The PARALYSES of the MOTHER

due to

P R E G N A N C Y and the P U E R P E R I U M.

with illustrative cases,

and

a n E X A M I N A T I O N o f

100 consecutive cases
for
motor and sensory disturbances.

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

T H E S I S

for the

M. D. DEGREE of GLASGOW UNIVERSITY.

b y

ROBT. CLARKE, M. B., C. M.

C O N T E N T S.

-_-_-_-_-_-_-_-_-

The association of certain forms of Paralysis with pregnancy and the puerperium has been recognised for a long time, although not a great deal has been written on the subject.

In most of the text-books on obstetrics it is not mentioned at all, and in the few in which it is mentioned, it receives little more than passing notice. The same may be said of works on Neurology. The literature on the subject in this country is not very plentiful. Greater attention has been directed to it on the Continent and in America. Amongst the earliest writers on the subject, in this country, the names of Lever, Simpson, and Churchill may be mentioned, and amongst foreign writers Imbert Gourbeyre, Bianchi, and Maringe.

In this country, as far back as 1866, we find a record of three cases by Dr. E. F. Fussell. (1) The first case refers to the wife of a medical friend, who described his wife's symptoms as follows:-- "Mrs B's symptoms evidently depended on pressure during labour. She had, as the head was entering the pelvis, the most violent cramps I ever witnessed, followed, after a time, by complete loss of sensation and motion in the lower extremities, which were gradually restored in some three or four months. The presentation was natural; there was no albumen in the urine, and no cerebral disturbance throughout."

The point worth noticing here in particular is the rapid disappearance of a paralysis so severe. Dr. Fussell naturally attributed the paralysis to pressure on the pelvic nerves. There are a good number of such cases recorded, and I shall have more to say on this subject later on.

Dr. Fussell's second case is of a different nature. It occurred after an easy labour:--"As soon as the patient was able to be about, she almost immediately developed some loss of power in the hands, which speedily increased until she lost all power of movement in both

(1) St. George's Hospital Reports: Vol. 1, P. 197, 1866.

upper and lower extremities. No loss of sensation, no albumen in urine, special senses unaffected."

He regards this condition of affairs as being due to a reflex paralysis. Most modern writers discard the doctrine of a reflex Paraplegia (Quain) [2] and regard such cases of peripheral neuritis and polyneuritis as being due to Auto-intoxication -- the presence of certain unknown toxines in the blood connected with pregnancy and the puerperium.

In this connection it may not be amiss to quote the words of Sir J. Simpson:--"During the puerperal condition the blood is more loaded with new materials, intended, some for excretion and some for secretion, than at any other period of life, and hence is especially liable to any diseased changes under the super-addition of any exciting or septic causes." The third case described by Dr. Fussell differs also from the previous ones. The patient developed Phlegmasis-dolens in the right leg in the course of a week or ten days after the birth, and some days after was suddenly taken with hemiplegia on the same side of the body. The face was free, but the arm and leg were perfectly useless. Recovery in this case was slow, some dragging of the foot remaining after fifteen months." The cause here was probably sepsis.

These cases are interesting on account of the fact that they occurred, and were described, so long ago, and that they agree, for the most part, with the description of similar cases by more modern observers.

Practically all are agreed that in the Puerperal Paralyses the lesion may be (1) in the brain, as from thrombosis and embolism; (2) in the spinal cord as in certain forms of Myelitis; (3) in the nerves themselves giving rise to neuritis and polyneuritis. Hoesslin [3] divides the latter group into four classes as follows:--

(2) Dictionary of Medicine, 1902.

(3) Von Hoesslin. Munch Med. Woch, 1905.

1. The traumatic puerperal paralysis.
2. The puerperal neuritis by contiguity.
3. " " " " Post infection.
4. The toxic neurites gravidarum et puerperarum.

Windschiet [4] gives practically a similar classification. Hoesslin, in the same table, also recognises the Cerebral Pregnancy Paralyses, and pregnancy Myelitis. The Cerebral he classifies into those due to (a) Apoplexy; (b) Albuminuria; (c) Thrombosis; (d) Embolism; (e) Other brain diseases.

(4) Sammlung Zwanglosen abhandlungen ausdem Gebiete der Frauenheilkunde W. Geburtshulfe V. Max Graefe Bd. II., 1899.

CEREBRAL PUERPERAL PARALYSIS.

Of the paralyses of pregnancy due to lesions of the brain I intend to say but little, as I have had a very limited personal experience of such cases. In my own practise I have come across only one case in which there was a lesion referable to the brain, and the following are my notes regarding it:--

Mrs G., aged 24 years, sixth birth. First child was born when she was 16 years old. Labours have always been easy. Third child was born when she was 19 years of age, in March, 1902. This birth was easy, but on the fourth day after the birth she suddenly lost the power of speech, which she did not regain for three months. There was also paralysis of the right side of the face, with ptosis limited to the same side. There has been no return of the facial paralysis, but I found the ptosis still present at the date of the birth of her sixth child on March 22nd, 1907. Leishman [5] refers to the subject and relates two cases of a somewhat similar nature:--"Several interesting cases of cerebral embolism after Parturition have been narrated by Hughlings, Jackson, Fordyce, Barker, and others; as in other cases of this lesion, the middle cerebral artery, on the left side, seems to be the most frequent site, and so we find that aphasia is one of the symptoms occasionally observed.

From two cases recently under the observation of Dr. Findlayson in the Glasgow Western Infirmary, it would appear that there may be a repetition of this accident. Both of the women referred to suffered from aphasia, which came on within a few days after labour, and after making a tolerably complete recovery, both were seized after their next labours with a very aggravated and persistent form of aphasia. In one of the cases the right hemiplegia was extreme, but in the other it was slight." (For Report of cases see Glas. Med. Jour., Sept., 1897.

(5) System of Midwifery, 3rd Edition, Page 828.

My own case, it will be noted, differs from these in that there was no return of the aphasic symptoms at the subsequent births.

Mention of this condition is made in some of the best books on Obstetrics and Neurology:--Dakin (6) admits that plugging of the cerebral arteries may occur during the lying in state, and that apoplexy may also occur in connection with Bright's disease in Pregnancy. Ballantyne (7) speaking of puerperal paralysis, says:--"They are rarely due to cerebral lesions such as apoplexy (embolism); usual symptoms (Hemiplegia, Aphasia, etc.)"

Beevor, (8) speaking of thrombosis, says:--"Besides changes of the arteries, some conditions of the blood, especially in the puerperal condition, are very prone to produce coagulation of the blood." The cases already mentioned and the authorities cited, compel us to admit that plugging of the cerebral arteries may be an occasional, though very rare, complication of Pregnancy.

(6) Handbook of Midwifery, 1897.

(7) Essentials of Obstetrics, 1904, Page 219.

(8) Diseases of the Nervous System, 1898, Page 230.

PUERPERAL SPINAL PARALYSES.

The class of Paralyses referred to by the different authorities on the subject, under this heading, are certain forms of Myelitis. I have notes of one case, however, which I attended, where there was a central disease of the cord, which I cannot say was due to, but which certainly developed co-incidentally with pregnancy. The case is one of lateral sclerosis or spastic paralysis, and the history is as follows:--Mrs W., aged 40. A particularly healthy looking, well-developed woman, who, in her own words "Never had a day's illness" until the onset of her present ~~illness~~ trouble. The family history is good. She has had four children; the first two were born naturally, the last two births were instrumental. The last birth took place in June, 1901. For two months before this she complained of numbness and a feeling of "pins and needles" in the region of the left ulnar nerve, extending from the elbow to the fingers on the ulnar side of the arm, with loss of power and weakness in the same region. There was no loss of sensation to touch, temperature, or pain. She began to regain power in the arm about six weeks after the birth of the child, and three months after the paralysis had practically disappeared.

The birth was a fairly difficult one, instruments being required, but quite normal in other respects, the only symptom attracting attention at this time being a most violent rigour occurring immediately after the birth,-- the most severe I have seen. There was no rise in temperature, no albuminuria, and patient seemed to be getting on well until the tenth day, when she got out of bed for the first time. She then complained of a feeling of great weight across the top of the hips. She was able to walk about, but slowly began to lose the power of her legs. Her condition gradually became worse. In a few months she could walk only with the greatest difficulty. At this time ankle clonus was well marked on both sides, and the knee jerks were distinctly exaggerated. She suffered also from muscular twitchings of a painful character, and gradually developed the characteristic spastic ~~gate~~ gait. At this time sensation to touch,

temperature, and pain was unimpaired. There were no atrophic changes in the muscles, nor any vaso-motor changes noticeable. The muscles of the lower limbs ultimately became very rigid, and at the present time are very hard and in a condition of tonic spasm. The disease has, for the last two or three years, gradually invaded the posterior columns of the cord and given rise to the usual sensory disturbances connected therewith. There has been retention of urine for the last eighteen months, and cystitis for a somewhat longer period. At present there is complete anaesthesia to touch, temperature, and pain -- a pin can be inserted any depth without pain or feeling of any kind. When the legs are forcibly extended, the movement is accompanied by distinct creaking at the knee joints.

Dr. Middleton, of the Glasgow Royal Infirmary, who saw the case about a year ago, whilst confirming the diagnosis of spastic paralysis, ultimately invading the posterior columns of the cord, and recognising the co-incidence of the onset of the disease with the last pregnancy, was unable to offer any explanation as to the, apparently, simultaneous development of the disease with child-birth.

The combination of a peripheral neuritis with a central disease of the cord like lateral sclerosis co-incident with pregnancy, as in the case I have just related, must be very rare, and in the literature of the subject, I can find no record of any exactly similar case. Hoesslin, (3) op. cit., however, records a case which he personally observed, in which a combination of a somewhat similar nature occurred. He says:--"The woman was 40, (tenth child) and had always had easy births. During the also very easy tenth birth, she felt at each throe pains in her whole right leg, which were worse than the throes. Immediately after the birth the right foot was paralysed in the region of the peroneus. This paralysis disappeared in the course of 9-10 weeks, but a marked swelling of the left, afterwards of the right foot joint appeared, and it became obvious that one had to do here witha tabetic arthropathy, as the more accurate examination showed that many other tabetic symptoms were present. The tabes had already existed before the birth, as was proved by the history, because one year before

the birth Dr. Von Licherer had already treated the patient for a paralysis of the eye muscles, which he thought was of central origin; but the patient had had no subjective complaints up till the birth. In this case there was the rare combination of a traumatic birth paralysis, affecting the territory supplied by the peroneal nerve, with tabes dorsalis."

These two cases present certain points of analogy. In the one case the subjective symptoms occurred first after the birth of the 4th child, and in the other after the 10th birth. In the one case, symptoms of lateral sclerosis, and ultimately of tabes developed immediately after the birth, in the other symptoms of tabes alone. In both there was a puerperal neuritis; in the one case due to trauma or pressure on the pelvic nerves during labour, and affecting the right leg only in the region supplied by the peroneal nerve, and in the other case a non-traumatic peripheral neuritis affecting only the left arm in the territory supplied by the ulnar nerve. It might be thought that this ulnar neuritis was an alcoholic one, as it is a well-known fact that some women consume a good deal of alcohol during pregnancy, and the puerperium. That this was not the case I am convinced, as the whole family are life abstainers. Again, in both cases the peripheral neuritis entirely disappeared inside of three months, and in both, on account of the spinal cord lesions, we may look upon the Prognosis as bad. In the present state of our knowledge it is inconceivable, of course, that two such diseases as tabes and lateral sclerosis could be produced as a result of pregnancy or the puerperal state, but the co-incidence is interesting, and, I think, worth recording.

That we may have a Myelitis of the cord due to pregnancy, the writings of different competent observers on the subject, go to prove conclusively. In an article on the subject by Elise Taube (9) seven

(9) Ruckenmarksaffectionen un Gefolge Von Schwangerschaft und Puerperium mit Einschluss der unter denselben Veraltnissen Auftretenden Neuritis und Polyneuritis, April, 1895.

cases are referred to; five of these are cases described by Brush,[10] one by Bielschowsky,[11] and one by Harry Morrell.[12]

As such cases are rare, it may be well to give a short description of each here.

BRUSH. C A S E I. Patient aged 29 years. Forceps delivery. After the birth she suffered from weakness in both lower limbs. This increased so that after two years she was unable to walk. Feeling of numbness and antcreeping in the lower limbs. Retention of urine. All forms of sensation absent in feet and legs.

BRUSH. C A S E II. Patient aged 22 years. The cervix and perineum were torn at the birth. Ten days after the birth there was complete paralysis of the lower limbs, absence of all forms of sensation, with incontinence of urine. Some improvements, which continued, with ultimate recovery from all the symptoms.

BRUSH. C A S E III. Patient aged 35. One week after delivery of a dead child puerperal fever set in, with, within twenty-four hours, complete loss of power and sensation in the lower limbs, and incontinence of urine and faeces. Finally, after a year, there was atrophy of the paralysed muscles, with aggravation of the symptoms.

C A S E IV. Patient aged 35. Forceps delivery. On 5th day afterwards, within a few hours, there was complete paraplegia with partial loss of sensation. Incontinence of urine and faeces. After six months the patient could walk; sensation returned; bladder and bowel condition improved. Complete recovery in 8 months.

BRUSH. C A S E V. Patient aged 27. Rupture of perineum and laceration of cervix at thebbirth. Ten days after, there was great difficulty in moving the lower limbs, with feeling of numbness in the feet and legs. About one year after, patient could stand without difficulty, but could not walk. Partial loss of sensation in the lower limbs. At times there was incontinence and at other times retention

(10) Medical News, 1898.

