THE REMOTE EFFECTS OF PUERPERAL SEPSIS.

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by

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

The problem of Maternal Mortality still continues to be a matter of deep concern to members of the Medical Profession, particularly the Obstetric Specialists and those in the Public Health Services; but in recent years more prominence has been given to another problem of equal importance, that of Maternal Morbidity resulting from child-bearing. That this is, indeed, a very real problem is evident from available statistics.

Blair Bell[1] estimates that in England and Wales, while 3,000 mothers die annually, 60,000 (10 per cent) are disabled; and, over a period of six years from 1925 to 1931, he found that 47.3 per cent of gynaecological operations in Liverpool Royal Infirmary were performed for conditions attributable to child-bearing. Holland[2] states that post-parturient disease accounted for 40 per cent of the patients attending him at his gynaecological department, while Miller[3] at the Edinburgh Post-natal Clinic, in an investigation of 2,000 patients, found about 30 per cent to be suffering from disabilities of various kinds. Young[4], again, puts the number of mothers disabled as a result of childbirth at about 40,000 annually.

These figures give some idea of the amount of ill-

health, which results from child-bearing, and, as Munro Kerr[5] points out, "the only true indication of the price paid for reproduction (in addition to the deaths) lies in an analysis of the disability caused thereby."

The importance of the problem of Maternal Morbidity was realised by the Departmental Committee in their Final Report for 1932,[6] but, at the same time, while recognising its prevalence, they pointed out that no accurate statistics were yet available. A similar statement was made by Mac-Lean[7] in a discussion on the problem of the remote effects of puerperal sepsis, who expressed the opinion that investigations had been so much concerned with the problem of Maternal Mortality that the "follow-up" of non-fatal cases of puerperal infection had been comparatively neglected. He also added that there were signs of a widespread desire that this neglect should be repaired.[8] Dame Louis M'Ilroy is also in agreement with these statements in a discussion on "The Maternal Morbidities which follow Puerperal Fever" and she advocates that patients should be followed up after child-bearing and made to attend routine examinations.

In view of the opinions just quoted and, more especially, in view of the fact that these authorities have emphasised the difficulty of assessing the prevalence of Maternal Morbidity and its real effects on the patient's

future health, the writer considered it opportune to investigate the problem, while he was in charge of the Puerperal Fever Wards in Robroyston Hospital, Glasgow. The whole subject of Maternal Morbidity, however, was not attempted, but the investigation was limited to a study of the late morbidity resulting from puerperal sepsis only, with the object of discussing the REMOTE EFFECTS of PUERPERAL SEPSIS. The term "remote" is not applied in the anatomical sense, but refers to the period of time elapsing after the infection.

Facilities for this particular type of investigation were eminently suitable. The Wards under the writer's care had been receiving cases of puerperal sepsis for six years previous to the start of the inquiry, and all the records of these patients were available, so that accurate information regarding the patients' puerperal illness could be obtained.

The Investigation was commenced in March 1936.

The number of patients examined was 200.

The following procedure was adopted:-

Invitations to attend at the hospital for examination were sent to all the patients who had been in the Wards with verified puerperal sepsis, until 200 had replied indicating their willingness to attend. The patients who

had been admitted to the Wards in 1930 were first sent for, then those admitted in 1931 etc., and it was found necessary to send for patients admitted in 1932 and 1933 before the required number was obtained.

In all, 710 invitations were sent out, and the 200 replies received in the affirmative represent a percentage of 28. The examination of the patients was carried out from August 1936 till February 1937. All the cases had been admitted between the years 1930-33 so that, at the time of examination, from 3 to 6½ years had passed since their puerperal illness; in 55 per cent of the patients this period was 4-5 years.

All the patients had suffered from a definite and proved puerperal sepsis, but otherwise were unselected.

The examination of the patient at the hospital consisted of:-

1. A careful survey of the patient's medical history, both before and after her puerperal illness.
2. A complete record of her menstrual and obstetric histories, before and after her puerperal illness.
3. A general medical examination.
4. Pelvic examination, bi-manual and per speculum.
5. Bacteriological examination of the vaginal secretion.
6. Radiological Examination when necessary.

The special case-sheet used in this investigation is reproduced in Appendix I at the end of the thesis.

By the courtesy of Professor Hendry, all the patients with abnormal pelvic findings were re-examined in the gynaecological wards of the Royal Infirmary, Glasgow, by Dr. Dugald Baird, and the findings confirmed.

In the case of all those patients who had had operative treatment since leaving Robroyston Hospital, enquiries were made at the various hospitals and the operative findings obtained.

Finally, in addition to the above series of patients, pelvic examination was performed in a further 50 patients, who had had no known history of puerperal infection. This examination was carried out in patients admitted to wards other than the puerperal fever wards of the hospital, and the results were used as a control in the discussion on the subject of chronic cervicitis, which will be referred to later.

To sum up, then:-

200 patients were examined:

All had had previous puerperal sepsis 3-6 years before the inquiry:

A further 50 patients were examined as "controls":

All the patients were examined personally by the writer.

The results obtained by this investigation are set forth below, and are an attempt to demonstrate the late effects, which may result from previous puerperal sepsis. The difficulty of isolating the morbidity from puerperal sepsis per se, is, of course, fully realised; and, although some of the conditions found may have been more the result of sepsis combined with other factors than of sepsis alone, these have been excluded as far as possible.

The results of the investigation have been considered under several main sections and these are given below:-

THE REMOTE EFFECTS OF PUERPERAL SEPSIS.

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Chapter I.
SUBSEQUENT OBSTETRIC HISTORY.

Childbirth has come to be regarded in recent years as a hazard, comparable to a major surgical operation; this in some measure to the necessary agitation for greater safety in parturition, but in part to the unwarranted and sometimes biassed criticisms of the press. But to a woman recovering from puerperal sepsis, the possibility of her present illness affecting future pregnancies and confinements is a matter of real concern. As will be shown later, the possibility of bearing further children is only one question that arises. More real, at the time of illness at least, is the possibility that the infection may become reactivated following a subsequent confinement.

From the point of view of the matters so raised, this series of 200 patients was specially examined as to their subsequent obstetric history. The findings may be grouped as follows.

A. Sterility following puerperal sepsis.

B. The effects of puerperal sepsis on succeeding pregnancies and on parturition.

C. The further incidence of puerperal sepsis.

D. Infantile Mortality.

A. STERILITY following Puerperal Sepsis.

Comparable with the effects of sepsis elsewhere in the body, it is to be expected that puerperal sepsis might well result in such permanent changes in the organs of generation as to prevent further conception. Of the 200 patients examined, 77 had no further pregnancy since the illness which brought them into the scope of this investigation. These 77 (38.5 per cent of those examined) may be divided into two groups, those truly sterile, and those in whom conception may have been prevented by the frankly admitted use of contraceptive methods. On this basis, 44 patients (22 per cent) were truly sterile, and the remainder, 33 (or 16.5 per cent) were possibly only apparently sterile.

Sterility, in its most widely accepted meaning, implies an inability to conceive during a definite period of normal marital relationship during full reproductive life. Most authors, as, for example, Cameron;[9] Kerr,[10] Young,[11] et alii,[12, 13] are agreed on a period of about four years. This investigation was carried out in the later months of 1936, and the following table indicates the number of years during which the patients in this series have failed

to conceive.

Table I.

Number of Years	1930-6 (6)	1931-6 (5)	1932-6 (4)	1933-6 (3)	Total
Sterile	2	15	15	12	44
Apparently sterile	1	8	7	17	33
Total	3	23	22	29	77

From this it can be seen that the period without conception ranged from 3-6 years for all cases, and was 3 to 4 years for the majority. For those who may be termed truly sterile, the period for most was 4 to 5 years, and for the apparently sterile it was 3 years. So far, therefore, as the time factor is concerned, these women may be considered sterile, with the reservation previously made, that in 16.5 per cent this sterility may have been only apparent.

The further factor of age is of supreme importance, since the term sterility cannot be fairly applicable unless a patient's age fall into the usually accepted period of reproductive life between 14 and 45 years (14, 15, 16).

Presented below in table II are the 77 sterile patients divided into age groups, the age given being that at the time of examination late in 1936.

Table II.

Age	-20	-25	-30	-35	-40	-45	45+	Total
Sterile	-	2	6	9	8	14	5	44
Apparently sterile	-	1	7	11	8	4	2	33

In both subsections, the ages range between 23 years and 46 years, the majority falling between 30 and 40 years. For most, therefore, it is clear that sterility cannot be attributed to age. In the case of those over 45 years old at the time of the inquiry, examination of the separate case records shows that all had suffered from puerperal sepsis at least four years previously. They had had, therefore, since their illness at least three years' reproductive life under normal circumstances, without conception having taken place, and so may, in fairness, be added to the younger age groups. In short, all 77 may be considered sterile, in terms of the definition of the word already stated.

With the disposal of the factors of duration of sterility and age, the two groups, sterile and apparently sterile, must be considered separately in detail.

(1) The "sterile" group.

The number of patients in this group has been shown

to be 44 in all, and they are all considered sterile for the reasons set forth below.

(a) The period of sterility has been shown to have been 4-5 years and to have occurred during reproductive life.

(b) No contraceptive methods were employed at any time, and throughout the period sexual intercourse was frequent.

The causes of sterility in the human subject are numerous and varied, but in dealing with the subject in the present series, many factors are not applicable, while others may be dismissed in a few lines. A brief reference to most will suffice. Congenital factors, such as gross malformation of the reproductive organs, do not apply in this series, as all the patients had borne at least one child. For a similar reason functional sterility due to primary pituitary, ovarian or thyroid dysfunction may be ignored. Dietetic deficiencies, as for example lack of Vitamin E, are more difficult to assess, but as far as could be ascertained, the patient's economic circumstances were as good during the period of sterility, as they had been in their productive years. More general conditions, not of a gynaecological nature, such as the various forms of anaemia, nephritis, diabetes etc. are factors of importance. Most

of the patients, however, had good health in the more distant past, and none of them had had any of the illnesses mentioned since their last pregnancy. Sterility is sometimes due to a fault in the male, the figure being variously given at 12 per cent to 35 per cent or more. (10, 12, 17) In this series, it is difficult to believe that it can have any bearing, since each patient was still cohabiting with her husband, to whom she had already borne one child. One patient was exceptional in that she had remarried, but her husband was a widower with three children by his first marriage. The possibility of the husbands having become sterile, as a result of disease, cannot be overlooked; but inquiries of the patients suggested that the husbands enjoyed good health. The nature of the investigation scarcely allowed of any examination of the husband, nor did any patient demand or suggest it. With the possible exception of the patient who had remarried, incompatibility may be ruled out of court. In the case of this remarried patient, too short an interval had passed to justify the use of the term 'sterility', but she had a definite pelvic abnormality when examined, and is accordingly to be found in one of the groups to be described later. The menopause marks the end of reproductive life, and occasionally occurs abnormally early apart from disease

or surgical interference. Accordingly, premature menopause is an important possible cause of sterility. Two of the 44 sterile patients under consideration may be said to be sterile, due to this cause. In both patients, such signs of the menopause as scanty irregular menstruation, flushings, and headache had been present for a few months prior to their last conception. On leaving hospital after treatment for puerperal sepsis, the menstrual periods ceased, in one after three, and in the other after one further period. In 12 per cent of women menstruation ceases between the ages of 35 and 40 years, (18, 19) and the ages of the patients under discussion were 36 and 40 years respectively when menstruation ceased. Neither had had any illness or operation, which might be recorded in explanation. Both are apparently examples of premature menopause, and the true reason for their sterility probably lies therein. Dyspareunia, when severe enough to prevent intercourse, may be a cause of sterility. In this group of patients quite a number admitted having always had some degree of dyspareunia, and five confessed that, since their puerperal sepsis this had greatly increased. These 5, it may here be noted, had all evidence of sufficient pelvic inflammation to account for the pain, but in none did it prevent intercourse. In none was vaginismus a complaint. Appar-

ently, then, dyspareunia as a cause of sterility may be excluded, though appearing in some as a definite symptom of pelvic disease. A further important causal agent is pelvic disease, the result of infection apart from that occurring in the puerperium. Gonococcal and tuberculous infections, and spread from adjacent non-genital infections, such as appendicitis, are possible causes. A survey of each patient's health since leaving Robroyston Hospital leaves it beyond doubt that none of these factors played any part in the sterility under discussion. One last cause of sterility is represented by one patient, who, having been delivered of her last child by Caesarian section, was advised to submit to ligation of both Fallopian tubes.

It therefore appears from this brief survey of the causes of sterility that, except in three of the 44 women discussed, the loss of fertility was due to causes outwith those already mentioned. Two were deemed sterile as the result of premature menopause, and the third had been therapeutically sterilised. There remain to be discussed 41 women, in whom the search for a cause of sterility narrowed down to a search for pelvic damage, the result of a past infection not due to factors already mentioned. For the sake of clarity, it may be stated now

that, where a pelvic lesion was found, it was inflammatory in origin. Pelvic neoplasm such as carcinoma, and fibromyoma, and bilateral ovarian cystic disease were not found. Similarly, uncomplicated displacements of the uterus were not found to be related to the causation of sterility.

Accordingly, as the results of pelvic examination, it was found possible to classify the 41 patients remaining to be discussed as follows:-

Group I — Chronic uterine inflammation.

Group II — Chronic adnexal disease.

Group III — No gross abnormality found.

A fuller explanation of each group heading is given with the discussion of that group. The relationship between the morbid condition found in 1936 and the initial puerperal infection, now tacitly admitted as the probable cause of sterility, is studied for each separate group, and since in puerperal infection one patient may have several lesions, the clinical standpoint has been classified according to the predominant lesion found at the original illness. The following clinical groups are thus obtained:

a) Local uterine sepsis and/or perineal or vaginal sepsis.

b) Pelvic cellulitis.

c) Salpingitis (with peritonitis, local or diffuse).

d) Septicaemia (complicating the primary lesion).

e) Phlegmasia alba dolens.

In Table III below, the division of the patients between these clinical groups and the three main groups I, II and III about to be studied, is made.

Table III.

Puerperal Infection	Group I	Group II	Group III	Total
a) Local Sepsis	10	2	5	17
b) Cellulitis	3	1	-	4
c) Salpingitis	-	9	-	9
d) Septicaemia	-	3	2	5
e) Phlegmasia	3	-	3	6
Total	16	15	10	41

GROUP I.

In this group are placed those patients who were found on pelvic examination to have no recognisable adnexal disease, but in whom the principal lesion was chronic uterine inflammation.

These patients numbered 16, and it is noteworthy that only 5 complained of symptoms referable to their uterine condition. The following example is typical of these few.

Mrs. M., aged 35 years.

The patient's previous health had been excellent and

she had given birth to 5 normal children. Four years previous to this investigation, she was admitted to Robroyston with Puerperal Sepsis following the birth of her sixth child. Her illness was not severe and she was allowed home after three weeks in hospital. Since dismissal she had only been in fairly good health, her chief symptoms being referable to her menstrual periods. These have become irregular, every three to four weeks. Menstrual flow has been excessive, lasting 7 days instead of 3 days as previously. She has also developed occasional pre-menstrual backache. Another troublesome symptom has been persistent and severe leucorrhoea.

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The remaining 11 patients appeared to be in good health, and although a leucorrheal discharge was present in 9, the majority were either unaware of its presence, or in no way inconvenienced by it. In all the constituent members of this group evidence of chronic uterine inflammation was found in the existence of chronic cervicitis, with varying degrees of erosion and enlargement of the cervix. In many, as might be expected, there was considerable scarring of the cervix; it is therefore not surprising to find that in 10 there was thickening of the parametrium or of the uterine ligaments. In a few cases, slight enlargement of the uterus, indicating a possible subinvolution, afforded

more definite evidence of corporeal infection; but in the majority of the patients infection of the body of the uterus was assumed from the presence of cervicitis, indicative of co-existing endometritis, (20) and in some, the diagnosis was substantially confirmed by histories of menorrhagia and metrorrhagia.

Considering the patients as a group, however, it may be said that all of them had a marked chronic uterine infection, though, in most, the more obvious lesion was a chronic endocervicitis. In this chronic uterine infection lies one of the recognised causes of sterility. Whether the loss of fertility in this group is due in particular to this condition, is dealt with in the discussion which follows shortly.

When a survey of the initial lesions is made, it is not surprising to find that a primary uterine infection existed in all, and in two-thirds of the group this local uterine sepsis was the sole recognisable lesion (see Table III). Of these 10 patients, only 3 might be said to have been at all ill, the remaining 7 having had little or no fever or general upset. The average residence in hospital was 21 days and at no time was anyone of the 10 regarded as seriously ill. Of the remaining 6 patients, 3 were treated for phlegmasia alba dolens and 3 for pelvic cellu-

litis, these lesions overshadowing the uterine sepsis, which was also present.

Among those with phlegmasia, the uterine sepsis was under treatment for some time prior to the development of the white leg. In the third case, the uterine element was scarcely more than suspected till phlegmasia had developed.

In those with pelvic cellulitis, all were acutely ill. In two, the cellulitis progressed to absess formation, requiring incision and drainage. In all, uterine sepsis was marked, but it may be significant that salpingitis was diagnosed with certainty only once. Case-records of the other two make no mention of co-existing tubal involvement, and the course of the illness was typical of pelvic cellulitis. In view of the later findings in one of these, the history is given in some detail below.

Mrs. P., para 5.

Admitted to Robroyston Hospital on her 3rd post-partum day with a moderately severe uterine sepsis.

On the 8th post-partum day the temperature was more unsettled than previously. Pain was complained of in the left side of the abdomen.

On the 10th post-partum day, vaginal examination disclosed a left pelvic cellulitis, which did not result in abscess formation. After suitable treatment she was dis-

charged fairly well. She was recalled in 1936, i.e. five years later, for the purpose of this inquiry, and examination showed a marked chronic uterine sepsis, considerable thickening of the parametrium, but neither Fallopian tube was palpable. On account of the general ill-health and severe pelvic pain which she suffered, she was referred to the Royal Infirmary, Glasgow, and was admitted to the care of Professor Hendry. It was found necessary to perform a total hysterectomy, with removal of the left tube and left ovary. Operation revealed a chronically enlarged uterus with a hypertrophied cervix, a much thickened parametrium, and cystic degeneration of both ovaries. Both tubes were thickened and adherent, but when tested showed patency. As a result of her operation she is now inevitably sterile, but she had been so prior to this.

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With the knowledge that the tubes were patent, it appears that the periophoritis prevented normal dehiscence of the mature follicle. The condition of the uterus was, if not the actual, at least a contributory cause of her sterility. The case remains of considerable interest, however, in that it demonstrates the possibility of salpingitis being present concurrently with pelvic cellulitis, but remaining difficult to diagnose separately

during its acute or chronic phases. The woman quite properly is classified in Group I (chronic uterine inflammation) because of the findings in 1936 at re-examination, but the point raised is discussed when the causation of sterility in this group is considered.

At the outset of the arguments centring on the possible causes of the lack of fertility in this Group I, it must be admitted that the solution is not likely to be found in the results of simple bimanual examination and the scrutiny of case histories. In this type of investigation, the more elaborate methods such as tubal insufflation, radiological examination of the tubes after the injection of iodised oil, and microscopical analysis of the products of curettage are impracticable. Nevertheless the partial examination that was possible has resulted in some points both interesting and important.

In the first place, it has been observed that examination of the patients revealed one abnormality common to all, in chronic endometritis. This condition alone could easily account for the sterility of the whole group, Wrigley (21) states that "chronic endometritis uncomplicated by salpingitis .... does not appear to be nearly so potent a cause of sterility as might be expected." In

none of the patients was chronic tubal disease demonstrated at examination, but, although this alone does not exclude tubal disease, it is reasonable to associate the sterility with the abnormal condition found. (22) Bourne, on the other hand, states that investigations of the Fallopian tubes at laparotomy have shown that obstruction could exist though no abnormality could be seen at laparotomy, or felt on bimanual examination. He also adds that "gradually it has been recognised that the cause of many cases of sterility in women is the obstruction of the tubes rather than an abnormal condition of the uterus." In view, then, of the possibility of diseased tubes escaping detection at examination per vaginam, what facts are there to suggest or deny their presence?

A survey of table II shows that in Group I salpingitis does not appear to have been the initial infection in any of the patients, with the possible exception of one, in whom it was so mild as to be doubtful and almost negligible. Against that fact must be placed the preponderance of uncomplicated uterine sepsis; ten out of the total 16 in the group so suffering. To these must be added three, who suffered predominantly from white leg; and it is found that of 16 patients, 13 did not apparently suffer from salpingitis in the course of their puerperal sepsis. In

the 3 remaining, the possibility of co-existing tubal disease is admitted, as possibly indistinguishable from the pelvic cellulitis from which they suffered. Munro Kerr et alii,(23) point out that uncomplicated pelvic cellulitis accounts for less than 10 per cent of the infective lesions of the pelvic organs. The example given previously may, in the absence of positive findings, fairly represent the condition of all three.

Group I may be summed up as follows:

1. All 16 patients were sterile.
2. One condition was found common to all - chronic uterine inflammation.
3. Pelvic examination failed to disclose adnexal disease.
4. The initial puerperal infection was mild.
5. In 10 out of 16, the infection was clinically localised to the uterus.

GROUP II.

The second group, based on the findings of pelvic examination in 1936, comprises those who showed definite evidence of inflammatory mischief of the Fallopian tubes. They total 15, and unlike those who formed Group I, they give a history, in the majority, quite compatible with the results of examination. Four only are noted to have had no complaints. The following resumé of a history

illustrates, in the main, most of the patients of the group.

Mrs. F., para VI, aet. 36 years.

No complaint of ill health prior to her puerperal infection and no gynaecological symptoms.

Menstruation was always regular and the flow lasted 7 days. She usually experienced slight pain before and during the period.

She had given birth to six full-time children. After the last child she was admitted to Robroyston Hospital and treated there for one month. The diagnosis was uterine sepsis and bilateral salpingo-oöphoritis. Since dismissal her health has been poor. She was pale and nervous and had lost weight.

Menstruation remained regular, occurred every 28 days, but lasted from 7 to 14 days. Occasionally she had bleeding between the periods. Dysmenorrhoea, especially premenstrual, was very severe. Great pain was experienced in the back and lower abdomen. Leucorrhoea was very troublesome, and very copious before the menstrual periods. Dyspareunia was severe, and becoming more so in the year prior to examination.

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The lesions found at bimanual examination ranged from simple thickening of the Fallopian tubes to bilateral tubal

inflammatory masses, with adhesions and fixation of the uterus. In thirteen patients the damage was bilateral, and ,in the remaining two ,only one side was involved. In all but 2 ,there was chronic cervicitis, but with three exceptions it was slight. Half of the number appeared to have thickening of the parametrium. Three patients are included in the group, not because of any findings at vaginal examination, but because of operative findings at laparotomy. . In each of the three, symptoms had been of such intensity as to merit laparotomy within one year of their discharge from Robroyston Hospital.

The records of their puerperal infection show this to have been predominantly tubal in nature. Their later operative findings were obtained and are briefly as follows:

1. Mrs. K., Para XIII. Treated Southern General Hospital. History of chronic pelvic pain, later becoming acute. Bimanual examination showed the uterus to be fixed by a mass in the posterior fornix.
   Operative findings and treatment: Pelvic viscera embedded in a mass of adhesions. Both tubes thickened and fibrotic. Complete hysterectomy, leaving part of left tube and ovary.

2. Mrs. M., Para I. Treated Samaritan Hospital, for slight backache and menorrhagia.
   Bimanual examination showed the uterus to be fixed, both tubes thickened, and the right ovary cystic.
   Operative findings and treatment: Numerous pelvic adhesions. Uterus enlarged and adherent to the bladder. Left tube and ovary the seat of chronic inflammation. Right ovary cystic and adherent to bowel. Subtotal hysterectomy and bilateral salpingo-oöphorectomy performed.

3. Mrs. S., Para V. Treated at Western District Hospital for pain in the left iliac fossa, especially at menstrual periods.
Bimanual examination showed the uterus to be enlarged, fixed and drawn to the left. There was a mass in the posterior fornix.
Operative findings and treatment: Mass of adhesions in left side of the pelvis. Left pyosalpinx adherent to sigmoid colon. Right tube and ovary thickened and adherent to the uterus. The right ovary was cystic. Left salpingo-oöphorectomy and right salpingectomy performed.

From what has been said of these patients, it can be seen that they were almost certainly sterile before operation and are certainly grouped correctly in Group II. In every case the operations done resulted in absolute sterility.

Summarising the examination findings of this Group II, it may be said that the prominent lesion was chronic adnexal inflammatory disease. In the absence of other gross lesions, this adnexal disease most probably accounts for their sterility, but the actual argument is better treated after consideration of the primary puerperal infection, which resulted in such damage.

