 + 4	10, 10, 40, 18, 8	-	Bicornuate
76	3 + 3	40, 40, 6, 40, 26, 16	8th - 29th	Bicornuate
92	1 + 2	40, 8, 12	12th - 16th	Bicornuate
109	0 + 4	8, 8, 12, 20	15th - 31st	Arcuate Absence of Left Ovary
111	1 + 5	24, 40, 10, 6, 24, 6	8th - 29th	Bicornuate

**TABLE 17 : GROUP I : PATIENTS WITH SMALLER-THAN-EXPECTED UTERUS
FIRST NOTED IN 1st TRIMESTER**

Case	Age	Parity	Duration of Pregnancy (weeks)				Pregnancy Terminated (weeks)
			1st Visit	Small Uterus	Ferning	Threatened Abortion	
22	22	0 + 1	9	10-18	9-24	9 21 admitted	38
23	31	1 + 4	6	8-38	6-36	5	38+
26	32	4 + 7	12	12-32	12-29	-	32
28	25	0 + 2	7	8-12	8-28	7 admitted	38
48	27	1 + 2	9	10-30	12-36	8+	38
74	23	0 + 4	8	10-24	9-13	-	24
111	23	1 + 5	8+	10-28	8-29	6 11	38+

**TABLE 18 : GROUP II : PATIENTS WITH SMALLER-THAN-EXPECTED UTERUS
FIRST NOTED IN 2nd TRIMESTER**

Case	Age	Parity	Duration of Pregnancy (weeks)				Pregnancy Terminated (weeks)
			1st Visit	Small Uterus	Ferning	Threatened Abortion	
12	30	1 + 2	9	14-22 30-38	17-23	-	43
16	25	2 + 3	7+	15-40	8	-	40
36	33	1 + 3	6	23-32	6-30	-	39
38	35	1 + 3	10	20-25	13-15	-	40
50	33	0 + 1	9	17-39	11-26	-	38+
65	37	1 + 2	9	20-30	10	-	40
70	23	1 + 3	5+	16-22	5-20	-	26
104	26	1 + 3	7+	18-38	7-38	11	38
107	29	0 + 1	7+	14-30	-	-	40+
115	26	1 + 0	10	16-28	11-35	9	40

**TABLE 19 : GROUP III: PATIENTS WITH SMALLER-THAN-EXPECTED UTERUS
FIRST NOTED IN 3rd TRIMESTER**

Case	Age	Parity	Duration of Pregnancy (weeks)				Pregnancy Terminated (weeks)
			1st Visit	Small Uterus	Ferning	Threatened Abortion	
2	30	1 + 4	8	28-36	-	8	36
29	31	1 + 2	12	28-35	13-26	16	37
31	30	1 + 4	6	30-39	6-18	-	39
47	20	0 + 2	15	28-39	-	10	39
60	33	0 + 1	18	31-35	18-37	14	38
71	21	2 + 3	10	34-37	12	10	37+
81	27	0 + 2	6	28-38	6-22	-	39
90	32	3 + 2	12	34-37+	12-34	-	37+
108	23	0 + 1	11	29-40	11-27	-	39+

TABLE 20 : PRESENCE AND DURATION OF FERNING OF THE CERVICAL
MUCUS IN MENTALLY UNSTABLE PATIENTS AND NUMBER OF
INJECTIONS OF 17 α -HYDROXY PROGESTERONE CAPROATE 250 mg. GIVEN

Case	Age	Parity	Duration of Ferning in Weeks	Pregnancy Terminated	No. of Injections
16	25	2 + 3	8th	40	1
45	32	1 + 3	9 - 15	16	6
*(89	33	1 + 4	10 - 36	38	25
66	35	2 + 3	10 - 29	36	22
67	33	0 + 3	-	37	-
*(105	34	1 + 3	13th	37+	1

* = same patient

** = same patient

**TABLE 21 : INCIDENCE OF THREATENED ABORTION IN THIS SERIES
AND FERNING IN CASES OF THREATENED ABORTION**

Threatened Abortion	No.	Percentage of Total	No. of Patients with Ferning
Treated successfully prior to first visit to clinic	9	7.5	8
Seen in hospital	18	15.0	11
Referred to clinic because of bleeding	7	5.8	4
Occurred for first time during attendance at clinic	17	14.0	15
Total number of cases of threatened abortion	51	42.0	38

**TABLE 22 : INCIDENCE OF FERNING OF CERVICAL MUCUS IN CASES
TREATED FOR THREATENED ABORTION PRIOR TO ATTENDING CLINIC**

Case	Age	Parity	Week of 1st Visit	Duration of Ferning in Weeks	17AHPG Injections
17	33	1 + 5	15th	15 - 20	4+ 74
19	35	0 + 1	11th	14 - 15	2
23	31	1 + 4	6th	6 - 36	32
47	20	0 + 2	15th	-	-
60	33	0 + 1	18th	18 - 37	21
61	38	7 + 2	10th	14 - 18	10
64	36	3 + 1	11th	12 - 39	36
100	32	2 + 1	14th	15 - 30	13
111	23	1 + 5	8th	8 - 29	28

17AHPG = 17 α -hydroxy progesterone caprate

**TABLE 23 : INCIDENCE OF FERNING OF CERVICAL MUCUS IN CASES
NOT ATTENDING SPECIAL CLINIC
ADMITTED TO HOSPITAL WITH THREATENED ABORTION**

Case	Age	Parity	Week of Admission	Duration of Ferning in Weeks	17AHPC Injections
1	30	1 + 1	11th	11+ - 18	6
2	30	1 + 4	8th	-	-
3	32	0 + 7	8th	9 - 24	16
5	26	0 + 5	11th	-	-
6	30	0 + 2	7th	-	-
7	32	2 + 3	9th	-	-
10	24	1 + 2	7th	9 - 20	6
28	25	0 + 2	7th	8 - 28	16
41	19	0 + 4	12th	-	-
44	22	1 + 3	10th	18 - 33	11
63	23	0 + 1	6th	9	3
72	20	0 + 2	11th	21 - 33	10
73	27	1 + 0	11th	18 - 30	38
84	30	1 + 6	15th	-	2
86	19	0 + 1	6th	9 - 35	58
97	29	1 + 2	6th	11 - 39	14
110	22	0 + 1	15th	-	1
117	38	1 + 7	13th	20 - 24	15