(11) Myelitis und Sehnervenentzündung. Berlin, 1901.

(12) Puerperal Neuritis; Philad. Med. Journal, Vol., 1902, Jany. 18.

of urine. Partial recovery in four months.

BIELSCHOWSKY. C A S E VI. Patient aged 32. Three weeks after the birth the right eye was affected; she could not see objects coming from the left. Afterwards myelitic symptoms; paralysis of the left and then of the right leg. Incontinence of urine and faeces. Optic neuritis present on both sides. From ~~centre~~ 2nd inter-costal space downwards, hyperaesthesia for all kinds of sensation. Later on elevation of temperature, with absence of patellar and plantar reflexes. Paralysis and loss of sensation in the arms, and facial paralysis two days before death.

MORRELL. C A S E VII. Patient aged 29. In connection with a septic birth with great loss of blood, there was paresis of the right lower limb, girdle feeling at level of the umbilicus. Sensation to pain absent, with disturbance of bladder and bowel reflex. Morrell believes that from a septic injection a streptococceic invasion into the spinal cord can take place, and may give rise to symptoms of Myelitis. The paralysis in this case disappeared in two years.

In addition to the foregoing seven cases referred to by Taube, the following two cases may be briefly described:--

C A S E VIII. This is a case of "Paraplegia co-incident with Pregnancy ending in death from acute Myelitis in eleven days," by Dr. W. R. Fisher, (13) of which the following is a short account.

Patient complained of numbness in the limbs since the 4th month of pregnancy. At the 8th month she had pains of a neuralgic character for a few days, and in six hours after complete paralysis of sensation and motion from the waist downwards. Labour started and progressed. The uterine contractions could be felt, also the descent of head per vagina, and the birth terminated normally. Patient was entirely unconscious of the progress of parturition from start to finish. There was slight improvement for a few days after, then she rapidly grew worse, and died on the eleventh day from the usual symptoms of acute Myelitis.

(13) Transactions of the Medical Society of New Jersey, 1875.

C A S E I X. Described by Mr Wm. Adams,[14] before the Medical Society of London, is one in which there was partial paralysis, with contraction of both legs within three weeks of a miscarriage, followed by excessive flow of blood, from which there seemed little hope of recovery. Condition supposed by some to be the result of Myelitis from loss of blood, by others spinal anaemia. Six and a half years after there was considerable, but not complete recovery. Adams is of the opinion that the condition was the result of strucrural changes in the motor tract of the cord. In the discussion which followed, Dr. Sturge, who examined the case, believed that the lesion was an acute inflammation of the anterior horns of grey matter in the cord, that this condition had recently been found as a sequel to typhoid fever and small-pox, and might it not therefore occur after parturition or other acute exhausting disease? Dr Edis related a somewhat similar case in which there was haemorrhage, retroflexion. and septicaemia, and within six weeks paraplegia, with contraction of legs and thighs. Dr. Dowse thought the symptoms in Mr Adams case pointed to Meningo-Myelitis.

With regard to the etiology of Myelitis, most authorities are agreed that it may be due to toxic conditions of the blood, Dercum [15] mentions two marked cases following gonnorhoeal infections, and says that it has been known to follow influenza, and that syphilis more often gives rise to the sub-acute and chronic forms. Cases due to gonnorhoeal infection are mentioned by Von Leyden [16] and Eulenberg.[17] Beevor [18] says "Toxic conditions of the blood are the cause in cases following the acute specific fevers, and those after syphilis and gout may be due to the same cause. Bruno [19] says:--

(14) Lancet, 1880, Vol. II, P. 699.

(15) Text-book on Nervous Diseases by American Authors, 1895, P. 577.

(16) Neitsehr Für Klin. Medizin, 1892. XXI, 5 and 6.

(17) Deutsche Med. Woch, 1900. Nr 43.

(18) Diseases of the Nervous System, 1898, P. 121.

(19) Eulenberg. Realencyclopadie, 1901. S. 569.

"The origin is due to a poison penetrating, in most cases, by way of the blood vessels into the spinal cord, and working destructively in the latter. Redlich [20] says:--"The toxines generated by bacteria and creeping into the blood are to be looked upon as the origin of the disease."

Strumpell [21] found in one case stapylococci by lumbar puncture.

Granted then that a Myelitis may be caused by the entrance of toxines into the blood we have an explanation of its occasional occurrence in connection with pregnancy, and when it does so occur we are justified, in most cases, in looking upon Puerperal Sepsis as the etiological factor in the production of the puerperal myelitis: the poison entering by the uterine bloodvessels and spreading by way of the peripheral nerves to the cord.

This view coincides with that expressed by Gowers [22] and Oppenheim.[23] Quain [2] op. cit., P. 1543, admits that "during the first week or two after child-birth there is likewise a liability to such symptoms," i. e., the symptoms of myelitis.

That Sepsis may be the cause of puerperal Myelitis is also borne out by an examination of the foregoing cases which I have just described. In four of these -- Nos. III, VI, VII, and IX -- there is a history of Sepsis. In cases I and IV forceps were used, which, we know, might be a possible source of infection. In cases II and V we have a condition of affairs very favourable to septic absorption, namely, rupture of the soft parts. In case VIII there is no mention of any febrile disturbance or other symptom that might point to sepsis. The possibility of a syphilitic or gonnorhoeal infection, however, as already mentioned, should be borne in mind. It seems to be a fairly well established fact, therefore, that septic absorption is the cause of puerperal myelitis in a large proportion of cases. Hence the necessity for the strict observance of aseptic and antiseptic measures in the management of labour and the puerperium is apparent.

(20) Neurol Centralblatt, 1901, Nr. 9.

(21) " Centrall, 1898, Nr 13. (22) Lehrbuch der Nervenkrankheiten. Deutsch Von Grube, 1892. (23)Lerbuch der Nervenkrankheiten.

I may here record a case, which, through the kindness of a medical friend, Dr L., I was allowed to examine, which presented symptoms resembling myelitis. Patient, Mrs F., aged 35, 3rd child. Previous history unimportant. Dr L states that "patient had always been very healthy until about two months before the present birth. From this time on she became very anaemic. The urine contained a little albumen, and there was, latterly, considerable oedema of the legs." I saw her on April 24th, 1907, one week after childbirth, which was a normal one. She was then extremely pale. Unfortunately, the blood was not examined, but, from the condition of the skin and mucous membranes, it was apparent that she was profoundly anaemic. She complained of loss of power, coming on shortly after labour, and beginning first in the legs and extending to the arms. There was only a very limited amount of power in the legs, and she could not feed herself owing to the weakness in her arms. Sensation to touch, temperature, and pain was normal. There was absence of knee-jerks, ankle clonus, and plantar reflexes on both sides. Temperature was sub-normal. Pulse weak, 120, and very feeble. Dr L. informs me that she rapidly became worse, losing all power of movement in both upper and lower limbs, and died two weeks after the birth of her child.

A paralysis so extensive and so rapidly fatal could have been due only to an affection of the cord, such as we find in myelitis.

An able article on the subject by Chas. K. Mills, M. D., (24) may be consulted with profit.

(24) Univ. Med. Mag., Philadelphia, May, 1893.

PUERPERAL NEURITIS AND POLYNEURITIS.

We come now to the consideration of paralysis due to the implication of the nerves themselves:--i. e., to the different forms of neuritis and polyneuritis due to pregnancy and the puerperium.

It will be convenient to divide these into two classes:--(1) The traumatic; (2) the non-traumatic. In the former class we have to deal only with injury to the pelvic nerves as they pass through the pelvis, with, it may be, a descending neuritis in the branches thereof. In the latter class we have to deal with neuritis affecting nerves in different parts of the body, and not necessarily passing through the pelvis. The cause in the latter class is generally either sepsis, incessant vomiting, or auto-intoxication.

Before proceeding to the consideration of these two classes, I shall here give a brief history of five cases, all of which I personally examined. Three of these occurred in my own practice, and the remaining two I was allowed to examine through the courtesy of medical friends. These represent both types.

C A S E I. Traumatic puerperal neuritis of the peroneal type, with septic symptoms. Development of a radial neuritis after recovery from same.

Mrs H., aged 32. Primipara. Had complained of labour pains for a few days before I was called on May 22nd, 1907. I found the patient very exhausted, os fully dilated. membranes ruptured and the head presenting above the brim with well marked caput succedaneum. Forceps and chloroform were used, and the child with great difficulty delivered. The perineum was ruptured and stitched. Baby asphyxiated and with difficulty brought round. She complained at once, after the birth, of severe pains in both lower limbs from the hips to the heels and soles of the feet, also of a numb feeling in the legs. On the following day there was some febrile disturbance. Temperature 100 F. Pain and numbness were still complained of. On the third day temperature rose to 104 F. Pulse, 110. I ordered three grs. of quinine every three hours, and intra uterine injections of lysol thrice daily. On the sixth day the temperature was still 103.2 F.

and Pulse 108. Pain and numbness had disappeared on the right, but were still present on the left side, and felt most in the great toe. Sensation to touch, temperature, and pain distinctly diminished over the outer side of left thigh, leg, and dorsum of the foot -- i. e., the cutaneous distribution of the peroneal, or external popliteal nerve. On the ninth day the temperature fell to 100 F. On the following day it rose again to ~~104~~.103.4, Pulse 120, and she complained of pain and stiffness about the left hip, extending to the back of the knee and leg, aggravated by deep Pressure. Pain and tenderness were also complained of in the left iliac region for which Dovers powder was added to the quinine already prescribed. Two weeks after the birth a marked swelling was made out in the left iliac region, painful and tender to the touch, and numbness in the left limb was still compalined of. During the following two weeks the temperature fluctuated between 100 and 105 F., although on one or two occasions it was normal. The swelling in the left iliac region gradually disappeared, and in one month after the birth the temperature fell to normal and remained so. She got up for the first time about six weeks after the birth and found that she could not walk owing to the weakness in the left leg. In two months time she could walk with the aid of a stick, but could not bend the left foot, and had the high stepping gait of peroneal paralysis affecting the extensors of the foot and toes. She complained also of some stiffness around the left hip. Dorsal flexion of the ankle was very weak, as was also dorsal flexion -- extension of the toes. She could flex and extend the knee joint fairly well. but abduction and rotation inwards at the hip joint was weak on the left side, as compared with the same movements on the right. (superior gluteal nerve.) The left thigh and leg were thinner than the right, and the muscles of the limb softer to the touch, The weakness in the left leg gradually improved and had disappeared entirely seven months after the birth. About this time, however, she began to suffer from numbness in the right arm, extending from the elbow to the fingers on the radial side of the fore-arm, with some loss of power. The numbness is still present, thought slight, on

Jany. 14th, 1908, and is complained of most in the thumb and middle finger.

In this case there is clearly a history of Peroneal Paralysis, affecting most severely the left side, due to trauma or injury to the sacral plexus. This is evident from the history of the case, for pain and numbness were complained of immediately after the birth, along the course of the sciatic nerve, and most severely in the territory supplied by the peroneal nerve. The symptoms also point to septic absorption. This might be accounted for by the fact that the woman in attendance was an untrained nurse, and had made frequent examinations per vagina before I was called in. The exact cause of the radial neuritis, which developed seven months after the birth, can hardly be determined.

Cases of puerperal neuritis have been described where the symptoms were attributable to the pressure of a pelvic exudate such as we had in this case. Thatsuch was not the case, primarily, at any rate, in this case, is evidenced by the fact that pain and numbness were complained of immediately after the birth in the region which ultimately suffered most, before the pelvic exudate had time to form or produce symptoms such as I have described. The weakness in the hip muscles was no doubt due to pressure on the superior gluteal nerve, which, we shall see, when we come to consider the anatomy of the parts, is much exposed to danger from pressure.

C A S E II. Traumatic Peroneal Paralysis affecting the left side.

For liberty to examine this case I am indebted to a medical friend, Dr. C. The history of the case, as related to me, is briefly as follows. Mrs K., aged 28, married five years. 3rd birth. Previous births were very difficult, instruments and chloroform being used on both occasions. Present birth took place on Feb. 26th, 1907.

She suffered from pains in the lower part of the abdomen, which were sometimes very severe, for one week before the birth. Labour lasted from 7 p. m. on the 25th until 1 p. m. on the 26th, i. e., eighteen hours. The birth was difficult, long forceps and

chloroform being required. Immediately after recovery from the anaesthetic, she complained of severe pain in the back of the left thigh and leg, extending to the foot. The whole leg felt numb and movement of the limb increased the pain. The right leg was unaffected.

Since the birth she noticed that the left leg felt colder than the right. She got up on the 11th day, and could walk, only with the greatest difficulty, dragging the left foot along the ground. In three weeks after the birth she could walk fairly well, without dragging the foot, but the leg was still weak. Ten weeks after the birth I found, on examination, some atrophy of the muscles on the outer side of the thigh and leg. These muscles felt soft to the touch, as compared with those on the right side. There was now no apparent lameness, but towards evening she still complained of a tired feeling in the left lower limb.

C A S E III. Paraplegia during latter months of pregnancy, with aggravation of symptoms after the birth, and a history of a similar paralysis in two previous births. For liberty to examine this case I am indebted to a medical friend, Dr E.

Mrs W., aged 39. 5th child. Family history good.

Previous births. The first birth occurred in Sept., 1898. The child was still-born. For two months before the birth she suffered from lameness in both legs and had to support herself with sticks. The lameness continued after the birth, but disappeared in a month or two. The second and third births took place in Sept., 1900, and Oct., 1902 respectively, and in these lameness was not complained of either before or after the birth. The 4th child was born in Nov. 1904. In this case there was slight lameness for one month previous to the birth, with pain in the right thigh and hip. After the birth of this child the right leg was numb and helpless, Four weeks after she was able to use the leg a little, and in two months time it was quite well.