As might be expected, the records of their residence in Robroyston Hospital show that salpingitis with peritonitis was the outstanding lesion in the pelvis. In 9 out of the 15 it was indisputably the major part of the illness; in one of these the tubal element was over-shadowed by a

major peritonitis, the result of a leaking pyosalpinx. Uterine sepsis, of variable severity, was also present in all. The average residence in hospital was 6 weeks and all were regarded as seriously ill, four being exceptionally so. Of the remaining 6, three were septicaemic, two were apparently regarded as uncomplicated uterine sepsis, and the last had a pelvic cellulitis. The septicaemic patients were all desperately ill and all three had positive haemocultures. In all three, the septicaemia was the result of severe sepsis involving the uterus and appendages with peritonitis, and tubal masses were first felt only after the pelvic peritonitis, which was present, had settled down. In contradistinction, the patients with purely uterine sepsis and the one with parametritis were only moderately ill at worst. In none was salpingitis diagnosed, though in 1936, bimanual examination showed clearly that it had been present. The difficulty of diagnosing salpingitis, where pelvic cellulitis is simultaneously present, has been already referred to in the discussion of Group I.

In discussing the cause of sterility in the patients in Group I, it was noted that, without very thorough investigation on accepted modern diagnostic lines, any conclusions reached are only of relative value. Even more

pointedly do these remarks apply to those patients who make up Group II, but nevertheless each patient in the group revealed on examination a lesion, which is a recognised cause of loss of fertility. In every patient simple vaginal examination revealed masses indicative of tubes and ovaries tied up in masses of adhesions. Such conditions might well prevent pregnancy, either by the periovarian adhesions preventing the normal development and rupture of Graäfian follicles, or through tubal occlusion preventing the ovum reaching the uterus. In either, the result is the same and attributable to the chronic inflammatory tubal mass.

It would appear, then, that pelvic examination and a careful scrutiny of the case history was sufficient to establish the cause of sterility in this group. Exception might be taken to this statement, but a weight of evidence supports it. It may be argued that acute infection can be followed by complete resolution with restoration of structure and of function.(24) This, however, is possible only in comparatively mild infections and in this group, such conditions apply to only 13 per cent of the total. Further, pelvic examination did not suggest much restoration of structure. The additional criticism may be made that not all the patients had bilateral tubal masses.

Actually 13 out of the total 15 (or 87 per cent) were so affected. The remaining two women had a palpable mass on one side, but it must be remembered that a diseased tube is not necessarily palpable even to the most skilled fingers; and further, that acute puerperal salpingitis, in the opinion of some, is usually bilateral. (25, 26) Nevertheless, in these two patients tests for tubal patency would have been instructive. In all likelihood, most of the patients, if subjected to laparotomy would have revealed conditions similar to those discovered in the three examples already quoted; in these it is difficult to conceive of pregnancy occurring, once the damage had been done.

Group II may, therefore, be summarised in the following terms:

1. All the patients in the group are sterile.
2. The outstanding result of examination was chronic adnexal disease in all of them.
3. This is a recognised cause of sterility.
4. It followed severe initial puerperal sepsis in the majority.
5. Salpingitis was a prominent feature of the illness in most.

GROUP III.

The total of the sterile patients is made up by add-

ing to Groups I and II, which have already been considered, all those in whom no gross abnormality was found on pelvic examination during the course of this inquiry. The lesions discovered included old perineal lacerations and deficiencies resulting therefrom such as cystocele, rectocele, and old cervical lacerations, often with mild degrees of cervicitis. Thickening and fibrosis of the parametrium was not a feature. Ten patients were so affected, and of the 10, only 4 were primiparae, 3 had borne two children, and 3 had from 3 to 6 children. The lesions found therefore occasion no surprise, and are essentially common results of parturition. The significant feature was, however, that none of these 10 women had borne further children, nor had they adopted measures to prevent impregnation. All were in apparently good health, and pelvic examination revealed no abnormality which could definitely explain their sterility. One fact stands out as common to all, that each had sustained a puerperal infection following their last confinement and it remains to investigate this as the possible primary cause of their sterility.

The assumption that puerperal sepsis caused sterility is not unreasonable, when one remembers that infection is probably the chief single cause of acquired sterility. (27)

Many women receive infection during labour and become sterile, but demonstrate no lesion such as would of itself account for their loss of fertility.(10) Such a group is this.

Since the causal lesion remains a matter of speculation, it may be justifiable to inquire into the nature of the initial infection. Scrutiny of the original records shows that in 5 of the 10, the mischief was localised to the uterus throughout the illness. A further 3 showed predominance of phlegmasia alba dolens, and the remaining 2 were septicaemic. In those with local uterine sepsis, the illness was more than usually severe and necessitated 6 weeks' residence in hospital.

Similarly, in the subgroup who suffered from white leg, uterine sepsis was not only proved, but was again severe. Naturally in the septicaemic group, the local lesion was quite overshadowed by more severe manifestations of blood invasion, in one by pneumonia followed by empyema, and in the other by metastatic abscesses. The records of both, however, provide ample evidence of uterine infection.

All 10 may then be accepted as having had, among other lesions, a uterine infection, and in most it was severe. It is interesting to refer to those who make

up Group I. There the initial uterine infection was mild, and yet at the time of examination, a residual chronic uterine inflammation was recorded. Here, in Group III, there remains no recognisable trace of what, in most of the patients, had apparently been an unusually severe metritis.

Research into the histories of these patients possibly gives a clue to the nature of the lesion. After leaving Robroyston Hospital, three of them gave a history of menorrhagia and metrorrhagia, and two a story of leucorrhoea. These symptoms would indicate chronic corporeal infection. In one, symptoms ceased after some months and she has remained well. In a second woman, symptoms remained troublesome for four years. She was treated in hospital for "subinvolution" and was relieved by curettage. Unfortunately no record of examination of the removed uterine mucosa exists. A similar case was similarly cured, and again microscopical examination of the endometrium was not carried out. This last woman was, however, later subjected to a laparotomy for removal of an ovarian cyst. The notes made at operation show that there were no pelvic adhesions and that the Fallopian tubes were then patent.

These histories suggest that some of the group at

least, suffered from chronic uterine infection, and that, although operation achieved symptomatic relief, it did not restore their fecundity. On the other hand, the possibility remains that infection may have travelled upwards and have infected the tubal mucous membrane. Even although there is not one instance of salpingitis having occurred in the original illness, the question remains open, since the patency of the tubes was not tested.

Group III cannot therefore be dogmatically summarised, but the following points deserve notice.

1. The 10 patients of the group are sterile.
2. This sterility dates from severe infection at their last confinement.
3. There is no clearly defined lesion present in 1936 that would account for this sterility.
4. There are reasons for believing that chronic uterine inflammation is responsible, at least for some instances.

STERILITY - GENERAL DISCUSSION.

For convenience in the discussion on all groups, Table III is reproduced. It is to be remembered that the classification of the puerperal illness is based on predominance of one particular aspect of it.

Table III.

Puerperal Infection	Group I	Group II	Group III	Total
a) Local Sepsis	10	2	5	17
b) Cellulitis	3	1	-	4
c) Salpingitis	-	9	-	9
d) Septicaemia	-	3	2	5
e) Phlegmasia	3	-	3	6
Total	16	15	10	41

A partial recapitulation is desirable for the sake of clarity. The total number of patients, sterile within the scope of the definition previously given, was 41: and in each case the sterility dated from their last confinement, at which each received a puerperal infection, and to which it is apparently attributable. In 31 of the total, chronic inflammatory lesions within the pelvis were detected, and in the remaining 10 no such disease could be made out, though some evidence was put forward in favour of its existence. Of the 31 with detectable lesions, 16 demonstrated chronic uterine sepsis, affecting chiefly the endometrium, and 15 had chronic inflammatory disease of the Fallopian tubes and of the ovaries.

Both chronic endometritis and chronic tubal disease are recognised causes of sterility, and in this series there

is a preponderance of the former lesion. Most writers on the subject of sterility have found otherwise. Munro Kerr et alii[10] state that "a certain number of acquired lesions produce sterility .... Of this group the most important are probably the extensive inflammatory lesions of the Fallopian tube." With this opinion, Comyns Berkeley[28] and Wilfred Shaw[29] are in agreement. Wrigley[21] states that "chronic endometritis, uncomplicated by salpingitis, does not appear to be so potent a cause of sterility as might be expected. The fact that pregnancy has followed the thorough curettage of an unhealthy endometrium does suggest that occasionally endometritis does cause sterility." Analysing 146 cases of relative sterility, Titus[30] found the commoner lesion to be tubal obstruction, though it was closely followed by chronic endocervicitis. After a study of the disabilities following childbirth in 2,700 women, Macintyre[31] also is at variance with the findings of this inquiry, when he shows that the average fertility rate, in patients with inflammatory lesions of the tubes and ovaries, is lower than in patients with chronic cervical infection; while Polak[32] is impressed with the number of women who are sterile as the result of chronic tubal disease.

Authoritative opinion, then, believes that tubal

inflammation more often results in sterility than does chronic endometritis, though the investigations of Titus, and of Macintyre demonstrate no very great difference between the two. The first reason to suggest itself for the discrepancy in this series is statistical. In a total number of 41 cases, the margin of error is very great. More important still is probably the fact that tubal patency was not assessed, though it can be seen the use of modern methods in this investigation would rapidly have limited the available material. The exact site of the lesion, then, was not determined. In the summary to Group II, it is pointed out that the Fallopian tubes with or without the ovaries are almost certainly culpable in all 15 patients. In Group I, the absence of the tests for tubal patency may be of great importance, particularly when it is recalled that in 3 patients such tests might have afforded evidence which would have justified their inclusion in Group II, and of course deletion from Group I. All actually had had pelvic cellulitis, and in one the original record states that salpingitis was present in addition; in a second, tubal mass was recognised at a later operation. However, in none of the three, was a chronic tubal mass recognised in 1936, but their transfer from one group to the other would give a result in close

harmony with the writers quoted. The findings for Group III are open to the same criticism of inadequate scientific investigation. In this group of 10 - a large percentage of the total 41 - no discoverable lesion of apparent importance resulted from proven severe puerperal sepsis. In a smaller series of patients, Kenny (33) too, had a large proportion with totally negative findings.

From what has already been said, it follows that, in studying the forms taken by the original puerperal sepsis, one would expect acute tubal disease to preponderate. According to Kenny (33) those patients who suffered peritonitis, including tubal mass, are "the least residually fecund". In this series local uterine sepsis accounts for by far the majority of the patients. The possibility that tubal damage escaped recognition during vaginal examination has already been mentioned, as has the incompleteness of the investigation of tubal function. It is possible, too, that salpingitis passed unnoticed during the original illness, but it is less likely; actually it may have happened in two instances out of 17, if the judgment is based on the residual lesions. Against the 17 patients, whose main lesion, during their acute illness, remained localised to the uterus, there are only 9 who suffered from salpingitis

outstandingly; but even the addition to these 9 of all those who, in the light of later knowledge, must have suffered tubal involvement, does not displace local uterine infection from first place. Third in order of frequency is the group of 6 who suffered from phlegmasia alba dolens. So far as the genital lesion is concerned, these 6 might well be added to the group of those with local sepsis. They are remarkable for the trivial results of genital examination either during their original illness or in 1936. The small number in the group made up of those who were septicaemic, is perhaps a reflection on the mortality associated with this form of puerperal sepsis. The interesting features of the group are firstly, that 2 in later years showed no permanent lesion, yet were sterile, and secondly, the high percentum rate for the occurrence of salpingitis. Lastly, pelvic cellulitis (4) makes up the total. In view of its frequent association with salpingitis, the number is surprisingly small.

Summing up, it can be said that sterility has resulted in a majority of patients from an apparently local uterine sepsis, this number including those whose local lesion was overshadowed at the time of the illness by phlegmasia alba dolens. Salpingitis, septicaemia, and cellulitis occupy 2nd, 4th and 5th places, and together

account for less than half the total. An outstanding feature of the whole group is the fact that a majority of the patients suffered from puerperal sepsis in its milder forms.

THE APPARENTLY STERILE PATIENTS.

The total of those patients, who have had no further pregnancies, is made up by 33 patients, in whom proof of sterility was lacking. The term 'apparently sterile' has been used because all but four had been using contraceptive measures in some form. The 4 who are excepted, had had no further intercourse by reason of the death or of separation from their partners, or their original unmarried state.

The contraceptive methods employed varied greatly. In six patients complete abstinence was practised since dismissal at least 3 years previously. One only employed "the safe period". The others used obstructive appliances for one or other partner, or notably coitus interruptus. Chemical contraceptives were not greatly used, but the most frequent was the quinine pessary.

Probably the most interesting feature of this group, in its relationship to contraceptive practice, is that not one woman would admit on questioning to having used

contraceptive methods, or to having condoned their use by her partner, prior to the attack of puerperal sepsis. A very small minority, having atleast five live children, wisely decided that economic circumstances would allow of no increase in the family. The remainder, an impressive majority, had definitely one reason. They were afraid that a further confinement would be followed by a second attack of puerperal sepsis. The realisation of their apprehension may be aided by consideration of the following table, and its subsequent commentary.

Table IV.

Parity	No.of Patients	No.with only 1 live child
Primiparae	4	4
Para II	6	3
Para III+	19	2
Total	29	9

The table, which excludes the 4 who had had no further opportunity of becoming pregnant, shows that 9 of the 29 patients had only one living child at the time of examination. Seven of the 10,who had borne fewer than 3 children, had each only one living. These 10 ardently desired further children but honestly believed that in

so doing they would risk their health, and possibly their lives. The number practising total abstinence from sexual intercourse is strongly suggestive of a deep-seated fear. Three of the six concerned had only one child, and were very frank in their expressions of desire for at least one further; and very grateful for what advice could be given to them.

Weight is given to the patients' fears, when consideration is given to the illnesses from which they suffered. Most of them were very ill, and some were at one time regarded as unlikely to recover. Grave septicaemia accounts for 10 of the 29 considered. Pelvic peritonitis, salpingitis, cellulitis, phlegmasia, and pulmonary embolism account for a further 9. Local uterine sepsis, mostly severe, was present in the remaining 10 patients. Further, too, comparison of their health before and after their last confinement revealed that only 7 patients of the 29 were in good health and uncomplaining. The remaining 22 gave a history of dysmenorrhoea, leucorrhoea and symptoms of chronic pelvic disease, and more general disturbances such as rheumatism and recurring sore throats. The whole question of general health is considered in detail later.

All 33 patients in this group have been termed apparently sterile, but possibly some were truly incapable of

conceiving a further pregnancy. Accurate assessment is obviously impossible. Below is given Table V, in which the "sterile" and "apparently sterile" groups are compared for their initial illness.

Table V.

Puerperal Illness	Apparently Sterile	Sterile
a) Local uterine sepsis,	11	17
b) Cellulitis	2	4
c) Salpingitis	6	9
d) Septicaemia	9	5
e) Phlegmasia	5	6
Total	33	41

The total of those, who suffered from septicaemia, salpingitis, and cellulitis, is 17 in the apparently sterile group, or rather more than half the total. Against this is to be compared 18 so afflicted out of the 41 sterile patients. Obviously then the apparently sterile group had suffered at least as much damage locally and probably more than the sterile patients. More important still is the result of pelvic examination. Table VI presents the two sterile groups compared according to the lesion found per vaginam.

Table VI.

Group	Chronic uterine inflammation.	Adnexal disease.	Nil found.	Total
Apparently sterile	12	5	16	33
Sterile	16	15	10	41

Actually it is seen that 17 of the 33 offered evidence of one or other of the two causes of sterility already discussed. The 5 patients with chronic adnexal disease demand particular attention. Of these, two had bilateral tubal masses and, in a third, the pelvic contents appeared to be closely adherent to each other. The remaining 2 had one or other tube so thickened as to be palpable. The first 3 may be considered sterile.

When consideration is given to the severity of the initial illness and to the residual damage, it seems not unlikely that a proportion of the members of this apparently sterile group were not only apparently but actually sterile. Questioning as to contraceptive practices revealed many loopholes in technique and makes it possible that in many the practice was unnecessary.

Summing the findings of the investigation of this group, it may be said that the group demonstrates clearly the fear of recurrence of septic infection at a future

confinement. Quite reasonably it would appear that this fear is greater the more severe the previous illness has been. This fear, often probably groundless, has led to the free adoption of contraceptive measures in 14 per cent of the sum total of all sterile patients. Even where a further pregnancy had occurred, it had been fraught with grave anxiety on the part of the patient and of her relatives.

STERILITY - REAL AND APPARENT - SUMMARY.

The main issues in this discussion on sterility can be set forth as follows.

1. In 200 patients investigated, 77 (38.5 per cent) had no subsequent pregnancies.

2. 44 or 22 per cent were definitely sterile.

3. 33 or 16.5 per cent were apparently sterile, and may have so been; the use of contraceptive measures prevented positive information being acquired.

4. Where sterility was present, it followed puerperal infection, to which it was attributable except in 4 instances.

5. In 25 per cent of the sterile patients, no pelvic lesion was found, which could account for their sterility.

6. Chronic tubal disease was accountable for sterility in 34 per cent.

7. In 36 per cent the outstanding lesion was chronic uterine infection.

N.B. These last two statements are not in agreement with the results of other workers. The discrepancy is possibly due to incomplete investigation of tubal function.

8. Mild puerperal infection accounts for most instances of sterility.

B. THE EFFECT OF PUERPERAL SEPSIS on succeeding Pregnancies and on Parturition.

The discussions of the previous section have shown that, after their puerperal illness, sterility was an outstanding feature of the obstetric history of the patients in this series; and it has been suggested, with apparent reason, that this sterility was, in fact, the direct result of that infective process.

In this section the obstetric history of those patients in the series, who had become pregnant again since leaving hospital, is examined in detail with a view to uncovering any notable abnormalities, which had developed, and to considering their possible relationship with the previous puerperal sepsis, since such pregnancies per se are possibly of even more importance in relation to the patient's health than sterility.

The whole question is dealt with under the following sub-sections:-

I. The Ante-Natal Histories.

(a) General health during pregnancy.
(b) Abortion.
(c) Ectopic Pregnancy.
(d) Premature Labour.

II. The Abnormalities and Complications of Labour.

(e) General Considerations.
(f) Instrumental Deliveries.
(g) Breech Presentation.

I. The Ante-Natal Histories.

(a) General health during pregnancy.

The result of consideration of the ante-natal histories of those patients who became pregnant since leavinghospital, is to show that in the majority, their health was at a fairly high level. Those who complained of ill-health were chiefly multiparae of at least third parity. Vague malaise, sickness in the early weeks of pregnancy, and swelling of the ankles were prominent complaints, but most of the patients admitted that in this respect, those disturbances of health during pregnancy had already been experienced during pregnancy in the past.

(b) Abortion.

An outstanding feature however of the ante-natal histories was the large number of pregnancies which terminated in abortion. As used here, the term abortion indicates the expulsion of the ovum before the seventh month of intra-uterine life. Some idea of the prevalence of abortion in this group of patients is got from a study of Table VII given below.

Table VII.

Showing Incidence of Abortion in series of 200 patients.

Sepsis	No. of patients	No.of children	No.of abortions	abortion/labour ratio.
Before	123	434	76	1 : 5.7
After	123	153	54	1 : 2.8

So many abortions occur unrecognised by the patient, that it is impossible to estimate the total number of abortions with accuracy, but an approximate figure can be reached from the ratio of the number of known abortions to the number of children born. On this basis, the above Table shows that after septic infection the abortion rate is almost twice as high as it had been before the puerperal illness.

Reference to the authorities shows the abortion rate to be estimated at about one abortion to five labours. Munro Kerr (34) dealing with this subject, states that in 500 patients in the Glasgow Royal Maternity and Women's Hospital, the ratio was found to be one abortion to 7 labours. Malins (35) found the ratio to be much the same for 2000 private patients as for 2000 hospital patients. In both groups he gives the abortion to pregnancy ratio as one to six. For the years 1909 to 1913, Whitehouse (36) found the figure for Birmingham General Hospital to be 1 : 4.6 and for 1924 to 1928 to be 1 : 4.8. The ratio of abortions to labours in this investigation (1 : 5.7) for the group of women prior to puerperal sepsis therefore closely corresponds with the findings of others.

Before attributing the almost doubled abortion rate after sepsis to that infection, several possible explana-

tions must be discussed.

Many writers agree that abortion ends more pregnancies in these times than it did in past years. Pearce[37] sees an increasing abortion rate alongside a falling birth-rate. Taussig,[38] in America, states that "there is every reason to believe that an increase in the number (of abortions) is taking place with each decade, similar to the experiences of other civilised countries." In the final Report of the Departmental Committee[39] "the Registrar General's figures show a rise of 21 per cent in deaths from abortion .... and it would appear that there has been an increase in the number of cases." It is admitted therefore that the abortion rate is increasing, but it is difficult to believe that in this group the rate could be almost doubled from that reason alone, in the comparatively short period of five years.

The possibility that a great increase in the number of abortions might be due to a marked increase in the number of criminal abortions may be disposed of briefly. In the articles of Munro Kerr, Malins, and of Whitehouse, both already referred to, it is shown that there is no obvious increase in abortion from causes other than criminal interference. But that criminal abortion is increasing in incidence is supported by the views of

many. Professor Sidney Smith[40] for example says, "in Great Britain we have no real knowledge of the extent of the practice. The criminal statistics show that the known cases have increased." Parry[41] showed that, in Bavaria, the convictions for criminal abortion had increased 900 per centum in eight years. What proportion, in any series of abortions, is due to criminal interference, is long likely to remain a matter of dispute. Taussig[38], previously quoted, states that "authorities, both here andabroad, agree that of the three types, the most common is that of criminal abortion." The proportions given by him are: Spontaneous, 37%; Therapeutic, 13%; Criminal, 50%. Smith[40] draws attention to the small proportion occurring among unmarried girls, and to the fact that only 12 per cent occurred among women pregnant for the first time. In this series, occurring in Russia, he concludes that "quite a number were procured."

The difficulties, inherent in the assessment of criminality as a causal factor, proved as great in this present investigation, as in others. Only one abortion was admitted to be criminal in origin, and even then the patient maintained that it was self-induced. There were almost certainly several others, but few women, in the writer's experience, will admit interference having taken place,

unless confronted with substantial proof. However, even allowing for an increased general incidence of abortion, and a possibly considerable increase of criminal interference, it still seems unlikely that these two factors could account for the greatly changed figures already given.

With the information available in this investigation it is manifestly impossible to state with any degree of accuracy the probable causes in this series. Study of the histories leads to the elimination of certain factors in some. Apparently in all cases, the husband's health was good. In two patients the expulsion of a hydatidiform mole was verified from the records of another institution, and the patients themselves seemed to have been in good enough health. In another patient, severe hyperemesis gravidarum during the early weeks of pregnancy had resulted in abortion at the third month. A further two who similarly aborted at the third month, had been treated for severe debility.

All the remaining women had been quite well during the pregnancy which ended in abortion, according to the histories given. The possibility of syphilis as a causal factor cannot be ignored, but in this series the average duration of pregnancy was 3 to 4 months whereas Taussig,[42] and Cameron,[43] quoting Adair and Cruikshanks, point out

that as a causal factor syphilis is responsible for premature labour, rather than abortion in the earlier months. The parts played by dietetic deficiencies, and by endocrene disturbances cannot be given, since no accurate information on these matters could be obtained. Briefly it may be said, that at the time of the examinations, none of the patients appeared to be suffering from chronic disease, likely to produce abortion, of any system other than the reproductive system; nor were there any abortions, the results of acute physical or mental illness.

There remains for discussion the possible part played by disease of the reproductive organs. Examination of the patients revealed comparatively little. No uterine malformation was found. In one woman, abortion may be attributed to fibromyoma and retrodisplacement. After deduction of one woman, in whom abortion was possibly due to criminal interference, and two further patients who suffered from hydatidiform mole, there are left for discussion 34 patients, who had each had one or more abortions since their recovery from puerperal sepsis some years previously. All of them, as has been already stated, enjoyed good health, and all were multiparae, who had had at least three pregnancies. Without exception, they all suffered from persistent leucorrhoea and each attributed their dis-

charge to their puerperal illness, denying the existence of it prior to their infection. In such a statement, it is of course probable that the illness merely served to draw the attention of some of them to a discharge of even greater chronicity, but nevertheless their collective opinions are of some significance. In 9 of the 34 under discussion, to leucorrhoea was added menorrhagia, and of these, three complained of persistent tiring backache. In 6 of these 9, pelvic examination revealed some definite abnormality; in 4, enlargement of the uterus not due to pregnancy or recent pregnancy, and in two, thickened tubes were palpable. The remaining 25 offered little history of pelvic mischief apart from leucorrhoea, and on examination essentially negative findings were recorded. Cervicitis, with or without erosion and old cervical lacerations were, as might be expected, of common occurrence.

It seems reasonable to conclude that many of the 34 women suffered from chronic endometritis. As multiparae they have been exposed to greater trauma and risk, and are more likely to have uterine disease. Cameron (43) gives this as one reason for the higher incidence of abortion in multiparae as compared with primiparae. In not a few, the leucorrhoea was probably wholly accountable by the presence of cervical disease, with erosions and lacerations.

There is, however, a close connection between these conditions and corporeal endometritis, according to Cameron.(44) In those in whom the leucorrhoea truly followed their puerperal illness, it may safely be assumed that the endometritis and consequent abortions were the direct sequelae of their illness. In some probably the issue is clouded by the natural tendency to seek a cause for each effect. That chronic endometritis is a potent cause of abortion is generally accepted.(43) Cameron places it, with chronic subinvolution, as most important of all causes, originating on the maternal side.(45) Munro Kerr is in close agreement in placing endometritis, metritis and backward displacement as the most important local lesions. Gonorrhoea apart, infection at labour is the commonest cause of chronic endometritis, and so indirectly becomes a cause of abortion. Unfortunately, conclusive proof of the existence of chronic endometritis rests on the examination of tissue removed by curettage; and where patients are asked to return for questioning such a step is impossible, in the absence of proper accommodation.