17AHPC = 17 α -hydroxy progesterone caproate

**TABLE 24 : INCIDENCE OF FERNING OF CERVICAL MUCUS IN CASES
REFERRED TO SPECIAL CLINIC BECAUSE OF THREATENED ABORTION**

Case	Age	Parity	Week of 1st Visit	Duration of Ferning in Weeks	17AHPC Injections
8	23	1 + 1	14th	-	0
22*	22	0 + 1	9th	9 - 24	13
43*	20	0 + 2	6th	-	9
71*	21	2 + 3	10th	12th	2
95*	27	0 + 2	11th	-	1
112*	32	1 + 2	9th	14 - 23	13
115*	26	1 + 0	10th	11 - 35	35

* Bleeding very slight when patient seen. Not admitted
to hospital

17AHPC = 17 α -hydroxy progesterone caproate

**TABLE 25 : INCIDENCE OF FERNING OF CERVICAL MUCUS IN CASES
WHERE ABORTION THREATENED FOR THE FIRST TIME
DURING ATTENDANCE AT THE CLINIC**

Case	Age	Parity	First Visit Week	Ferning (weeks)	Threatened Abortion (week)	17AHPC Injections
13	25	1 + 5	5th	5-37	10th	37
25	33	1 + 5	8th	18-24	13th	6
29	31	1 + 2	12th	13-26	16th	7
34	26	0 + 2	7th	7-30	13th	14
37	27	0 + 3	12th	13-17	26th	7
45	32	1 + 3	9th	9-15	15th	6
56	40	0 + 3	9th	10-18	19th	20
58	23	0 + 3	6th	7th	9th	2
62	22	1 + 4	7th	7-11	10th	11
74	23	0 + 4	8th	9-13	16th	11
75	36	1 + 4	13th	-	14th	2
76	36	3 + 3	8th	8-29	10th	32
77	27	2 + 5	6th	6-37	8th	56
83	23	0 + 2	7th	7-10	10th	11
98	41	3 + 6	10th	-	27th	-
104	26	1 + 3	7th	7-36	11th	51
116	30	0 + 1	6th	6-15	11th	14

17AHPC = 17 α -hydroxy progesterone caproate

**TABLE 26 : PATIENTS INCLUDED IN PRIMARY ABORTION GROUP WITH
HISTORY OF ONE PREVIOUS ABORTION (PARA 0 + 1)**

Case	Age	Threatened Abortion (weeks)	Period of Infertility
19	35	6th-8th and 10th	-
22	22	8th- 9th	-
50	33	-	5 years
55	27	-	6 years
60	33	14th-16th	4 years
63	23	6th- 8th	-
86	19	6th- 8th	-
96	28	-	3½ years
102	37	-	13 years
107	29	-	5 years
108	23	-	4 years
110	22	15th-18th	4 years
116	30	11th-12th	-

TABLE 27 : NUMBER OF PREVIOUS ABORTIONS IN PRIMARY ABORTION
GROUP

Total number of cases = 120

Cases of primary abortion = 46 (38.3 per cent)

<u>No. of Previous Abortions</u>	<u>No. of Patients</u>
1	13
2	16
3	9
4	3
5	4
6	-
7	1

TABLE 28 : RESULT OF PREGNANCY IN CASES OF PRIMARY ABORTION

No. of Previous Abortions	Cases		Viable		Stillbirth or Neonatal Death		Abortion		Success	
	No.	%	No.	%	No.	%	No.	%	No.	%
1 or more	46	100	41	89.1	2	4.3	5	10.8	39	84.7
2 or more	33	71.7	29	87.8	2	6.0	4	12.1	27	81.8
3 or more	17	36.9	14	82.3	1	5.8	3	17.6	13	76.4
4 or more	8	17.3	6	75.0	0	-	2	25.0	6	75.0

TABLE 29 : NUMBER OF PREVIOUS CONSECUTIVE ABORTIONS IN THE
SECONDARY ABORTION GROUP

TOTAL NUMBER OF CASES = 120
CASES OF SECONDARY ABORTION = 58 (48.3 per cent)

<u>No. of Previous Consecutive Abortions</u>	<u>No. of Patients</u>
1	10
2	24
3	15
4	4
5	3
6	1
7	1

**TABLE 30 : SECONDARY ABORTION : CASES WITH ONLY ONE ABORTION
SINCE A PREGNANCY OF MORE THAN 28 WEEKS' DURATION**

Case	Age	Parity	Reason for Inclusion
1	30	1 + 1	Threatened abortion when first seen - at 11th week. Infertile for 3 years since last abortion.
18	27	1 + 1	Infertility investigations before first pregnancy.
26	32	4 + 7	Two previous premature deliveries; 2 full-time deliveries, one of which resulted in a stillbirth; 3 live children, 1 spastic.
30	32	1 + 4	Three abortions then ferning in successful pregnancy followed by 1 further abortion. Also included (Case 4) in primary abortion group.
36	33	1 + 3	Two abortions. Cervical suture in 3rd pregnancy - successful.
64	36	3 + 1	Threatened abortion prior to 1st visit at 12th week. First 2 pregnancies resulted in neonatal deaths.
88	32	2 + 2	Threatened abortion in both successful pregnancies. In hospital for long periods on each occasion.
100	32	2 + 1	Threatened abortion prior to 1st visit at 14th week. First pregnancy resulted in neonatal death.
101	29	1 + 3	Abortion occurred after period of 3 years' infertility following a successful pregnancy.
106	24	2 + 4	Seen in 5th pregnancy. Threatened abortion and ferning found - successful outcome (Case 44), then abortion in 6th pregnancy.

TABLE 31 : RESULT OF PREGNANCY IN CASES OF SECONDARY ABORTION

No. of Previous Consecutive Abortions	Cases		Viable		Stillbirth or Neonatal Death		Abortion		Success	
	No.	%	No.	%	No.	%	No.	%	No.	%
1 or more	58	100	55	94.8	6	10.3	3	5.2	49	84.4
2 or more	48	82.7	45	93.7	3	6.2	3	6.2	42	87.5
3 or more	24	41.3	22	91.6	2	8.3	2	8.3	20	83.3
4 or more	9	15.5	8	88.8	1	11.1	1	11.1	7	77.7

**TABLE 32 : ANALYSIS OF ABORTION RATES IN PRIMARY AND
SECONDARY ABORTION GROUP**

Result of Pregnancy	Abortion Type		Totals
	Primary	Secondary	
Abortion	5 (10.87%)	3 (5.17%)	8
Viability	41	55	96
T o t a l	46	58	104

**TABLE 33 : ANALYSIS OF SUCCESS RATE (NUMBER OF BABIES
SURVIVING) IN PRIMARY AND SECONDARY ABORTION GROUPS**

Previous Abortions	1	2	3	4 or more	Totals
Primary Abortion Group (Number successful)	12 *(63.2%)	14 (38.9%)	7 (35%)	6 (46.2%)	39 (43.3%)
Secondary Abortion Group (Number successful)	7 (36.8%)	22 (61.1%)	13 (65%)	7 (53.8%)	49 (56.7%)
T O T A L S	19 (100%)	36 (100%)	20 (100%)	13 (100%)	88 (100%)

* Percentage values are percentage of total
success in each column.