Present birth. Patient states that she was lame from the middle of Dec. 1906 until the date of the present birth, which took place on the 25th Feby., 1907, i. e., about nine weeks. Two days before the birth she

fell to the ground without warning, owing, as she says, to her legs giving way under her. During the last three weeks of pregnancy patient states that she was so lame that she had to be assisted when she attempted to walk.

Dr E. states that the birth was a placenta previa, and that the patient suffered from slight haemorrhage, which lasted from 7 a. m. on the 24th until 4 a. m. on the 25th, when the bleeding became very severe and alarming and he was sent for. He proceeded to turn and deliver at once. This was accomplished without much difficulty, the child being alive and healthy. Patient was very sick after the birth.

On regaining consciousness she suffered from severe after-pains for which a narcotic was prescribed. At this time she complained of a feeling of coldness and numbness affecting the whole of both lower limbs. She attempted to get out of bed on the 15th day, and found that her lower limbs were helpless, and complained that she had no feeling in them at all. At no time was there any rise in temperature, albuminuria, or cerebral disturbance. I examined the patient on April 19th, 1907, and found that she could not yet walk alone, but required the aid of a stick and the nurse's hand to support her. She was unable to lift either foot off the ground, and, in attempting to walk, she pushed the right foot forward without lifting it, and brought the left foot up to it along the ground. The muscles of both lower limbs were somewhat soft and flabby, but were not electrically tested. Sensation, at this time, was normal to touch, temperature, and pain, but a feeling of coldness and numbness was still complained of in both lower limbs. The patient gradually improved, and Dr E. informs me that recovery was complete in five months after the birth of the child, i. e., in about seven months from the beginning of the symptoms. The temperament negatived hysteria, and there was no history or suspicion of alcoholism.

C A S E IV. Traumatic Puerperal paralysis affecting the left lower extremity, with recovery in two months.

Mrs W., aged 36. 5th child. Family history unimportant.

Previous Births. 1st child born six years ago. Had labour pains for three days before the birth. Chloroform and instruments were used. States that after the 3rd and 4th births she suffered from pain and a feeling of numbness, affecting the whole of the left thigh and leg, and that she could scarcely feel her own hand on her thigh. Present birth. Prolonged labour lasting 24 hours. All this time she complained of the pains running down the front and back of the thighs, especially the left.

The child was born without instruments on Feby. 19th, 1907. On the 11th day she got up for the first time, and complained of lameness in the left leg, with tenderness on deep pressure over the muscles in front of the thigh and leg. She was able to walk a little with difficulty. There was slight dulling of sensation over the outer side of the left leg and dorsum of the foot, as compared with the right:-- i. e., the cutaneous distribution of the peroneal nerve. Her condition gradually improved, and I saw her finally on April 19th, 1907, two months after the birth. Sensation was then equal and normal on both sides, and she could walk with comparative ease, although she still felt the left leg a little weak and easily tired.

C A S E V. Puerperal neuritis affecting the right radial nerve.

Mrs B., aged 38, married 19 years. 6th birth. Two weeks before the present birth she suffered occasionally from severe cramps in the left leg. The birth took place on July 21st, 1907. I was called to see her on that date. The progress of labour was somewhat slow, but the birth normal. For twelve hours afterwards she suffered from pains running down both thighs. She got up on the 10th day, and felt well, but complained of numbness and a sensation of pins and needles in the feet. This passed off very soon. I was called to see her again on Sept. 26th, nearly six weeks after the birth, on account of loss of power and a feeling of numbness in the right arm, extending from the right shoulder-blade down the arm, and affecting, for the most part, the radial side of the fore-arm, thumb, fore, and middle fingers. The loss of power was partial, but distinct. She is right-

handed, but the grip with the right hand was distinctly weaker than the grip with the left. She states that the numbness began about two weeks after the birth, and got gradually worse. There was no impairment of sensation at the time of my examination. I saw her again on Oct. 15th, exactly two months after the birth, and noted only slight numbness in the thumb, fore, and middle fingers. This, she said, troubled her most when she attempted to sew, for at such times she hardly felt the needle between her fingers. I did not detect any trophic changes in the muscles such as have been noted in other similar cases. The only other case of a similar kind, of which I have notes, is that described under spinal cord lesions, where an ulnar neuritis began two months before, and disappeared three months after the birth, in connection with lateral sclerosis.

In the foregoing cases it will be noted that cases I, II, and IV are undoubtedly due to pressure on the pelvic nerve roots during labour, for, on no other hypothesis can we explain the severe pain felt, and running along the course of the nerves, during labour, with loss of power and numbness, shewing themselves at the same time, or immediately after, the birth. Cases III and V were clearly not due to injury to the pelvic nerve roots during labour, for in cases III the patient complained of loss of power in the lower extremities beginning two months before the birth, which increased so much that three weeks before the birth she could not walk without assistance. In case V, again, the neuritis affected the right arm only, and did not come on for two weeks after the birth.

I shall now enter into the consideration of these two types of Puerperal Paralysis, beginning with the

NON-TRAUMATIC PUERPERAL PARALYSIS.

Hoesslin,(3) Windscheit,(4) op. cit., and others, divide the puerperal neurites into four classes. One of these is the traumatic form, the other three are non-traumatic, and therefore belong to the class of cases we are now about to consider. In order that we may be better able to examine and compare the views of some of the most competent writers, as to the aetiology of these paralyses, I shall now describe briefly a few cases which I have found in the literature of the subject. Dr Reynolds (25) records two cases which occurred in his own practice. These, he states, were cases of true peripheral neuritis, similar to that found after taking alcohol and other poisons.

In the first case abortion had to be procured at the 4th month owing to severe and uncontrollable vomiting. For two or three weeks after there was loss of power over the bladder and rectum, which passed off in two weeks. One month after the abortion the feet were cold and numb, a month after wards the legs were very weak and sensation almost abolished. Afterwards, complete paralysis of lower limbs / Knee-jerks absent. No loss of sensation. She was confined again fifteen months afterwards; Birth normal, and patient comparatively well; could take walks outside.

In the second case the patient suffered from chronic pyaemia, following the birth of her first child, with the development of total atrophic paralysis of both lower extremities. There was absence of knee jerks, but the arms and sensation were unaffected. In two years afterwards she was practically well.

After describing these two cases, REynolds proceeds to review the subject, and, in doing so, takes into consideration 49 cases of non-traumatic puerperal neuritis. 17 of these are cases collectdd by himself, and 38 are described by Eulenberg. With regard to the

(25) Puerperal Neuritis connected with Pregnancy and the Puerperal State. Brit. Med. Jour., Oct. 16, 1897.

(26) Deutsche Med. Woch., 1895.

aetiology of the condition he finds in 15 cases a history of sepsis, in some form, with febrile symptoms; in 11 cases marked and incessant vomiting of Pregnancy; in several there was marked anaemia. A distinct alcoholic history was made out in four cases. He says:--"In many cases reported it is difficult to find any cause for the neuritis of pregnancy, and the puerperium, but personally I look upon sepsis or on incessant vomiting as the most potent factors in producing the disease." Dr. Reynolds makes no mention of auto-intoxication as a possible explanation of those cases in which, as he states, it is difficult to find a cause. This auto-intoxication is referred to by several well-known writers on the subject, and is by them said to be due to preceding changes in the blood due to the puerperal state. Amongst the advocates of the auto-intoxication theory the name of Mobius (27) must be mentioned, for it was he who first introduced the name puerperal neuritis. Indeed, Mobius looks upon the neuritis occurring in connection with a normal, uncomplicated child-birth as the only true puerperal neuritis, the cause of which he ascribes to auto-intoxication alone; all other cases where there is a history of sepsis, trauma, pressure from pelvic exudates, incessant vomiting, etc., he regards as non-genuine cases of puerperal neuritis. Oppenheim (23) op. cit., includes among the puerperal neurites cases arising from puerperal sepsis. That a puerperal neuritis may arise in connection with incessant vomiting, Oppenheim, Saenger,(28) and Windscheit are agreed. Saenger, however, is in agreement with Mobius in not looking upon such a case as one of true puerperal neuritis. He holds to the auto-intoxication theory of Mobius. Remak (29) agrees with Oppenheim in including cases of septic origin. Reynolds says:--"As regards the incessant vomiting of pregnancy, two views may be taken. (1) The views stated in a paper by Dr. Clifford Allbutt that the neuritis is due to the same toxins ; i. e., the toxine which

(27) Munch. Med. Woch., 1887, Nr 9; und 1890, Nr 14; 1892.

(28) Referat. im Centralbl F. Gynak, 1900, Nr 10.

(29) Neuritis und polyneuritis. Wein. 1899.

causes the hyperemesis, and (2) Dr Reynolds suggests that the incessant vomiting sets up a condition of Acetonoemia and that the acetone or some other allied body in the blood produces the neuritis just as may possibly occur in the neuritis of diabetes.

Whether we accept the above theories or not, there is a sufficient number of cases of puerperal neuritis described by competent observers to prove that hyperemesis is undoubtedly the etiological factor in producing the neuritis in certain cases. Soloweiff (30) records a case of incessant vomiting occurring in the second month of pregnancy with development of multiple neuritis which terminated fatally in $2\frac{1}{2}$ months after the beginning of the disease. Eulenburg (26) op. cit., describes a cse of incessant and incurable vomiting of pregnancy in which abortion had to be procured at the 4th month, after which a multiple neuritis developed, beginning in the legs, and extending to the arms, and muscles of the back, accompanied by aphonia and paralysis of the muscles of deglutition. Recovery in $5\frac{1}{2}$ months. Dr. Stembo in Wilna (31) records a somewhat similar case of incessant vomiting, occurring in the second month of pregnancy, and lasting three months, with the development of a polyneuritis. There was a gradual recovery which continued after the birth. It may be looked upon, therefore, as a well established fact, that the incessant vomiting of pregnancy may be the cause of puerperal neuritis.

With regard to sepsis, it is perhaps the most common cause of the non-traumatic puerperal neuritis. It will be noticed that in Reynolds cases the greatest number were of septic origin, namely, 15 out of 49.

Wharton Sinkler (32) records four vases of puerperal multiple neuritis in three of which there is a distinct septic history. In the first case, (non-septic) labour was uncomplicated and normal. Neither instruments nor any anaesthetic were used. No laceration.

(30) Centralbl. F. Gynak, 1892. Nr 8.

(31) Deutsche Med. Woch., 1895, Nr 29.

(32) Journal of Amer. Med. Assoc., Feb. 25th, 1905.

No febrile symptoms or any evidence of sepsis. On 8th day symptoms of neuritis began in the upper limbs and rapidly extended to the feet and legs. Two weeks after this there was complete loss of power in both upper and lower limbs. In 9 months she was able to walk and generally improved.

In the second case a general neuritis followed a septic birth. The day after the birth the temperature rose to 103 F., with pain in right inguinal region. Patient operated on for appendicitis nearly three months after the birth. Previous to this there was loss of power in the legs, with a temperature remaining high for three weeks. Large amount of pus in right iliac possa. After the operation, complete loss of power in both legs. Knee jerks absent. Result not given.

The third case is one of multiple neuritis following abortion at the second month with septicaemia. Portion of decomposed placenta passed per vagina a few days after. One month after, numbness in both upper and lower extremities with loss of power. After three months. total loss of power in lower, and partial loss in the upper limbs. Death one month after this.

The fourth case is one of neuritis following the abortion of a foul-smelling mole, with septic symptoms. Septic diarrhoea and development one week afterwards of small septic abscesses in buttocks and thighs. Finally, paralysis of extensors of both legs. Partial recovery in two years.

Kast (33) records the case of a septic birth in which there developed shortly after a neuritis, affecting, most severely, the ulnar and median nerve regions of the upper limbs, with some loss of power in the lower limbs. Recovery took place in seven weeks. And there are many other cases on record to warrant us in accepting sepsis also as a cause of the non-traumatic puerperal neurites.

Sinkler's first case belongs to the true puerperal neuritis of Mobius, occurring in a normal, uncomplicated child-birth. My own cases III and V, already described, are also of the Mobian type, for

(33) Deutsche Archiv. Klin. Medizin, 1886. Bd. 40.

in neither of these cases was there any evidence of incessant vomiting, sepsis, alcohol, etc.

In accepting the auto-intoxication theory of Mobius, however, as the cause of a puerperal neuritis in a normal, uncomplicated childbirth, I see no reason to discard the opinion held by Oppenheim, Remak, and others, that under the puerperal neurites, should be also included those other cases which we have already mentioned as being due to septic absorption, incessant vomiting, or alcohol, and also the traumatic puerperal neurites; i. e., those due to pressure on the pelvic nerves during labour.

The latter type we shall now consider.

THE TRAUMATIC PUERPERAL PARALYSES.

The paralyses which are to be considered under this head are, as before indicated, limited to those cases in which there is a history of trauma or injury to the pelvic nerves during labour. In these cases there are two prominent symptoms which, when present, may be looked upon as diagnostic of this particular type of puerperal paralysis, namely, pain during or soon after labour in the distribution of one or other of the main branches of the pelvic nerves, namely, the obturator, crural, or sciatic nerves, but most frequently affecting the latter, and a resulting paralysis or neuritis affecting the muscles in the territory supplied by the particular branches involved, with, in many cases, loss or dulling of sensation in the cutaneous distribution of these nerves. In most of the cases recorded, the paralysis affects solely, or most severely, the muscles supplied by the external popliteal or peroneal nerve -- a branch of the great sciatic.