Further, less important considerations add weight to the association between abortion and previous puerperal infection. The number of patients who had had one or more abortions before their septic infection, was 8, or 21 per

cent of the total, and in no case was the number of abortions more than two. After sepsis, repeated abortion occurred in 13, or 34 per cent. Eleven of these patients had had two abortions and one each had three and four abortions respectively. In these the continuous action of a single cause may be presumed. Most interesting is the fact that in 65 per cent the first pregnancy to follow puerperal sepsis terminated in abortion, while 50 per cent have had no full-time children since their puerperal illness.

(c) Ectopic pregnancy.

At the beginning of this section, a brief consideration of the histories of subsequent pregnancies showed that the health of the patients was on the whole good. No serious complication, outside of the reproductive system, had arisen.

Extra-uterine gestation, however, deserves special mention. In the whole series of 200 patients, none were discovered to have had this complication before their puerperal illness. Considering the period covered by the 200 histories taken, this may appear unusual. The average child-bearing period was 10-15 years, reaching a maximum of 25 years. In the much shorter period of 4 years from 1926 to 1930, there were operated upon in the

Glasgow Royal Maternity and Women's Hospital 57 cases of ectopic pregnancy.(46) These 57 operations were culled from 19,806 admissions(47) and give rise to an incidence rate of 2.8 per 1000. The paucity of patients in this series therefore probably accounts for the total absence of this complication.

There were similarly no instances of ectopic gestation among thesepatients in the years after their puerperal illness. This is rather surprising when the etiology of extra-uterine pregnancy is considered. Although the exact factors entering into its causation are still under discussion there is general agreement that salpingitis is of some importance.(48) Cameron states that there is ample pathological and clinical evidence to show that in many instances tubal pregnancy is preceded by salpingitis. He quotes Lawson Tait as regarding salpingitis as the commonest cause of extra-uterine pregnancy.(49) Taussig, discussing the sequelae of abortion, refers to salpingitis as a frequent accompaniment of infected abortion, predisposing to ectopic pregnancy and resulting in a marked increase in the number of tubal gestations.

All the patients in this series had had a definite puerperal sepsis, and in 30 of them a definite tubal infection was recorded at the time of their initial illness or

found at the later examination in 1936. Doubtless, many others may have suffered from mild tubal infection, unrecognised on either occasion. Despite the smallness of the numbers, it remains interesting that no ectopic pregnancy has occurred, It should be remembered, however, that a period of sterility often precedes the occurrence of extrauterine pregnancy, and about half the patients with known tubal lesions have already been considered sterile. The possibility that some of these may yet suffer an abnormal implantation must meantime remain an interesting speculation.

(d) Premature labour.

Although toxaemias of pregnancy, syphilis and diseases of the placenta are usually regarded as the more important etiological factors in the causation of premature labour, "all causes, which predispose to abortion, may also cause premature labour. (50) It having already been shown that the incidence of abortion is greatly raised after septic infection, it falls similarly to discuss the occurrence of premature delivery.

The following Table covers the 123 patients who had become pregnant since their puerperal illness.

Table VIII.

Incidence of Premature Labour in series of 200 patients.

Sepsis	No. of patients	No. of viable children	No. of Premature births	% premature
Before	123	434	20	4.6
After	123	153	9	5.8

The Table shows but little alteration in the incidence of premature delivery, and it transpires that two patients had prematurely borne children before the occurrence of sepsis. The deduction of these two gives the even more correct figure of 4.5 per cent, which is to be compared with 4.6 per cent occurring before septic infection.

Further scrutiny of the remaining seven reveals the fact that three of them had each one or more full term child between their puerperal illness and the premature births under discussion. In a fourth, the four pregnancies after her illness terminated at 3 months, 2 months, 6 months and 7½ months. Her previous history shows that sepsis followed her first pregnancy, which safely reached term. Here it seems reasonable to presume that sepsis may have been connected with her later misfortunes. Of the remaining three, toxaemia of pregnancy possibly accounts for one, but the other two apparently enjoyed good health, though one has not since borne further children, and examination showed her to be suffering from chronic uterine disease.

It seems, therefore, that with possibly two exceptions pre-existing sepsis does not account for the occurrence of premature delivery. In neither of the two exceptions can

a conclusive case be put forward that sepsis in the past was a causal factor.

II. Abnormalities and Complications of Labour.

(e) General Considerations.

The more serious complications of labour are usually concerned with structural deformity of the birth passage and malformation and abnormalities of the foetus. These factors arise quite independently of pre-existing puerperal sepsis, and in fact rather predispose to infection. The possibility that previous sepsis, through causing chronic disease of the uterus or permanent damage to the canal might have some causal relationship to delay in labour has been investigated, and is presented in the following paragraphs.

It has already been noted that of the total 200 patients investigated, 123 had become pregnant after their puerperal sepsis, and 105 had given birth to viable children. Unfortunately the details of each labour are necessarily limited, since the majority of the patients had been confined in their own homes, and the information extracted from them was therefore not necessarily technically accurate. Where possible, any available hospital record of a confinement falling into this group has been scrutinised.

The more minor complications such as delay in the 1st and 3rd stages could not be accurately determined, but the only malpresentation on which reliable statements could be obtained was breech presentation. Instrumental delivery could be noted only as such, and the reason for its necessity in many cases could only be assumed or remained totally undiscovered. Nevertheless, with the information available, a fairly reasonable estimate could be made of the complications of labour and of their incidence.

The 105 patients now being considered gave birth to 505 children, 352 before and 153 after puerperal sepsis, and in a broad way complications of labours were not apparently unduly frequent. As already explained the two chief complications dealt with are instrumental delivery and breech presentation. The following Table summarises the results.

Table IX.

Incidence of Instrumental & Breech Deliveries.

Sepsis	No. of patients	No. of births	Forceps deliveries	%	Breech deliveries	%
Before	105	352	36	10.2	12	3.4
After	105	153	4	2.6	10	7.8
Total for series	105	505	40	7.9	22	4.3

(f) Instrumental deliveries.

The Table gives the percentage incidence of instrumental delivery as 7.9 for the whole series. Munro Kerr (51) states that "cases in which forceps is necessary need not exceed 6-8 per cent", and while the figure for this series is within the limits so given, it is definitely to the higher figure; but most of the patients were confined in their own homes, where, as Munro Kerr (51) points out, the percentage of instrumental deliveries is usually higher. His comparison between the incidence for the General Lying-in Hospital, York Road (2.5%) and that of the Queen's Institute of District Nursing for the same years (6.8%) demonstrates this. The percentage of instrumental deliveries was much higher before, than after puerperal sepsis, the figures being 10.2 per cent and 2.6 per cent respectively. The explanation lies to a great degree in the fact that of the total 40 instrumental deliveries, 26 or 77 per cent of them were at first labour. Further 60 per cent of the patients in the group "after sepsis" were women who had borne four or more children. With increasing parity, the necessity for forceps diminishes, and usually only occurs in cases of marked disproportion. The actual number of forceps deliveries "after sepsis" was four in

as many patients, and three of these patients had had previous instrumental deliveries. One patient had a slightly contracted pelvis, and had had forceps at both her confinements. A second had borne 13 children, two of which, born prior to her septic infection, had been delivered by forceps. She appeared to have some contraction of the pelvic outlet, and the child to occasion. her third instrumental delivery was 9½ lbs. weight when born. The third had borne 15 children, the first having been delivered by forceps. The third child born after her puerperal sepsis was similarly assisted. Three pregnancies rapidly following, together with 12 previous confinements, had apparently led to uterine inertia; this is supported by the occurrence after delivery of a slight post-partum haemorrhage. The pelvis appeared to be normal. The fourth patient to be delivered by forceps was confined in hospital, and the records show her to have been an instance of delayed labour due to uterine inertia resulting from a persistent occipito-posterior presentation. High forceps delivery ended her 9th labour. She had a slightly contracted pelvis.

These factors go to show that factors other than previous sepsis caused instrumental delivery in these four cases and no relationship can be found between the

one and the other condition.

(g) Breech presentation.

Although many malpresentations, such as occipito-posterior presentation, must of necessity have been included under "instrumental deliveries" owing to lack of information, it was possible to obtain definite details regarding the occurrence of breech delivery.

Bourne (52) states that "of all the malpresentations, the breech is by far the commonest." Standard text-books, as for example, Cameron, (53) estimate the incidence to be about 4 per cent; and Munro Kerr (54) states that it is "about 3-4 per cent taking full time and premature labours into account." In this series, over the years before and after the patients' septic illnesses, the figure reached was 4.3 per cent, which is in close agreement with those already quoted.

In confinements, in the period after puerperal sepsis, a higher incidence might be expected, since it has already been shown that there is a definite tendency to chronic uterine sepsis in such people. Such a condition favours the occurrence of premature labour, (50) and prematurity predisposes to breech presentation. Reference back to Table IX would appear to support such a view. The incidence of breech delivery before sepsis

was 3.4 per cent, while after sepsis, the much higher figure of 7.8 per cent is recorded. This latter figure -almost double the figure regarded as normal - explains why the figure for the whole series is slightly above the highest quoted by the authorities mentioned.

Further study of the group, however, reveals the figures in a truer light. There were 9 patients involved, and 10 breech deliveries, one patient having had two breech deliveries. A brief analysis of these cases is given, with reference to what was probably the dominant cause of the malpresentation. It must not be lost sight of that more than one cause may have operated in each case.

Table X.

Showing the predominant factor in the breech presentations occurring at subsequent pregnancies,

Predominant factor.	No. of Breeches
(a) Contracted Pelvis	3
(b) Prematurity	2
(c) Foetal Deformity	1
(d) Multiparity	3
(e) Doubtful	1
Total	10

(a) There were two patients with contracted pelves.

The first had borne two stillborn children, the first a difficult forceps delivery, followed by severe puerperal sepsis, and the second a breech delivery. The patient's pelvis was markedly contracted. The second patient had her first of four children after a difficult instrumental delivery and this was followed by septic infection. Following two breech deliveries, she had her first normal delivery. The pelvis was moderately contracted.

(b) In the two patients in this group, the first delivery after sepsis was of a seven months child. One child was stillborn, the second died in a few hours. The first woman had had a similar misfortune previously, while the second woman had had two abortions prior to her confinement which was followed by sepsis. In both, pelvic examination revealed no abnormality.

(c) This one patient was delivered of a child with a meningocele, who lived seven months. Her pelvis was normal.

(d) In three patients multiparity was apparently the causal factor. In two cases the birth was the last of thirteen, but both had had two normal deliveries between their puerperal infection and the breech deliveries under discussion. The third patient had had

twelve pregnancies, with puerperal sepsis following the tenth, an abortion at the third month. This was followed by another abortion and a breech delivery in rapid succession.

(e) In the remaining patient, no definite reason for breech presentation could be ascertained. Possibly the explanation was multiparity for she had had three deliveries in rapid succession. Sepsis followed the first, a normal delivery; the second was a normal confinement and delivery; and the third was a breech delivery. The child weighed 7½ lbs. and the pelvis was normal.

These brief details suggest that the occurrence of breech presentations in the years following septic infection were more probably due to causes other than the preceding sepsis, though it is interesting to recall that none of the nine women concerned had had such a presentation before, yet in seven of them, the birth occurring first after sepsis presented by the breech. The occurrence of breech presentation in those two who were delivered of premature children might indirectly be attributed to sepsis, but in both instances there was a clear history of premature delivery or of abortion before the puerperal illness.

The probable explanation may be that the patients

here considered had previously borne four children on an average, and so the incidence of breech presentation after sepsis is in close agreement with the figure usually quoted for women who have had four or more confinements. Further examination of the causes of breech delivery supports this view. After deducting those four in whom multiparity may be regarded as the cause, six remain. The incidence so reached is 3.9 per cent, a figure which is within the normal limits and any increase, it follows, can be attributed to multiparity.

In conclusion then, it may be fairly stated that, in this series of patients, the previous puerperal infection had had but little influence on the course of succeeding pregnancies and labours or in the development of complications. Factors other than previous puerperal infection had been found responsible for the complications which had arisen.

To this there was one exception, notably the occurrence of abortion. This complication had increased in frequency seemingly as the result of the previous puerperal sepsis.

Such a conclusion must be viewed with interest in the light of the difficulties which surround the investigation of the various factors concerned in the cause of

abortion in a community such as Glasgow, from which these patients were drawn; but, from the point of view of this investigation into the remote effects of puerperal sepsis, the finding is of more importance, when the subsequent health of the patients is considered.

There can be no doubt that abortion may have a serious effect on a woman's health. Indeed, Berkeley[55] points out that on an average of 10 years, abortion accounts for 12 per cent of the total maternal death rate, while Taussig[56] includes as the late complications of abortion, menstrual disturbances, sterility, a tendency to repeated abortion, and neurasthenia.

C. THE FURTHER INCIDENCE of Puerperal Sepsis.

It has already been remarked earlier in this work that there is in the minds of many women suffering from puerperal sepsis, the very real fear that a recurrence of a similar infection at a future confinement will again endanger health and life. During the period in which the treatment of puerperal sepsis was his whole concern, the writer has treated women for post-abortum sepsis, and some of these patients had been so obsessed by the idea of the recurrence of sepsis as to induce abortion by their own hand, using methods which, ironically enough, apparently gave a very real foundation to their belief. These facts, together with the speculation, which existed in the minds of the writer and his colleagues, that re-infection was at least possible, resulted in the investigation which constitutes the following portion of this thesis.

It has been shown in previous chapters that, of the 200 patients in the series, 123 had pregnancies since leaving hospital. These pregnancies resulted in 153 births and 54 abortions. Following 23 confinements, the puerperium was abnormal and, in a further 3 abortions, convalescence was interrupted by further illness. After close questioning and whenever possible by verifi-

cation of the answers by clinical findings, it has been possible to show that in 7 the subsequent illness was coincidental, but in 19 it seems to have been due to puerperal sepsis.

Regarding those 7 patients in whom the subsequent puerperal illness was coincidental and not due to puerperal sepsis, further investigation showed that in 6 of these patients, an acute mastitis had developed during the first or second week of the puerperium, while the remaining patient had suffered from a mild facial erysipelas. In each case, the puerperium had been abnormal after one pregnancy only, although all 7 patients had had several subsequent pregnancies.

In all 6 patients with mastitis, the condition had progressed to abscess formation and had been treated by incision and drainage. Three of these patients had had no previous breast trouble and lack of proper attention to the nipples with resulting excoriation had apparently been a predisposing factor. All three patients had had a normal confinement subsequent to their previous puerperal sepsis and before the pregnancy now under consideration. In the other two patients, no apparent cause for their mastitis could be found, but it was noted that this had occurred after the confinement

immediately following the previous puerperal illness, during which affection both patients had suffered from acute mastitis. Neither patient had had any other pregnancies. At the time of examination, the patients' breasts appeared healthy.

The remaining patient, who had had erysipelas, had developed this condition after the second pregnancy succeeding her puerperal illness. She had had no previous attacks, but it was noted that her only previous illness had been scarlet fever, frequent tonsillitis and puerperal sepsis, the infecting organism in the last mentioned illness being the streptococcus. It is interesting to note that non-haemolytic streptococci were cultured from the upper vagina at the time the patient was examined in this investigation.

Little conclusion is to be drawn from these details other than that already stated, that the subsequent illness of these patients may have been merely coincidental, although in the last patient mentioned, a marked susceptibility to streptococcal infection might be admitted. On the other hand, in the 19 patients with subsequent puerperal sepsis some relationship to the previous sepsis has already been suggested and further details of these patients must now be considered.

In all 19 patients, with one exception, sepsis followed one confinement only; in one, sepsis followed two pregnancies, but in estimating the incidence of sepsis among the patients this has been regarded as one case. The total number of patients then, represents the number of pregnancies followed by sepsis. In 15 instances, sepsis followed the first confinement, after their residence in Robroyston Hospital: in that patient who had two confinements followed by septic infection, both followed her hospitalisation without any other intervening pregnancy.

None of the patients were at any time seriously ill, and several had not been sent to hospital. Of those who had been hospitalised, the majority had been re-admitted to Robroyston Hospital, where verification of the existence of sepsis was amply confirmed. In those who were not admitted to hospital, the existence of sepsis was based entirely on the history received from the patient. Accordingly the patients are grouped as follows:

(a) Verified Sepsis. (b) Probable Sepsis.

(a) Verified Sepsis. There were 12 patients in this group and below is given the diagnosis for each case.

Local uterine sepsis, 9(*)
Phlegmasia alba dolens, 2
Salpingitis, 1

(*)includes 3 instances of sepsis following abortion. While it has been said that none of the patients was seriously ill, in 3 out of the 12 sepsis was severe. There was little or no relationship apparent between the first and the second attacks of sepsis. The records of the bacteriological findings at the second illness being somewhat incomplete, it is difficult to compare every case in this respect for its two illnesses. In the primary infection, streptococci appeared to be the causal organism in 9 of the twelve: in three, the streptococcus was haemolytic. In the remaining three the infection was mixed, but included streptococci. The records are accurate for only 7 of the 12 at the second illness, and again streptococci predominated, being the infective organism in 5 of the seven. While further on in this thesis the question of the bacteriology of the genital track of the patients in this series is more adequately dealt with, it is interesting to note at this stage that when examined in 1936, streptococci were grown from smears of the upper vagina in 8 of the 12 patients in this group. In a further two, the resultant growth consisted of staphylococci and in two the culture remained sterile.

(b) Probable Sepsis. The seven patients in this group were not notified as suffering from puerperal sepsis or pyrexia, and accordingly no reliable record exists outside of the patients' own story. In every case there appears to have been a rise of temperature in some, accompanied by shivering or rigor within the first week after the confinement. All state they felt ill, and most recall a malodorous vaginal discharge. Probably the most reliable information received from all of them was to the effect that they were confined to bed for three weeks (the minimum period mentioned) to four weeks. In most the lesion appeared to be a limited uterine sepsis, though one gives a history strongly suggestive of salpingitis. In another a prolonged period in bed was followed by acute mastitis requiring incision and drainage. Uterine sepsis in one was followed by facial erysipelas, of which this woman had suffered previous attacks.

At the original attack of puerperal sepsis, the hospital records show that in 5 of the 7 the infection had been streptococcal; two yielded a haemolytic streptococcus. The smears taken at the interview in 1936 yielded non-haemolytic streptococci in these 5 who had been previously so infected; in the remaining two no

growth resulted.

It now remains to discuss the incidence of puerperal sepsis among these women who have had a previous attack and to compare it with the incidence in an unselected series. Since the number of abortions occurring among the population cannot accurately be assessed, the incidence of puerperal sepsis in that same population is based on the number of births. This series is similarly treated. It will be recalled that the total number of pregnancies was 207, consisting of 153 births and 54 abortions. The resultant cases of sepsis numbered 19, which includes 3 abortions. In this series then, the incidence of sepsis is 16 in 153, the three abortions having been deducted. This is equivalent to a rate of 104 per 1000 births over the 4-5 year period 1931-1936. For the ten year period 1927-1936 the incidence of sepsis is given in the Report of the Medical Officer of Health for Glasgow (1936)[57] as 11.7 per 1000 to 38 per 1000, the average incidence being 25.1 per 1000 births. Further study of the same Report shows that this series and the unselected population of the Report are proportionately derived from the same districts of the city, and from the same social strata, while the period covered by the writer's cases is covered by the Medical Officer's

assessment.

The difference between the Glasgow figures and those based on the writer's series is striking, but it is to be remembered that the Report figures are based on the occurrence of verified puerperal sepsis. Deducting from this series those already labelled "probable sepsis" there is left in the writer's series an incidence of 58 per 1000 births, based on the occurrence of 9 instances of sepsis in 153 births. The rate for probable sepsis alone, it follows, is 46 per 1000 births. Even for verified sepsis, then, the rate in this series is more than double that for the City of Glasgow, while if the "probable" cases be added a further great increase is yielded.

Before accepting this figure as final, it is necessary to show that no other factor, other than the existence of previous sepsis, could be held responsible. Peckham (58) in an analysis of 5,767 cases of puerperal sepsis, found the incidence of sepsis to be influenced by age, parity, obstetric abnormalities with operative deliveries, and medical conditions. He found that there was a steady fall in the incidence of sepsis with increasing age up to 30, when there was a secondary rise, but due to an increase in the number of obstetric compli-

cations. There was a similar decline with increasing parity till after the birth of the ninth child, when he again noted a rise due to obstetric difficulties. In this series, the majority of the patients were less than 30 years old and the average parity was VII; there were no primiparae and only two patients had borne more than nine children. These two factors - age and parity - then apparently had nothing to do with the increased rate. Similarly the possibility of obstetric difficulty and operative delivery as a factor in the production of sepsis may briefly be dismissed.

Only two of the nine cases of verified sepsis had any complication, both suffering perineal tears, one due to a forceps delivery and the other due to a difficult breech delivery. Among the cases of probable sepsis, one patient had a delayed, but eventually spontaneous delivery. The only medical condition encountered in the series examined was oedema of the ankles, presumably with albuminuria, and this was encountered thrice in all, once among the verified and twice among the presumed septic cases. Medical opinion differs regarding albuminuria as a causal factor. Cameron (59) and Hewitt (60) believe its presence does predispose to infection, but Bourne (61) believes otherwise, an opinion which is in

agreement with the findings of the Committee of the Obstetrical Section of the Royal Society of Medicine.(62) For the purposes of this investigation, it seems most fair to presume that albuminuria is a predisposing factor.

These factors, then, cover briefly those conditions which are generally accepted as chiefly concerned in favouring the development of puerperal sepsis. In this series of 16 cases, where sepsis complicated the puerperium, these factors operated in 3 of the 9 cases of verified sepsis and in 3 of the 7 cases of probable sepsis. By excluding them, an incidence of 63 per 1000 births is reached, made up of (a) verified sepsis - 39 per 1000 births, and (b) probable sepsis - 24 per 1000 births. Even after the deduction of these cases, in which possible predisposing causes have been present, it is obvious that at the figure of 63 per 1000, the incidence rate of sepsis among patients who have previously suffered a similar illness is far above the expected figure, in the calculation of which no allowance is made for predisposing factors. Nor would it appear that the incidence of factors likely to encourage sepsis in this series is higher than normal, and with due allowance for statistical error due to the small number, it

seems reasonable to assume that the pre-existing infection must have influenced the onset of the later illness.

Before further discussion, it is advisable to reproduce the figures reached in this investigation.

Table XI.

Incidence of Sepsis in Unselected Cases and in Selected Cases under Investigation.

Unselected Cases. M.O.H. figures	Writer's series. verified and probable	Selected cases - all factors.		Selected cases - known factors excluded.	
		Confirmed	Probable	Confirmed	Probable
25.1/1000	104/1000	58/1000	46/1000	39/1000	24/1000

These figures, it may be argued, suggest that a woman who has once suffered from puerperal sepsis, is liable to contract similar infection at a future confinement. Such a liability may be explained by an inherent susceptibility to infection in those patients, or to an increased susceptibility to the particular organism of the primary infection, or to the persistence in the genital canal of virulent organisms, the residuum of the earlier illness. Possibly more than one of these factors plays a part in each illness. Individual susceptibility to streptococcal puerperal infection has been fully investigated in pregnant women. By the use of

the Dick test, as in scarlet fever, Cruikshank & Baird,[63] Salmond & Turner,[64] and Stent[65] were unable to prove the existence of such a sensitiveness beyond doubt. Burt-White and Colebrook,[66] however, considered their results of value. It is not impossible that the second factor mentioned, increased susceptibility the result of a first infection, acts as it is known to act in erysipelas and influenza.[67] Were either of these factors proved to have some causal relationship to second attacks of puerperal sepsis - in one woman, one might almost say recurrent sepsis - more weight would be added to the finding of the persistence in the genital canal of streptococci, according to the figures already given. Certainly the objection stands that in no case seen in 1936 was a haemolytic streptococcus found, an objection perhaps offset by the recently promulgated theory that streptococci can change their cultural characteristics, losing and perhaps later regaining their power of haemolysis.[68]

In conclusion of this section, it may be said that in this series a large statistical error may be present due to the paucity of the material. The material however shows the further incidence of puerperal sepsis to be very much higher than for an unselected series of patients, and suggest a possible relationship between

first attacks and subsequent attacks. These suggested conclusions are possibly stressed by the occurrence in 12 of the 16 live births, of sepsis in that confinement which took place first after dismissal from Robroyston Hospital.

D. INFANTILE MORTALITY.

It is convenient at this stage, when dealing with the subsequent obstetric histories of the patients, to discuss briefly a subject of perhaps lesser importance, but nevertheless of some interest, which arose while the details of the obstetric histories were being investigated. The subject referred to is the Infantile Mortality among those children at whose birth the puerperal illness, which formed the subject of this research, had developed.

Investigations showed that, at the time of the puerperal illness, 147 children were born alive, and of this number, 28 had died during the first year of life, giving an Infantile Mortality rate of 170 per 1000 live births. Seven of these children had died during the first four weeks of life, giving a Neonatal Mortality rate of 47 per 1000 live births, and includes 4 who died of debility, three of these actually being triplets.