**TABLE 34 : ANALYSIS OF SUCCESS RATES AND FAILURE (ABORTION
+ STILLBIRTHS AND NEONATAL DEATHS) RATES IN PRIMARY AND
SECONDARY ABORTION GROUPS**

Result of Pregnancy	Abortion Type		Totals
	Primary	Secondary	
Success	39 (84.7%)	49 (84.4%)	88
Failure	7 (15.2%)	9 (14.1%)	16
Totals	46 (100%)	58 (100%)	104

**TABLE 35 : RESULT OF PREGNANCY IN ABORTION-PRONE CASES WHICH
COULD NOT BE CLASSIFIED UNDER PRIMARY OR SECONDARY ABORTION**

No. of Previous Abortions	Patients		Viable		Stillbirth or Neonatal Death		Abortion	Success	
	No.	%	No.	%	No.	%		No.	%
None	4	25.0	4	100	1	25.0	-	3	75.0
1 or more	12	75.0	12	100	1	8.3	-	11	91.7
2 or more	10	62.5	10	100	-	-	-	10	100.0
3 or more	6	37.5	6	100	-	-	-	6	100.0
4 or more	2	12.5	2	100	-	-	-	2	100.0

**TABLE 36 : INCIDENCE OF FERNING OF CERVICAL MUCUS IN ABORTION-
PRONE CASES WHICH COULD NOT BE CLASSIFIED
UNDER PRIMARY OR SECONDARY ABORTION**

Total No. of Cases	Cases with Ferning	Percentage
16	14	87.5

**TABLE 37 : 17 α -HYDROXY PROGESTERONE CAPROATE THERAPY IN CASES
OF PRIMARY ABORTION**

Patients with Ferning	Patients given Therapy without Mucus Test	Total
35 (76%)	3 (6.5%)	38 (82.5%)

**TABLE 38 : 17 α -HYDROXY PROGESTERONE CAPROATE THERAPY IN CASES
OF SECONDARY ABORTION**

Patients with Ferning	Patients given Therapy without Mucus Test	Total
50 (86.2%)	3 (5.1%)	53 (92.9%)

**TABLE 39 : 17 α -HYDROXY PROGESTERONE CAPROATE THERAPY IN CASES
WHICH WERE ABORTION-PRONE BUT NOT CLASSIFIED UNDER
PRIMARY OR SECONDARY ABORTION GROUPS**

Patients with Ferning	Patients given Therapy without Mucus Test	Total
14	-	14 (87.5%)

**TABLE 40 : RESULT OF PREGNANCY IN 38 CASES OF PRIMARY ABORTION
TREATED WITH 17 α -HYDROXY PROGESTERONE CAPROATE**

No. of Previous Abortions	No. of Cases	Viable		Stillbirth or Neonatal Death		Abortion		Success	
		No.	%	No.	%	No.	%	No.	%
1 or more	38	34	89.4	2	5.2	4	10.5	32	86.8
2 or more	26	23	88.4	2	7.6	3	11.5	21	80.7
3 or more	13	11	84.6	1	7.6	2	15.2	10	76.0
4 or more	5	4	80.0	1	20.0	1	20.0	3	60.0

**TABLE 41 : RESULT OF PREGNANCY IN 53 CASES OF SECONDARY
ABORTION TREATED WITH 17 α -HYDROXY PROGESTERONE CAPROATE**

No. of Previous Consecutive Abortions	No. of Cases	Viable		Stillbirth or Neonatal Death		Abortion		Success	
		No.	%	No.	%	No.	%	No.	%
1 or more	53	51	96.3	5	9.2	2	3.7	46	86.5
2 or more	43	41	95.3	4	9.2	2	4.6	37	86.0
3 or more	20	19	95.0	2	10.0	1	5.0	17	85.0
4 or more	8	8	100%	1	12.5	-	-	7	87.5

**TABLE 42 : RESULT OF PREGNANCY IN 14 ABORTION-PRONE CASES NOT
CLASSIFIED UNDER PRIMARY OR SECONDARY ABORTION GROUPS
TREATED WITH 17 α -HYDROXY PROGESTERONE CAPROATE**

No. of Previous Abortions	Patients		Viable		Stillbirth or Neonatal Death		Abortion		Success	
	No.	%	No.	%	No.	%	No.	%	No.	%
None	4	28.5	4	100	1	25	-	-	3	75
1 or more	10	71.4	10	100	1	10	-	-	9	90
2 or more	9	64.2	9	100	-	-	-	-	9	100
3 or more	5	35.7	5	100	-	-	-	-	6	100
4 or more	2	14.2	2	100	-	-	-	-	2	100

**TABLE 43 : PATIENTS NOT GIVEN 17 α -HYDROXY PROGESTERONE CAPROATE
THERAPY : PREVIOUS OBSTETRIC HISTORY AND OUTCOME OF PREGNANCY**

Case	Age	Parity	Duration of Previous Pregnancies in weeks	Result of Pregnancy
2	30	1 + 4	10, 40, 12, 8, 12	Success
5	26	0 + 5	12, 9, 7, 10, 12	Success
6	30	0 + 2	12, 8	Success
7	32	2 + 3	40, 14, 10, 10, 40*	Success
8	23	1 + 1	8, 30 (SB)	Stillbirth
21	40	1 + 9	12, 6, 12, 12, 12, 12, 20, 30, 6, 20	Success
24	34	0 + 2	8, 8	Success
41	19	0 + 4	18, 10, 22, 6	Abortion
42	20	0 + 5	18, 10, 22, 6, 24	Success
47	20	0 + 2	6, 9	Success
51	27	2 + 4	8, 40, 40, 6, 8, 8	Success
53	28	2 + 3	40, 40, 12, 27, 26	Success
67	33	0 + 3	10, 12, 16	Success
98	41	3 + 6	40 (NND), 6, 40, 40, 8, 12, 10, 20, 12	Abortion (27+ weeks)
107	29	0 + 1	7	Success