The following cases which I find in the literature of the subject I shall now briefly record. Thomas (34) records two cases. Both patients were under 30, and in both instruments were required. In one case (2nd birth) pain was complained of along the course of the sciatic nerve before instruments were used. In both pain was complained of immediately after labour, and in both paralysis was noticed

(34) John Hopkins. Hospital Bulletin. Nov. 1900. No. 116, P. 282.

at once, and affected most severely the muscles supplied by the peroneal nerve; i. e., the flexors of the ankles and extensors of the toes. Abduction and rotation inwards at the hips was weak in one case (1st child) i. e., muscles supplied by the superior gluteal nerve -- a branch of the lumbo sacral cord. Pain in both was a prominent symptom, localised on the outer side of the leg below the knee, and dorsum of foot. In one case sensation was diminished in the area supplied by the cutaneous branch of the peroneal nerve on the right side only; i. e., the antero lateral aspect of the leg and dorsum of the foot. In the other case both legs were affected. Thomas considers an affection of both legs rare, and has not seen a description of a similar case. There are, however, a number of such cases recorded. Welch (35) records a case of traumatic neuritis following a forceps delivery. The patient was a primipara in labour for 36 hours. The birth was a difficult one, long forceps being used. After delivery there was great pain in the course of the sciatic nerves, more severe on the left side. Pain in the right leg disappeared in two weeks, and patient could walk with difficulty, after seven weeks. Recovery took place in two months.

Aldrich (36) gives a history of three cases of peroneal paralysis.

CASE I. Patient robust, aged 29, 2nd birth. In labour ten hours; child large, weighing 12 lbs. Three days after the birth there was pain extending from the right groin and hips along the course of the sciatic nerve to the foot. Considerable loss of power at once apparent. The left side became similarly affected in fourteen days. Could walk unassisted in two months. Diminution in muscular volume was strictly confined to the peroneal region. There were varying grades of reaction of degenaration in all of these muscles. Six months after could walk well.

CASE II. Primipara, aged 26. Labour long and severe. Chlo-

(35) J. C. Welch, M. D. Med. News, Philadelphia. Oct. 19, 1895. P. 428.

(36) Chas. J. Aldrich, Amer. Gyn. and Obstet. Jour., Aug., 1889. P. 142.

roform and high forced were used. The following morning there was pain in the right hip and leg, with inability to move it. Then rapid increase of the symptoms of a severe descending neuritis. The pain disappeared in three months. Reaction of degeneration was present in all the muscles of the limb, with complete paralysis. Re Some tactile anaesthesia present on dorsum of the foot and toes. Recovery in 18 months.

CASE III. Primipara, aged 30. Contracted pelvis. In hard labour for fourteen hours, instruments and chloroform being used. Some hours after the birth. severe pain in the left hip and leg along the sciatic and its branches. Numbness and tingling on outer and anterior aspect of the leg, and loss of power. Pain was intense during the following week. Three weeks after, quantitative and qualitative changes to galvanic current present in all the muscles supplied by the peroneal nerve. Patient unable to flex the ankle or extend the toes. Some loss of tactile sense over the dorsum of the foot, outer and posterior aspect of the calf. Could walk well in fourteen months.

Mills (37) whom we had occasion to quote when dealing with the non-traumatic myeletic type of these paralyses, has written a great deal on the subject, and describes in this reference three cases of puerperal paralysis of the peroneal type of which the following is a brief outline.

CASE I. Patient aged 30. Prolonged and painful labour, instruments and chloroform being used. After the birth complained at once of severe pains in left hip, leg and foot. The limb was paralysed with all the symptoms of a severe neuritis, which began to abate only after three months. One month later the leg was still in an extreme condition of motor paralysis. All the muscles below the knee supplied by the peroneal nerve were paralysed. There was no loss of sensation.

CASE II. Patient aged 33 years. In labour 21 hours; very severe for the last 10 hours. Forceps delivery. Patient under

(37) Univ. Med. Mag., Philadelphia; Vol. 5, April 1893, P. 508.

chloroform for nearly an hour. After delivery left leg paralysed and anaesthetic, requiring to be lifted for all purposes. During the third week pain began in the hip and rapidly became more and more severe, extending down the leg to the toes. Soon right leg was attacked by similar, but less severe pain, accompanied by some loss of power. The pain continued, and she was able to stand or walk only with the aid of a cane, the effort causing much suffering. On examination four months after, no paralysis was found in the right lower extremity, but she was unable to flex the ankle or extend the toes of the left leg. Calf muscles unaffected. The symptoms are attributed to crushing of the lumbo-sacral cord. The limb was hyperaesthetic.

CASE III. Patient aged 24. Prolonged instrumental birth. Before delivery she complained of severe pain, commencing at the hip and extending to the toes of the right foot, and at the time of the birth felt a sharp pain in the same parts. After delivery the pain and tenderness spread over the entire limb. On the 9th day she tried to get up, but found the right limb nearly helpless and so painful, when attempting to move it, that she was forced to lie down. Was able to walk in four weeks, but had not the proper use of her foot. Pain was thought to be more severe on the outside of the limb from ankle to hip. Less severe repetition of symptoms at subsequent birth. Extension of the toes can be made, but not flexion of ankle, therefore the extensor long digitorum and extensor proprius pollicis muscles are, at present, not paralysed. Mader (38) reports the case of a woman aged 24, who after the birth complained of pain in the course of the right sciatic nerve. Labour was prolonged and forceps were used. During labour, sharp pain was felt from the hips to the toes on the right side. There was a resulting paralysis of the anterior tibial and peroneus tertius muscles. The finish is not given.

Eulenburg (26) op. cit., reports the case of a woman, 5th child, severe birth: large child weighing 11 pounds. She complained after the birth of pain in the left leg from the heel to the back of the

(38) Neurolog. Centralbl., 1893, No. 4.

knee, greatly increased by attempts to move the leg, especially by plantar flexion of the foot; i. e., the muscles supplied by the internal popliteal nerve. Eulenburg also refers to another patient -- a primipara, aged 25, who, at the end of the first week after the birth, suffered from severe pain in the whole of the right lower extremity from the hip to the foot, with some loss of power in the leg and foot. Right foot swollen and muscles of the leg soft. Knee jerk weak on the right side, plantar reflex absent. Recovery began after two or three weeks, although pain was still present in the peroneal region. She recovered completely in six weeks.

Mader (39) reports the following case. Patient aged 25. Primipara. Severe pain was complained of from the beginning of labour, on outer side of right thigh and calf, spreading to the foot. Birth was severe, forceps being used. After the birth there existed the indications of a considerable paralysis of the sensory and motor fibres of the right peroneal nerve. No reaction of degeneration. Complete recovery in four weeks.

Lloyd, (40) who writes a valuable contribution to the subject elsewhere, (41) quite recently describes a case of peroneal paralysis in a patient aged 23; Primipara. Prolonged but not very severe birth, instruments being used. Was well up till the 9th day, when she complained of numbness and tingling in the left leg, which had been present, but not complained of, since the birth. She had foot drop, with anaesthesia over the dorsum of the foot, and antero-lateral part of the leg over the peroneal muscles. The toes could be flexed but not extended, the ankle could not be dorsi-flexed, but could be plantar-flexed strongly; i. e., the paralysis was limited to the muscles supplied by the peroneal nerve and to the skin supplied by the same nerve. Patient was comparatively well seven weeks after the birth.

If we add to the foregoing fourteen cases the 3 cases already

(39) Korrespondenzblatt. Fur Schweizer Ärzte, 1901.

(40) New York Med. Jour., December 22nd, 1906.

(41) Twentieth Century Practice of Medicine, Vol. XI, 1897, P. 307.

described, which I personally examined, we have 17 cases from which we of Traumatic Puerperal Paralysis can draw the following conclusions.

To begin with, we notice the fact already mentioned, that in all the cases PAIN was a prominent symptom, coming on during, or soon after labour, and accompanied, or followed by, LOSS OF POWER in greater or less degree. Then in 7 of the cases there was more or less ANAESTHESIA affecting the cutaneous distribution of the motor nerves involved. In three sensation was unaffected; In one there was paraesthesia, and in one hyperaesthesia. In five of the cases the cutaneous sensibility is not referred to. We may therefore look upon sensory symptoms as fairly common, and it will be noted that, when present, they usually disappear before the motor symptoms, in the course of the affection. Eight of the cases occurred in Primiparae, and seven in Multiparae; one of the latter -- a second birth -- had similar symptoms after the first birth. In two cases the number of the birth is not mentioned. More than one half of the cases, therefore, occurred in Primiparae. With regard to age, 15 were between the ages of 20 and 30 years, which, of course, is the most prolific child bearing period. One was 33 and the other 36 years.

In four cases both lower limbs were affected, but one side usually more so than the other. In 13 cases one lower limb only was affected, the right side claiming six of these and the left seven, so that our cases point to the left side being rather more liable to this affection than the right.

The paralysis was in 16 of the cases confined solely to, or affected most severely, the parts supplied by the peroneal nerve. In one case only was the paralysis limited to the parts supplied by the internal popliteal nerve; i. e., the plantar flexors of the foot and toes. Recovery took place in some cases after a few weeks, and only in a few cases was it delayed beyond one year, so that the prognosis is distinctly favourable as compared with cases of paralysis due to other causes.

In two of the cases there were symptoms of paralysis of the muscles supplied by the superior gluteal nerve, shown by weak abduction

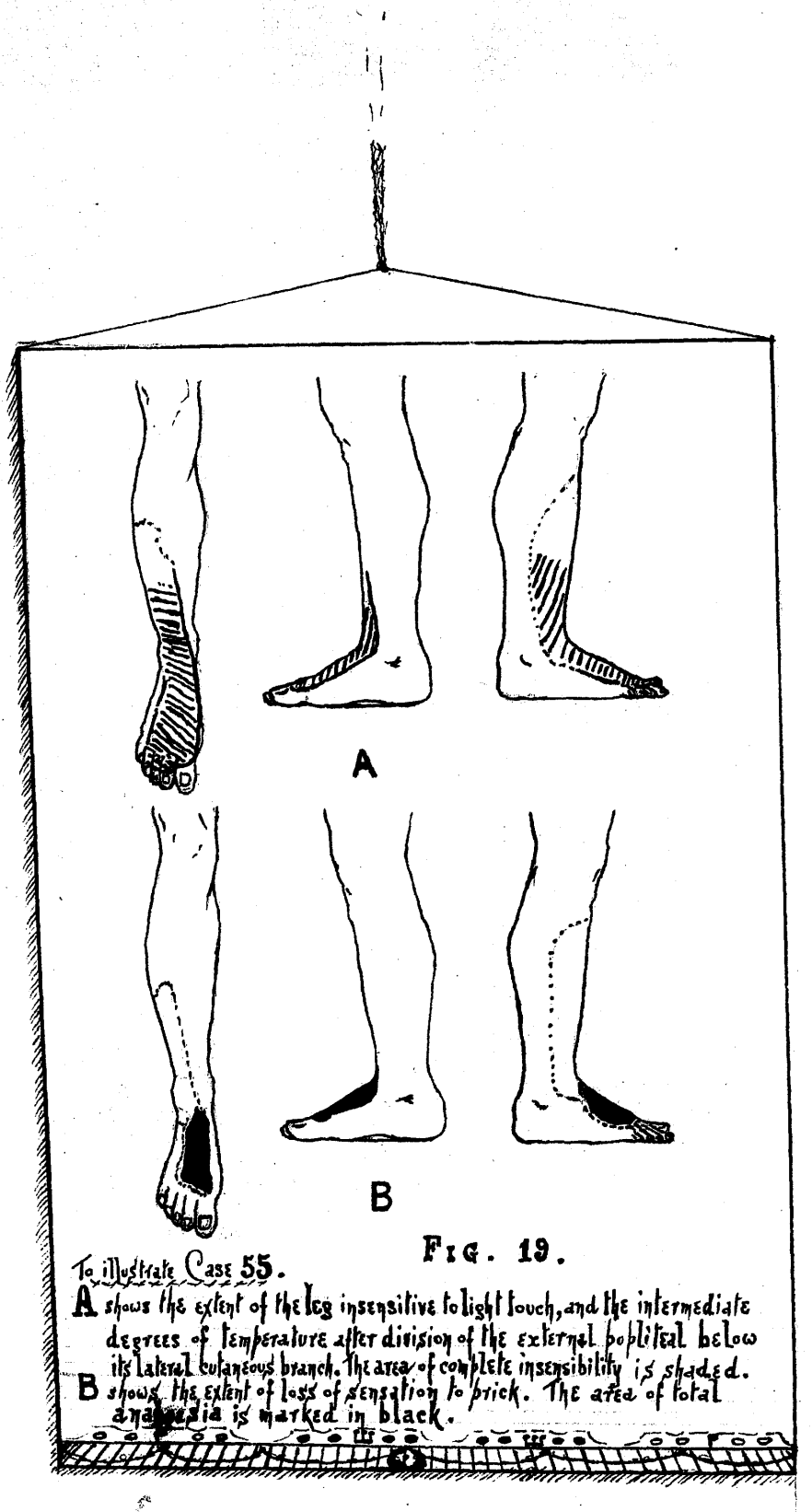


FIG. 19.

To illustrate Case 55.

A shows the extent of the leg insensitive to light touch, and the intermediate degrees of temperature after division of the external popliteal below its lateral cutaneous branch. The area of complete insensibility is shaded.

B shows the extent of loss of sensation to prick. The area of total anæsthesia is marked in black.

and rotation inwards at the hip.