A distinguishing feature of the Infantile Mortality rate is its local variation, not only between countries and between cities, but also between different quarters of the same city, (69) but a rate of 170 per 1000 live births is striking.

With but few exceptions, all the patients in this investigation had been living in Glasgow at the time of

their puerperal illness and since leaving hospital. A comparison of the figures for the Infantile Mortality rate for that city during the past ten years (1927-1936) shows that the rate has been about 103.7 per 1000 live births,[70] whereas the rate of 170 per 1000 live births for this series is not only much higher, but corresponds almost exactly to the highest rate for Glasgow - that for Blythswood Ward.[70]

By no means all of the women interviewed could have been regarded as living in what are about the worst conditions in Glasgow either at the time of their puerperal illness or at the time of the interview, and it was thought that an explanation for the high mortality lay in the period the patient spent in hospital, which is, in fact, the period spent away from the child. Investigation of this, however, showed no appreciable difference between those women whose babies had died within a year of birth and those whose children had survived. In both cases the average period spent in hospital was 5-6 weeks. But to suggest that, in this group, the conditions even approximated to the worst in Glasgow is surely an indication that conditions might be bettered and the infantile mortality rate more closely approach that for the city generally, at about 103.7 per 1000 live births.

Even if not borne out by figures, it is suggested that possibly lack of maternal care and the enforced absence of breast-feeding may be contributory factors in the deaths of these infants. This is in some measure supported by a scrutiny of the various causes of death as given in the Table below, where it is seen that infections - pneumonia and enteritis; and debility, accounted for two-thirds of the deaths, including neonatal deaths.

Table XII.

Infantile Mortality with Cause of Death and other relevant Factors.

Cause of Death	Total No. of Cases	Duration of Pregnancy		Type of Delivery		Time spent by mother in Hospital
		Full-time	Pre-mature	Spontaneous	Instrumental	
Pneumonia	10	10	-	10	-	3-7 weeks
Prematurity	6	-	6	6	-	3 "
Debility	2	2	-	1	1	3-9 "
Enteritis	4	4	-	4	-	5-8 "
Birth Injury	1	1	-	-	1	3 "
Icterus neonatorum	1	1	-	1	-	5 "
Tuberculosis	2	2	-	1	1	3 "
Unknown	2	2	-	2	-	7 "
Total	28	170 per 1000 live births.				

Possibly if the babies were brought to hospital in every case, conditions might change. The occurrence of admitted ward epidemics of enteritis need not be expected

to the same extent as in a children's hospital, for at least 60 per cent of these babies, hospitalised along with their mothers, might be breast-fed. This assertion is the result of experience. It need only be added that in many women breast feeding would prove beneficial to them, while the establishment of lactation and its continuance after the cessation of the mother's illness, would be of undoubted benefit.

Chapter II.
THE HEALTH OF THE PATIENTS.

Of primary importance in this investigation into the remote effects of puerperal sepsis is the health of the patients in the years subsequent to the attack. Accordingly a detailed history of the health of the patients was taken, and a thorough general examination was made. Even from the considerable data so amassed, it was found difficult to assess the presence of ill-health and particularly when such was present, the degree to which it might be attributed to the previous attack of sepsis. Several extraneous factors had to be considered and due allowance made for them.

Foremost among these factors was the social status of the patients. With but few exceptions, the women were of the "hospital class" and many, in very poor circumstances, were frankly undernourished and anaemic. Most of them left hospital after their attack of puerperal sepsis at the earliest possible opportunity. Only exceptionally did a woman remain long enough to benefit from haematinic therapy. By compulsion they had to take up immediately their housekeeping duties, and give attention to their usually large families. Such conditions must obviously prove detrimental to recovery from a pregnancy and confine-

ment, and the effect must be the greater when a confinement is followed by puerperal sepsis. Accordingly, as Kenny (33) points out, "any practitioner observing cases in the first months of the post natal period, cannot fail to receive complaints of bodily and mental impairment related to the confinement." The patients in this series were not exceptional in this respect. Many had suffered during the first few months succeeding their illness from such symptoms as weakness and lassitude; breathlessness on exertion; slight swelling of the ankles in the evening, Headaches, dizziness and nervousness were other common complaints.

Again, subsequent pregnancies or a rapid succession of pregnancies, with or without such complications as abortion, difficult labour and sepsis, all combine to reduce the health of the mother. To some extent this question has already been dealt with when the effects of sepsis on subsequent obstetric history was considered. Increased economic difficulties resulting from unemployment, and in some cases death of the husband causing straitened circumstances, may be mentioned as other factors which cannot but have had a serious effect on some patients. The following is an illustrative case.

Mrs. N.. In Robroyston Hospital in 1932, suffering

from puerperal sepsis, complicated by mastitis. She made a good r ecovery and went home well after a stay of 5 weeks. She remained in good health for two months, when her husband died; the patient then suffered a "nervous breakdown". Since then she has been depressed both mentally and physically, and from the time she has had to scrub floors as a means of livelihood, she has suffered from rheumatic pains in her hands. Whether that condition is the result of her employment or a reaction to her fear of losing it is beyond the scope of this work.

With these facts in mind, it will r eadily be appreciated that much ill-health, even if not serious, was encountered in this investigation of the patients' health, especially occurring in the first six to twelve months after leaving hospital. Making allowance for the factors already discussed, the question as to how many suffered indisposition as a direct result of their puerperal sepsis, has been approached from the two viewpoints, firstly the state of health as judged from the patient's assessment of it; and secondly, the health assessed from results of medical examination. From a study of the patients' opinions three groups were identified:-

Group I. Health unchanged.
" II. Health good, but troubled by mild indisposition.
" III. Health poor to very poor.

Group I - Health unchanged. This group may be regarded as comprising those women in whose opinion their health had been no worse since their illness than it had been before it, allowance being made for the factors previously discussed. The average parity of this group was 4 and it so follows that examination, particularly of the pelvis, was by no means negative. Sometimes systemic examination revealed old-standing disease, not attributable to puerperal sepsis. Briefly this group presented findings of the following type:

General health good or unchanged (with allowances)
Menstrual history unchanged.
Various systems healthy.
Pelvic condition normal or compatible with number of births.
Vaginal discharge absent or not increased.

The number of patients in this group was 34, and all of them appeared to be in good health at the time of examination, and had apparently remained well since dismissal from hospital. A few had complained for a short period immediately following dismissal, of weakness, slight breathlessness, and headache such as might follow any illness, but all had recovered from these in one or two months.

Clinical examination was negative in a large majority. A few had chronic bronchitis and one a marked mitral stenosis of known rheumatic origin, and oldstanding.

Several patients had quite marked degrees of secondary anaemia. The lesions, if any, found on pelvic examination were wholly accountable to child-bearing, and quite unrelated to septic infection.

Group II - Health good, but impaired since illness. In this group are placed the 90 patients whose health after puerperal sepsis was, while on the whole good, marked by some indisposition, which had occurred since their illness, or on whom, at examination in 1936, some clinical finding of note had been recorded. They are, therefore, intermediate between those in Group I, whose health had remained unchanged, and those in Group III, whose health had apparently been definitely damaged. As might be expected, the symptomatology varied so greatly that no classification could be attempted. In some the symptoms pointed to involvement of the genital system; in others to one or other of the extra-genital systems, and in several to a combination of both. Accordingly, the predominance of affections of one or other group offers the best grouping and as a result, the 90 patients may be further sub-divided as follows:

Subgroup (a) Gynaecological symptoms predominant, 49
Subgroup (b) Extra-genital symptoms predominant, 41

In later pages the actual medical conditions underlying these symptom complexes will be fully discussed. In this chapter

is being discussed the well-being of the patient.

In subgroup (a), the histories show that only 15 out of 49 or 30 per cent had complained of symptoms since their puerperal illness. Menstrual irregularity, menorrhagia and leucorrhoea were the chief complaints, which were essentially of a mild degree. Dysmenorrhoea and backache were occasional complaints. With the possible exception of leucorrhoea, none of the symptoms were constant, and had apparently not greatly affected the patients' health. This can be judged from the fact that few had sought medical advice, and only 3 of these had required operative interference, and in each of these three, curettage had been performed with complete relief.

Of the remaining 34 patients in subgroup (a), while there was little in the way of symptoms, it is clear that they deserve inclusion in the group because of gynaecological conditions found. In many, sterility was present, though as has been shown, it was only infrequently the subject of complaint. In others, the presence of leucorrhoea was regarded as the normal sequence of puerperal sepsis.

Of the whole group 41 out of the total 49 were found at the time of examination to be in good health. In the remaining 18 per cent, there was a fairly well marked secondary anaemia with a history of loss of weight. In these

the general health was only fairly good.

Subgroup (b) consisted of the 41 patients whose symptomatology was referable to some source outwith the genital tract. All had experienced indisposition since their puerperal sepsis, and as might be expected the symptoms differed greatly, according to the nature of the lesion. The predominant complaint was swelling and stiffness of one or both legs, in those patients who had suffered from phlegmasia alba dolens. Arthritic pains and "rheumatism" followed closely, and almost equally frequent were symptoms of chronic urinary infection. Symptoms of chronic pulmonary disease, recurring sore throats, and nasal catarrh were other complaints received.

Like the patients in subgroup (a), the health of these patients had not been seriously affected, but as compared with them, their symptoms had been perhaps more troublesome and more persistent. Much mild illhealth had resulted. Actually only 10 of the total 41 had completely recovered from symptoms at the time of their interview. The remaining 31 were even then complaining. In the case of those who had suffered from phlegmasia the symptoms had been more or less constant, but in the others recurrences and remissions had alternated.

Less than 30 per cent ofthis group had found it neces-

sary to receive medical attention, and it may be presumed that all suffered from mild invalidism only. This is confirmed on finding that 88 per cent appeared to be in fairly good health when examined in 1936. The remaining 5 patients (12 per cent) were not regarded as being in enjoyment of full health, though apart from general weakness they had few complaints. Four of these were shown to be suffering from early and active pulmonary tuberculosis, later confirmed by radiological examination. The fifth patient suffered from chronic non-specific arthritis of the knee and her health was definitely poor.

Group II may, therefore, be regarded as one composed of patients with a great variety of complaints, and with equally varying causes. Several indeed had little or no complaint. In many who did complain, the upset was troublesome rather than serious: and in no case did their condition produce more than mild invalidism.

Group III - Health poor to very poor - There remains for discussion a group of 76 patients whose general health had deteriorated after their puerperal illness, and had since remained at a level lower than normal. It may again be remarked that some discussion will later be entered on, as to the relationship between these later illnesses and the preceding sepsis.

Again two subgroups may be formed according to the predominance of group symptoms.

Subgroup (a) - gynaecological symptoms predominant - 53
Subgroup (b) - extra-genital symptoms predominant - 23

Every patient in each group had complained of ill-health. Some had been reduced to chronic invalidism, others had been severely disabled.

Of the 53 patients in subgroup (a) whose symptoms were essentially gynaecological, 12 (or 23 per cent) had suffered more or less continuously since their dismissal from hospital. Conservative treatment had brought little or no relief and their condition in 1936 could be described as one of severe chronic ill-health. The remaining 77 per cent had suffered less severely or less continuously, but their general health had suffered greatly. Here, however, conservative and operative treatment had improved the underlying condition. Of the total 53, 14 had been treated surgically, and in some cases operative interference had been repeated; in 50 per cent it had been found necessary to operate within 2 years after their dismissal from hospital. In three patients abdominal operations had been performed.

The symptoms complained of by these patients in subgroup (a) were typically those of chronic pelvic inflammation. Severe backache, and pains in the flanks, aggravated

at the menstrual period, menorrhagia and persistent leucorrhoea were prominent symptoms in those who had suffered most. General debility, headache, nervous irritability, dyspepsia and dyspareunia were all of frequent occurrence. All these had inevitably a detrimental effect on general health. On the average, three years had elapsed since dismissal, but all had received medical advice during that period for the symptoms already detailed; yet only 56 per cent could be described as enjoying good health at the time of interview, the general condition of the remainder being decidedly poor.

Among the 23 women in subgroup (b), the symptoms were traceable to conditions outwith the genitalia; and, without exception, these conditions had caused considerable ill-health since the attack of puerperal sepsis.

Eight patients (approx. 33 per cent) were still complaining of symptoms, which had persisted in spite of treatment, and they were in poor health when examined in 1936, for the purposes of this work. The remainder had recovered with the aid of medical treatment, but all of them had been troubled by their symptoms, in most cases continually, in other cases intermittently, for an average period of 18 months after leaving hospital.

The conditions met with were many and varied. Most

common was persistent painful swelling of the legs following white leg. Frequently to this was added phlebitis, varix and varicose ulcers. Next in order was a group of "rheumatic" complaints - rheumatism, articular and muscular, and neuritis. Other conditions met with include chronic phthisis, pyelitis, corneal ulceration, empyema, rheumatoid arthritis, erysipelas, etc.. These alone could have caused great disability, but may have had, in addition, obvious gynaecological symptoms, which were overshadowed by those already mentioned.

As compared with the gynaecological group - subgroup (a) - the health of this group generally was remarkably good at the time of examination. Only those 8 already mentioned as then still suffering from their symptoms, could be said to be in ill-health. Three of those suffered from chronic pulmonary tuberculosis, two had obvious chronic rheumatism, one suffered from mitral stenosis, one had chronic varicose ulcers and persistent phlegmasia, and one had a marked post-pneumonic pulmonary fibrosis. All the others apparently had fully recovered.

The health of the patients in Group III had, it appears, undoubtedly suffered. Their case records show that before their puerperal illness all of them had enjoyed good health, but since then nearly all had suffered for a period, long

or short. Many of them had become regular patients of their medical attendant, and a large number had received treatment in the infirmaries - medical, surgical and gynaecological departments.

In conclusion, a more general impression of the state of the patients, from the time of leaving hospital till the time of interview, may be gained from the following Table:

Table XIII.

Summary of Health of Patients and Severity of their Symptoms.

Health of Patient	Group I.	Group II.		Group III.	
	Unchanged	Good-mild Invalidism.		Poor-severe Disability	
		Gynaecological symptoms	Extra-genital symptoms	Gynaecological symptoms	Extra-genital symptoms
No. of Patients	34	49	41	53	23
% of Total	17	24.5	20.5	26.5	12.5

The effect of the conditions on the patients' health and the degree of disability may be judged from the following analysis:-

Table XIV.

An Analysis of Clinical Data obtained from the Medical Histories of the Patients since leaving Hospital.

Clinical Data.	Group II. mild symptoms		Group III. severe symptoms	
	Gynae-cological symptoms	Extra-genital symptoms	Gynae-cological symptoms	Extra-genital symptoms
Had complained,	30%	100%	100%	100%
Had not complained,	70%	-	-	-
Fair health at time of examination	18%	12%	44%	34%
Persistent symptoms	-	-	12%	33%
Good health at time of examination	82%	88%	56%	66%
Operative treat-ment	6%	-	28%	4%
Hospital treatment	6%	-	28%	60%
No medical treatment	90% (approx)	70%	-	-

From a consideration of the results shown in Tables XIII and XIV, several interesting conclusions may be drawn. The first Table clearly demonstrates that in only 17 per cent of the patients had the state of health remained unchanged in the years following the septic illness. The remaining 83 per cent had developed signs and symptoms of impaired health. The symptoms varied in severity, producing but mild invalidism in 44 per cent of the women and severe indisposition in 38 per cent.

The second table gives some idea of the degree of invalidism. It shows that, while many women complained of symptoms, among those with mild indisposition (Group II), about 85 per cent were in good health at the time of their interview and none were in poor condition. Despite their troubles, relatively few had sought medical advice, and even fewer had received treatment, medical or surgical. To these may be added those women whose health had remained unchanged, with the result that it may fairly be stated that 62 per cent of the total 200 patients had been but little affected by their puerperal infection.

The same table shows that the remaining 38 per cent had suffered severe symptoms, with definitely detrimental effects on health. All had complained, and all had received treatment. In 44 per cent of them, this treatment had been given in hospital, and in 16 per cent surgical interference had been necessary. Only 61 per cent could be said to be in good health at the time of the interviews, while 22.5 per cent were in severe ill-health. Whether the patients' symptoms were the direct result of their attack of puerperal sepsis will be considered later. At present it will be sufficient to say that an appreciable, and almost certainly abnormal, volume of ill-health had developed among 200 patients who had suffered from puer-

sepsis some years previously. Of those unfortunates, 61 per cent had symptoms referable to the genital tract, while in 39 per cent an extra-genital cause seemed to be responsible.

The second table brings out clearly one surprising fact. All those who suffered from illness referable to an extra-genital cause had complained of their trouble. Of those with gynaecological mischief only 65 per cent made any mention of it. It might be possible to assume that these gynaecological conditions, though much more prevalent than extra-genital troubles, gave rise to fewer symptoms. Another explanation lies in the impression received by the writer during his interviews. Many of the patients questioned made no mention of backache, leucorrhoea, and irregular menstruation because they believed that such symptoms were to be expected after "childbed fever". For one reason or the other, only 17 per cent of those gynaecological patients sought hospital treatment, compared with 30 per cent of those with symptoms of extra-genital origin. Nevertheless the gynaecological conditions proved the more amenable to treatment, since at the time of interview only 6 per cent of the patients who had so suffered were at that time in persistent ill-health; and these (6 per cent) were they who had not been treated surgically. Against this

small figure, is to be placed 16 per cent of those with extra-genital trouble, who, at the time of interview, were still suffering in spite of hospital treatment.

Chapter III.
THE MORBID CONDITIONS FOUND.

In the preceding chapter the state of the patients' health since their puerperal illness, as judged from the patients' own assessment of it; their symptoms, and the effect on their general well-being have been discussed; but the health of the patients must now be assessed from the results of the medical examination, by reviewing the various morbid conditions found and their etiological relationship to the previous puerperal illness. This may be done to advantage in two separate sections, entitled:-

Section E. The Morbid Gynaecological Conditions.

Section F. The Morbid Extra-genital Conditions.

E. The MORBID GYNAECOLOGICAL CONDITIONS.

Pelvic examination of any series of women, the majority of whom are multiparae, cannot fail to disclose many lesions of the reproductive tract. These fall into one of two groups, viz:- (a) traumatic lesions, and (b) chronic infective lesions, and they constitute the two main causative factors of disability resulting from childbirth. In this particular series, both types of lesions were found; but, as pelvic examination was performed essentially to

discover what residuum had been left from the previous puerperal sepsis, attention was directed chiefly to the presence of the infective lesions.

The classification of these lesions proved a matter of considerable difficulty.

In the first place, infections of the genital tract are not restricted by anatomical boundaries, so that several lesions were frequently present in the one patient.

In the second place, the examination of the pelvic organs in this investigation was simply bi-manual and per vaginal speculum and, therefore, only the more gross lesions of the pelvic organs were detected. Other lesions, less marked, may have been present, but more elaborate methods would have been necessary for accurate diagnosis, such as histological examination of the endometrium or tubal insufflation, etc.. In this investigation the patients obviously could not be subjected to such diagnostic procedures, and so the presence of these other lesions could only be assumed from the symptomatology or the co-existence of the other more gross lesions.

Accordingly, the classification adopted is purely a clinical one and is based, not only on the pelvic examination, but also on the clinical histories. A careful analysis of the symptoms and the pelvic findings was made in

each case and the various infective conditions noted. Only those gross enough to be detected at examination or to have produced definite symptoms, were included. The patients were then grouped according to the predominant lesion diagnosed. As the histories extended over a period of years, some patients were included who had had symptoms, but, at the time of examination, had recovered by reason of treatment. In several of these patients, details from other hospital records confirmed the diagnosis. The various clinical groups are set forth in the Table below:-

Table XV.

Showing the Infective Lesions diagnosed in each patient as the chief cause of the gynaecological condition.

Predominant Infective Condition	SEVERITY OF SYMPTOMS PRODUCED			Total	%age of total Patients	%age of patients with Lesions
	No symptoms	Mild symptoms	Severe symptoms			
None diagnosed,	43	-	-	43	21.5	-
Chronic cervicitis,	-	66	9	75)	78.5	47
Chronic uterine sepsis (corporeal)	-	18	22	40)		25
Chronic pelvic cellulitis,	-	3	1	4)		2.5
Chronic salpingo-oophoritis,	-	5	25	30)		19
Doubtful,	-	8	-	8)		5
Total,	43 (21.5%)	100 (50%)	57 (28.5%)	200	100	-

From the results in this Table it is evident that chronic infective lesions had been found in the great majority (78 per cent) of the patients of this series. It is worthy of note, however, that in 21 per cent of the patients no marked lesion was found.

Regarding the various infective lesions, some further commentary is necessary.

The lesions in Table XV have all been diagnosed as present at the time of examination, except in the case of those patients already noted to have recovered by reason of treatment. They have been shown, however, only as they occurred as the predominant lesion. The true incidence of each lesion was therefore not apparent, and it was necessary to make an analysis of the pelvic findings of the whole series, whereby the incidence of each lesion as a separate entity could be shown. The difficulties of diagnosing the various lesions have already been mentioned, but it should again be noted that only lesions sufficiently marked as to be detected at examination were included in the pelvic findings.

CHRONIC CERVICITIS was detected with most accuracy, the cervix being seen direct per vaginal speculum, the employment of which, according to Whitehouse (71) "is a sine qua non in the diagnosis of chronic endocervicitis." All

varieties of chronic cervicitis were included in this group, and varied from cases with slight enlargement and redness and perhaps excessive muco-purulent discharge from the cervical canal, to cases with considerable enlargement, marked erosion with or without Nabothian follicles and leucorrhoea.

The presence of CHRONIC CORPOREAL INFECTION, on the other hand, proved a matter of considerable difficulty, and indeed, only an approximate estimation of the number of patients with this lesion could be made. In those cases, already noted in Table XV, where the predominant symptoms were those of chronic corporeal infection and where pelvic examination excluded any other marked lesion, the diagnosis was fairly certain.

It must be remembered, however, that chronic corporeal infection frequently co-exists with other infective lesions of the pelvic organs. This is especially so in the case of chronic cervicitis; and, indeed, Cameron (20) states that "as corporeal endometritis usually exists in all cases of endocervicitis, a diagnosis of endocervicitis alone, can seldom be made." Whitehouse (72) on the other hand, is of the opinion that "the spread of inflammation to the cavity of the uterus from the cervix is by no means invariable." A similar difference of opinion is expressed by the same

authors in the case of chronic salpingitis. Cameron[73] states that "chronic endometritis is almost constantly present when the adnexa are in an inflammatory condition", but Whitehouse[74] points out that "the endometrium is quite commonly normal and healthy even in the presence of extensive chronic inflammation of the uterine appendages." Regarding those patients with chronic pelvic cellulitis as the predominant lesion, all of them had chronic cervicitis, so that the question of corporeal infection in association with pelvic cellulitis has already been considered. The incidence of chronic corporeal infection, then, may be assessed either on symptomatology alone or on both the symptoms and the presence of associated lesions, while the results will vary considerably according to the method adopted.

In this series the presence of chronic endometritis has been estimated from the symptomatology only, the diagnosis being made only in the presence of definite symptoms such as leucorrhoea, menorrhagia, backache, etc., although it is realised that the results obtained were probably rather lower than the actual number of cases. It should also be mentioned that included in this group of patients with symptoms of corporeal infection, were six patients in whom their age, between 35 and 40 years, and a history

of severe menorrhagia with some enlargement of the uterus or marked retrodisplacement, enabled the diagnosis of chronic metritis and subinvolution to be made.

CHRONIC PELVIC CELLULITIS was readily detected at bimanual examination, but only cases of marked induration of the parametrium with or without some fixation of the pelvic viscera were included in this group. CHRONIC SALPINGO-OÖPHORITIS was only diagnosed, when definite thickening of the tubes could be felt at bi-manual examination. The lesion varied from thickening of the tubes to definite tubal masses with or without peritoneal adhesions and displacement of the adjacent viscera.

The analysis of these pelvic findings gives the incidence of the chronic infective lesions just described, as separate entities and is shown in Table XVI, while by comparing the incidence of each lesion as it occurred as a separate entity and as a predominant lesion, the relative frequency of each lesion as the predominant cause of the patients' symptoms is obtained. This is set forth in Table XVII.

For convenience Table XV is reproduced first.

Table XV.

Showing the Infective Lesions diagnosed in each patient as the chief cause of the gynaecological condition.

Predominant Infective Condition	SEVERITY OF SYMPTOMS PRODUCED			Total	%age of total Patients	%age of patients with Lesions.
	No symptoms	Mild symptoms	Severe symptoms			
None diagnosed,	43	-	-	43	21.5	-
Chronic cervicitis,	-	66	9	75	78.5	47
Chronic uterine sepsis (corporeal)	-	18	22	40		25
Chronic pelvic cellulitis,	-	3	1	4		2.5
Chronic salpingo-oophoritis,	-	5	25	30		19
Doubtful,	-	8	-	8		5
Total,	43 21.5%	100 50%	57 28.5%	200	100	-

Table XVI.

Showing incidence of Chronic Infective Lesions as separate entities.

Chronic Infective Lesion.	Number of Lesions	Percentage of Patients with undernoted Lesions.	Percentage of total Lesions found.
No gross lesion,	43	-	-
Chronic cervicitis,	135	67.5	57
Chronic corporeal infection (symptomatic)	58	29	24.4
Chronic pelvic cellulitis,	14	7	6
Chronic salpingo-oophoritis,	30	15	12.6

Total Number of Lesions = 237.