* Cervical suture inserted

SB = stillbirth

NND = neonatal death

**TABLE 44 : RESULT OF PREGNANCY IN CASES AFTER INSERTION OF
CERVICAL SUTURE**

Case	Parity	Ferning	Premature Weeks	Term (38 + weeks)	Child
7	2 + 3	-	-	+	Alive
8	1 + 1	-	-	+	Stillborn
11	0 + 3	+	-	+	Alive
15	0 + 3	+	-	+	Alive
19	0 + 1	+	-	+	Alive
20	1 + 3	+	-	+	Alive
21	1 + 9	-	38	-	Alive
26	4 + 7	+	32	-	Stillborn
42	0 + 5	-	-	+	Alive

**TABLE 45 : RESULT OF PREGNANCY IN PATIENTS WITH UTERINE
RETROVERSION**

Case	Parity	Ferning	Delivery (weeks)	Child
6	0 + 2	→	40	Alive
40	2 + 3	+	39	Stillbirth
57	2 + 3	+	39	Alive
68	0 + 5	+	38	Alive
87	0 + 2	+	40	Alive
104	1 + 3	+	38	Alive
114	1 + 2	+	40	Alive

**TABLE 46 : RESULT OF PREGNANCY IN PATIENTS WITH UTERINE
ANOMALIES**

Case	Parity	Forming	Delivery (weeks)	Child	Type of Delivery
47	0 + 2	-	39	Alive	S.V.D.
72	0 + 2	+	35	Alive	S.V.D.
75	1 + 4	-	38	Alive	C.S.
76	3 + 3	+	37	Alive	C.S.
92	1 + 2	+	37	Alive	S.V.D.
109	0 + 4	+	33	Alive	C.S.
111	1 + 5	+	38	Alive	S.V.D.

S.V.D. = Spontaneous Vertex Delivery

C.S. = Caesarean Section

**TABLE 47 : RESULT OF PREGNANCY IN CASES WHERE UTERUS FIRST NOTED
TO BE SMALLER-THAN-EXPECTED IN 1st TRIMESTER - GROUP I**

Case	Age	Parity	Ferning	Pregnancy Terminated (weeks)	Child	Weight lbs oz (G.)	Placental State and Weight lbs oz (G.)
22	22	0 + 1	+	38	Alive	7 1 (3205)	Healthy 1 lb. 7 oz. (650 G.)
23	31	1 + 4	+	38+	Alive	4 5½ (1960)	"Small"
26	32	4 + 7	+	32	SB	2 14 (1300)	Infarcted : retroplacental clot
28	25	0 + 2	+	38	Alive	4 15 (2240)	Healthy
48	27	1 + 2	+	38	Alive	6 13 (3090)	Infarcted 1 lb. 2 oz. (510 G.)
74	23	0 + 4	+	24	-	-	-
111	23	1 + 5	+	38+	Alive	6 6 (3345)	Calcified 1 lb. 3 oz. (540 G.)

SB = Stillbirth

**TABLE 48 : RESULT OF PREGNANCY IN CASES WHERE UTERUS FIRST NOTED
TA
TO BE SMALLER-THAN-EXPECTED IN 2nd TRIMESTER - GROUP II
TO BE SMALLER-THAN-EXPECTED IN 2nd TRIMESTER - GROUP II**

Case	Age	Parity	Ferning	Pregnancy Terminated (weeks)	Child	Weight lbs oz (G.)	Placental State and Weight lbs oz (G.)
12	30	1 + 2	+	43	Alive	6 ⁸ (2950)	Infarcted: small
16	25	2 + 3	+	40	Alive	4 ⁸ (2040)	Infarcted
36	33	1 + 3	+	39	Alive	6 ⁵ (2860)	Infarcted : circumvallata: small
38	35	1 + 3	+	40	Alive	6 12 (3060)	Infarcted
50	33	0 + 1	+	38+	Alive	5 14 (2665)	Infarcted
65	37	1 + 2	+	40	Alive	6 4 (2840)	Infarcted 1 lb. 6 oz. (620 G.)
70	23	1 + 3	+	26	NWD	1 8 ⁵ (680)	-
104	26	1 + 3	+	38	Alive	6 ⁰ (2724)	Healthy 1 lb. 1 oz. (480 G.)
107	29	0 + 1	-	40+	Alive	8 13 (4000)	Velamentous insertion : healthy 1 lb. 11 oz. (764 G.)
115	26	1 + 0	+	40	Alive	6 13 (3090)	Healthy

**TABLE 49 : RESULT OF PREGNANCY IN CASES WHERE UTERUS FIRST NOTED
TO BE SMALLER-THAN-EXPECTED IN 3rd TRIMESTER - GROUP III**

Case	Age	Parity	Ferning	Pregnancy Terminated (weeks)	Child	Weight lbs oz (G.)	Placental State and Weight lbs oz (G.)
2	30	1 + 4	-	36	Alive	4 0 (1816)	Retroplacental clot : unhealthy
29	31	1 + 2	+	37	Alive	6 3 (2810)	Infarcted
31	30	1 + 4	+	39	Alive	5 11 (2580)	Circumvallata: 1 lb. 0 oz. (454 G.)
47	20	0 + 2	-	39	Alive	5 8 (2500)	Infarcted : calcified : 1 lb. 0 oz. (454 G.)
60	33	0 + 1	+	38	Alive	6 0 (2724)	Calcified : 1 lb. 0 oz. (454 G.)
71	21	2 + 3	+	37+	Alive Alive	3 12 (1700) 4 2 (1870)	Binovular : healthy : 1 lb. 12 oz. (790 G.)
81	27	0 + 2	+	39	Alive	6 10 (3000)	Infarcted
90	32	3 + 2	+	37+	Alive	5 13 (2640)	Infarcted : 1 lb. 8 oz. (680 G.)
108	23	0 + 1	+	39+	Alive	5 10 (2550)	Infarcted : 0 lb. 15 oz. (880 G.)