It will be seen, therefore, from the foregoing, that the traumatic puerperal paralyses affect mainly the peroneal muscles. These are the tibialis anticus, extensor longus digitorum, three peronei muscles, extensor proprius hallucis, extensor brevis digitorum, and some of the interosseus muscles. The main function of these muscles is to extend the feet and toes, so that when paralysed there is inability to dorsi-flex the ankle or extend -- dorsi-flex -- the toes, and when severe there is present also the characteristic foot drop and high stepping gait of peroneal paralysis.

Sensation -- when affected -- it will be noticed, was diminished in most of the cases, on the antero-lateral aspect of the leg and dorsum of the foot. This corresponds to the cutaneous distribution of the peroneal nerve as mapped out by Head (42) who based his conclusions on a careful examination and investigation of several cases of injury to the nerve. He found that the area of insensibility to light touch was somewhat greater in extent than that to pain, and that only over the dorsum of the foot did he find total loss of sensation to pain. The accompanying figures opposite, by Head, taken from the "Brain," op. cit., Page 203 illustrate this:--

(42) Injury to the peripheral nerves in Man. Brain, Part CX, P. 202.

We have clear evidence, then, in the cases already related, that in the traumatic puerperal paralysis both the motor and sensory symptoms are confined solely to, or affect most severely, the parts supplied by the peroneal nerve. An explanation of this is found by a study of the anatomy of the parts.

We find that the external popliteal or peroneal nerve is one of the branches into which the great sciatic nerve divides in the lower third of the thigh behind the knee, and it seems strange, at first sight, that this nerve should suffer and the other branch, the internal popliteal, escape in a paralysis due to pressure on the pelvic nerves so far above the point where this division takes place. If we further examine the anatomy of the parts, however, we find that the sacral plexus, from the apex of which the great sciatic arises, lies, in the true pelvis, on the soft belly of the pyriforms muscle, and is therefore protected from pressure against the bone. This plexus is formed by the junction of two plexuses of nerves. One of these is made up of part of the 4th, the whole of the 5th lumbar, and part of the first sacral nerves -- forming the lumbo-sacral cord. The other, the lower, is made up of part of the 1st, the whole of the 2nd, and 3rd, and part of the 4th sacral nerves. The latter joins the former; i. e., the lumbo-sacral cord, in the true pelvis, and together they form the sacral plexus.

The lumbo-sacral cord, however, as it passes downwards, before joining the plexus, passes over the sharp ridge of the linea inominata lying close to the bone, and is therefore exposed to pressure. It is the lumbo-sacral cord, then, that is most liable to injury, during labour, either by forceps or by the child's head, and moreover, it has been found by careful dissection that the peroneal or external popliteal nerve can be traced upwards and shown to be continuous with the lumbo-sacral cord; indeed, Thomas (34) mentions that Dr. C. R. Bardeen, Associate in Anatomy, John Hopkins University, in a dissection of 200 cases found in 10% of the cases a complete separation of the external and internal popliteal nerves extending up to their origin; i. e., the so-called high division of the sciatic nerve; and that in all cases they can be easily dissected apart without much injury.

Although it had been known for a long time that the traumatic puerperal paralysis was mainly of the peroneal type, yet Hunermann [43] was the first to clear the matter up, and to show how the anatomical arrangement of the parts, as described above, favoured the production of this particular type of paralysis, ~~although~~ Mills [37] claims to have already reasoned as to the production of this most common type of puerperal paralysis, in much the same way as Hunermann, at the Philadelphia Hospital, and to his ward classes. Hunermann also pointed out that the superior gluteal nerve, a branch of the lumbo-sacral cord, is also exposed to pressure against the bone, which fact explains the occurrence of paralysis affecting the hip, more especially the movements of abduction and rotation inwards such as we found in two of the cases already described. In this connection the following words of Thomas may be here quoted:--"It is not easy to understand how an injury to the lumbo-sacral cord could cause a motor and sensory paralysis so sharply limited to the distribution of the peroneal nerve as often occurs in obstetrical paralysis. Dr. Bardeen has suggested, as a possible explanation, that the branches of the roots that go to form the external popliteal nerve are given off from the dorsal aspect of the plexus and lie next to the bone, while those forming the internal popliteal lie on them, and that therefore these dorsal off-sets would be apt to be injured."

This is a point which I have not seen mentioned by any other authority, and may be an important addition to Hunermann's theory.

Opinions differ as to whether it is the child's head or forceps that is the cause of the nerve injury in these paralyses. Hunermann believes that the conditions most favourable for the production of these paralyses are -- a generally contracted pelvis and a large head, and in normal pelves, face and brow presentations. Forceps, he admits, are sometimes the cause when pendulum or rotating instruments are used. Lloyd [40] says, "I think anyone who will take the trouble to take a pelvis and insert the obstetrical forceps in the proper position,

(43) Arch. F. Gynakol., Vol. XLII, 1892, P. 307.

will readily see how possible it is for the blade of the instrument to do injury to the lumbo-sacral cord, which passes over the brim of the true pelvis in a position most exposed to pressure, either by the head or by the forceps, and the wonder is not that it is ever injured, but that it is not injured oftener." Playfair (44) disposes of the question in these words, "Partial paralysis of one lower extremity, generally the left, sometimes occurs from pressure of the foetal occiput, and may continue for days, or weeks, with a gradual improvement after parturition."

Mills (37) P. 518, etc., says the injury to the nerve cords is usually inflicted by the skull of the child, but admits that injury by forceps is sometimes the cause, and is of opinion that the delay in using forceps, rather than the forceps, is sometimes responsible for the nerve crushing, neuritis, and paralysis. Winscheid (45) says that traumatic paralysis can be caused in the case of a normal pelvis, when the head of the child remains for a long time in a fixed position in the pelvis; that it is specially liable to occur in a generally contracted pelvis, and that it may also occur during a forceps delivery, and that, in the latter case, it is not so much the pressure, as the strain or pull on the nerves by the blades of the forceps.

Bianchi (46) and Le Fèbre (47) point out that unnarcotized patients sometimes suffer from severe shooting pains during every pull on the forceps. Mills, op. cit., P. 521, says "In one case which has come to my knowledge, the patient was, at the time, partially under the influence of ether, but cried aloud with the pain in her leg when the forceps were applied. The pain, she said, was different from the ordinary labour pain, although, in her case, this was extreme. Neuritis and lameness followed, but disappeared in six weeks." Mills attributes this to pinching of one of the cords of the plexus.

(44) Science and Practice of midwifery 1889. vol. I. P. 243

(45) Neurs Pathologie und Gynaekologie, August, 1896.

(46) Des Paralysies traumatiques des membres inferieures chez les nouvelles accouchées. These de Paris, 1867.

(47) Des paralysis traumatiques des membres inferieures consequitives à l'accouch. laborieux. These de Paris, 1876.

(48) Monatsschr F. Geb. Hulfe W. Gyn. Ap. 1899. Bd. IX, H. 4. Zur prophylaxe der neuritis puerperales.

Hoesslin (3) op. cit., believes that the generally contracted and flat rachitic pelves tend towards the traumatic puerperal neuritis, and that it may occur at difficult, as well as easy births. Of 80 cases, he found 61 required forceps. He has been able to collect several absolutely certain cases, in which, immediately after the difficult forceps labour, both lower extremities were totally motionless. He believes that the paralysis is more likely to be caused by the head staying too long in the small pelvis, but foes not deny that direct pressure of the forceps may be the cause. Huber (48) believes the chief danger to be pressure of the child's head, and says that if labour halts, provided the soft parts are dilated, instruments should be used at once. Badly applied forceps, he admits, may cause injury to the nerves.

Dakin (6) P. 564. says, "The only way to prevent severe damage to the lumbo-sacral cord is not to allow pressure to be exercised on the structures at the brim, but to help the head by some means (Forceps craniotomy) through it; or to rectify mal-positions. The forceps, though often blamed for causing it, if used in time prevent it; and in cases where its use is supposed to have led to paralysis, the damage has probably been done before it was applied."

It will be seen from the foregoing that most of the authorities mentioned agree that the injury to the pelvic nerves may be due to pressure of the child's head, or to injury by the forceps, and nearly all agree that the injury is due, in the greater proportion of cases, to pressure of the child's head. In this connection, it may be noted that, apart from the consideration of puerperal paralysis, the early application of the forceps, provided the soft parts are dilated, and labour halts, is now generally recognised as being safest, for both mother and child. In a discussion on this subject recently before the South-West London Medical Society (49) Dr. Biggs gave statistics of a large number of cases in his own practice showing that in Multiparae he applied forceps in 7%, and in Primiparae in 30%, and quoted

(49) Lancet, October 19th, 1907.

other observers who had recorded as high a rate as 50%.

In 100 consecutive cases of my own, hereafter recorded. I find that in Multiparae forceps were used in about six per cent, and in Primiparae about 42% of the cases. This is a fairly high percentage, but I believe the early application of the forceps, in suitable cases, gives the mother the best chance of a favourable and quick recovery, and may also result in a saving of infantile lives.

I am at one with those who believe that the injury to the pelvic nerves is, in the majority of cases, due to pressure by the child's head rather than to injury by forceps. Seldom have I heard a patient complain of pain when the forceps were being applied or in situ, but every now and again, when exercising traction with the forceps, I have heard complaints of severe shooting pains, sometimes with cramps, usually affecting the thigh or calf muscles on one side of the body only. Such symptoms I believe are due, not to direct pressure on the nerves by the blade of the forceps, but to crushing of the nerves between the head of the child and the bony pelvis during traction, at a point where, as we have seen, the nerve is exposed to such pressure. In the case of prolonged labour, before the application of the forceps, frequently I have heard patients complain of similar shooting pains with or without cramps in the thigh or calf, or both, coming on during, and ending with the cessation of uterine contraction. This being so I feel strongly that we can certainly lessen the liability to these puerperal paralyses by the early application of the forceps under suitable conditions. In addition, I think it is a wise rule always, in such cases, to use an anaesthetic; by doing so the mother is freed from needless pain, the soft parts are more relaxed, and there is considerably less resistance and less liability to tearing or bruising.

For a study of the anatomy of the parts concerned in these paralyses a beautiful coloured plate reproduced by Sahl [50] might

(50) Diagnostic Methods; 1906, P. 927.

be consulted with advantage, showing the arrangement of the lumbar and sacral plexuses, with the ultimate distribution of their branches. Reference might also be made to the excellent diagram in Quain's (51) Anatomy. The following simple diagram taken from Dakin (6) P. 563. shows the exposed position of the lumbo sacral cord as it crosses the brim of the pelvis:--

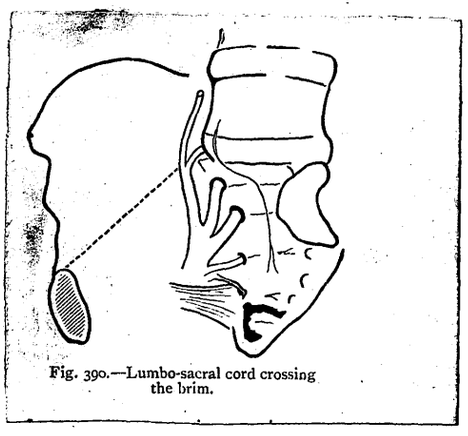


Fig. 390.—Lumbo-sacral cord crossing the brim.

One thing that strikes us in the history of these puerperal paralyses is the hopeful prognosis as to recovery that can be given in almost every case. It is only in the very severe cases where there is atrophy of the muscles with reaction of degeneration that any permanent paralysis remains. The rapidity of the recovery is very striking as compared with that found in paralysis due to other causes. The greater proportion of cases recover in from a few weeks to some months, and this applies to the non-traumatic as well as to the traumatic forms of puerperal paralysis. With regard to treatment, this has to be carried out much on the same lines as that laid down for paralysis or neuritis due to other causes. Hot fomentations sprinkled with laudanum or prepared with decoction of poppy heads do good; dry heat applied by means of warm sand bags or hot water bottles; gentle friction with soothing applications; all are beneficial. Internally. aspirin, salol, salicylate of soda. quinine, etc., are perhaps the most useful. The diet should be light, generous, and nutritious. Later on. Swedish movements.

(51) Vol. III, Part II, 1895, P. 324.

change of air, tonics, especially quinine and iron, have proved useful, and Faradism has usually a beneficial effect.

The whole subject of puerperal paralysis, whether due to traumatic or non-traumatic causes, is one which has not received the attention which perhaps it deserves. In a personal experience of over 3000 births, I can recall many cases of patients who complained of pain and cramps in the lower limbs during or aftar labour, which I attributed to neuralgia or other causes, and of lameness which I passed by unheeded, attributing the same to weakness or some other such general cause. Most general practitioners and obstetricians must have come across many similar cases without forming any definite opinion as to the aetiology of the condition. With a view to determining how often we may have symptoms, however slight, of neuritis or paresis, due to traumatic or other causes, as a result of pregnancy, I have, in the following 100 consecutive births, which I personally attended during the past year, taken minute notice of symptoms, not only complained of by the patient, but of symptoms which, it is clear, would have been passed by unnoticed had they not been looked for. These cases I shall now record and, as far as possible, thereafter endeavour to analyse, although it will be admitted that it is one thing to record facts or symptoms observed, and quite another thing to interpret such in a satisfactory manner.