Table XVII.

Illustrating the Relative Frequency of the various infective lesions as the predominant gynaecological condition.

Chronic Infective Lesion.	Present at Examination.	Diagnosed as Predominant Lesion.	Frequency as Predominant Lesion.
Chronic cervicitis,	135	75	55.5%
Chronic corporeal infection (symptomatic)	58	40	68.9%
Chronic pelvic cellulitis,	14	4	28.5%
Chronic salpingo-oophoritis.	30	30	100%

The results shown in all three tables may now be further discussed:-

From Table XVI, showing the true incidence of the various lesions, it is apparent that the commonest infective lesion in the series was chronic cervicitis. This was found in 67½ per cent of the patients, while it formed more than half the chronic infective lesions diagnosed, 57 per cent of these being chronic cervicitis. Chronic corporeal infection was the next most frequently diagnosed condition, being found in 29 per cent of the patients and and forming 24 per cent of the infective lesions. This is considerably less than the cervical lesion, but it has already been noted

that this estimation is probably much lower than the actual number.

Chronic inflammatory lesions of the Fallopian tubes and ovaries were fewer still, being found in only 15 per cent of the patients and forming 12 per cent of the infective lesions, about half the estimated number of cases of corporeal infection.

Chronic pelvic cellulitis formed the smallest group, being found in only 7 per cent of the patients and accounting for only 6 per cent of the infective lesions found. This may be partly explained by the classification adopted, wherein only marked lesions of the parametrium were noted, while slight fibrosis in either fornix and thickening of the utero-sacral ligaments were not included as separate lesions. Other lesser degrees of cellulitis must also have been included under chronic salpingo-oöphoritis.

In Table XV the gynaecological health of the patients is briefly summarised and the various infective lesions are shown as they occurred as predominant conditions and the chief cause of the patients' symptoms since leaving hospital. Not unexpectedly, the incidence of the various lesions as the predominant cause of symptoms closely follows the general incidence as found at examination and shown in Table XVI.

Of those patients complaining of gynaecological symptoms, chronic cervicitis was the chief cause in 47 per cent; chronic endometritis was responsible for 25 per cent; chronic inflammatory lesions of the Fallopian tubes and ovaries for 19 per cent and chronic pelvic cellulitis for 2.5 per cent. In 5 per cent of the patients, the symptoms were very mild and there was a doubt as to the condition mainly responsible.

The severity of the symptoms is also indicated in the Table.

In chronic cervicitis, the symptoms produced were mild in almost all cases; in corporeal infection mild symptoms and severe symptoms occurred in an almost equal number of cases; in chronic inflammatory lesions of the Fallopian tubes and ovaries, severe symptoms had been produced in the big majority of the patients; in pelvic cellulitis the symptoms had been mild in 3 out of 4 cases.

The significance of this variation in severity of symptoms becomes apparent when the relative frequency of each lesion, as a predominant gynaecological condition, is examined as shown in Table XVII.

Here, it is noted that chronic salpingo-oophoritis was the foremost condition in giving rise to predominant symptoms.

In all cases (i.e. 100 per cent) where this condition had been present, the resulting symptoms had dominated those produced by other associated gynaecological lesions. The crippling nature of this condition is amply demonstrated by the details, given in Appendix II, of four patients all of whom had undergone abdominal operation. The operative findings in these cases illustrate well the damage to the reproductive organs, which may result from puerperal inflammation of the uterine appendages; while the operative measures found necessary to effect a cure, show how the damage from disease may be of necessity increased by surgical removal of the organs affected.

Chronic corporeal infection came next to tubal disease, producing predominant symptoms in 69 per cent of the cases in which it was present. This figure is probably rather high as it has already been noted that the estimation of patients with this lesion was somewhat low.

Chronic cervicitis, although the most prevalent lesion, was the chief cause of symptoms in only 55 per cent of the patients in whom it was found, and it should be noted that in these patients no other lesion had been diagnosed. Apparently such was the mild nature of the symptoms that cervicitis appeared as a dominant condition only in the absence of other lesions.

Similarly, pelvic cellulitis seldom appeared as the predominant condition, producing the main symptoms in only 28 per cent of the patients in whom it was found. In the latter patients the only associated lesion present was chronic cervicitis. This low figure may be explained by the frequent association of pelvic cellulitis with tubal disease, already noted as the foremost lesion to produce severe symptoms. Munro Kerr et alii (23) state that "uncomplicated pelvic cellulitis does not amount to more than 10 per cent of all the infective lesions of the pelvis."

These findings may now be briefly summarised thus:-

In the series of 200 patients examined, chronic infective lesions had been diagnosed in 78.5 per cent of cases. In 21.5 per cent of cases, no infective lesion had been found.

Chronic Uterine Sepsis (cervical or corporeal) was the commonest condition found, forming about 81 per cent of the lesions diagnosed.

Chronic Pelvic Cellulitis of any marked degree was infrequently found, and the symptoms produced were mild or completely overshadowed by associated lesions.

Chronic Salpingo-oöphoritis resulted in severe symptoms with most frequency and, in some, marked destruction of the

reproductive tract both from disease and operation.

Chronic Uterine Sepsis resulted mostly in milder symptoms.

These findings correspond closely to those of MacIntyre (31) who sums up the situation thus:

> "Chronic infective lesions, when restricted to the lower level of the genital tract, produce discharge, discomfort, mild invalidism and possibly sterility.
>
> At higher levels of the reproductive tract, invalidism is pronounced, and destruction of tissue may lead to arrest or premature termination of reproductive life, or total loss of the essential reproductive organs."

Details of some of the more interesting cases of this group of patients are given in Appendix II.

. . . . . .

The various chronic infective conditions of the genital tract, which had been uncovered during this investigation, have been discussed in detail, and it now remains to consider the etiological relationship of these lesions to the previous puerperal illness.

It has been noted that all the conditions were chronic inflammatory lesions, so that the subject under discussion concerns the etiology of infections of the female pelvic organs. The modes of infection are many, but are summarised by Young (75) into three main groups:-

(1) Infection from below; (2) spread from adjacent structures in the pelvis; (3) through the blood-stream.

By a careful scrutiny of the medical histories of the patients in this series, infection by the latter two methods can be reasonably dismissed. None of the patients had suffered from acute specific fevers since leaving hospital, but a few had developed pulmonary tuberculosis. In these particular patients, the only gynaecological lesion found was chronic cervicitis. There were no symptoms suggestive of chronic endometritis or of chronic salpingitis, while in each case, the uterus and appendages were apparently normal at pelvic examination. The possibility, then, of secondary tuberculous infection from the lung lesion can be fairly discounted, since tuberculosis of the uterus, as Teacher (76) points out, is comparatively rare and usually secondary to tuberculosis of the Fallopian tubes; while the cervix is much less commonly affected than the uterine body and almost always secondary to the uterine lesion. Again, with the exception of a few patients, who had developed appendicitis, none of the patients had suffered from acute inflammatory lesions of the adjacent viscera. In those few patients, who had had appendicitis, pelvic examination failed to reveal any gross abnormality of the pelvic organs.

In several of these patients, the operative findings at appendicectomy were obtained and there had apparently been no involvement of the pelvic viscera. The mode of infection, then, in this series had come from below.

With the exception of a number of patients who had had further infection at a subsequent labour, none of the patients gave a history of subsequent infection either gonorrhoeal or puerperal, while from their previous obstetric history, the puerperal sepsis at the time of admission to hospital had apparently been the first known infection following a confinement or abortion. It is reasonable, then, to assume that the only mode of infection in the case of the patients in this series had been puerperal and that the chronic infective lesions, which had developed, had their origin in the puerperal infection now under investigation.

In connection with this discussion on the puerperal origin of these lesions, the analysis given by Munro Kerr (77) of the various sources of infection in inflammatory gynaecological lesions proves of interest. Infection during pregnancy and labour are estimated to form 60-70 per cent of the cases. Twenty per cent are gonorrhoeal; 5 per cent are tuberculous; while miscellaneous sources such

as from bowel or appendix etc., account for the remaining 5-15 per cent.

Further support to the puerperal origin of the patients' infective lesions is to be found by comparing the predominant infective lesions which were uncovered at the examination of the patients (see Table XV) with the chief condition diagnosed at the time of the primary puerperal illness. This is shown in the following table:-

Table XVIII.

To show the relationship between the present chronic infective lesions and the previous acute puerperal condition.

Predominant Infective Condition found at Examination	Number of Patients	PRIMARY PUERPERAL INFECTION, CLINICAL CONDITION DIAGNOSED.			
		Local Sepsis (Sapraemia or septic Endometritis)	Salpingitis and Peritonitis (pelvic or diffuse).	Pelvic Cellulitis (with or without Salpingitis)	Septicaemia (no local Lesion.)
Chronic cervicitis.	75	56	9	6	4
Chronic uterine sepsis (corporeal)	40	30	5	1	4
Chronic pelvic cellulitis.	4	3	-	1	-
Chronic Salpingo-oöphoritis.	30	7	16	4	3
Doubtful.	8	7	-	-	1

It is evident from the Table that a distinct relation-

ship existed between the past and present lesions.

In chronic cervicitis, previous local sepsis was high, and it is noteworthy that in the majority of these cases, the local lesions had been very mild with little or no general upset. The uterine lesion had apparently been very localised and the symptoms compatible with an acute cervicitis. It is also significant that 6 out of the 12 cases of acute pelvic cellulitis are all in this group, which is not surprising as the lesion is frequently associated with cervical trauma, which would favour cervical infection.

In those with chronic uterine sepsis (corporeal), previous uterine sepsis was again prominent, but, in this group, the previous records of the patients showed that the uterine infection had been much more severe and attended with considerable toxaemia. In most instances, the condition had been an acute metritis rather than simply an acute endometritis.

In those with chronic pelvic cellulitis, the relationship of the primary lesion was less evident. Only one out of the four patients had suffered from a previous acute pelvic cellulitis and this was associated with salpingitis. Records of the other three patients showed that there had been no clinical evidence of acute inflammation of the para-

metrium, but all had had a severe uterine sepsis. It is significant that in all three cases, evidence of severe cervical trauma was found at the time of examination, proof that an avenue for infection of the parametric tissues had existed.

In those with chronic salpingo-oöphoritis, acute salpingitis had been the predominant primary lesion in more than half the cases, while in four patients the main condition had been pelvic cellulitis. This is not surprising in view of the frequent association of these two lesions, and, indeed, the records of all four patients showed that although cellulitis had been the predominant condition, the clinical course suggested an associated salpingitis. It is interesting to note, also, that the remaining patients of this group had had no clinical evidence of tubal disease. In those 8 patients in whom no prominent lesion had been found and who have been regarded as "doubtful", chronic uterine infection (cervical and corporeal) was found in all of them, while mild local uterine sepsis had been the chief primary lesion at the time of their puerperal illness.

It would appear then that the chronic infective lesions uncovered by this investigation could be regarded as the results of previous puerperal sepsis.

This statement is made, however, with some reservation,

as it must be admitted that such chronic lesions may develop insidiously and without symptoms, hence the lesions under discussion may have been present before the first puerperal infection to be recognised clinically. At this point the findings of MacIntyre (31) in his investigation of chronic infective lesions of the reproductive tract resulting from childbirth, are of special interest. He found no high incidence of history of infection definite or presumptive, in chronic cervicitis, being about 8 per cent of cases. In chronic endometritis, the incidence was 11.6 per cent; but in chronic subinvolution the incidence was regarded as higher although no figures were given, owing to a definite puerperal origin being difficult to establish in view of the frequently low virulence of the causal infection. In chronic inflammatory lesions of the tubes and ovaries and in pelvic cellulitis, a higher incidence was obtained, being about 33 per cent and 31 per cent respectively. The incidence of known puerperal infection, however, was not very high for any of the lesions.

On the other hand, the definite onset of symptoms in most cases soon after the acute puerperal illness, enhances the probable origin of the lesions.

.....

In this connection, special consideration must be given

to chronic cervicitis and the possible relationship of this lesion to the previous acute puerperal infection.

This has been noted as the most prevalent lesion occurring in the series, but it must be remembered that it is a lesion, which is very commonly observed in gynaecological practice. Bubis (78) in America states that in his experience "vaginal examination seldom discloses a perfectly non-irritated cervix." He also mentions that cervicitis is frequently found in virgins, nulliparae and even in infants. In these statements, however, the author is referring to cervicitis due to any cause whatever, but he later adds that "childbirth, with its concimitant and inevitable traumatism, has been the most common cause of the pathological changes that take place in the cervix." A similar view is held by Freedman (79) who concludes that:- "following labour, a normal physiological process, most women receive lacerations and attendant endocervicitis." He further adds that: "the occurrence of endocervicitis can almost be considered a usual event in child-bearing women." MacIntyre, (31) too, points out that chronic inflammatory lesions of the cervix are in the majority of cases secondary to or associated with trauma of the cervix during delivery, while Whitehouse (72) states that acute cervicitis may supervene upon infected lacerations of the

cervical tissues, and adds that inflammation of the cervix is more likely to occur in multiparae.

It would appear, then, that cervical inflammation is by no means infrequent among women and that chronic cervicitis of puerperal origin is more the result of child-bearing per se than sepsis, the occurrence of infection being determined by the presence of trauma at delivery.

The frequent occurrence of chronic cervicitis among child-bearing women must therefore be accepted and applied to the results in this series. The average parity of the patients was 4, so that a high incidence could be expected. The actual percentage of the patients found to have the lesion was 67.5. The question under discussion, however, concerns more the part played by the previous puerperal infection in the etiology of these cases of chronic cervicitis.

MacIntyre,already referred to,(31) in his investigation of disablement resulting from infection and trauma in childbirth, has stressed the importance of trauma; and in his cases of chronic cervicitis he excludes those cases where injury to the cervix was recognisable, the trauma at confinement being accepted as the primary lesion.

Strachan,(80) however, discussing some aspects of cervical pathology is of the opinion that chronic inflammatory aftereffects may be as marked after slight as after severe cer-

vical lacerations, and that these after effects and their late sequelae depend much more on the degree of the infection than on the physical extent of the laceration.

Some difference of opinion, then, exists regarding the importance of trauma as the primary factor in chronic cervicitis. In obstetrics, however, as MacIntyre (31) points out, there is always less or more trauma, and it cannot be eliminated when assessing the effects of infection.

Chronic cervicitis, then, must be regarded in this series, as the combined result of trauma and infection, while the true effect of an acute puerperal infection, such as the patients in this series had suffered, can only be roughly estimated by comparison with cases not known to have had sepsis. Accordingly a series of 50 patients were selected, all of whom had borne children, in most cases several, and in whom there was no history of an abnormal puerperium. These patients were examined bi-manually and per vaginal speculum, while any symptoms were noted. The findings were compared with those of the patients under investigation with special reference to the presence of chronic cervicitis. The results are tabulated below:-

Table XIX.

Showing the Incidence of Chronic Cervicitis in the two Series of Patients examined.

No. of Patients	Previous Puerperal Sepsis	No Cervicitis detected.	Cervicitis present.
200	+	32.5%	67.5%
50	-	52.5%	48.5%

The Table shows that the incidence of chronic cervicitis was found to be distinctly higher among those patients who were known to have had puerperal sepsis.

The influence of trauma and consequently of parity have already been mentioned. Further analysis, however, showed that the percentage of recognisable trauma of the cervix and the distribution of the various parity groups were very similar in both series of patients, but that the incidence of cervicitis varied with the parity, only in those patients with no previous puerperal sepsis.

These findings are summarised below in the following two Tables:-

Table XX.

To show the effect of Parity on the Incidence of Cervicitis in Patients with no previous Puerperal Sepsis.

Percentage recognisable Cervical Trauma.	Parity	No. of Patients	No Cervicitis	Cervicitis present	Percentage Cervicitis in each Parity Group.
34%	I	6 (12%)	4	2	33.3% approx.
	II	7 (14%)	3	4	57%
	III+	37 (74%)	19	18	48%
	Total	50	26	24	-

Table XXI.

To show the effect of Parity on the Incidence of cervicitis in Patients with previous Puerperal Sepsis.

Percentage recognisable Cervical Trauma.	Parity	No. of Patients	No Cervicitis	Cervicitis present	Percentage Cervicitis in each Parity Group.
28%	I	18 (9%)	6	12	66%
	II	31 (15.5%)	10	21	68%
	III+	151 (71.5%)	49	102	67%
	Total	200	65	135	-

This further analysis shows that in the patients with previous puerperal sepsis, the incidence of cervicitis is still higher for each parity group, and, indeed, remains at

the same level irrespective of parity, whereas in those patients with no previous puerperal sepsis, the incidence is lower and shows a distinct variation with parity, being lowest among the primiparae.

So far, chronic cervicitis has been referred to irrespective of whether it occurred as an incidental lesion, i.e. a lesion found on examination, although no complaint of symptoms from the patient was made; or as a lesion producing marked symptoms. When, however, the cases of chronic cervicitis were examined under this category, the difference between the two series of patients became much more apparent.

In the patients with previous puerperal sepsis, the majority of those with cervicitis, had symptoms of less or more severity, while in the patients with no previous puerperal sepsis, only about a third of those with cervicitis had complained of symptoms or were aware of the presence of the lesion. On the whole, the degree of cervicitis was much more marked among the patients with previous puerperal sepsis.

These points may be briefly summarised in the following Table:-

Table XXII.

Comparing the Incidence of Chronic Cervicitis in both series as it occurred as an incidental lesion and as a lesion producing symptoms.

No.of Patients	Previous Puerperal sepsis	No Cervicitis detected.	Cervicitis with few or no symptoms	Cervicitis with marked symptoms	Percentage of Patients with marked symptoms.
200	+	32%	28.5%	39%	58%
50	-	52%	36%	12%	33% approx.

Before summarising these points, it should be remarked that the control series of 50 patients is perhaps too small to allow of any final conclusions on the subject, but it is interesting to note for comparison, the results obtained by Bubis (81) in his examination of 670 cervices. Evidence of chronic cervicitis was found in 325 cases, a percentage of 48.5 per cent, which corresponds exactly to the percentage obtained in the control series examined in this investigation, and is also distinctly less than the percentage obtaining for the patients with previous puerperal sepsis.

It may further be added, that Bubis' examination was histological and he does not state the percentage of cases which could have been detected clinically. This would probably be even less than 48 per cent.

After consideration of these various points, then, it seems reasonable to conclude that, although the chronic

inflammatory lesions of the cervix, uncovered in this investigation of 200 patients, must be regarded as the result of trauma at childbirth and superadded infection, the previous acute puerperal infection had resulted in an increase in the incidence and severity of the cervical lesion.

The importance of this finding is perhaps better appreciated when the relationship of chronic cervicitis to carcinoma of the cervix is recalled.

Many authorities (82,83,84,85) on the subject stress the importance of old infected cervical lacerations in the etiology of this condition, while Strachan (86) regards carcinoma as the main local sequel of cervicitis and erosion.

Whitehouse (87) states that statistics show that not more than 4 per cent of recorded cases have occurred in multiparous women, and adds that there can be no doubt that parturient lacerations of the cervix and the chronic cervicitis, which so frequently follows them, form the connecting link between childbirth and the development of cancer. Cullen (88) in America expresses a similar opinion, while Polak (89) in a study of 4,815 cases of cervical repairs, including trachelorrhapy, amputation and cauterisation of the cervix, makes the interesting observation that only 7 of these developed cancer at a later date. Bubis (90) goes further and recommends that all cervical lacerations be repaired immediately after

childbirth. Chronic cervicitis, then, is to be regarded as a potentially serious lesion and consequently any factors predisposing to its development must be recognised. In this connection, too, the association of chronic cervicitis with the subject of focal infection and also in the etiology of sterility should be remembered. This is referred to in other sections of this work (Chap.I (A); III (F).)

F. MORBID EXTRA-GENITAL CONDITIONS.

During this investigation it was found that many of the patients had developed certain extra-genital conditions since leaving hospital. These presented a considerable variety, and are worthy of mention, both from a point of interest and from their possible relationship to the previous puerperal illness.

There were in all 64 such patients, and the various conditions found in these people are fully discussed in the following paragraphs, each of which deals with a single definite illness or group of illnesses. In each group full cognisance has been taken of any genital morbidity, which had resulted from the primary illness and which may have had a bearing on the present disability. Further, an attempt has been made to trace any connection between the present condition and the original puerperal infection.

Below is a brief numerical resumé of the conditions recognised:-

CHRONIC PHLEGMASIA,	21 cases
CHRONIC ARTHRITIS and RHEUMATISM,	11 cases
PULMONARY DISEASE,	8 cases
URINARY AFFECTIONS,	8 cases

OCULAR DISEASE,	5 cases
NASOPHARYNGEAL AFFECTIONS,	6 cases
CARDIAC DISEASE,	2 cases
MISCELLANEOUS AFFECTIONS,	6 cases
Total,	67

Since a few patients had more than one lesion, the total number of lesions diagnosed exceeds that of the patients.

The various groups will now be discussed more fully:-

CHRONIC PHLEGMASIA.

There were 21 patients in this group and all of them had had a well-marked PHLEGMASIA ALBA DOLENS in one or both legs as part of their previous puerperal infection. In all cases the affected limb or limbs had given trouble more or less constantly since leaving hospital. The symptoms varied from swelling of the leg after exertion or at night, to persistent swelling and severe pain with difficulty in walking. A noticeable feature in some cases was an increase in the symptoms at the menstrual periods, while it was noted that in the case of those who had become pregnant again, the affected limb had given considerable trouble during each pregnancy. A few patients had, in addition, troublesome varicose veins. These will be referred to shortly.

At the time of examination only 4 out of 21 patients were no longer having trouble from their legs, and examination of the limbs revealed no abnormality apart from pigmentation. In the four patients, then happily free from trouble, their symptoms had lasted for 5 years before recovery.

The remaining 17 patients were still having trouble and examination of the affected limbs revealed definite thickening with, in some cases, oedema of the foot and ankle. In these patients, about 4 years had elapsed since the development of their phlegmasia.

Four patients from this latter group deserve further mention, as they all had developed varicose veins in the affected leg with subsequent ulceration. In one patient there were several ulcers. In all four patients these ulcers had developed within a year of their dismissal from hospital, and, in three of the patients, had persisted for a period of six months, two years, and three years respectively. In the fourth patient, the ulcer was still present at the time of examination 3½ years after its development. Details of this case are given in Appendix III (No.1).

It has already been noted that all those in whom persistent swelling of the legs had occurred, had originally been treated for phlegmasia alba dolens either as

the outstanding or the sole lesion during the time they were in hospital. Whether one regards phlegmasia alba dolens as a swelling produced by venous thrombosis or as caused by septic blockage of the lymphatic trunks[91], or possibly as the result of all three factors, the condition is essentially mechanically produced. Common clinical knowledge bears witness to the slow recovery from any venous or lymphatic block however produced, and the occurrence of trophic and nutritional changes in the area affected. This is remarked upon by MacLean[92] in the case of phlegmasia, when dealing with the remote effects of puerperal sepsis. The whole subject is admirably and boldly treated by Homans[93] who openly advocates the operative reestablishment of the circulation. It is significant that in 4 of the group under discussion, the pelvic contents appeared to be normal, while, in the others, the only abnormality found was chronic uterine inflammation. There is little reason to doubt, then, that the late condition is essentially a continuance of the earlier. Pelvic congestion at the menstrual periods, possibly the greater because of the presence of chronic uterine sepsis, may explain exacerbation of symptoms previously noted as occurring in some patients at that time.

CHRONIC ARTHRITIS and RHEUMATISM.

Under this heading were placed all those patients who had suffered from some form of chronic rheumatism since leaving hospital.

There were 11 patients in this group and the following two forms of arthritis were diagnosed.

A. Chronic Arthritis of Pyaemic Origin. There were two cases and both patients had had a severe puerperal infection with pyaemia, accompanied, among other lesions, by septic arthritis in a large joint. In one case a shoulder-joint had been affected and in the other a knee-joint. Incision and drainage of the joint had been necessary in both cases. The infecting organism in the genital tract had been the Streptococcus haemolyticus and a similar coccus was also recovered from the joints. Accordingly, after dismissal both patients had been left with a chronic arthritis of the affected joint, with limitation of movement and atrophy of the muscles. Details of one of these cases is given in Appendix III (No.2).

Such a state calls for little comment. The late condition is beyond question the result of puerperal septicaemia and one might but mention that both patients were more fortunate than many, in that ankylosis was fibrous, and not bony as might have been expected. Even yet, their

disability remains obvious, crippling and permanent.

B. Chronic Non-Specific Rheumatism. There were 9 patients in this group and all had had marked symptoms such as pain and swelling of the joints; persistent stiffness in one or more joints; and, in some cases, fibrositis and neuritis were prominent along with the joint symptoms. Details of an illustrative case are given in Appendix III (No.3).

In 6 out of these 9 patients, no previous rheumatic history was obtained. All of them had developed their symptoms within a few weeks of leaving hospital, and, indeed, four of them had had symptoms of acute non-suppurative arthritis during their puerperal illness. These had cleared up with medical treatment, though in most, relief was at best temporary.

At the time of examination, 5 out of the 9 patients were still complaining of symptoms, an average of 4½ years after onset. The remaining 3 patients had all recovered after periods of 4 months, 2 years, and 2½ years respectively.