TABLE 50 : RESULT OF PREGNANCY IN CASES REFERRED TO PSYCHIATRIST

Case	Age	Parity	Ferning	Pregnancy Terminated (weeks)	Child	Weight lbs oz. (G.)	Placental State and Weight
16	25	2 + 3	+	40	Alive	4 8 (2040)	Infarcted
*45	32	1 + 3	+	16	-	- -	-
66	35	2 + 3	+	36	Alive	4 6 (1984)	Infarcted : 0 lb. 15 oz. (880 G.)
*67	33	0 + 3	-	37+	Alive	5 4 ¹ / ₂ (2383)	Small infarcts
*89	33	1 + 4	+	38	Alive	6 0 (2724)	Infarcted : 1 lb. 6 oz. (620 G.)
*105	34	1 + 3	+	37+	Alive	6 12 (3060)	Infarcted

* same patient

+ same patient

TABLE 51 : RESULT OF PREGNANCY IN CASES WITH A PREVIOUS HISTORY OF

GYNAECOLOGICAL OPERATION

Case Age Parity	Operation	Duration of Perning (weeks)	Duration of Pregnancy (weeks)	Child		Placental State and Weight
				Alive SB MND	Weight lbs oz (G.)	
24 40 1 + 9	Trachelorrhaphy x 2	-	38	Alive 6	4 (2840)	Prævia
37 27 0 + 3	1) Partial resection both ovaries 2) Left oophorectomy; bilateral salpin- gostomy; endometriosis	13 - 17	38	Alive 7	10 (3460)	Healthy; 1 lb. 2 1/2 oz. (510 G.)
50 33 0 + 1	Myomectomy and Gilliam sling	11 - 26	39	Alive 5	14 (2665)	Infarcted
59 36 2 + 0 (MND)	Right ovarian cystectomy	24 - 35	37	Alive 5	13 (2635)	Infarcted
67 33 0 + 3	Right oophorectomy	-	37+	Alive 5	4 1/2 (2383)	Fairly healthy; small infarcts; 0 lb. 15 oz. (424 G.)

SB = Stillbirth ; MND = Neonatal Death

**TABLE 52 : THREATENED ABORTION : RESULT OF PREGNANCY AND
INCIDENCE OF ASSOCIATED PLACENTAL INFARCTION AND FERNING**

Threatened Abortion	No.	Ferning	Result of Pregnancy			Placental Infarcts*
			Ab ⁿ	SB/NND	Success	
a) Treated successfully prior to 1st clinic visit	9	8:89%	-	-	9:100%	2 : 22%
b) First seen in hospital	18	11:61%	1	1	16: 89%	7 : 41%
c) Referred to clinic because of bleeding	7	4:57%	-	1	6: 85%	3 : 43%
d) Occurred during clinic attendance	17	15:88%	6	1	10: 59%	4 : 36%
T o t a l	51	38:74%	7 13.7%	3 5.8%	41: 80%	16 : 36%

* Percentage calculated from number of viable deliveries

Abⁿ Abortion

SB/NND Stillbirth or neonatal death

**TABLE 53 : CASES OF PRE-ECLAMPTIC TOXAEMIA (PET) SHOWING
INCIDENCE OF FERNING OF CERVICAL MUCUS**

Case	Age	Parity	PET Developed Week and Severity	Duration of Ferning (weeks)	Delivery (weeks)	Placenta
4	30	0 + 3	38 +	11th	39	Healthy
16	25	2 + 3	28 +	8th	40	Infarcted
17	33	1 + 5	36 ++	15 - 20	40	Small infarcts
18	27	1 + 1	28 +	9 - 15	38	Normal
27	25	0 + 2	37 +	7 - 12	40	Infarcted
31	30	1 + 4	37 +++	6 - 18	39	Circumvallata
32	23	0 + 3	39 +	6 - 16	40	Healthy
33	22	2 + 1	36 ++	6 - 19	38+	No note
34	26	0 + 2	36 ++	7 - 30	37+	Infarcted
43	20	0 + 2	37 +	- *	38	Infarcted
52	26	1 + 2	30 +	13th	39	Infarcted
57	34	2 + 3	39 +	6th	39+	No note
59	36	2 + 0	36 ++	24 - 35	37	Infarcted
66	35	2 + 3	29 +++	10 - 33	36	Infarcted
67	33	0 + 3	31 ++	-	37+	Small infarcts
77	27	2 + 5	36 +	6 - 37	38+	No note
81	27	0 + 2	38 +	6 - 22	39	Infarcted
105	34	1 + 3	32 +	13th	37+	Infarcted
109	35	0 + 4	30 +++	15 - 31	33	Infarcted
114	27	1 + 2	32 +	8 - 23	40	Infarcted

* No ferning seen but 9 injections of
17 AHPC given because of threatened
abortion.

**TABLE 54 : DURATION AND TIME OF OCCURRENCE OF FERNING
OF CERVICAL MUCUS IN CASES OF PRE-ECLAMPTIC TOXAEMIA (PET)**

Duration and Occurrence of Ferning	Trimesters						Ferning Absent
	1st	1st/2nd	1st/2nd/3rd	2nd	2nd/3rd	3rd	
Mild PET	6	4	1	-	-	-	1 *
Moderate PET	-	1	1	1	1	-	1
Severe PET	-	1	1	-	1	-	-

* given injections

TABLE 55 : CASES OF ACCIDENTAL HAEMORRHAGE IN THIS SERIES AND ASSOCIATED FERNING OF CERVICAL MUCUS AND/OR CERVICAL SUTURE

Case	Age	Parity	Duration of Ferning (weeks)	Cervical Suture in situ (weeks)	Accidental Haemorrhage (week)	Severity of Pre-Eclampsia	Child
2	30	1 + 4	-	-	Concealed (36)	-	Alive
8	23	1 + 1	-	25 - 39	Concealed (39)	-	SB
26	32	4 + 7	13 - 29	20 - 32	Mixed (32)	-	SB
66	35	2 + 3	10 - 33	-	Mixed (36)	+++	Alive
117	38	1 + 7	7 - 24	+	Mixed (30)	-	NND

SB = Stillbirth

NND = Neonatal death

TABLE 56 : SUMMARY OF CASES OF PREMATURE LABOUR AND DELIVERY

Case	Age	Parity	Duration of Pregnancy (weeks)	Week of Delivery	Type of Delivery and Result
2	30	1 + 4	-	36	Caesarean section. Accidental haemorrhage. Alive : 4 lb. 0 oz. (1816 G)
13	25	1 + 5	5 - 37	37	Spontaneous vertex delivery. Alive : 6 lb. 8 oz. (2950 G)
26	32	4 + 7	13 - 29	32	Spontaneous vertex delivery. Accidental haemorrhage. Stillbirth : 2 lb. 14 oz. (1300 G)
29	31	1 + 2	13 - 26	37+	Caesarean section. Delayed labour. Alive : 6 lb. 3 oz. (2810 G)
34	26	0 + 2	7 - 30	37+	Caesarean section. Pre-eclampsia. Spontaneous rupture of membranes. Alive : 5 lb. 8 oz. (2500 G)
53	28	2 + 3	-	37+	Spontaneous vertex delivery. Alive : 6 lb. 9 oz. (2976 G)
54	38	4 + 3	12 - 32	37	Assisted breech. Hydrocephalus. Stillbirth
59	36	2 + 0	24 - 35	37	Elective caesarean section. Pre-eclampsia. Alive : 5 lb. 13 oz. (2640 G)
66	35	2 + 3	10 - 33	36	Caesarean section. Accidental haemorrhage Alive : 4 lb. 6 oz. (1984 G)
*67	33	0 + 3	-	37+	Forceps : pre-eclampsia. Alive : 5 lb. 4 oz. (2383 G)

* - labour induced

continued ...