EXAMINATION OF 100 CONSECUTIVE BIRTHS FOR MOTOR AND SENSORY DISTURBANCES.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex	Symptoms during 1st week after delivery. Knee Jerks.	Ankle Clonus.	Plantar Reflex.		Result.
I	Mrs P. 28 II 1st child born normally 3 years ago.	Dec. 20th, 1906. Normal. In labour 10 hours. Male.	Both present.	Both absent.	Both present.	Sensation and motion normal.	Up on 10th day feeling well.
II	Mrs K. 28 IV	Dec. 20th, 1906. Normal. Had severe pains for 6 hours before the birth. Female.	Both absent.	Both absent.	Both absent.	Sensation and motion normal.	Knee jerks were absent for 3 months and there was no Plantar response for 6 weeks.
III	Mrs A. 26 III	Dec. 24th, 1906. Labour slow but terminated normally after 16 hours from the start. Female.	Absent in right leg diminished in left.	Both absent.	Both present.	Sensation and motion normal.	One week after birth knee jerks present and patient feeling very well.
IV	Mrs I. 20 I	Dec. 30th, 1906. In labour 16 hours. Contracted brim. Long forceps. Child asphyxiated and with difficulty brought round. Mouth to mouth insufflation seemed to be of more value than any of the other usual methods tried.	Both well marked.	Both absent.	Slight response on both sides.	Sensation diminished to touch, temp. and pain on outer side of the left leg and dorsum of foot, i.e. the cutaneous distribution of the external popliteal N. Flexion of ankle weak on left side, also extension of toes. Dorsal flexion.	Motor and sensory symptons disappeared about the 12th day. Could walk quite well when she got up on the 10th day but felt the left ankle a little stiff.

No. of Case..	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery. Knee Jerks.	Ankle Clonus.	Plantar Reflex.		Result.
v	Mrs M. 26 i	Jany.1st 1907. In labour 8 or 9 hours. Easy birth. Normal.	Left diminished. Right normal.	Both absent.	Both absent.	Sensation and motion normal.	12 days after birth both knee jerks were active and patient feeling well.
vi	Mrs R. 24 I	Jany 2nd 07. Slightly hysterical during 1st stage. Slow labour. Small forceps at outlet. Female.	Both absent.	Both absent.	Both absent.	Complained of numbness and weakness in both legs. Sensation to touch temporary and pain normal.	Numbness and weakness in legs did not disappear for 6 weeks. Knee jerks were still absent on March 30/07, i.e. 3 months after the birth.
vii	Mrs M. 24 ii 1st child born with instruments and chloroform.	Jany.7th 1907. In labour 12 hours. Instruments and chloroform. Fairly tight. Male.	Right diminished. Right active	Both absent.	Both absent.	Sensory and Motor symptons normal.	Patient got up on 10th day feeling well. Knee jerks then normal.
viii	Mrs H. 26 ii 1st birth normal.	Jany.9th 1907. Had pains for 3 weeks before the birth, which was normal. Male.	Both distinctly modified.	Both absent.	Both present.	Sensory and motor symptons normal.	Both knee jerks fairly active 9 days after birth. Patient well.
ix	Mrs M. 28 ii Instruments required in both ~~her~~ births	Jany.12th 1907. Was in hard labour for 12 hours delivered with instruments and chloform. Male.	Both diminished.	Both absent.	Both absent.	Sensory and motor symptons	Knee jerks were both active on April 12th 07 i.e one month after birth.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery. Knee Jerks.	Ankle Clonus.	Plantar Reflex.		Result.
x	Mrs J. 32 ii 1st labour easy.	Jany.15th 1907. Only in labour a few hours. Male. Easy normal birth.	Both normal.	Both absent.	Both present.	Sensory and motor symptons normal.	Was up and feeling well on 10th day.
xi	Mrs E. 23 i	Jany.18th 1907. Breech Slow easy birth. Child alive. Male.	Right absent, Left normal.	Both absent.	Both diminished.	Sensory and motor symptons normal.	Both plantar reflexes were well marked on the 5th day and the knee jerks were both active on the 13th day.
xii	Mrs G. 38 vii Previous births normal.	Jany.19th 1907. Slow easy labour terminating normally after 18 hours. Female.	Both diminished.	Both absent.	Both absent.	Sensory and motor symptons normal.	Both knee jerks still diminished after a month from birth.
xiii	Mrs M. 42 v Previous births normal.	Jany.21st 1907. Easy normal labour. Male.	Both at first diminished, then absent.	Both absent.	Both absent.	Sensory and motor symptons normal.	Got up 10th day feeling well. Knee jerks and plantar reflexes still absent one month after the birth.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery. Knee Jerks.	Ankle Clonus.	Plantar Reflex.		Result.
xiv	Mrs C. 39 v Previous births slow but normal.	Jany.23rd 1907. 17 hours in labour. Child born with well marked caput-succedaneum. Normal birth. Suffered from severe cramps in back of thighs and legs a few times every day for a month before the birth. (~~also before the birth~~). Male.	Left, exaggerated, Right normal.	Both absent.	Both present.	Sensory symptons normal. Plantar flexion of toes weak also extension of ankle joint on both sides.	On the 14th day both knee jerks normal and patient could flex the toes and extend the ankle normally.
xv	Mrs M. 21 i	Jany.25th 1907. Easy normal birth. Female.	Both active.	Both absent.	Both present.	Sensory and motor symptons normal.	Patient up on 10th day feeling well.
xvi	Mrs K. 27 iv	Jany.30th 1907. Slow easy normal birth. Male.	Both active.	Both absent.	Flexor response in both.	Developed a cystitis about the 4th day with temperature of 101 No motor or sensory symptons.	Was fevered more or less for a fortnight. Well in 3 weeks. Cystitis cured.
xvii	Mrs B. 25 i	Jany.30th 1907. Slow labour. Small forceps owing to delay at outlet. Male.	Both active.	Both absent.	Both present.	Sensation to touch, i.e. the head of a pin, absent in front of left thigh and leg and back of foot. Present to pain i.e. point of needle.	Got up feeling well on 10th day. Sensitive to touch now ~~distinct~~ on both sides.

No. of Case.	Name, Age, No.of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery. Knee Jerks.	Ankle Clonus.	Plantar Reflex.		Result.
xviii	Mrs W. 37 xviii All her labours were normal, unless the last one when she had a severe P. Part. Haem.	Feby.1st 1907. Easy normal birth. Female.	Left diminished, Right active.	Both absent.	Both distinct with flexion of toes.	Distinct area of insensibility to touch over the front of the left thigh. No anatgesia.	7 days after birth sensation to touch restored on left side, but the left knee jerk is still diminished on 3rd April i.e 2 months after the birth.
xix	Mrs McF. 20 i This patient has valvular disease of the heart.	Feby.1st 1907 Easy normal birth. Male.	Both active.	Both absent.	Both present.	Normal.	Got up on 10th day feeling well.
xx	Mrs C. 23 ii	Feby.2nd 1907. Easy labour. Breech presentation. Child alive. Male.	Both active.	Both absent.	Both present.	Normal.	On 10th day knee jerk on left side was absent and was present on the right. Both present on the 14th day.
xxi	Mrs G. 19 i	Jany.3rd 1907. Slow labour. Normal birth. Female.	Left absent. Right active.	Both absent.	Both absent.	Normal.	Knee jerks were present on 12th day also Plantar Reflexes.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
xxii	Mrs C. 29 iii	Feby.7th 1907. Normal birth. Male.	Both active at 1st but on 4th day Left absent, Right diminished.	Both absent.	Both absent.	Normal.	On 10th day both knee jerks active. Plantar Reflexes well marked. Patient feels well.
xxiii	Mrs G. 26 ii First birth instrumental.	Feby.15th 1907. Slow normal labour.18 hours. Male.	Both present.	Slight on Right side.	Both present till 3rd day when it was lost on left side. Even touch was hardly felt. Present on Right side with extension of toes..	Sensation to light touch over front of thigh, leg and back of foot on both sides was almost absent. Dulling of sensation to pain on left side. There has been pain since the birth over the front of both thighs and around the knees which is aggravated by deep pressure over the nerves and muscles, espacially on left side.	On the 14th day sensation was normal on both sides. Both Plantar Reflexes were present, but still a suspicion of Ankle Clonus on Right side Patient feels well.
xxiv	Mrs R. 36 v Previous births. normal.	Feby.15th 1907. Slow 1st stage. Normal birth. Female.	Left diminished. Right active.	Right Ankle Clonus present.	Both present with flexion of toes.	Normal.	On 10th day both knee jerks active. Patient up and feeling well. Right Ankle Clonus absent

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
xxv	Mrs McG. 37 xi States that the 10 previous births were either cross or breech presentations. 8 of these were dead born. Two are alive aged 13 years and 3 years. I attended her with the latter two. The intervening births took place when she was away from the district.	Feby.17th 1907. Rapid labour. Breech. Child's head born before she had time to send for me. Had considerable difficulty in bringing down the arms. Child dead.	Both active.	Both absent.	Both present.	Normal.	Up on 10th day feeling well.
xxvi.	Mrs W. 32 iv After each of preceding births suffered from pains in left thigh and leg, with partial loss of power for 2 months.	Feby.19th 1907. Normal birth. Labour pains lasted 24 hours. Complained all this time of pains in front of left thigh. Male.	Left, weak. Right, normal.	Both absent.	Both present.	Pain sensation distinctly diminished over front of left thigh and leg. Deep pressure causes pain in same region. Incontinence of urine present since birth. Albuminuria.	April 19th knee jerks both well marked. Sensation normal. Weakness in muscles gone. practically well.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
xxvii	Mrs B. 38 v Contracted Syphitis from husband 3 years ago. Last child born dead at 8th month.	Feby.20th 1907. Easy birth. Child born dead at 6th month. Female.	Both feeble.	Both very feeble.	Both well marked.	Sensation and motion normal.	Same after one month.
xxviii	Mrs A. 32 ii First child born with instruments and chloroform after 48 hours labour.	Feby.20th 1907. 24 hours in labour. Instruments and chloform. Female. Normal presentation.	Right diminished, Left normal.	Right, slight. Left, absent.	Both absent.	On 6th day both knee jerks normal. Ankle Clonus both absent. Sensation and motion normal.	Recovery good.
xxix	Mrs A. 23 i	Feby.23rd 1907. Normal presentation. In labour 12 hours. Instruments and chloform.	Right absent. Left weak.	Right slight. Left absent.	Both well marked.	Sensation and motion normal.	On the 14th day no Ankle Clonus, and Right knee jerk was present though weak.
xxx	Mrs L. 27 iii Previous births easy.	Feby.26th 1907. Easy normal birth. Male.	Both present.	Both absent.	Both present.	Sensation and motion normal.	Good recovery