There was one patient deserving of special mention in that "rheumatoid arthritis" had been diagnosed and this had been treated in hospital with gratifying results. The symptoms had commenced and steadily increased within a

few weeks of her dismissal from Robroyston Hospital. Nevertheless, two years later, when examined by the writer, her symptoms were still marked, if not severe. In addition, since her illness, she had suffered from frequent "nettlerash", a trouble from which she had never before suffered. She was in fact complaining of this condition when she presented herself for examination. Details of this case are given in Appendix III (No.4).

Few subjects connected with medical pathology have been so fully and variously discussed as the pathogenesis of chronic rheumatism. Even at present, no general agreement exists as to the classification or nomenclature of its various sub-groups, and the writer believes himself to be in conformity with modern medical opinion, when he labels the cases under discussion as chronic non-specific rheumatism. (94)

A work of this nature is only doubtfully the place to discuss other than briefly the various causal theories so far elaborated, and accordingly such hypotheses are dealt with herein, only in so far as some seem to bear on the cases under review.

According to Willcox, the great majority of chronic rheumatics have associated infective conditions, which in some are so obvious as to be justly regarded as the primary (95)

cause.[96] In its minor forms, such as the myalgias, Clamann regards infection as the chief cause, though admitting the possibility of other factors entering into the pathogenesis. That environment and climatic conditions play a part is common knowledge, and the use, in practical medicine, of such terms as "climacteric arthritis" and "menopausal rheumatism" reflect the opinion held by many that endocrine unbalance plays a not unimportant part (see Willcox;[95] Duncan;[97] Proceedings of the Royal Society of Medicine, 1927.[98]).

It is, however, from the point of view of a possible infective cause that the patients under discussion are of most interest. Schlesinger, Signy, and Payne[99] in 1935 and later Eagles, Hardy, Evans, Fisher and Keith[100] in 1937 have put forward evidence that the infection is due to a virus, but admit that the occurrence of streptococci in association with rheumatic conditions is not fortuitous. Eagles et alii go so far as to conclude that chorea, rheumatoid arthritis, and rheumatic fever are all due to the same or very similar viruses. This is a hypothesis in close agreement with Timbrell-Fisher's[101] investigation into the comparative micro-pathology of the two latter conditions. Buckley[102] weighing the evidence from many sources, apparently agrees with Willcox[95] that focal infection is too intimately connected with rheumatism to be ignored; and

the eradication of septic foci is often followed by cure or amelioration of the rheumatism.(103) The possibility that the tissues become sensitized to bacterial products is the subject of a contribution by Zinsser and Yu(104) and, as will be seen in a later section, there were found cases in this series presenting definitely allergic phenomena.

Reverting to the clinical material under discussion in this section, it will be remembered that there were 9 women, who apparently suffered from chronic non-specific rheumatism; and in six of them there was no history of previous rheumatism. All had been hospitalised and their illness verified as puerperal sepsis. In 7 out of the total of 9, the infecting organism was a streptococcus; in 5 a haemolytic streptococcus and in 2 a non-haemolytic variety. With the exception of three, all the patients were definitely more ill than the average admitted to the ward in which they were treated, and it will be recalled that 4 actually suffered from non-suppurative arthritis when in residence. When examined in 1936 for pelvic abnormalities all but one had a lesion. Of the 8 remaining, 7 had cervicitis and 1 had chronic salpingitis. In those with cervicitis, 2 had in addition clinical manifestations of corporeal infection and one had a chronic pelvic cellulitis. The relationship of the puerperal infection

to these lesions has already been discussed in a previous chapter. Cultures from the posterior vaginal fornix at the time of examination yielded a growth of streptococcus non-haemolyticus in 7 out of the 9 cases.

In this short series, then, there appears to be demonstrated a connection between chronic non-specific rheumatism and focal infection. That the genital tract can provide a nidus for systemic infection is borne out by Whitehouse.(105) It is difficult to assess the value of the cultures grown from the cervical canals in 1936. In 7 of the 9 women examined, streptococci were grown. According to Stroganoff, quoted by Whitehouse(106) these are abnormal findings. Further, these streptococci may actually represent the original haemolytic infection, if one accepts the possibility that streptococci can change their characteristics as suggested by Cecil.(68)

PULMONARY DISEASE.

Eight patients were found to have pulmonary disease, and, of these, six were diagnosed as Pulmonary Tuberculosis; one had Chronic Pulmonary Fibrosis; and one had Chronic Empyema.

Pulmonary Tuberculosis. All six patients had definite symptoms and at examination quite marked physical signs, confirmed radiologically.

In all cases the symptoms had developed gradually, but within six months of leaving hospital. The health of the patients previous to their puerperal illness had been good and with no history of pulmonary disease, nor had this been even suspected while the patients had been in hospital.

There is little to conclude from these six cases beyond the fact that they illustrate the well-known effect of child-bearing on tuberculosis, namely, that of re-activating latent disease.

Three out of the six patients had been primiparae at the time of their puerperal sepsis. The other three, however, had had several pregnancies beforehand with no resulting pulmonary symptoms. This would appear to support the contention of Fishberg (107) that patients with quiescent lesions may pass through pregnancy unscathed. It is interesting to speculate whether the added strain of sepsis may not have been a deciding factor producing the exacerbation of the lung disease after the confinement at present under discussion. This is not improbable, when the effect of sepsis on pulmonary tuberculosis is recalled. (108)

CHRONIC PULMONARY FIBROSIS.

There was one case: the patient had been very ill at the time of her puerperal infection with Septicaemia

and Broncho-pneumonia complicating her uterine sepsis. She recovered, but after dismissal, developed symptoms of chronic pulmonary fibrosis confirmed radiologically at the time of examination. Details of this case are given in Appendix III (No.5).

Chronic Empyema. There was one case: the patient had developed an empyema as a complication of her puerperal sepsis and this had given further symptoms after dismissal from hospital, in spite of radical decortication of the lung after gradual decompression. Details of this case are also given in Appendix III (No.6).

There is little difficulty in tracing the relationship of these two conditions to the previous puerperal illness.

In the first mentioned case, there seems little doubt that the pulmonary fibrosis was a late result of the Broncho-pneumonia, which, as Davidson (109) observes, is frequently the primary lung lesion in cases of fibrosis; and it has already been noted that the patient's lung condition was merely part of the puerperal septicaemia.

The second case is an example of an acute streptococcal Empyema arising as a complication of a severe puerperal infection and becoming chronic with resulting symptoms and disability.

URINARY AFFECTIONS.

Included in this group were 8 patients, whose chief trouble since leaving hospital concerned the urinary system. The chief symptoms were frequency and painful micturition at varying intervals, but notably during subsequent pregnancies. In two patients the symptoms were more severe than just frequency, there being backache, headache and quite a degree of ill-health suggestive of a chronic pyelitis. A careful examination of the urine, however, was necessary before a diagnosis could be made, while the dictum of Whitehouse (110) was followed that only the detection of definitely pathogenic organisms in pure culture was regarded as evidence of urinary infection.

In this way 4 out of the 7 patients were found to have chronic urinary infection, while in the remaining 3 patients, the symptoms were apparently due to some condition other than infection.

In the 4 patients with urinary infection, there was no history of urinary infection at any previous pregnancies, the symptoms in all cases having developed shortly after recovery from their puerperal infection now under investigation. These symptoms had persisted at intervals till the time of examination, 4 to 5 years after the onset.

In 3 out of the 4 cases, acute infection of the urinary tract had developed as a complication of the puerperal sepsis, but in the fourth case, the only evidence of infection was the presence of organisms in the urine.

Organisms had been isolated by culture in all cases, both during the puerperal illness and at the time of examination as shown below.

Table XXIII.

Number of Patients	Puerperal Infection (organism)	EXAMINATION OF URINE.	
		At Puerperal Illness	At Time of Interview
3	Streptococcus haemolyticus	Pus and Streptococci	Pus; Streptococci (Non-haem)
1.	B.Coli and Streptococci (Non-haem).	Pus: B.Coli.	Pus: B.Coli and a few Strepts. (Non-haem).

All 4 patients then had undoubtedly a chronic infection of the urinary tract, and this seems to have resulted from infection at the previous puerperal illness, at least in the 3 patients who had had a definite acute infection previously. In these latter patients, it is noted that the infecting organism in both the genital and the urinary systems at the acute illness had been the Streptococcus, while this was also found in the chronic urinary infection.

In the case of the patient who had had no previous history of an acute urinary infection, the similarity of the infecting organism in both genital and urinary systems is again apparent.

MacIntyre (31) reports 3 cases of chronic urinary infection in whom a previous history of a complicated puerperium due to urinary tract infection was obtained. He includes these cases as illustrating disability due to urinary infection resulting from child-bearing, and emphasises the difficulty of tracing such conditions to the puerperal state. It must be admitted, however, that chronic urinary infection is frequently met with in pregnancy and that its onset is often insidious and may escape recognition. This is amply demonstrated by Baird, (111) who found the incidence of pyelitis in pregnancy to be 15.6 per cent, while the condition had been diagnosed in only 40 per cent of his cases sent to hospital.

It is possible, then, that the four patients under discussion and, in particular, the one with no history of urinary complication at the puerperal illness, may have had a previous latent infection exacerbated by their sepsis. The bacteriological findings, however, do not suggest this, as the Bacillus Coli is usually the infecting organism in

(112)
chronic urinary infection.

It should be added at this point, that not a few patients in this investigation were found to have had symptoms of chronic urinary infection since leaving hospital but, as they all had given a history of such symptoms previous to their puerperal illness, they have not been included in this group.

Regarding the remaining 3 patients included in this group, examination showed that their symptoms were due to conditions other than infection. In all three cases, no organisms were isolated from the urine.

The first patient, a parous woman with eight children, had an early uterine prolapse with prominent bladder symptoms.

In the second patient, pelvic and urine examination failed to reveal sufficient to account for her bladder symptoms, which were apparently of nervous origin; but it is worthy of note that her nervousness had only developed after her puerperal illness, which had been severe.

In the third patient, the only symptom was frequency and the cause of this was indefinite. It was noted, however, that this symptom had developed with the onset of the menopause and may have been an example of the condition

described by Whitehouse (113) as "Irritable Bladder", in which there is frequency associated with hyperaemia of the trigone and not uncommonly met with in women at or approaching the menopause.

OCULAR DISEASE.

For the sake of completeness, below are given five instances of eye disease, which developed immediately following the puerperal illness or within a reasonable period after recovery. The five patients comprising the group suffered as follows:

Conjunctivitis,	3
Iritis,	1
Corneal Ulceration,	1

Conjunctivitis. Of the three patients with this condition, one can fairly be disregarded as having contracted her trouble as the direct result of her puerperal sepsis. At the time of her dismissal from hospital, her husband, a school teacher, was in charge of pupils suffering from "pink eye" - That she contracted this form of conjunctivitis is readily explained, but it proved very chronic and persisted for eleven months, which may have been due to her debilitated state of health following her illness in hospital and therefore indirectly attributable to her

puerperal sepsis. One point in her history, of only doubtful significance, however, is that an exacerbation of eye condit ion coincided with each menstrual period. The second instance of conjunctivitis appears to have been entirely casual and no relationship to the previous puerperal sepsis was traced.

In the third instance, no direct connection was traced, there having elapsed some 2½ years between the puerperal illness and her first attack of conjunctivitis. Cultures made from this patient's eye, however, yielded streptococci and it is possible that these came from an associated chronic dacryocystitis.

Iritis. There was only one instance of iritis. The disease took the plastic form and commenced just over 4 years after her discharge from Robroyston Hospital. Until that point, she had had no eye trouble, but from then she became almost blind in one eye. Under treatment at the Ophthalmic Institute, she is recovering, but has already had 18 months' treatment. Enquiries at the Institute show that Syphilis, Tubercle and injury as prime causes of her condition, can be excluded and leave open the possibility that the condition may have been rheumatic in origin. (114) While there were no other manifestations

of the rheumatic diathesis, it is worth notice that focal sepsis was a possible cause. (115) Examination of the patient revealed a grossly hypertrophied and chronically inflamed cervix, from which it was possible to grow a streptococcus. It is possible, therefore, that arguments similar to those put forward for the group of rheumatic patients, might be advanced here also.

Corneal Ulceration. Again, there was only one example. This patient developed corneal ulceration of both eyes within 14 days of dismissal from Robroyston Hospital, and the ulceration persisted and recurred for the next eight months. Apart from the resultant corneal opacities, no other abnormality was detected when the patient's eyes were examined at the interview in 1936. She had, however, a chronic dacryocystitis. The patient had received treatment at another institution devoted to the care of eye disease, but no findings, bacteriological or otherwise, of this case could be traced. It is therefore impossible to prove or disprove any relationship to the previous puerperal sepsis.

NASOPHARYNGEAL AFFECTIONS.

There were 6 patients so classified, and, while it is difficult to believe that nasopharyngeal disease is in

any way connected with a previous attack of puerperal sepsis, it is noteworthy that all six patients denied the existence of such trouble prior to the confinement, which was followed by septic infection. Even under close questioning, they all attributed their present condition to their puerperal illness, rightly or wrongly. In general, the affected organs were the accessory sinuses and the tonsils, and frequently both were affected.

Two of the patients suffered predominantly from recurrent acute tonsillitis, but while this was their chief complaint, both admitted to ill-defined "rheumatics". On examination of these two patients, little could be made out apart from slightly enlarged and chronically inflamed tonsils, and some degree of chronic pharyngitis. Examination of the locomotor systems revealed no serious abnormality, but nevertheless, the patients' story in no way differed from the vague joint and muscle pains so frequently encountered in those subject to recurrent inflammatory affections of the upper respiratory tract. One of these two women suffered also from recurrent boils and hordeoli, probably a mark of her extreme debility, but it is interesting to mention that in 1935, two years after her sepsis, she had suffered a brisk attack of scarlatina, which was

followed by an increase of her rheumatic pains.

The remaining 4 patients suffered from periodic influenzal attacks, "hay fever", and "nasal catarrh". In all, chronic antral disease was fairly obvious and in two of the patients it had been actively, although to date unsuccessfully treated at suitable clinics. In one, a feeling of malaise and shivering preceded the exacerbation of her nasal symptoms by a day or two, while in a further few days after the exacerbation menstruation commenced. This occurred so regularly that to the patient her symptoms and the menstrual flow appeared to be closely connected.

A study of the original illnesses of these patients adds but little. Both those women, who eventually suffered from recurrent tonsillitis, had been more than averagely ill at the time of their puerperal illness, one at least being septicaemic. Only one of those, whose residual trouble was nasal, had been at all ill, and she had suffered a grave blood-positive septicaemia, to be followed in convalescence by a severe tonsillitis due to a haemolytic streptococcus. Similarly, one whose indisposition was recurrent tonsillitis, had her initial attack while in Robroyston Hospital. Another patient, with septicaemia, had joint pains during her illness,

but no true arthritis. It is possible, therefore, that these women had received a further infection while in a ward heavily infected with streptococci in variety. This aspect of the question will be touched upon when a summary is given of all the residual extragenital conditions. Certainly it is difficult to associate such pelvic conditions as were found in 1936 with the conditions complained of by the patients. In all six, cervicitis with erosion was a feature and one had, in addition, a chronic inflammatory tubal mass; but their influence, if any, was possibly through their part in bacterial sensitization, rather than as a direct source for organisms responsible for the nasopharyngeal affections.

CARDIAC DISEASE.

Two women are recorded as having recognisable organic cardiac lesions when examined in 1936. The records compiled during their sojourn in Robroyston Hospital state that there were no such lesions at that time, and neither patient had at any time in the past suffered such an illness as might be presumed typically to result in organic heart disease.

One patient has already been referred to in that section which treats of chronic non-specific arthritis.

The details are given fully in Appendix III (No.3). Her records are interesting in that they suggest the development of a true organic mitral incompetence as an integral part of a severe non-specific rheumatism; and some evidence has already been put forward that the rheumatism is, if not a sequela, at least closely related to the preceding severe puerperal streptococcal septicaemia. The second differs somewhat from the first, in that the initial puerperal illness was of mild degree and apparently associated with infection by the colon bacillus. She too had, when seen in 1936, an advanced mitral valvular lesion with early decompensation. Again, there was nothing in her history to suggest the occurrence, either before or after puerperal sepsis, of any of those rheumatic lesions commonly associated with carditis. It remains only to state that in 1936, a non-haemolytic streptococcus was the organism grown from the upper vaginal canal in each patient.

These two cases alone do not afford conclusive evidence that puerperal infection may be followed by cardiac lesions. At most, they are suggestive, particularly that patient detailed in Appendix III (No.3). Here is some evidence pointing to the common pathology

of all rheumatic joints suggested by Timbrell Fisher, (101) and already mentioned; and conceivably closely related to those unfortunates whose initial attack of acute rheumatism passes into a more chronic form, which, as McNee (116) points out, is indistinguishable from non-specific rheumatism. This thesis is not the place to touch on the cardiac complications of those who died of puerperal sepsis in Robroyston Hospital, but it can be stated with authority that the records of the numerous post-mortem examinations held, reveal a surprising incidence of endocarditis. In a scrutiny of the records of the cases so affected, it is perhaps significant that, in one instance only, could pre-existing rheumatic endocarditis be traced. It is possible, it seems, that the others were pathologically related to the two examples quoted in this section.

MISCELLANEOUS AFFECTIONS.

There remain six patients to be discussed. The illnesses involved are made up as follows:- urticaria, 2; dermatitis, 1; erysipelas, 1; pernicious anaemia, 1; tuberculous adenitis, 1.

The last two patients call for very little comment. One woman developed typical pernicious anaemia in the later months of a further pregnancy occurring two years

after her dismissal from Robroyston Hospital. This apparently was of such severity as to require blood transfusion after the ensuing confinement. Two further transfusions were given in the following three months and when seen by the writer in 1936, she was still under treatment. The blood examination done in 1936 showed a picture typical of pernicious anaemia. Her condition seems much more likely to be a result of the later pregnancy than a sequela of the puerperal infection, which was in every way of a mild nature. The second woman showed extensive cervical adenitis, which had developed some considerable time after her discharge from Robroyston Hospital. It is not suggested that the adenitis resulted from her puerperal illness. She was advised to apply for treatment, and her records confirm that glandular enlargement was of tuberculous origin.

The four instances of skin disease consisted as follows:- erysipelas, 1; dermatitis, 1; urticaria, 2.

The patient who suffered from erysipelas presented an extremely interesting story. She was originally treated for pelvic cellulitis in 1932, the infecting organism being a haemolytic streptococcus. In 1936 vaginal examination revealed chronic parametritis on that

side of the cervix previously affected, with, in addition, chronic cervicitis and erosion. She complained throughout the whole period of "heaviness" located in the lower abdomen, and suffered from profuse leucorrhoea. In the interval between 1932 and 1936, she bore two further children. The birth of the first was followed by proven puerperal sepsis. In the following seven months she had three attacks of erysipelas, always affecting the face. The birth of her last child early in 1936, was followed by severe acute mastitis and some months later by a gross ischio-rectal abscess. For the six months prior to her visit to the writer late in the same year, she had suffered from severe dermatitis of both palms and of the arm flexures. The cause of this could not be traced.

The absence of bacteriological data of her later illnesses precludes the certain advancement of the theory that all her subsequent illnesses were related to her original pelvic cellulitis. True, pelvic cellulitis and erysipelas meet on the common ground of causal agent in a haemolytic streptococcus, and the second attack may have been similarly related. The mastitis may have been of different origin, as may have been the ischiorectal

abscess, but the occurrence of a dermatitis such as has been described is not, as will be seen later, incompatible with the persistence of a septic focus. Certainly, the consultant responsible for her treatment was unable to trace any more obvious cause, and the existence of chronic parametritis and cervicitis seem to be sufficient evidence for the existence of such a focus of infection. Whether these residual lesions acted as harbours for virulent organisms, slowly becoming less virulent, or as foci, sensitising the patient to fresh infections, is a matter of fine argument.

The second instance of skin disease is possibly etiologically related to the case previously described. The condition was again diagnosed as "dermatitis" of the palms and the records of the institution wherein she received treatment for three years, with ultimate good results, offer no causal explanation. This woman was found in 1936 to have marked chronic cervicitis with leucorrhoea. The latter had been marked since her dismissal from Robroyston Hospital in 1933, where she had been treated for acute streptococcal metritis. During the year following her dismissal she had suffered from recurrent vulvar abscesses. While the uterine cervix

is not so prominently featured as other organs, as a source of focal sepsis, the possibility that it can act as such is accepted.(105) That focal sepsis may be the underlying cause in obscure dermatitis, particularly of a distribution such as is described in these last two case records, is put forward by Ingram(117) and by Cranston Low(118). The latter goes so far as to associate such conditions with the presence, in the foci, of streptococci of low virulence. Possibly a similar explanation accounts for the skin affection in these last two patients.

Two instances of recurrent urticaria complete this chapter. Both women suffered from severe puerperal sepsis, one in 1932 and the second in 1933. Both revealed palpable after effects; in one there was a chronic tubal mass and in the other an obviously chronically diseased cervix. Both suffered from leucorrhoea and premenstrual backache. In one, the urticarial attacks were irregular and of short duration, but in the second, the attack preceded the onset of menstruation by a few days. These attacks had commenced a few months after her recovery from her puerperal illness, and though they did not occur at every period since then, they were extremely frequent. Interest is added in stating that this woman was treated in Robroyston Hospital by anti-

streptococcal globulins (scarlatina) and developed a serum rash as a result. That focal sepsis can be the explanation of an otherwise inexplicable urticaria is admitted by Sir Norman Walker (119) and it is of some significance, perhaps, that the attacks, in the cases cited, should occur when there would be maximum congestion of, and consequently maximum absorption from, the possibly culpable foci.

MORBID EXTRAGENITAL CONDITIONS - SUMMARY.

The disabilities found in the 200 patients examined have been divided into gynaecological affections, and morbid conditions affecting the various extragenital systems. The occurrence and degree of gynaecological disability have been fully discussed and the actual extent of the impairment of health, from whatever cause, has been similarly assessed. From the preceding chapters, it appears probable that some considerable ill-health can be the indirect result of puerperal sepsis. In the few succeeding paragraphs an attempt has been made to summarise the substance of Chapter III, Section F.

The illnesses discovered can reasonably be divided into three categories, according as to whether or not puerperal sepsis played a part in the pathogenesis of the

succeeding ailment; and a third section containing those illnesses in which its influence was unproved, though suspected and probable. The columns below give such a division. In columns 1 and 3, an additional column represents the number of sufferers at the time of the examination - a period averaging 3-3½ years from the original illnesses.

Table XXIV.

Showing the succeeding systemic illnesses of the 200 patients examined and the relationship to the previous puerperal sepsis.

Disease Group	Attributable Total @ 1936		Non-Attributable Total	Unproved but probable Total @ 1936		Total
Chronic phlegmasia	21	17	-	-	-	21
Chron.arthritis & rheumatism	2	2	-	9	5	11
Pulmonary disease	2	2	6	-	-	8
Urinary affections	-	-	4	4	4	8
Ocular disease	-	-	3	2	-	5
Nasopharyngeal disease	-	-	6	-	-	6
Cardiac disease	2	2	-	-	-	2
Miscellaneous affections	-	-	2	4	2	6
Total	27	23	21	19	11	67
% Total of 200 patients	13.5	12.5	-	9.5	5.5	-

With three exceptions, these incidents gathered together under "attributable" and "non-attributable" require little argument for their justification.

Persistent phlegmasia, partial or complete amkylosis of previously pyaemic joints, and gross changes in the lungs, which have resulted from blood borne infection, can have no other reasonable origin than the illnesses of which they were integral parts. The two instances of cardiac disease are less easily proved to be attributable. The arguments given in the text of the appropriate subsections need not be repeated. It can be reiterated that, in the writer's mind, there is no doubt that a puerperal septicaemia can result in endocarditis.

With the exception of conjunctivitis and nasopharyngeal disease, equally little further need be said of the "non-attributable" affections. The two exclusions are here included because of the possibility that they owe their origin to a different mode of infection, though still indirectly connected with puerperal sepsis, and particularly with those forms due to streptococci. The occurrence of acute streptococcal tonsillitis in patients convalescent has already been remarked, and if it be admitted that this may have been due to a casual extran-

eous infection received in a pavilion where such an infection is an ever-present possibility, it takes but a short step to include infections of the accessory sinuses and the lachrymal sac - and so the conjunctiva - under a similar pathogenesis. That such a method of infection is possible, is borne out by the writer's personal experience, which showed that the great majority of cases of tonsillitis, otitis media and nasopharyngeal infection generally, among members of the nursing staff, occurred in those girls nursing puerperal sepsis. Enquiry of senior members of the hospital administration amply confirmed the impression so formed. Since the patients under discussion may have been similarly infected, they were regarded as having the origins of their later troubles in sources outwith their own primary illness. Any apparent association between these extragenital lesions and any residual pelvic mischief has been explained in the appropriate sub-section.