TABLE 56 (continued)

Case	Age	Parity	Duration of Perning (weeks)	Week of Delivery	Type of Delivery and Result
69	22	1 + 1	32 - 33	34	Spontaneous face (anencephalic) : stillbirth
71	21	2 + 3	-	37+	Twins - both spontaneous vertex deliveries. Alive : 3 lb. 12 oz.(1700 G) Alive : 4 lb. 2 oz.(1870 G)
72	20	0 + 2	21 - 33	35	Spontaneous vertex delivery. Alive : 5 lb. 7 oz.(2466 G)
73	27	1 + 0	18 - 30	34	Assisted breech. Alive : 5 lb. 0 oz.(2270 G)
76	36	3 + 3	18 - 29	37	Elective caesarean section. Ante-partum haemorrhage. Alive : 6 lb. 14 oz.(3120 G)
85	34	2 + 3	8th	37+	Spontaneous vertex delivery. Alive : 5 lb. 5 oz.(2411 G)
90	32	3 + 2	12 - 34	37	Spontaneous vertex delivery. Alive : 5 lb. 13 oz.(2640 G)
92	34	1 + 2	12 - 16	37	Spontaneous vertex delivery. Alive : 6 lb. 8 oz.(2950 G)
99	25	0 + 2	8 - 15	35	Spontaneous vertex delivery. Alive : 6 lb. 6 oz.(2890 G)
105	34	1 + 3	13th	37	Elective caesarean section. Pre-eclampsia. Alive : 6 lb. 12 oz.(3060 G)

continued ...

TABLE 56 (continued)

Case	Age	Parity	Duration of Ferming (weeks)	Week of Delivery	Type of Delivery and Result
109	35	0 + 4	15 - 31	33	Elective caesarean section. Diabetes. Pre-eclampsia Alive : 5 lb. 12 oz. (2610 G)
117	38	1 + 7	7 - 24	30	Spontaneous vertex delivery. Accidental haemorrhage. Stillbirth : 2 lb. 0 oz. (908 G)
118	31	3 + 3	11 - 26	28	Assisted breech. Alive : 2 lb. 4 oz. (1020 G)

**TABLE 57 : PERINATAL MORTALITY : INCIDENCE OF STILLBIRTH OR NEONATAL DEATH IN 9 CASES
IN THIS SERIES SHOWING PREVIOUS HISTORY AND RESULT OF CERVICAL MUCUS TEST**

Case	Age	Parity	Previous Stillbirth or Neonatal Death	Duration of Fertning (weeks)	Suture	Duration of Pregnancy (weeks)	Cause of Fatality
8	23	1 + 1	Stillbirth at 30 weeks	-	+	39	Stillbirth. Asphyria. Concealed accidental haemorrhage. Wt. 5 lb. 10 oz. (2550 G.) Placenta: 1 lb. 2 oz. (510 G.): infarcted +++
26	32	4 + 7	Stillbirth at term	13 - 29	+	32	Stillbirth. Asphyria. Mixed accidental haemorrhage Prematurity. Wt. 2 lb. 14 oz. (1300 G.) Placenta infarcted.
40	36	2 + 3	-	9 - 10	-	39	Stillbirth. Unexplained intra-uterine death at 38+ weeks. Wt. 6 lb. 4 oz. (2840 G.) Placenta: 1 lb. 2 oz. (510 G.): infarcted.
54	38	4 + 3	-	12 - 32	-	37	Stillbirth. Hydrocephalus

continued ...

TABLE 57 (continued)

Case	Age	Parity	Previous Stillbirth or Neonatal Death	Duration of Fetring (weeks)	Suture	Duration of Pregnancy (weeks)	Cause of Fatality
56	40	0 + 3	-	10 - 18	-	26	Neonatal death. Prematurity. Wt. 1 lb. 11 oz. (764 G.)
69	22	2 + 0	Stillbirth at 26 or 28 weeks	32 - 33	-	34	Stillbirth. Anencephalic.
70	23	1 + 3	-	5 - 20	-	26	Neonatal death. Prematurity. Wt. 1 lb. 8½ oz. (680 G.)
78	22	0 + 2	-	13 - 25	-	40	Stillbirth. Asphyxia. Wt. 7 lb. 2 oz. (3230 G.) Calcification in placenta. No infarcts
117	38	1 + 7	-	2 - 24	-	30	Neonatal death. Accidental hemorrhage. Prematurity. Wt. 2 lb. (910 G.) Placenta infarcted; wt. 9 oz. (250 G.)

**TABLE 58 : NOTED FOETAL ABNORMALITIES AND PRESENCE OF
FERNING OF CERVICAL MUCUS**

Case	Age	Parity	Duration of Ferning (weeks)	Abnormality	Sex
4	30	0 + 3	11th only	Unilateral talipes	Male
54	38	4 + 3	12 - 32	Hydrocephalus	Male
69	22	2 + 0	32 - 33	Anencephalus	Female
105	34	1 + 3	13th only	Slight unilateral talipes	Female
110	22	0 + 1	-	Hypospadias	Male

**TABLE 59 : PLACENTAL ABNORMALITIES IN THE SERIES RELATED TO PRESENCE OF FERNING,
THREATENED ABORTION, WEIGHT OF BABY AND PRESENCE OF PLACENTAL INFARCTION**

Case	Abnormality	Duration of Pregnancy in Weeks		Weight of Baby	Placenta	
		Ferning	Threatened Abortion		Degree of Infarction	Weight
24	Praevia	-	-	6 lb. 4 oz. 2840 G.	Not noted	Not noted
26	Praevia	13 - 29	-	2 lb. 14 oz. 1300 G.	++	Not noted
76	Praevia	8 - 29	10 and 14	6 lb. 14 oz. 3120 G.	-	Not noted
34	Circumvallata	6 - 18	11 (slight)	5 lb. 11 oz. 2580 G.	+++	1 lb. 0 oz. 454 G.
36	Circumvallata	6 - 30	-	6 lb. 5 oz. 2860 G.	+++	1 lb. 0 oz. 454 G.
100	Circumvallata	15 - 30	12	7 lb. 0 oz. 3180 G.	+++	1 lb. 2 oz. 510 G.
119	Circumvallata	7 - 22	-	7 lb. 4 oz. 3290 G.	+++	1 lb. 2 oz. 510 G.
3	Velamentous insertion of cord	8 - 24	7	6 lb. 4 oz. 2837 G.	-	1 lb. 0 oz. 454 G.
107	do.	-	-	8 lb. 13 oz. 4000 G.	-	1 lb. 11 oz. 764 G.
105	Battledore	9 - 13	-	7 lb. 3 oz. 3260 G.	-	1 lb. 7 oz. 650 G.
5	Succenturiata	-	11	5 lb. 12 oz. 2610 G.	++	Not noted