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth, Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
xxxi	Mrs K. 29 v Previous births normal.	March 2nd. 1907. 3rd crainal, 8 hours severe labour. Female.	Both absent.	Both very feeble.	Both present.	Sensation and motion normal.	Both knee reflexes were present 3 weeks after the birth. No ankle clonus.
xxxii	Mrs C. 20 I	March 3rd, 1907. 7 months child. Dead born. In labour 15 hours. Female.	Both very feeble.	Both absent.	Both distinct.	Sensation distinctly absent to light touch over front of right thigh. Present to pain. Normal on left side.	Good recovery. Sensation normal 10 days after birth.
xxxiii	Mrs G. 26 ii 1st child born in August 1905 with instruments and chloroform. Contracted brim. Child dead born. Slow recovery.	March 5th, 1907. Normal presentation. Instruments and chloroform. Male.	Both present.	Both absent.	Both absent.	Incontinence of urine.	Made a good recovery.
xxxiv	Mrs J. 28 ii	March 9th, 1907. Easy normal birth. Female.	Both weak.	Both absent.	Both well marked.	Sensation and motion normal.	Recovered well. 3 weeks after knee reflexes normal.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery. Knee Jerks.	Ankle Clonus.	Plantar Reflexes.		Result.
xxxv	Mrs D. 39 / xv Married 19 years (never had twins). 6 children are alive. 2 were dead born and the others died in infancy. Labours all easy.	March 14th, 1907. Easy normal birth. Had niggling pains for 3 days before the birth. Male.	Both very weak.	Both absent.	Both present.	Sensation and motion normal.	Good recovery. 3 weeks after birth knee jerks normal.
xxxvi	Mrs D. 40 / i Sudden sharp pains were felt running down right thigh and leg, now and again, for a month before the birth, with cramps in calf.	March 19th, 1907. 3d cranial. difficult birth. Instruments and chloroform. Female.	Both feeble.	Both present.	Both present.	Sensation and motion normal. Pain on deep pressure over muscles on back of thigh and leg.	Good recovery.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after labour. Knee Jerks.	Ankle Clonus.	Plantar Reflexes.		Result.
xxxvii	Mrs R. 39 vii 3 months before the birth, when out, was seized with sudden pain and numbness in left leg with almost complete loss of Power. This got well in a week or two and did not return.	March 24th,1907. Normal birth. Child weighed 11 lbs 7 oz and had a large square shaped head. Male.	Both feeble on 2nd day then absent.	Both absent.	Both present.	Sensation and motion normal.	3 weeks after birth both knee jerks present. Good recovery.
xxxviii	Mrs G. 24 vi Married 8 years. Suffered from Aphasia after 3rd birth. Unable to speak for 3 months.	March 22nd,1907. Normal birth. Male.	Right absent, Left weak.	Slight on both sides.	Both present.	Sensation and motion normal.	After a fortnight both knee reflexes present. Ankle Clonus absent. Good recovery.
xxxix	Mrs S. 35 iii Last birth 5 years ago.	March 28th,1907. Prolonged 1st stage. Large caput. Forceps at outlet. Chloroform. Male.	Both very weak.	Both absent.	Both present.	Sensation and motion normal.	2 weeks after birth both knee jerks active. Good recovery.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflexes.		
XL	Mrs G. 44 xii	March 29th,1907. Normal easy birth. Male.	Both absent.	Both absent.	Both absent.	Sensation and motion normal.	Knee jerks still absent one month after birth, also plantar reflexes.
XLi	Mrs H. 35 iv	March 31st,1907. Normal birth. Labour rather severe. Female.	Both absent.	Both absent.	Both absent.	On 2nd day sensation to touch and pain much diminished over front of right thigh.	2 weeks after birth knee jerks and Plantar reflexes present and sensation same on both sides.
XLii	Mrs C. 36 viii Previous births easy.	April 1st,1907. False pains for 2 weeks, and occasional acute pain over Pubis. No pains for some hours. Os. well dilated. Child expressed manually. Male.	Both absent.	Both absent.	Both weak response.	Sensation and movement normal 8th day knee jerks feeble.	12th day knee jerks normal. Good recovery.
XLiii	Mrs M. 24 i	April 3rd,1907. In labour 14 hours. Normal birth. Labour pains extended down right thigh and leg. Female.	Right weak. Left normal.	Right slight. Left absent.	Both present.	Sensation to touch and pain diminished over outer side of right thigh and front of leg since 2nd day.	10th day knee jerks both well marked. Ankle Clonus absent on both sides. Sensation same on both sides.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery. Knee Jerks.	Ankle Clonus.	Plantar Reflexes.		Result.
XLiv	Mrs R. 33 viii Required instruments with 1st and 3rd child.	April 5th, 1907. Normal birth. Slow labour. Large child. Male.	Right absent. Left present.	Both absent.	Right absent. Laft present.	Sensation distinctly diminished in upper part of right thigh and front of right leg to touch and pain.	12th day sensation same on both sides. Reflexes also normal.
XLv	Mrs McC. 21 i	April 8th, 1907. Severe labour pains for 12 hours running down left thigh. Instruments and chloroform. Male.	Left normal. Right feeble.	Both absent.	Left marked. Right feeble.	Sensation to pain and touch diminished over front of left thigh and right leg.	2 weeks after birth sensation and reflexes normal.
XLvi	Mrs B. 23 ii Last child born 13 months ago.	April 12th,1907. Normal easy birth. Male.	Both present.	Both absent.	Both present.	Sensation and motion normal.	Good recovery.
XLvii	Mrs G. 26 iv	April 10th,1907. Normal birth. For 2 weeks before birth complained of numbness in right leg.Male.	Right absent. Left normal.	Both absent.	Both absent.	Sensation to touch and pain in front of right thigh and outer side of right leg diminished.	3 weeks after knee jerks normal. Sensation same on both sides.
XLviii	Mrs McD. 17 ii 1st child born when she was 15 years of age. Very easy birth.	April 11th,1907. Normal easy birth. Female.	Both present.	Both absent.	Both absent.	Sensation and motion normal.	Good recovery. Plantar reflexes still absent one month after birth.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth Sex.	Symptoms during 1st week after delivery. Knee Jerks.	Ankle Clonus.	Plantar Reflex.		Result.
XLIX	Mrs R. 34 III	April 19th,1907. For 3 days before the birth occasional griping pains in front and back of left thigh. Male.	Both weak.	Both absent.	Absent in left. Present in Right.	Feeling of numbness like pins and needles in the left leg from the knee down, also. Pressure tenderness over muscles in front of left thigh and leg for about 3 days.	5 days after birth numbness gone, also pain on deep pressure Good recovery after 11 days.
L	Mrs K. 25 I	April 21st, 1907. Chloroform and small forceps at outlet. Female.	Right weak. Left normal.	Both absent.	Both well marked.	Sensation and motion normal.	10th day knee jerks both normal. Good recovery.
LI	Mrs L. 32 IV Previous births easy.	April 23rd,1907. Normal birth. Male.	Both weak.	Both absent.	Both present.	Sensation and motion normal.	Good recovery. 10th day knee jerks normal.
LII	Mrs McC. 35 VIII 5 of previous births were instrumental.	March, 9th,1907. Instruments and chloform. Female.	Right marked. Left absent.	Both absent.	Both present.	Sensation and motion normal.	Knee jerks normal 2 weeks after birth.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
LIII	Mrs McA. 22 I	May 6th, 1907. In labour 18 hours. Instruments and chloroform. Complained of cramps in both legs during pain. Male.	Left marked. Right feeble.	Both absent.	Both absent.	Sensation seemed to be slightly diminished to touch and pain over front of thighs and legs.	8th day all normal.
LIV	Mrs H. 33 III	May 9th, 1907. Twins. Boy and Girl. Unable to walk for last 3 months owing to pain and stiffness in legs, Skin all over the body itchy and glossy for last week. No redness.	Both weak.	Both absent at first, distinct clonus on right side about the 6th day.	Both absent.	Sensation distinctly diminished over right thigh and outer side of leg to touch and pain. Deep pressure causes pain and clonic spasms in leg. Motor symptons also present.	10th day got up and was very lame. Foot drop, Leg still weak, but improved 4 months after birth.
LV	Mrs P. 42 V Last birth 2½ years ago. Suffered then from loss of power in left leg 3 weeks before and 3 weeks after.	May 11th, 1907. 16 hours in labour. Helped a good deal by expression. Female.	Right absent. Left normal.	Both absent.	Both feeble.	Sensation and motion normal.	Condition normal on 14th day.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
Lvi	Mrs B. 30 iii	May 17th, 1907. Easy normal birth. Male.	Both present.	Right present. Left absent.	Both absent.	Sensation and motion normal.	Condition normal 2 weeks after birth.
Lvii	Mrs F. 23 i	May 17th, 1907. Normal birth after severe labour lasting 8 hours.	Both present.	Both absent.	Feeble in both.	Sensation to touch and pain diminished over left hip, outer side of thigh and leg. Left foot feels as if it were sleeping.	Good recovery.
Lviii	Mrs M. 33 v	May 20th, 1907. Twins. 1st child 3d cranial, 2nd child normal. Male and female. Had cramps in the left leg occasionaly for two or three weeks before the birth.	Right absent. Left normal.	Both absent.	Both feeble.	Sensation to pain diminished over outer side of left leg from knee down. Motion:- Flexion of ankle, and extension of toes weak on left side.	Symptons normal on the 12th day.

No. of Case.	Name, Age, No.of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
Lix	Mrs I. 30 II 1st child born with instruments 5 years ago.	May 22nd,1907. 15 hours in labour. Child above brim, long forceps, no chloroform. Traction with forceps caused violent cramps in back of left thigh from hip to back of knee. Male.	Both present.	Left feeble. Right absent.	Left absent. Right present.	Sensation distinctly diminished over front of left thigh and leg and dorsum of foot; to touch and pain.Motion:- Rotation inwards of left hip weak. adduction weak.Flexion and extension of toes weak. Pain on deep pressure in muscles front and back of thigh and outer side of left leg.	Symptons normal in 14 days.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.			Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.	
LX	Mrs H. 32 1	May 22nd, 1907. In labour 36 hours. Very difficult. Instruments and Chloroform being used. Child asphyxiated but brought round.	Left exaggerated. Right weak.	Left distinte. Both present. Right absent.	Numbness in both limbs with pains in soles of feet. On 5th day numbness only felt on left side. Sensation to touch temperature and pain diminished over front of left thigh and leg and dorsum of foot. Motion:- weak flexion of left ankle. Left leg feels colder. Pain on deep pressure in muscles of the left thigh and leg - back and front. Temp. 100 to 100 to 103·2 F. Symptoms of Pelvic celulitis develop.	After one month the temp. became normal, but left lower limb still weak with atrophy of the muscles.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
LXi	Mrs A. 25 II 1st child born 3 years ago with instruments and chloroform at which time the legs were very oedematous. Suffered from a severe attack of chorea after the death of this child at 17 months.	May 24th, 1907. Patient very anaemic. Both thighs and legs very oedematous. For 2 months has suffered from cramps in balls of legs which disappeared a fortnight ago. Easy normal birth. Female.	Both absent.	Both feeble.	Right present with plantar flexion of toes. Left present with plantar flexion of all toes, unless the great toe in which there is dorsal flexion.	2nd day complained of numb sleeping feeling in left forearm with tingling in the fingers. This lasted for 5 days then disappeared.	Plantar reflex normal on left side 14 days after birth Knee jerks present one month after.
LXii	Mrs T. 24 II 1st birth easy and normal.	May 24th, 1907. Easy normal birth. Male.	Both present.	Both absent.	Both present.	Sensation to touch and pain diminished on outer side of left leg. Motion:- Normal. Tenderness on deep pressure over back of thigh and leg on left side. (Sciatic).	10th day condition normal.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
LXiii	Mrs S. 23 iii Married 3½ years. Before last birth she suffered for 2 months from lameness and weakness in right leg, which did not disappear for some months.	May 30th, 1907. In labour about 30 hours. Pains severe during last 6 hours. Male.	Left present. Right absent.	Both absent.	Both absent.	Severe pains in back of right thigh for 12 hours after the birth, Sensation diminished to touch and pain over outside of right thigh front of leg and back of foot. Pain on pressure over calf muscles on right side. Motion:-Normal.	Condition normal on 14th day.
LXiv	Mrs W. 28 vi Previous births normal.	June 1st, 1907. In labour 12 hours. Normal birth. Pains were felt in back of right thigh from hip to knee. Female.	Left present. Right absent.	Both absent.	Both present.	Sensation and motion normal. Pain on deep pressure over sciatic region on right side.	Condition normal on 10th day.
LXv	Mrs Y. 33 i Married 9 years.	June 2nd, 1907. Slow birth. Breech presentation; head releived by long forceps. Chloroform used. Child asphyxiated but brought round. Perineum torn and stiched. Very anaemic. False pains of a severe nature for a week previous. Female.	Both absent.	Both absent.	Both absent.	Complained for a few days of pains in both calfs aggravated by pressure.	In 3 weeks condition normal.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
LXvi	Mrs R. 36 vi States that after each previous birth she suffered for a day or two from severe pains like toothache in left calf.	June 3rd, 1907. In labour 24 hours, latterly pains weak. Instruments and chloroform. Male.	Left increased. Right weak.	Both absent.	Both absent.	Sensation and motion normal.	10th day condition normal.
LXvii	Mrs B. 26 iii Previous births Instruments and chloroform.	June 4th, 1907. 6 hours in hard labour. Instruments and high forceps. Pains radiated down back of right thigh to the knee. Complained of occasional cramps in legs for a month or two before birth. Female.	Both present.	Both absent.	Both present.	Sensation and motion normal.	Got up on 10th day. Good recovery.
LXviii	Mrs P. 33 v Previous births easy.	June 7th, 1907. Easy natural birth. Male.	Both present.	Both slight. Left absent.	Both absent.	Sensation and motion normal.	10th day condition normal.
LXix	Mrs A. 38 i	June 11th, 1907. 16 hours in labour. Normal birth.	Both marked.	Both absent.	Both absent.	Sensation and motion normal.	Condition normal 14 days after the birth.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
LXX.	Mrs McC. 31 iii	June 14th, 1907. Normal birth. Female.	Both marked.	Both absent.	Both marked.	Sensation and motion normal.	10th day. Good recovery.
LXXi	Mrs C. 20 i	June 15th, 1907. Very easy birth. Female.	Both absent.	Both absent.	Both present.	Sensation and motion normal.	Good recovery.
LXXii	Mrs McG. 30 i	June 15th 1907. Slow prolonged birth - 24 hours. Instruments and chloroform.	Left feeble. Right distinct.	Both absent.	Both present.	Sensation to pain diminished in front of left thigh as compared with the right. Hyperaesthesia over back of left foot. Extension of left toes very weak. Both well marked on right side.	Good recovery. 11th Day.
LXXiii	Mrs M. 27 ii	June 16th, 1907. Normal birth. Male.	Both present.	Both absent.	Both present.	Dulling of sensation on outer side of leg on left side. Dorsal flexion on ankle and extension of toes weak on same side.	Good recovery on 9th day.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
LXXiv	Mrs M. 19 i	June 16th ,1907. Half an hour before the birth she suffered from cramps in front of right thigh. Normal birth. Male. 3d cranial.	Both weak.	Both absent.	Both absent.	Sensation normal. Flexion of left great toe diminished.	Good recovery on 12th day. Plantar reflexes both present.
LXXv	Mrs D. 42 vi Three of previous births were instrumental.	June 24th, 1907. Day previous had severe pains in back of left thigh and leg, which disappeared after fomenting and resting. 3d cranial. Female.	Both present.	Both absent.	Both present.	Right leg from knee down feels colder.	Good recovery on 10th day.
LXXvi	Mrs C. 28 i	June 24th, 1907. In sharp labour for 7 hours.	Both present.	Both absent.	Both present.	Sensation and motion normal.	Good recovery
LXXvii	Mrs B. 26 i	June 29th, 1907. In labour for 24 hours. Pains run down front of thighs.	Both very feeble.	Both absent.	Both absent.	Feels the right lower limb painful on moving it also numb. Says she had to keep it warm with her hand.	10th day feels well. Both knee jerks still feeble. Both plantar reflexes present.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
LXXviii	Mrs C. 27 II 1st child born 5½ years ago, with instruments.	July 1st, 1907. Patient very anaemic. For two months before the birth she suffered from oedema of legs, weakness and shortness of breath. Twins. Male and Female. Male - 1st cranial. Female - Breech.	Left present. Right absent.	Both absent.	Both absent.	Feels at times right lower limb numb and cold. Muscles in front of right thigh and leg painful on pressure and on movement. Dulling of sensation over front of leg and dorsum of foot.	Got up on 13th day. Could not walk or lift right leg off the ground. 15th day was able to move holding on to a table. 16th trails right foot after her. Muscles in front of thigh and back and front of leg painful on pressure. Recovery in 4 weeks. Knee jerks both active.
LXXix	Mrs H. 34 Iv Previous births normal.	July 2nd, 1907. Normal birth, big child. Male.	Left present. Right absent.	Both absent.	Both absent.	Sensation and motion normal.	13th day pain and numbness complained of in right leg, since she got up on the 9th day, which has now almost gone.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
LXXX LXXXi. over the page.	Mrs P. 28 II 1st birth 17 months ago.- Twins.	July 3rd, 1907. Normal birth. Child 10 lbs. Had very severe pains in the legs and hips for 2 months before the birth, labour lasted 20 hours, Male. The pains in the legs caused her to shout out and she was lame, after standing a little.	Both absent.	Both absent.	Both absent.	Distinct dulling of sensation to touch and pain over the whole of the right hip, thigh and leg - as compared with the left. At the end of 1st week right leg feels cold and numb at times. Movements feeble in ankle and toes.	10th day got up practically well, but right leg feels a little stiff with soreness about the ankle.
LXXXii	Mrs S. 33 vii 1st child born with instruments, the others naturally. Last birth 5 years ago.	July 3rd, 1907. In labour 8 hours. Easy normal birth. Says she suffered from pain in left lower limb from hip to the knee every day for 2 months before the birth, often darting in character which forced her to stop and hold on to something, while walking; also complained of occasional cramps in right calf, lasting only a short time, the latter for a few weeks before the birth.	Both active.	Both absent.	Both present.	For 24 hours after the birth she had occasional pains in back of left thigh from hip to knee, each pain was accompanied by a feeling of numbness. Could not plantar flex the great toe on either side.	Well on the 10th day. Plantar flexion of great toes still impossible.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptons during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
Lxxxi	Mrs S. 38 vii	July 5th, 1907. Normal birth. Female.	Both feeble.	Both absent.	Both present.	Felt pain all day after the labour in front of right thigh which dissapear-ed after 12 hours. Sensation and motion normal.	Good recovery