The illnesses most provocative of argument as to pathogenesis undoubtedly are included within column 3. The bacteriological similarity between their original illnesses and their later urinary infections might justify the transference of 4 instances of urinary infection to column 1, but the prevalence of unrecognised cystitis

in women mitagates against this. The instance given of repeated severe manifestations of septic infection - recurrent puerperal sepsis, erysipelas and mastitis and dermatitis - has already been fully discussed. The remainder - 9 instances of chronic non-specific rheumatism, 1 of iritis, 2 of urticaria and 1 of dermititis- have possibly a common origin in focal sepsis and the arguments in favour of such a possibility have already been referred to, when these cases were described in this chapter.

Chapter IV.
BACTERIOLOGY.

In a previous section of this inquiry, it has been remarked that there appears to be an increased liability to puerperal infection in pregnancies subsequent to the initial attack. Such a possibility existed in the mind of the writer even in the earliest stages of this investigation, and as a natural sequela to the conception of such a possibility, a bacteriological examination of the vaginal flora of each patient was undertaken. During the routine examination of each woman, a smear was taken from the upper vagina and immediately inoculated on to blood serum slopes, which were incubated. These were examined when growth was apparent, and where the growth proved to be streptococci or contained streptococci, a sub-culture was established on plates of blood agar, and the resultant growth examined for haemolysis of the blood. Previous to the work being undertaken, an arrangement had been reached whereby any streptococcus suspected of belonging to a haemolytic strain, could be re-examined by a professional bacteriologist with a view to its proper classification. It may be said forthright, however, that in no case was a haemolytic streptococcus

isolated.

The results of this portion of the work are presented below as percentages:

Haemolytic streptococci	0%
Non-haemolytic "	56%
Bacillus coli	23%
Staphylococcus albus	52.5%
Staphylococcus aureus	.5%

The difficulties intrinsic in culturing anaerobic streptococci compelled their omission from the table.

The bacterial content of the reproductive canal and its causal relationship to puerperal sepsis, has been the subject of much investigation. Research on this relationship has been intensified since it has come to be realised, as Cameron (120) points out, "that intrinsic infection is a much more common infection than was formerly believed. Its incidence is estimated by various observers at about 30 per cent of all cases."

In this connection, the vaginal flora is obviously of first importance, especially during pregnancy since the presence of potentially virulent organisms must inevitably increase the risk of infection developing in the subsequent puerperium. This has been the subject of detailed investigation by many workers such as Logan, (121) Lockhart, (122) Taylor and Wright, (123) and Cruikshank and Baird. (124)

While their results vary in detail, they essentially demonstrate the flora of the vagina to be much as given by Cameron (120), quoted below:-

Haemolytic streptococci,	.5 - 3.1% of cases
Non-haemolytic "	35 - 55%
Anaerobic "	1 - 2%
Coliform bacilli,	30%
Staphylococcus albus,	60%
" aureus,	1%
Diphtheroid bacilli,	25%

The inclusion of recognised pathogenic organisms is obvious, but comparison with the results of bacteriological work in puerperal sepsis is instructive. Thomas (125) demonstrates clearly that the streptococcus is the most important causal organism, while D.C.Colebrook (126) has shown that in 68-96 per cent of fatal cases of puerperal sepsis, the haemolytic type of streptococcus is responsible.

In this series of 200 cases, all the patients had had proven puerperal sepsis in past years. In a large majority the infection had been streptococcal in origin, and in many the haemolytic strains had been present. The results obtained are given below and are placed for comparison alongside Cameron's summary.

Table XXV.

Bacteriological Findings (upper vagina) in 200 cases investigated.

Organism.	Patients investigated: % of cases affected.	Cameron's Summary: % of cases affected.
Haemolytic streptococci	0.0	0.5 - 3.1
Non-haemolytic "	56	35 - 55
*Anaerobic "	-	1 - 2
Coliform bacilli	23	30
Staphylococcus albus	52.5	60
Staphylococcus aureus	.5	1
Diphtheroids	-	25

* Not investigated, owing to difficulties in culturing.

It can be seen by a comparison of the two columns that the bacterial content of the upper vagina in this series of patients did not differ greatly from that of the normal pregnant woman. Two features of the writer's series stand out sharply, though their significance is doubtful. The first is that in no instance was a haemolytic streptococcus recovered, despite the occurrence in the past of an illness, due, in many instances, to an organism of that strain. The second is that the percentage of streptococci recoverable in the writer's series reaches the upper limit of the figures given for

streptococci by Cameron. Apart from these two deviations, it would appear that the vaginal flora of these women has not been greatly altered, even though many of them suffered at the time of the examination from chronic pelvic disease.

Chapter V.
SUMMARY and CONCLUSIONS.

This thesis purports to be an attempt to assess the subsequent health of women who had suffered from proven puerperal sepsis, and to uncover, thereby, the remote effects of puerperal infection.

The number of patients interviewed and examined was 200. To attain this figure, 710 invitations to attend were issued.

All 200 women had suffered a puerperal infection at some time between the years 1930-1933, the average case history covering a period of 4-5 years.

The investigation shows that the health of the patients had not suffered in any great degree following puerperal sepsis; only 38 per cent had suffered in any way severely.

The various lesions uncovered were not confined to the reproductive tract, but included affections of the various general systems.

In 78 per cent of the patients examined, chronic infective lesions of the genital tract were found and considered the result of puerperal infection.

Chronic Uterine Sepsis (cervical and corporeal) was the commonest lesion found; but in most cases produced

only mild disability.

Chronic Salpingo-oöphoritis was less frequently found, but invariably produced severe disability.

An outstanding gynaecological sequela of puerperal sepsis was Sterility. Of the 200 patients, 22 per cent were considered sterile. In a further 16 per cent, no further pregnancy had occurred, which may have been the result of contraceptive measures or actual sterility.

The incidence of abortion is apparently increased as a result of previous puerperal sepsis.

The incidence of puerperal sepsis was found to be higher after the primary infection.

In 32 per cent of the patients, affections of the general systems had developed since the initial puerperal infection, but not all were the result of puerperal sepsis.

In 11.5 per cent of the patients, no puerperal origin for their later condition could be traced.

In 12-14 per cent of the patients, the conditions found were considered the direct result of puerperal sepsis.

In 9.5 per cent of the patients, puerperal infection was considered the probable origin.

An interesting feature of the extra-genital conditions was their wide diversity.

The prominent part played by focal sepsis, located in the genital tract, in the etiology of these latter conditions is noteworthy.

In the great majority of the patients, the infecting organism at the primary puerperal illness had been the streptococcus haemolyticus, but in no instance was this organism demonstrated in the vagina at the time of examination.

Name: Address:

Age: Para:

Admitted:

Dismissed:

Diagnosis:

Previous Illnesses:

Health since Dismissal:

OBSTETRIC HISTORY.

No.	Date	Health during Pregnancy	DURATION		DELIVERY		WT.	Alive	Puerperium	Child
			Preg.	Labour	Spont.	Inst.				
				B E F O R E S E P S I S						
				A F T E R S E P S I S						

MENSTRUAL HISTORY. Onset:

Menopause:

	Before Sepsis	After Sepsis
Type		
Duration		
Regular/Irregular		
Dysmenorrhoea		
Amenorrhoea		
Menorrhagia		
Metrorrhagia		

LEUCORRHOEA - (a) before Sepsis:
(b) after Sepsis:

STERILITY:

DYSPAREUNIA:

EXAMINATION OF PATIENT.

General:

Breasts:

Articular:

Cardio-Vascular: Blood-Pressure:

Respiratory:

Alimentary:

Urinary:

Nervous:

Detailed Examination of System Affected:

REPRODUCTIVE SYSTEM.

Vulva and Urethra:

Perinaeum:

Vagina:

Cervix:

Uterus:

Tubes and Ovaries:

Vaginal Swab:

Catheter Specimen of Urine:

Appendix II.

In this appendix are included 5 patients, who had suffered from gynaecological symptoms arising from a chronic affection of the reproductive system, the direct result of their previous puerperal infection.

These 5 patients were selected since they serve to illustrate well the disability which may result from acute puerperal sepsis; while in 4 of them, details of the findings at a later abdominal operation, performed for relief of symptoms, demonstrate clearly the residual damage to the reproductive organs, which may accompany such disability.

CASE No.1.

NAME: Mrs.P. AGE: 45 years. PARITY: V.

DATE of PUERPERAL ILLNESS: August - November 1931.

DATE of INTERVIEW and EXAMINATION: November 1936.

INTERVAL between DISMISSAL from HOSPITAL & EXAMINATION: 5 yrs.

DETAILS of PUERPERAL ILLNESS.

The patient was admitted to Robroyston Hospital on the 7th day of the puerperium with Puerperal Sepsis following a spontaneous delivery of a full-time child.

Examination revealed a septic Metritis; a septic tear of the Cervix with an acute Pelvic Cellulitis of the left Parametrium. The infecting organism was the haemolytic streptococcus.

The patient was acutely ill and her condition improved only slowly. The cellulitis went on to abscess formation and was drained into the posterior fornix. The patient was able to go home well after 12 weeks in hospital.

STATE of HEALTH before PUERPERAL ILLNESS.

Good: no serious illnesses: chronic Bronchitis.

OBSTETRIC HISTORY.

(a) Before Puerperal Illness:

1915-22. 3 Normal full-time deliveries.

1927. 3-months abortion.

1931. 1 spontaneous full-time delivery - Puerperal Sepsis.

(b) After Puerperal Illness.

No further pregnancies. (After examination, the patient was considered sterile.)

HEALTH since DISMISSAL.

The patient has been in poor health since leaving hospital. A few months after dismissal, she began to have severe ill-defined pains across the lower abdomen and in the vagina, which were only relieved by rest in bed and warmth. These pains have since persisted at intervals of 3-4 months and she has just recently recovered from one such attack. The spasms of pain lasted usually 24-48 hours during which time intercourse was impossible.

Apart from these attacks of pain, patient has developed fairly severe pre-menstrual pain relieved by the onset of the menstrual period. Her menstrual periods, however, have been regular and not excessive. There has been no leucorrhoea, Dyspareunia has been troublesome since leaving hospital, but not sufficiently severe to prevent intercourse except as noted above.

General health has been poor. She has become nervous and inclined to worry about her condition.

EXAMINATION of PATIENT.

General State of Health.

Poor. Patient is pale and thin, and appears to be in a state of chronic ill-health.

General Systems.

Apart from chronic Bronchitis, all extra-genital systems were apparently healthy.

Reproductive System.

Pelvic examination, bimanual and per speculum, revealed:

1. Chronic Cervicitis with chronic inflammatory enlargement, erosion and Nabothian follicles.
2. Slight enlargement of the uterus with some fixation.
3. Old Pelvic Cellulitis with considerable induration in both fornices.
4. Tubes and Ovaries not distinctly palpated owing to the induration in the fornices.
5. Culture from upper vagina: non-haemolytic streptococci in pure culture.

Following her interview at Robroyston Hospital, the patient was admitted to the Gynaecological Wards of the Royal Infirmary, where she was operated upon for her condition. The details of the operative findings and operative measures have been kindly supplied and

were as follows:-

OPERATIVE FINDINGS.

Cervix hypertrophied.

Uterus generally enlarged.

Parametrium much thickened.

Both Fallopian tubes thickened by adhesions, but patent, when tested at operation.

Both ovaries cystic with tortuous ovarian veins.

OPERATION PERFORMED.

Total Hysterectomy with removal of the left tube and ovary.

RESULT.

Patient made a good recovery and her general health has been much improved.

CASE No.2.

NAME: Mrs. K. AGE: 46 years. PARITY: XIII.

DATE of PUERPERAL ILLNESS: August - September 1931.

DATE of INTERVIEW and EXAMINATION: October 1936.

INTERVAL between DISMISSAL from HOSPITAL & EXAMINATION: 5 years.

DETAILS of PUERPERAL ILLNESS.

The patient was admitted to Robroyston Hospital on the 5th day of the puerperium with Puerperal Sepsis following the spontaneous delivery of a full-time child.

On examination the patient was found to be suffering from acute septic Endometritis with retention of lochia. On the third day after admission, she developed symptoms of acute Salpingitis and Pelvic Peritonitis, which subsided without operation being necessary. A week after admission, the patient developed Phlegmasia alba dolens of the left leg.

The patient was acutely ill, but made a steady recovery. After six weeks in hospital, however, the patient went home on her own responsibility and before she had completely recovered.

STATE of HEALTH before PUERPERAL ILLNESS.

Very good: no previous illnesses.

OBSTETRIC HISTORY.

(a) Before Puerperal Illness:

Nos. I - X, Normal full-time deliveries.

No. XI, 3-months abortion.

No. XII, 3-months abortion.

No. XIII (1931) Spontaneous full-time delivery - Puerperal Sepsis.

(b) After Puerperal Illness:

No further pregnancies. (After examination the patient was considered sterile).

HEALTH since DISMISSAL.

Since the patient left Robroyston before she had completely recovered, she remained in poor health for about a month after leaving hospital before she became well. She then began to have dull pain in the left iliac fossa and backache, but not noticeably increased at menstruation. The menstrual period remained regular and unaffected. About three months after dismissal, the patient developed acute pain across the lower abdomen with sickness, rigidity and tenderness of the abdomen (Hospital Records). She was removed to the Southern

General Hospital where an abdominal operation was performed, with relief of symptoms. Since her operation patient has recovered from her gynaecological symptoms, but has developed a ventral hernia through the operation scar during the past year. This has been giving trouble with symptoms of partial strangulation.

EXAMINATION of PATIENT.

General State of Health.

Fairly good. Patient is stout and somewhat breathless; pale sallow complexion. No evidence of previous Phlegmasia in the left leg.

General Systems.

Alimentary System: There is a large ventral hernia through the previous operation scar.

Respiratory System: Chronic Bronchitis.

Other Extra-Genital Systems: Apparently healthy.

Reproductive System.

Pelvic examination, bi-manual and per speculum, revealed the complete absence of uterus and appendages. No other abnormality was detected. Culture from the upper vagina yielded no growth of organism.

Details of the operative findings and operation performed have been kindly supplied and were as follows:-

OPERATIVE FINDINGS.

Pelvic viscera embedded in a mass of adhesions and adherent to bowel, which had been ruptured, causing the symptoms. Both Fallopian tubes fibrosed and completely closed.

OPERATION PERFORMED.

Total hysterectomy, leaving only part of the left Fallopian tube and ovary.

Ruptured bowel united by a lateral anastomosis.

RESULT.

Patient made a rapid recovery, but the abdominal wound discharged for three months before it closed.

Operation has resulted in relief of gynaecological symptoms and the general health has greatly improved.

CASE No.3.

NAME: Mrs. M. AGE: 42 years. PARITY: I.

DATE of PUERPERAL ILLNESS: November 1930 - February 1931.

DATE of INTERVIEW and EXAMINATION: August 1936.

INTERVAL between DISMISSAL from HOSPITAL and EXAMINATION: 5½ years.

DETAILS of PUERPERAL ILLNESS.

The patient was admitted to Robroyston Hospital on the 14th day of the puerperium following the spontaneous delivery of a live child at the 8th month of pregnancy. The patient was very ill on admission and on examination was found to be suffering from general peritonitis. Operation showed this to be the result of a ruptured pyosalpinx. Both Fallopian tubes were inflamed, apparently following an acute uterine sepsis arising from infection at labour. The infecting organism was chiefly the Bacillus Coli Communis.

Patient improved after laparotomy, but recovery was very slow although uneventful. At the end of 13 weeks she was allowed home well.

STATE of HEALTH before PUERPERAL ILLNESS.

Very good: no previous illness.

OBSTETRIC HISTORY.

(a) Before Puerperal Illness.

1930. One spontaneous delivery of 8-months child - Puerperal Sepsis.

(b) After Puerperal Illness.

No further pregnancies. (After examination, the patient was considered sterile as the result of operation.)

HEALTH since DISMISSAL.

Before leaving hospital the patient had been advised to attend the Royal Samaritan Hospital for Women, and about six months after dismissal she was admitted to this hospital for treatment. Her health since leaving Robroyston had been fairly good, her chief complaint concerning the menstrual periods. These had been regular, but with some menorrhagia and some pre-menstrual backache. Headaches at the periods had been severe, and there was troublesome dyspareunia. After operation the patient's symptoms were relieved and she has since remained in good health. Menopausal symptoms developed shortly after operation and were troublesome for about a year. There were no further menstrual periods.

EXAMINATION of PATIENT.

General State of Health.

Good. Patient appears well, has good colour and is well-nourished.

General Systems.

All extra-genital systems were apparently health.

Reproductive System.

Pelvic examination, bi-manual and per speculum, revealed the complete absence of uterus and appendages. No other abnormality was detected.

No growth of organisms was obtained by culture from the upper vagina.

It is interesting to note the findings at bi-manual examination of the patient before operation, i.e. about six months after her puerperal illness. These were as follows:

Uterus enlarged and fixed by adhesions.
Ovarian cyst felt in the right side.
Fallopian tubes difficult to palpate owing to adhesions.

Details of the operative findings and the operation performed have been kindly supplied and were as follows:

OPERATIVE FINDINGS:

Numerous adhesions in the pelvis. Uterus and urinary bladder adherent. Large cyst in the right ovary

which was adherent to adjacent bowel. Left Fallopian tube and ovary thickened and bound up with adhesions.

OPERATION PERFORMED.

Subtotal Hysterectomy. Bilateral Salpingo-oöphorectomy.

RESULT.

Patient made a rapid recovery and apart from the post-operative menopause already noted, has been in much better health.

CASE No.4.

NAME: Mrs. S. AGE: 35 years. PARITY: V.

DATE of PUERPERAL ILLNESS: October - November 1930.

DATE of INTERVIEW and EXAMINATION: October 1936.

INTERVAL between DISMISSAL from HOSPITAL and EXAMINATION: 6 years.

DETAILS of PUERPERAL ILLNESS.

The patient was admitted to Robroyston Hospital following a complete abortion in the 4th month of pregnancy which had taken place two days previous to admission.

On examination she was found to be suffering from uterine sepsis of moderate severity. A few days after admission the patient developed symptoms of acute salpingitis, but the condition settled with conservative treatment in about a week.

The patient was moderately ill, but was able to go home well after 4 weeks in hospital.

STATE of HEALTH before PUERPERAL ILLNESS.

Very good: occasional tonsillitis.

OBSTETRIC HISTORY.

(a) Before Puerperal Illness:

1922-6. 4 Normal full-time deliveries.
1930. 4-months abortion - Puerperal Sepsis.

(b) After Puerperal Illness:

No further pregnancies. (After examination, the patient was considered sterile as the result of operation.)

HEALTH since DISMISSAL.

The patient remained in quite good health for six months after leaving hospital, then she began to have trouble at her menstrual periods. The chief complaint was severe backache commencing about two days before menstruation and only partially relieved with the onset of the period. There was also dull throbbing pain in the left iliac fossa between the periods. The menstrual periods were regular, but menorrhagia was troublesome. There was slight leucorrhoea. About 3-4 months after the onset of the symptoms, the patient was admitted to Oakbank Hospital for treatment in the gynaecological wards. While in the wards she developed acute abdominal symptoms which necessitated immediate operation. The condition found at operation was an acute exacerbation of a chronic salpingitis. Details of the operation are referred to below.

After operation patient recovered and has since remained in very good health.

EXAMINATION of PATIENT.

General State of Health.

Good. Patient appears well, but is somewhat pale and thin.

General Systems.

All extra-genital systems were apparently healthy.

Reproductive System.

Pelvic examination, bi-manual and per speculum, revealed:-

1. Mild catarrhal cervicitis.
2. Uterus retroverted and fixed by adhesions towards the left side of the pelvis.
3. Fallopian tubes and ovaries not palpated.
4. Culture from the upper vagina: non-haemolytic streptococci in pure culture.

Details of the Operative Findings and the operation performed in Oakbank Hospital have been kindly supplied and were as follows:

OPERATIVE FINDINGS.

A mass of adhesions in the left side of the pelvis involving the different organs, which were accordingly difficult to define. The left Fallopian tube and ovary were found to be the seat of acute inflammation super-

imposed on a chronic Pyosalpinx. The right Fallopian tube and ovary were thickened and bound together by adhesions and adherent to the posterior wall of the uterus. The right ovary was cystic.

The uterus showed little evidence of disease.

OPERATION PERFORMED.

Left salpingo-oöphorectomy. Right salpingectomy. Right ovarian cysts punctured.

RESULTS.

Patient made a good recovery and has had complete relief from her symptoms since operation.

CASE No.5.

NAME: Mrs. L. AGE: 37 years. PARITY: VI.

DATE of PUERPERAL ILLNESS: May - December 1934.

DATE of INTERVIEW and EXAMINATION: February 1937.

INTERVAL between DISMISSAL from HOSPITAL and EXAMINATION: $2\frac{1}{4}$ years.

DETAILS of PUERPERAL ILLNESS.

The patient was admitted to Robroyston Hospital on the 5th day of the puerperium with Puerperal Sepsis following the spontaneous delivery of twins at term. The patient was very ill on admission and on examination was found to be suffering from Acute Uterine Sepsis with Septicaemia. There was considerable laceration of the cervix on both sides, but more marked on the right side. The infecting organism was a streptococcus (non-haemolytic). The course of the illness suggests that this may have been an infection due to the anaerobic variety of streptococcus, but the records show that cultivation of anaerobic streptococci was not attempted.

The patient remained critically ill for about ten days, then there was some slight improvement in her general condition. At this point signs of Pelvic Cellulitis

became clinically evident on the right side and examination showed extensive involvement of the cellular tissue of the right side of pelvis. This condition remained stationary for about 7 days, when pus formation took place and the abscess appeared above Poupart's ligament on the right side. This was opened and drained at operation through an incision along the inguinal ligament. The patient improved considerably after operation, but her convalescence was slow and interrupted by a mild phlebitis of the right leg. The operation wound failed to heal completely, a sinus forming. This was still discharging when the patient was allowed to go home, 28 weeks after admission to hospital. Her general condition was otherwise good.

STATE of HEALTH before PUERPERAL ILLNESS.

Very good. Erysipelas of leg at 21. No other illnesses.

OBSTETRIC HISTORY.

(a) Before Puerperal Illness.

1925-31. 5 Normal full-time deliveries.

1934. Spontaneous delivery of twins at term - Puerperal Sepsis.

(b) After Puerperal Illness.

No further pregnancies. (Patient had been using contra-

ceptive measures, but after examination was regarded as probably sterile.)

HEALTH since DISMISSAL.

The patient's health since leaving Hobroyston Hospital has been poor and during the past year her symptoms have become more persistent and more marked.

Her chief trouble is the sinus in her operation wound. As already noted, the sinus formed after her operation and discharged all the time she was in hospital. It has discharged persistently since leaving, and has and still requires daily dressing. The discharge is thick and at times quite copious. Her other complaint is of severe shooting pains down the right thigh and also across the lower abdomen. These developed gradually about six months after dismissal, but during the past year, the pains have become more severe and the spasms more frequent, coming on about every 6 weeks. They are noticeably worse shortly before the menstrual period. At times the pains in her leg cause her to limp.

Menstruation has been little affected by her illness with the exception of the abdominal pains becoming more marked as noted. There is however troublesome leucorrhoea, which seems to be getting worse. The patient's

general health has not been good and she has become very nervous, easily tired and troubled with headaches.

EXAMINATION of PATIENT.

General State of Health.

Fairly good. The patient appears anxious and is rather pale and thin.

General Systems.

Alimentary System.

Abdomen: There is an ill-defined mass palpable in the right iliac fossa.

Along Poupart's ligament on the right side is the linear scar of the previous operation, the middle third of which is replaced by a sinus. The edges of this are rounded, and the surrounding skin is red and irritated with discharge. There is a sero-purulent discharge oozing from the granulations in the floor of the sinus.

Other Extra-genital Systems:

Apparently healthy. No abnormality of the right hip joint was found, and there was no tenderness over the right sciatic nerve.

Reproductive System.

Pelvic examination, bi-manual and per speculum, re-

vealed:

1. Considerable scarring of the cervix with cicatricial contraction and narrowing of the whole of the vault of the vagina.
2. Some degree of vaginitis and mild cervicitis.
3. Uterus difficult to define, not apparently enlarged, but drawn towards the right side of the pelvis and fixed.
4. The whole of the right side of the pelvis filled with a mass of adhesions, adherent to the body of the uterus and surrounding the supra-vaginal portion with a hard band of adhesions.
5. Considerable fibrosis in the left fornix with thickening of the left Fallopian tube.
6. The right Fallopian tube and ovary were indistinguishable in the mass of adhesions on the right side.
7. Culture from upper vagina: staphylococcus albus and non-haemolytic streptococci.

REMARKS.

At interview, the chief concern of this patient was, not unnaturally, the possibility of having her sinus healed.

The details, just given, present clearly the difficulties both in prognosis and treatment.

Since the sinus has been discharging for almost three years, operative interference would appear now to be the

most hopeful line of treatment and to offer the best chance of success; but the difficulties of operation become very apparent when the findings at pelvic examination are considered.

Appendix III.

In this appendix are included selected examples of those patients whose chief symptoms arose from a morbid condition outside the reproductive system.

Six patients have been selected; and the interesting feature of the group is the varied character of the symptoms presented and the variety of the conditions found. While in several of the patients, a distinct relationship between their subsequent illness and the previous puerperal infection can be traced; in the other patients, such a relationship is perhaps more hypothetical than real, and less easily proved. These latter patients, however, are none the less worthy of note; and the group as a whole serves fairly to illustrate the extra-genital morbidity, which may sometimes result from acute puerperal sepsis.