TABLE 60 : INCIDENCE OF PLACENTAL ABNORMALITIES IN THIS
SERIES (EXCLUDING INFARCTION) - 112 CASES

	<u>No.</u>	<u>Per Cent</u>
Placenta praevia	3	2.6
Placenta circumvallata	4	3.6
Velamentous insertion of cord	2	1.8
Battledore insertion of cord	1	0.9
Succenturiate lobe	<u>1</u>	<u>0.9</u>
T o t a l	<u>11</u>	<u>9.8</u>

TABLE 61 : COMPARISON OF WEIGHTS OF BABIES BORN AT 38 WEEKS
OR OVER TO 85 ABORTION-PRONE AND 500 "NORMAL" PATIENTS

Weight Interval of Babies	Abortion-prone Patients	Normal Patients
4 lb 0 oz - 5 lb 7 oz 1816 G. 2466 G.	7	14
5 lb 8 oz - 6 lb 15 oz 2500 G. 3150 G.	45	116
7 lb 0 oz - 8 lb 7 oz 3180 G. 3830 G.	27	273
8 lb 8 oz or over 3860 G.	6	97
T o t a l s	85	500

**TABLE 62 : DURATION OF LABOUR IN 84 ABORTION-PRONE PATIENTS
DELIVERED VAGINALLY**

Duration of Labour	Virtual Primigravidae (28 patients)		Multigravidae (56 patients)		Total Patients	
	No.	%	No.	%	No.	%
Under 6 hours	5	17.8	27	48.2	32	38.1
6 - 12 hours	12	42.8	18	32.1	30	35.7
12 - 18 hours	6	21.4	9	16.0	15	17.8
18 - 24 hours	3	10.7	1	1.8	4	4.7
Over 24 hours	2	7.1	1	1.8	3	3.5

TABLE 63 : METHOD OF DELIVERY IN 112 PATIENTS
WHO REACHED VIABILITY

	<u>No.</u>	<u>Per Cent</u>
Spontaneous vaginal	68	60.7
Assisted breech	2	1.7
Forceps	16	14.2
Caesarean section	26	23.2

TABLE 64 : INDICATIONS FOR CAESAREAN SECTION

Prolonged 1st stage of labour (over 24 hours) and cervix less than half dilated	4
Failed induction	3
Placenta praevia	3
Severe pre-eclamptic toxæmia	3
Concealed accidental hæmorrhage	2
Transverse lie in labour	2
Fœtal distress	2
Generally contracted pelvis - previous section	1
Generally contracted pelvis	1
Contracted pelvis - breech presentation	1
Hiatal hernia - previous section for prolonged labour	1
Diabetes	1
Unstable lie - unsuitable for induction	1
Two previous neonatal deaths at 36 and 37 weeks	1

TABLE 65 : CASES WHERE ASCHEIM-ZONDER TEST WAS NEGATIVE

Case	Parity	Duration of Pregnancy (weeks)		Result
		A-Z Test Negative	Ferning	
2	1 + 4	11	—	Success
23	1 + 4	12	6 — 36	Success
38	1 + 3	10 and 14	13 — 15	Success
57	2 + 3	6 and 7	6	Success
65	1 + 2	10	10	Success
100	2 + 1	13	15 — 30	Success

**TABLE 66 : FOLLOW-UP SERIES : INCIDENCE OF TERNING, CERVICAL
INCOMPETENCE AND RESULT OF FIRST PREGNANCY AFTER ATTENDING
SPECIAL CLINIC**

Case	Parity	Duration of Terning (weeks)	Cervical Suture	No. of Injections	Result
4	0 + 3	11th	-	1	Success
5	0 + 5	-	-	-	Success
7	2 + 3	-	+	-	Success
8	1 + 1	-	+	-	Stillbirth
12	1 + 2	17 - 23	-	4	Success
13	1 + 5	5 - 37	-	31	Success
14	1 + 3	13 - 17	-	6	Success
15	0 + 3	14 - 21	+	10	Success
19	0 + 1	14 - 15	+	2	Success
32	0 + 3	6 - 16	-	6	Success
34	0 + 2	7 - 30	-	14	Success
40	2 + 3	9 - 10	-	2	Stillbirth
41	0 + 4	-	-	-	Abortion
43	0 + 2	-	-	9	Success
44	1 + 3	18 - 33	-	11	Success
45	1 + 3	9 - 15	-	6	Abortion
46	2 + 3	8 - 33	-	16	Success
49	0 + 2	6 - 17	-	5	Success
58	0 + 3	7th	-	2	Abortion
60	0 + 1	18 - 37	+	21	Success
62	1 + 4	7 - 11	-	11	Abortion
63	0 + 1	9th	-	3	Success
67	0 + 3	-	-	-	Success
70	1 + 3	5 - 20	-	18	Neonatal Death
83	0 + 2	7 - 10	-	11	Abortion
85	2 + 3	8th	-	2	Success
102	0 + 1	8th	-	1	Abortion
112	1 + 2	14 - 36	-	13	Success

**TABLE 67 : RESULT OF PREGNANCY IN 33 SUBSEQUENT PREGNANCIES
UNDERTAKEN BY 28 PATIENTS RELATED TO ANTENATAL TREATMENT**

Antenatal Care	No. of Cases	Result of Pregnancy			
		Ab.	SB or NND	Success	Still Pregnant
<u>Special Clinics</u>					
Ferning present; injections given	16	1	-	12	3
Cervical suture	1	-	-	1	-
<u>Other Clinic or G.P.</u>					
Injections given empirically	3	-	-	3	-
Injections + cervical suture	1	-	-	1	-
Cervical suture	3	-	-	3	-
<u>No Special Treatment or No Antenatal Care</u>	9	5	1	3	-

**TABLE 68 : SUMMARY OF 120 ABORTION-PRONE CASES INCLUDING
AGE, PARITY, PRESENCE OF FERNING, PREVIOUS TREATMENT
AND RESULT OF PREGNANCY**

Ab = Abortion : SB = Stillbirth : NND = Neonatal Death
S = Successful : 17AHPG = 17 α -hydroxy progesterone caproate

Case	Age	Parity	Ferning	Cervical Suture	Previous Treatment	Result
1	30	1 + 1	Yes	-	-	S
2	30	1 + 4	-	-	-	S
3	32	0 + 7	Yes	-	-	S
4	30	0 + 3	Yes	-	-	S
5	26	0 + 5	-	-	-	S
6	30	0 + 2	-	-	-	S
7	32	2 + 3	-	Yes	Cervical suture	S
8	23	1 + 1	-	Yes	-	SB
9	34	1 + 4	Yes	-	-	S
10	24	1 + 2	Yes	-	-	S
11	29	0 + 3	Yes	Yes	Cervical suture	S
12	30	1 + 2	Yes	-	-	S
13	25	1 + 5	Yes	-	-	S
14	25	1 + 3	Yes	-	-	S
15	24	0 + 3	Yes	Yes	-	S
16	25	2 + 3	Yes	-	-	S
17	33	1 + 5	Yes	-	-	S
18	27	1 + 1	Yes	-	-	S
19	35	0 + 1	Yes	Yes	-	S
20	25	1 + 3	Yes	Yes	-	S
21	40	1 + 9	-	Yes	Rested for 6 mths	S
22	22	0 + 1	Yes	-	-	S
23	31	1 + 4	Yes	-	-	S

Case	Age	Parity	Ferning	Cervical Suture	Previous Treatment	Result
24	34	0 + 2	-	-	-	S
25	33	1 + 5	Yes	-	-	S
26	32	4 + 7	Yes	Yes	-	SB
27	25	0 + 2	Yes	-	-	S
28	25	0 + 2	Yes	-	-	S
29	31	1 + 2	Yes	-	-	S
30	32	1 + 4	Yes	-	17AHPO	S
31	30	1 + 4	Yes	-	-	S
32	23	0 + 3	Yes	-	-	S
33	22	2 + 1	Yes	-	-	S
34	26	0 + 2	Yes	-	-	S
35	31	1 + 9	Yes	-	Progesterone Implant	S
36	33	1 + 3	Yes	-	Cervical suture	S
37	27	0 + 3	Yes	-	-	S
38	35	1 + 3	Yes	-	-	S
39	21	0 + 3	Yes	-	-	S
40	36	2 + 3	Yes	-	-	SB
41	19	0 + 4	-	-	-	Ab
42	20	0 + 5	-	Yes	Bed rest +	S
43	20	0 + 2	-	-	-	S
44	22	1 + 3	Yes	-	-	S
45	32	1 + 3	Yes	-	-	Ab
46	28	2 + 3	Yes	-	-	S
47	20	0 + 2	-	-	-	S
48	27	1 + 2	Yes	-	-	S
49	25	0 + 2	Yes	-	-	S
50	33	0 + 1	Yes	-	-	S

Case	Age	Parity	Turning	Cervical Suture	Previous Treatment	Result
51	27	2 + 4	-	-	-	S
52	26	1 + 2	Yes	-	-	S
53	28	2 + 3	-	-	-	S
54	38	4 + 3	Yes	-	-	SB
55	27	0 + 1	Yes	-	-	S
56	40	0 + 3	Yes	-	-	NND
57	34	2 + 3	Yes	-	-	S
58	23	0 + 3	Yes	-	-	Ab
59	36	2 + 0	Yes	-	-	S
60	33	0 + 1	Yes	-	-	S
61	38	7 + 2	Yes	-	-	S
62	22	1 + 4	Yes	-	Cervical suture	Ab
63	23	0 + 1	Yes	-	-	S
64	36	3 + 1	Yes	-	-	S
65	37	1 + 2	Yes	-	-	S
66	35	2 + 3	Yes	-	-	S
67	33	0 + 3	-	-	-	S
68	38	0 + 5	Yes	-	-	S
69	22	1 + 1	Yes	-	-	SB
70	23	1 + 3	Yes	-	-	NND
71	21	2 + 3	Yes	-	-	S
72	20	0 + 2	Yes	-	-	S
73	27	1 + 0	Yes	-	-	S
74	23	0 + 4	Yes	-	17AHPC	Ab
75	36	1 + 4	-	-	-	S
76	36	3 + 3	Yes	-	-	S
77	27	2 + 5	Yes	-	17AHPC	S

Case	Age	Parity	Ferning	Cervical Suture	Previous Treatment	Result
78	22	0 + 2	Yes	-	-	SB
79	28	1 + 2	Yes	-	-	S
80	31	2 + 2	Yes	-	-	S
81	27	0 + 2	Yes	-	-	S
82	35	4 + 4	Yes	-	-	S
83	23	0 + 2	Yes	-	-	Ab
84	30	1 + 6	-	-	Cervical suture	S
85	34	2 + 3	Yes	-	-	S
86	19	0 + 1	Yes	-	-	S
87	24	0 + 2	Yes	-	-	S
88	32	2 + 2	Yes	-	-	S
89	33	1 + 4	Yes	-	17AHPC	S
90	32	3 + 2	Yes	-	17AHPC	S
91	34	3 + 2	Yes	-	-	S
92	34	1 + 2	Yes	-	-	S
93	24	1 + 2	-	-	-	S
94	32	2 + 3	Yes	-	-	S
95	27	0 + 2	-	-	-	S
96	28	0 + 1	Yes	-	-	S
97	29	1 + 2	Yes	-	-	S
98	41	3 + 6	-	-	-	Ab
99	25	0 + 2	Yes	-	-	S
100	32	2 + 1	Yes	-	-	S
101	29	1 + 3	Yes	-	-	S
102	37	0 + 1	Yes	-	-	Ab
103	38	0 + 2	Yes	-	17AHPC	S
104	26	1 + 3	Yes	-	-	S

Case	Age	Parity	Ferning	Cervical Suture	Previous Treatment	Result
105	34	1 + 3	Yes	-	Clinic	S
106	24	2 + 4	Yes	-	17AHPC	S
107	29	0 + 1	-	-	-	S
108	23	0 + 1	Yes	-	-	S
109	35	0 + 4	Yes	-	-	S
110	22	0 + 1	-	-	-	S
111	23	1 + 5	Yes	-	Cervical suture	S
112	32	1 + 2	Yes	-	17AHPC	S
113	39	7 + 3	Yes	-	-	S
114	27	1 + 2	Yes	-	17AHPC	S
115	26	1 + 0	Yes	-	17AHPC	S
116	30	0 + 1	Yes	-	-	S
117	38	1 + 7	Yes	-	-	NND
118	31	3 + 3	Yes	-	17AHPC	S
119	24	0 + 5	Yes	-	17AHPC	S
120	33	1 + 2	Yes	-	-	S