CASE No.1.

NAME: Mrs. H. AGE: 40 years. PARITY: VII.

DATE of PUERPERAL ILLNESS: October - December 1932.

DATE of INTERVIEW and EXAMINATION: November 1936.

INTERVAL between DISMISSAL from HOSPITAL and EXAMINATION: 4 years.

DETAILS of PUERPERAL ILLNESS.

The patient was admitted to Robroyston Hospital during the second week of the puerperium with Puerperal Sepsis following the spontaneous delivery of a full-time child.

On examination the patient was found to have a left Phlegmasia alba dolens. Her condition was not serious although the oedema of the leg was quite marked. A slight purulent lochia was the only other evidence of sepsis. About six days after admission a right phlegmasia alba dolens developed, with marked oedema of the limb and considerable pain. Thereafter the patient improved slowly but steadily. At the end of 9 weeks' treatment with splints, then massage, the swelling of the legs had subsided, although there was still some thickening of the ankles. She was able to walk quite well and allowed to go home. Cultures from the cervical swab were not made.

STATE of HEALTH before the PUERPERAL ILLNESS.

Very good: no previous illnesses.

OBSTETRIC HISTORY.

(a) Before Puerperal Illness:

1916-27. 6 Normal full-time deliveries.

1932. 1 Spontaneous full-time delivery - Puerperal sepsis.

(b) After Puerperal Illness:

No further pregnancies. (After examination, the patient was considered sterile).

HEALTH since DISMISSAL.

The patient's general health has been quite good since leaving hospital, but her legs have given considerable trouble more or less continually since dismissal.

The ankles were still thickened when she went home, but within a few weeks the legs began to swell at night and after exertion. This was slight at first, but gradually became more marked and there was frequently severe aching. The left leg was much more troublesome than the right, and the pain in this leg often caused the patient to limp. The swelling and pain were noticeably worse shortly before the onset of the menstrual periods.

There were no varicose veins, but about a year after

leaving hospital, the patient developed a small circular ulcer on the lateral aspect of the lower third of the left leg. This gave considerable pain and, in spite of treatment at various hospitals, increased in size and has persisted. It requires daily dressing.

The patient complains of no pelvic symptoms, except occasional leucorrhoea and slight premenstrual backache; and, as already noted, she has had no further pregnancies.

EXAMINATION of PATIENT.

General State of Health.

Good. Patient is well-nourished and of good colour. She walks with a slight limp of the left leg.

The Lower Limbs:

The Right Limb: There is slight, but definite thickening and oedema of the leg. The skin is considerably pigmented, but there are no ulcers and no varicose veins.

The Left Limb: There is marked thickening with chronic oedema and induration of the foot and leg. The skin of the leg is much pigmented and shows atrophic changes. There are no varicose veins.

In the lower third of the leg on the lateral aspect, there is a large circular ulcer about 1⅛ inches in diameter. The ulcer appears to be very chronic with

rounded edges and unhealthy granulations in its floor. There is a thin serous discharge. The surrounding skin for a considerable area is red and inflamed.

General Systems.

Apart from the condition above described, all extra-genital systems were apparently healthy.

Reproductive System.

Pelvic examination, bi-manual and per speculum, revealed:

1. Chronic Cervicitis with bi-lateral tears of the cervix, some inflammatory enlargement and slight erosion.
2. Some thickening of the utero-sacral ligaments and parametrium.
3. Uterus and appendages were apparently normal.
4. Culture from the upper vagina gave a growth of staphylococcus albus.

CASE No.2.

NAME: Mrs. B. AGE: 33 years. PARITY: IV.

DATE of PUERPERAL ILLNESS: August - December 1933.

DATE of INTERVIEW and EXAMINATION: February 1937.

INTERVAL between DISMISSAL from HOSPITAL and EXAMINATION: 4 years.

DETAILS of PUERPERAL ILLNESS.

The patient was admitted to Robroyston Hospital with Puerperal Sepsis following a complete abortion a few days previously.

On examination the patient was found to be critically ill and suffering from acute uterine sepsis with Septicaemia.

The infecting organism in the genital tract was found to be the haemolytic streptococcus and this organism was also obtained from the blood stream.

The patient remained acutely ill for about 10 days when the occurrence of further rigors with swinging temperature and the development of abscesses in the subcutaneous tissues indicated that the patient's condition had merged into one of Pyaemia.

Little change occurred in the patient's condition for a further week, then she developed septic arthritis of

the right shoulder-joint, which necessitated incision and drainage of the joint. This was followed by a marked improvement of symptoms and after a further 10 days the patient was considered out of danger.

Convalescence was slow, the joint healing gradually. After 16 weeks in hospital, the patient had recovered sufficiently to be allowed home. The haemolytic streptococcus was cultured from the pus in the affected joint.

STATE of HEALTH before the PUERPERAL ILLNESS.

Fairly good. Several attacks of Articular Rheumatism in adolescence. No other illness.

OBSTETRIC HISTORY.

(a) Before Puerperal Illness:

1924-9. 3 Normal full-time deliveries.

1933. Complete abortion at end of second month of pregnancy - Puerperal Sepsis.

(b) After Puerperal Illness.

No further pregnancies (contraceptives being used).

HEALTH since DISMISSAL.

The patient's general health has been quite good since leaving hospital, her only symptoms arising from her affected shoulder-joint. This remained persistently

painful and stiff for 9 months after dismissal, then the pain gradually subsided; but the stiffness has remained and she has not the full use of her right arm owing to restricted movement of the shoulder-joint.

Attacks of articular rheumatism which frequently affected the patient, have now been much less frequent and much less severe, and, apart from occasional neuralgic pains in the right shoulder and arm, the patient feels well. She has no pelvic symptoms except slight leucorrhoeal discharge between the menstrual periods.

EXAMINATION of PATIENT.

General State of Health.

Very good. The patient is well-nourished and of good colour.

The Articular System.

The Right Shoulder Joint: There is the scar of the operation incision on the anterior aspect of the joint. This is soundly healed.

The movements of the joint are good and only slightly restricted except on raising the arm, which movement is so restricted that the arm cannot be raised above the level of the clavicle either actively or passively.

There is slight atrophy of the muscles around the joint.

The movements of the joint are painless, but considerable chronic arthritis is present.

Radiological Examination of the Affected Joint.

The result of X-ray Examination was as follows:-

> "No bony adhesions seen. There is roughening of the head of the Humerus with considerable chronic arthritis."

All other joints were found to be apparently normal.

Cardio-Vascular System.

Examination of the heart showed slight enlargement and an early mitral incompetence.

Other Extra-genital Systems.

Apparently normal.

Reproductive System.

Pelvic examination, bi-manual and per speculum, revealed:

1. Chronic cervicitis with some inflammatory enlargement and slight erosion.
2. Uterus and appendages were apparently normal.
3. Culture from the upper vagina gave a growth of non-haemolytic streptococci in pure culture.

CASE No.3.

NAME: Mrs. I. AGE: 33 years. PARITY: VIII.

DATE of PUERPERAL ILLNESS: March - April, 1933.

DATE of INTERVIEW and EXAMINATION: December, 1936.

INTERVAL between DISMISSAL from HOSPITAL and EXAMINATION: 3½ years.

DETAILS of PUERPERAL ILLNESS:

The patient was admitted to Robroyston Hospital with puerperal sepsis following a complete abortion a few days previous to admission.

On examination the patient was found to be suffering from uterine sepsis of moderate severity. She was not considered seriously ill, but her progress in hospital was slow and her temperature remained unsettled for about 10 days. At the end of 3 weeks in hospital she was convalescent and appeared fit to go home when she developed further pyrexia and complained of fleeting pains in her finger-joints. These became swollen and stiff, but the joint condition rapidly settled in a few days with the administration of salicylates. There were no other symptoms such as cardiac and the patient was dismissed well. Cultures from cervical swabs gave a growth of haemolytic streptococci.

STATE of HEALTH before the PUERPERAL ILLNESS.

Very good. No previous illnesses: no rheumatic history: no sore throats, etc.

OBSTETRIC HISTORY.

(a) Before Puerperal Illness:

1922-9. 5 Normal full-time deliveries.

1931. 4-months' complete abortion.

1933. 2-months' complete abortion - Puerperal Sepsis.

(b) After Puerperal Illness.

1935. Breech delivery of 7-months still-born child.

HEALTH since DISMISSAL.

The patient remained well for only a short time after leaving hospital, then she began to have further attacks of pain in her finger-joints and also her knee-joints. During these attacks, the affected joints became swollen and acutely painful, the various joints being affected in rapid succession. When the knee-joints were involved, the patient was unable to walk. These attacks of joint pains lasted for a few days then disappeared as rapidly as they had come. For 18 months the patient suffered frequently from these joint pains and was more or less a cripple especially in the winter months,

Two years after leaving hospital, the patient became

pregnant again, and during the later months she became breathless and noticed that her ankles became swollen. After delivery of the child, which was still-born and premature, as noted above, patient felt much better and has had no further joint pains; but her dyspnoea has returned during the past year and has become more marked. Recently oedema of the ankles in the evening has again been noted, while praecordial pain with exertion has given the patient some cause for anxiety.

There have been no pelvic symptoms and no change in her menstrual periods.

EXAMINATION of PATIENT.

General State of Health.

Fairly good. The patient is thin and of poor colour, slightly cyanosed, but not noticeably breathless. There is no oedema of the ankles.

Throat: Slight injection of fauces: tonsils not enlarged and appear healthy.

The Articular System.

The Finger-Joints: These appear normal. There is no pain or stiffness in any of the joints.

The Knee-Joints: Apart from slight stiffness and some chronic arthritis, both joints appear to have suffered

little permanent damage.

All other Joints and Spine: No disease found.

Cardio-Vascular System.

The radial pulse is regular and of good quality. The blood pressure is 110/78 mm. of Hg.

The Heart: Apex beat is forcible and of a slapping quality, but inside the nipple line: slight praecordial thrill palpable in 4th and 5th left interspaces. There is an increase in the cardiac dullness: thus:-

The right border is close to the mid-sternal line.
The left border is $3\frac{3}{4}$" to the left of the mid-sternal line.

Auscultation reveals a marked systolic murmur and a short presystolic murmur at the mitral area. The second Pulmonic sound is accentuated, but the sounds at the other valve areas are pure.

Diagnosis: A mitral incompetence with commencing stenosis, arising from organic disease of the mitral valve.

Respiratory System.

There is some basal congestion of both lungs and chronic bronchitis.

Other Extra-genital Systems.

All other systems apparently healthy.

Reproductive System.

Pelvic examination, bi-manual and per speculum, revealed:

1. Chronic cervicitis with severe old bi-lateral tearing and some inflammatory enlargement. No erosion.
2. Parametrium thickened in the left lateral fornix.
3. Uterus and appendages apparently healthy.
4. Culture from upper vagina gave a growth of non-haemolytic streptococci in pure culture.

This case presents two main features of interest.

The patient, previously in good health, develops "rheumatic" joint pains after her puerperal illness, which persist for 18 months before ceasing; but 2 years after her infection with haemolytic streptococci, she develops symptoms of cardiac disease and examination 3½ years later reveals the presence of a definite cardiac lesion.

CASE No.4.

NAME: Mrs. M. AGE: 30 years. PARITY: II.

DATE of PUERPERAL ILLNESS: November 1933 - February 1934.

DATE of INTERVIEW and EXAMINATION: February 1937.

INTERVAL between DISMISSAL from HOSPITAL and EXAMINATION: 3 years.

DETAILS of PUERPERAL ILLNESS.

The patient was admitted to Robroyston Hospital on the 6th day of the puerperium with Puerperal Sepsis following the instrumental delivery of a full-time child.

Examination showed the patient to be acutely ill and suffering from acute Metritis and Perineal Sepsis. There was considerable tearing of the Perinaeum and also the cervix. General toxaemia was marked. A few days after admission the patient developed severe pain in the right iliac fossa and examination revealed signs of an acute pelvic cellulitis on the right side. For about 14 days the patient remained gravely ill, there being little change in the inflammatory process except for a further spread. Constitutional symptoms were severe. Some slight improvement then took place and at the end of the fourth week the inflammation had reached the stage of suppuration with the abscess "pointing" in the pos-

terior fornix. This was opened and drained per vaginam with great improvement in the patient's general condition. Recovery thereafter was uninterrupted but slow, and after 10 weeks in hospital the patient was able to go home well.

The infecting organism was the haemolytic streptococcus.

STATE of HEALTH before the PUERPERAL ILLNESS.

Very good. No previous illnesses.

OBSTETRIC HISTORY.

(a) Before Puerperal Illness:

1931. Complete abortion at 3rd month of pregnancy.

1933. Instrumental delivery of full-time child - Puerperal Sepsis.

(b) After Puerperal Illness.

No further pregnancies. (Not considered sterile since patient has had no further intercourse, which was the method of birth control adopted).

HEALTH since DISMISSAL.

The patient has suffered considerably since leaving hospital, and at the time of examination was still in poor health. About 2 months after dismissal she began to have trouble from gradually increasing pain and stiff-

ness of the spine, especially the lumbar and cervical regions. This resulted in much pain when bending or turning her head. Shortly afterwards pain and swelling of the metacarpo-phalangeal joints and also several of the phalangeal joints became troublesome. She received medical treatment but at first did not improve; then both knee-joints, ankle-joints, and wrist-joints all became involved. Pains were also felt in the hip-joints and shoulder-joints and the patient, after about six months, became practically completely crippled and in bed. She became very depressed and her general health suffered accordingly. Medicinal treatment was continued, guaiacol and camphor resulting in the first real improvement; and after about a year of continuous treatment, the patient had recovered sufficiently to be able to walk about. Massage and Light Therapy completed the treatment with considerable success, and she is now able to get about but still with a limp and occasional "rheumatic" pains in the knees, ankles and wrists.

Apart from these joint pains, the patient had no other symptoms until about 18 months after leaving hospital, when she had a recurrence of pain in the right iliac fossa. This persisted and was noticeably increased at her menstrual periods, but after several weeks there was

sudden discharge of pus from the vagina and the pain subsided. She has had no further trouble, although her menstrual periods have been somewhat excessive and there has recently been considerable premenstrual backache.

EXAMINATION of PATIENT.

General State of Health.

Fairly good. The patient is of good colour but rather thin. She walks stiffly and limps with the right foot.

Throat: The tonsils and throat appear healthy.

Teeth: No dental caries seen.

The Articular System.

The Phalangeal and Metacarpo-Phalangeal Joints of both Hands:

There is some fusiform thickening and slight stiffness of the 1st metacarpo-phalangeal joint of the left hand and similar deformity of the 2nd and 3rd phalangeal joints of both hands. The remaining joints are apparently healthy.

The Wrist Joints: Slight thickening of both wrists, but no deformity or ulnar deviation.

The Elbow and Shoulder Joints: No apparent disease in these joints in either limb.

The Phalangeal and Metatarso-Phalangeal Joints of the Feet:

No apparent disease found in these joints.

The Right Ankle-Joint: There is much stiffness of the joint, producing pain and limitation of movement to a considerable degree. Crepitation could be elicited with ease.

The Left Ankle-Joint. There is slight stiffness but the movements of the joint are painless and not restricted.

The Right and Left Knee Joints: Both joints are stiff and movements, though not greatly restricted, produce much crepitation and slight pain on full flexion. The left knee joint is more affected than the right. There is definite thickening of the peri-articular tissues of both joints and some atrophy of the extensor muscles emphasising the slight swelling of the joints.

The Hip-Joints: The movements of both joints are satisfactory and produce no pain.

The Spine: There is no deformity of the spine visible, but there is marked stiffness and soreness in the lumbar spine when the patient stoops. No fixation of the spine is detected. The movements of the head and neck are painless and unrestricted.

The Temporo-Mandibular Joints: No disease could be detected.

Atrophy of the muscles adjacent to the joints was not a feature and only detected in the case of the knee-joints.

Marked smoothness of the skin was noted in the hands only.

Cardio-Vascular System.

No disease was detected.

Alimentary System.

Abdomen: There was definite tenderness in the right iliac fossa but no masses felt.

Other Extra-Genital Systems.

All other systems were apparently healthy.

Reproductive System.

Pelvic examination, bi-manual and per speculum, revealed:-

1. Cervix scarred and somewhat fixed. No obvious cervicitis.
2. Uterus in good position, but slightly fixed.
3. Chronic Parametritis with considerable thickening of the utero-sacral ligaments and fibrosis extending round the cervix and in the right side of the pelvis forming an indurated mass.
4. Right Fallopian tube difficult to palpate owing to cellulitis present: left Fallopian tube considerably thickened.

5. Culture from upper vagina gave a growth of non-haemolytic streptococci in pure culture.

CASE No.5.

NAME: Mrs. M'I. AGE: 40 years. PARITY: IX.

DATE of PUERPERAL ILLNESS: May - July 1931.

DATE of INTERVIEW and EXAMINATION: September 1936.

INTERVAL between DISMISSAL from HOSPITAL and EXAMINATION:

5 years.

DETAILS of PUERPERAL ILLNESS:

The patient was admitted to Robroyston Hospital with Puerperal Sepsis on the fourth day of the Puerperium following the spontaneous delivery of a full-time child.

She was very ill on admission and was found to be suffering from acute uterine sepsis with Septicaemia. For a few days, the patient's condition remained unchanged, then signs of broncho-pneumonia developed with widespread involvement of both lungs and considerable consolidation. The symptoms of this complication rapidly dominated the clinical picture. The patient's condition remained critical and little hope for her recovery was entertained, but after about 10 days a slight remission of symptoms took place and thereafter the patient gradually improved. Convalescence was surprisingly rapid and at the end of 7 weeks in hospital the patient was allowed to go home.

The infecting organism in the genital tract was the haemolytic streptococcus, and this organism was also isolated by culture from the blood.

STATE of HEALTH before the PUERPERAL ILLNESS:

Very good. No previous illness.

OBSTETRIC HISTORY.

(a) Before Puerperal Illness:

1919-30. 5 Normal full-time deliveries and 1 incomplete abortion at the 4th month of pregnancy.

1931. 1 Spontaneous full-time delivery - Puerperal Sepsis.

(b) After Puerperal Illness:

2 Normal full-time deliveries.

HEALTH since DISMISSAL.

After leaving hospital the patient regained her health slowly and only after several months, during which time general weakness and headaches were her chief complaints.

Her health however has never returned to its previous high level. Her principal symptom has been breathlessness, at first on exertion but now persistent and gradually becoming more marked. A short dry cough has also been troublesome, but there has been no spit. Night sweats have recently become frequent, and her voice has

become hoarse. During the past year her general health has been poorer; weakness, lassitude, loss of appetite and general malaise have become prominent. She has become nervous and depressed, about her condition. Her symptoms were much increased during her subsequent pregnancies, the patient being more or less an invalid in bed throughout the later months of these pregnancies.

Pelvic symptoms have been few; leucorrhoea, somewhat distressing before the menstrual periods, being the most noticeable feature. Pre-menstrual backache and headaches at the periods have also been troublesome. These pelvic symptoms developed subsequent to her puerperal sepsis and had not been present beforehand.

EXAMINATION of PATIENT.

General State of Health.

Poor. The patient is pale and thin, and looks ill. She is depressed and speaks in a hoarse voice. There is no oedema of ankles, and no clubbing of her fingers, but she is breathless on exertion.

Respiratory System.

Pharynx and Larynx. Examination revealed chronic inflammation of the pharynx, while the left vocal cord was seen to be thickened and infiltrated and in a state of

chronic inflammation. No ulceration was detected.

Chest: Examination revealed chronic bronchitis and physical signs of generalised pulmonary fibrosis with suspicion of active disease at both apices.

Radiological Examination of Chest.

The result of X-ray Examination was as follows:-

> "There are slight adhesions at the right base. There is bronchial thickening in both sub-clavicular areas and considerable fibrosis extending from the lung roots. No evidence of tuberculosis is seen."

No sputum was available for examination.

Cardio--Vascular System.

No cardiac enlargement. Heart sounds were of poor tone but pure in character.

Other Extra-genital Systems.

All other systems were apparently normal.

Reproductive System.

Pelvic examination, bi-manual and per speculum, revealed:-

1. Chronic cervicitis with considerable inflammatory enlargement and erosion, bi-lateral tears and nabothian follicles.
2. Uterus in good position and not enlarged.
3. Parametrium much thickened round the cervix and in

both lateral fornices, producing slight fixation of the cervix.

4. Fallopian tubes and ovaries not palpable and apparently normal.

5. Culture from the upper vagina gave a growth of non-haemolytic streptococci in pure culture.

CASE No.6.

NAME: Mrs. McL. AGE: 41 years. PARITY: III.

DATE of PUERPERAL ILLNESS: January - April 1933.

DATE of INTERVIEW and EXAMINATION: December, 1936.

INTERVAL between DISMISSAL from HOSPITAL and EXAMINATION:

3 years 8 months.

DETAILS of PUERPERAL ILLNESS:

The patient was admitted to Robroyston Hospital on the seventh day of the puerperium with puerperal sepsis following the spontaneous delivery of a full-time child.

On examination the patient was found to be acutely ill and suffering from acute septicaemia. There was little clinical evidence of local uterine sepsis except slight uterine tenderness and diminished lochia. The infecting organism cultured from cervical smears and from the blood-stream was found to be the haemolytic streptococcus.

During the first few days after admission the patient remained very ill, and signs of acute broncho-pneumonia rapidly became evident. Cultures from the sputum yielded a growth of haemolytic streptococci.

After 10 days there was no improvement in the patient's

condition, but instead, a further increase in the general toxaemia, a swinging temperature and an alteration in the physical signs in the chest indicated the development of acute empyema of the left side of the chest. Aspiration confirmed this with the withdrawal of thin turbid fluid from which haemolytic streptococci were isolated by culture. The patient's condition remained critical and, after repeated aspiration of the left chest till the formation of thick pus, thoracotomy was performed and the empyema drained. The operation resulted in a marked improvement in the patient's general condition and gradual recovery. At the end of 8 weeks, however, the sinus in the chest wall still discharged and radiological examination showed no diminution or signs of obliteration of the abscess cavity, and no re-expansion of the underlying lung. Accordingly a further thoracotomy was performed with resection of two ribs and a radial decortication of the lung performed. Re-expansion of the lung was not complete, but the empyema cavity was closed. The patient was able to go home well after 14 weeks in hospital without further trouble.

STATE of HEALTH before the PUERPERAL ILLNESS.

Very good. No rheumatic history; no fevers; ovarian

cyst removed at the age of 16 years.

OBSTETRIC HISTORY.

(a) Before Puerperal Illness:

1923-9. 2 Normal full-time deliveries.

1933. 1 Spontaneous full-time delivery - Puerperal Sepsis.

(b) After Puerperal Illness:

No further pregnancies. (After examination patient was considered sterile).

HEALTH since DISMISSAL.

The patient remained well for only a month after dismissal, then the sinus in the chest recommenced to discharge pus. This persisted for about 9 months, a considerable quantity of pus escaping each day and necessitating daily dressing of the wound. The patient felt fairly well otherwise, general weakness and breathlessness being her chief complaint. There was no cough and no spit. About a year after dismissal from hospital, the patient was admitted to the Glasgow Royal Infirmary and a further operation performed on her chest in an attempt to close the empyema cavity. This was unsuccessful and, after 8 weeks in hospital, the patient was allowed home with the chest sinus still discharging daily. Instructions were given to the

patient to return for further operation at a later date, but was not arranged and about a year later the sinus healed spontaneously and has given no further trouble.

The patient has been in good health since the sinus closed.

In all, the sinus had discharged daily for a period of 2 years after leaving Robroyston Hospital.

The patient had no pelvic symptoms, but, as already noted, she had had no further pregnancies.

EXAMINATION of PATIENT.

General State of Health.

Good. The patient is of good colour but thin. There is no noticeable dyspnoea and no clubbing of the fingers.

Respiratory System.

Chest: The right side of the chest is well-shaped, but there is flattening and retraction of the left chest with corresponding secondary scoliosis.

The thoracotomy incision and the old sinus present a depressed scar in the postero-lateral aspect of the left chest wall about the level of the fifth intercostal space. The scar is soundly healed.

Further examination of the chest revealed: Slight displacement of the cardiac dullness to the left;

dimished expansion of the chest on the left side with diminished percussion resonance amounting to dullness over the lower lobe posteriorly and in the axilla; marked diminution of the respiratory murmur over the area of dullness with distinctly tubular quality; vocal fremitus and vocal resonance correspondingly diminished; physical signs in the right lung apparently normal.

Cardio-Vascular System.

Slight displacement of the cardiac dullness as noted above, but heart sounds are pure.

Other Extra-Genital Systems.

All other systems were apparently healthy.

Reproductive System.

Pelvic examination, bi-manual and per speculum, revealed:

1. Chronic cervicitis, with some inflammatory enlargement and slight erosion.
2. Uterus and appendages apparently normal.
3. Culture from the upper vagina gave a growth of non-haemolytic streptococci and staphylococcus albus.

The details of this patient's history show that the patient had suffered from a chronic sinus following an acute empyema, which had developed as a complication of her puer-

peral illness, while examination reveals further more permanent sequelae in the chest itself, namely, flattening and deformity of the chest wall, considerable pleural thickening and incomplete expansion of the affected lung.

Apart from the pulmonary complications the patient was found to be sterile.

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