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
LXXXiii	Mrs R. 22 I	July 16th, 1907. Easy normal birth. Female.	Both present.	Both absent.	Both present.	Sensation and motion normal.	Good recovery.
LXXXiv	Mrs McD. 34 vi All females.	July 17th, 1907. In labour 19 hours. Instruments and chloroform. Male.	Both present.	Both absent.	Both present.	Felt after pains radiating down front of left thigh.	Got up 11th day feeling well, but felt great pain, when sitting or attempting to rise, down the back of both thighs and legs.
LXXXv	Mrs M. 25 II	July, 19th, 1907. Normal birth. 12 hours in labour. Male.	Both present.	Both absent.	Both absent.	Sensation and motion normal.	Good recovery. Plantar reflexes still absent 14 days after.
LXXXvi	Mrs J. 26 ii 1st birth normal.	July 20th, 1907. Easy birth. 2 hours in labour. Male.	Both active.	Both absent.	Both present.	Sensation and motion normal.	Good recovery.
LXXXvii	Mrs B. 38 vi	July 21st, 1907. For 2 weeks before the birth severe cramps in left leg. Male.	Both present.	Both absent.	Both absent.	For 12 hours after the birth suffered from severe pains running down back of both legs.	Well on 11th day. Plantar Reflexes active, 14th day radial neuritis.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth, Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
LXXXviii	Mrs G. 45 xv 8 were still born.	July, 30th, 1907. 6 weeks before the birth, had on four occasions, a severe haemorrhage at intervals of 3 days, with large clots coming away. Child 10½ lbs. Says she felt pain in left lower limb all the time she was pregnant. Male.	Both present.	Both absent.	Both absent.	Distinct dulling of sensation to touch and pain in front of left thigh, as compared with the right. Motion normal.	Good recovery
LXXXix	Mrs B. 30 iii Previous births instrumental.	August 1st, 1907. For 6 weeks before the birth, suffered from pain and weakness in both lower limbs causing partial lameness.	Both absent.	Present in Right. Absent in left.	Both present but on right side great toe remains extended.	Sensation and movement normal, but cannot flex the great toe on the right side.	Good recovery

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery. Knee Jerks.	Ankle Clonus.	Plantar Reflex.		Result.
XC	Mrs B. 33 iv Previous births normal.	August 6th, 1907. For some months before present birth severe pains and cramps in both thighs and legs, especially the right. Male. Normal birth.	Both absent.	Both absent.	Both absent.	For 12 hours after labour - severe after pains extending down the thighs and legs both back and front, also numbness and cold feeling from the knees down. Movement induced cramps. Pain on pressure in same parts especially behind. 3 days after rigor; temp. 103 F. Stiffness and numbness in lower limbs. 8th day temp. normal. Pain like toothache in right arm from elbow to hand on ulnar side.	11th day got up legs very weak and causes pain in muscles of calf. Got quite well in a few days.
XCi	Mrs P. iv	August 7th, 1907. For a week coloured discharge. Cervix soft and patulous, No uturine pains. Has felt pains in front of both thighs and stiffness in walking for a week. Birth normal. Female. After pains extended to both thighs, worse on left side.	Both weak.	Both absent.	Both present.	Sensation and motion normal.	Good recovery

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
XCii	Mrs W. 25 ii	August 8th, 1907. Normal birth. In labour 20 hours, severe for last 2 hours. Male.	Both absent.	Both absent.	Both absent.	Dulling of sensation to touch and pain in front of thigh, outside of leg, and back of foot, on left side. Motion normal.	Plantar both active reflexes on 3rd day. Knee jerks still absent 3 weeks after. Good recovery.
XCiii	Mrs C. 30 iii	August 15th, 1907. Twins - Male and female. Easy birth.	Both active.	Both absent.	Both active.	Sensation and motion normal.	Good recovery.
XCiv	Mrs S. 28 ii 1st birth, instruments and chloroform, 16 months ago.	August 15th, 1907. Normal birth. In labour 5 hours. Female. Suffered for a week before from cramps in front of left thigh with sensation of prickling from knee downwards.	Both present.	Both absent.	Both present.	Sensation and motion normal.	Good recovery.
XCv	Mrs M. 23 i	September 1st, 1907. Easy normal birth. Female. Complained of pains and weakness in both lower limbs for 24 hours before the birth.	Both absent.	Both absent.	Both active.	Sensation and motion normal.	Good recovery. 3 weeks after knee jerks both present but modified.

No. or Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
XCvi	Mrs R. 26 ii 1st birth very difficult. Doctor sent her to Maternity Hospital as a serious case.	September 6th 1907. Labour easy. Male. For some months before - severe cramps in back of thighs and calf. Shortly after the birth severe cramp in back of left thigh.	Both present.	Both absent.	Both present.	Sensation to touch and pain diminished over left thigh, leg and back of foot, as compared with the right. Motion normal. Tenderness on pressure all up back of calfs and thighs on both sides.	11th day quite well.
XCvii	Mrs B. 33 v Previous births normal.	September, 7th 1907 Was called 3 days before when she suffered from severe pains, evidently uterine. Child born practically by expression, - caput succedaeneum well marked.	Both present.	Both absent.	Both present.	Severe after pains 1st 12 hours with cramps in front of both thighs and tingling sensation extending to the knees, more felt on right side. Sensation slightly diminished on right side from the knee down. Motion normal.	10th day got up quite well
XCviii	Mrs M. 35 v All Males. Easy births.	September, 8th, 1907. Slow labour. 26 hours, Instrumental but easy. Pains had been weak and short. Male.	Both present.	Both absent.	Both feeble.	Sensation and motion normal.	Good recovery.

No. of Case.	Name, Age, No. of Birth.	Date and Nature of Birth. Sex.	Symptoms during 1st week after delivery.				Result.
			Knee Jerks.	Ankle Clonus.	Plantar Reflex.		
XCIX	Mrs G. 40 / vi Previous births easy. Last child only 10½ months old.	Sept; 8th, 1907. Rupture of membranes 3 days before. No pain till above date. Anaemic. Male.	Both absent.	Both absent.	Both absent.	Sensation and motion normal.	Good recovery but knee jerks still absent 6 weeks after the birth.
C	Mrs G. 27 / ii 1st birth 4 years ago. Instruments and chloroform used. Perineum stitched.	Sept., 14th, 1907. States that ever since the first birth she has had a feeling of numbness in the right leg. Has never suffered from actual lameness, but the leg gets tired very soon.	Left present. Right absent.	Both absent.	Left present. Right feeble.	On 3rd day she complained of aching pains in the legs lasting the whole day. More severe on right side.	On 11th day she got up feeling well, There was a tingling sensation in both legs and feet but this soon disappeared off. The knee jerks and plantar reflexes were equal on both sides and well marked.

It will be noticed that in sixteen of the foregoing cases (2, 6, 13, 31, 40, 41, 42, 61, 65, 71, 80, 89, 90, 92, 95, 99.) both knee jerks were absent. In fourteen cases (12, 27, 32, 34, 35, 36, 39, 49, 51, 54, 74, 77, 78, 91.) both knee jerks were feeble.

Unilaterally the knee jerk was absent on the right side in twelve cases (3, 11, 29, 44, 47, 55, 58, 63, 64, 78, 79.) and on the left side in two cases (21, 22.) It was found to be feeble on the left side in eight cases (3, 5, 18, 24, 26, 29, 38, 72.) and on the right side in nine cases (7, 28, 43, 45, 50, 53, 60, 66, 100.)

The knee jerk appeared to be exaggerated, on the left side only, in three cases, (14, 60, 66.)

Ankle clonus was found, though feeble, on both sides in four cases (27, 31, 38, 61.).

Unilaterally it was present, on the right side, in eight cases (23, 24, 28, 29, 43, 54, 56, 89.) and in one of these only (54) was it distinct. On the left side it was present in two cases (59, 60.). In case(59)it was feeble, and in case (60) it was quite distinct.

The plantar reflex was absent on both sides in thirty-three cases (2, 5, 6, 7, 9, 12, 13, 21, 22, 28, 33, 40, 41, 47, 48, 53, 54, 56, 63, 65, 66, 68, 69, 74, 78, 79, 80, 85, 87, 88, 90, 92, 99.)
Unilaterally it was absent, on the right side, in one case (44) and on the left side in two cases (49, 59.).

Sensation was affected, on both sides in three cases (23, 45, 53.). In case 23, over the front of the thighs, legs and dorsum of the feet, sensation to light touch was almost absent, with dulling of sensation to pain on the left side. In case (45) sensation to pain and touch was diminished over the front of the left thigh and right leg. In case (53) sensation to pain and touch was slightly diminished over the front of the thighs and legs.

Unilaterally sensory symptoms were detected on the right side in ten cases (32, 41, 43, 44, 47, 54, 63, 78, 80, 97.). In case(32) sensation to light touch was distinctly absent over the front of the right thigh, though present to pain. In case (41) sensation to touch and pain was much diminished over the front of the right thigh. In case (43)

sensation to touch and pain was diminished over the front of the thigh and leg. Cases (44,47,54) were similarly affected. In case (63) sensation to touch and pain was diminished over the outer side of the right thigh, front of the leg and dorsum of the foot. In case (78) there was dulling of sensation over the front of the leg and dorsum of the foot. In case (80) distinct dulling of sensation to touch and pain, over the whole of the hip, thigh and leg, was made out. In case (97) sensation was slightly diminished from the knee downwards.

On the left side sensory symptoms were present in thirteen cases (4,17,18, 26,57,58,59,62,72,88,92,96.). In case (4)sensation to touch temperature and pain was diminished on the outer side of the left leg and dorsum of the foot. In case (17) sensation to touch was absent in front of the left thigh and leg and dorsum of the foot, though present to pain. In case (18) there was a distinct area of insensibility to touch over the front of the left thigh, but no analgesia. In case (26) sensation to pain was distinctly diminished over the front of the left thigh and leg. In case (57) sensation to touch and pain was diminished over the left hip and outer side of the thigh and leg. In case (58) sensation to pain was diminished over the outer side of the left leg from the knee downwards. In case (59) sensation to touch and pain was distinctly diminished over the front of the left thigh and leg and dorsum of the foot. Case (60) was similarly affected. In case (62) sensation to touch and pain was diminished on the outer side of the left leg. In case (72) sensation to pain was diminished in front of the left thigh with hyperaesthesia over the dorsum of the foot. In case (88) distinct dulling of sensation to touch and pain was made out, in front of the left thigh. In cases(92) and (96) sensation to touch and pain was diminished over the front of the left thigh, leg and foot. Motor symptoms were found on both sides in two cases (14 and 82). In case(14) plantar flexion of the toes and extension of the ankle joint was weak. In this case it will be noted that the patient suffered from severe cramps in the back of the thighs and legs for two or three times a day, for a month before the birth, which might account for the weakness in the flexor muscles supplied by the internal popliteal nerve. In case (82) the patient could not plantar flex the great toe on either side.

Unilaterally motor symptoms were present on the right side in four cases (54, 61,80,89.). In case (54) the patient complained of lameness in the whole of the right leg and required to be assisted when attempting to walk. This patient was of a very neurotic temperament. The plantar

reflexes, it will be noted, were both absent, and very distinct clonus could be elicited, affecting not only the ankle but the whole of the right lower extremity. It will be noted also that the patient was unable to walk for three months before the birth (twins) owing to pain and stiffness in the lower limbs. I regarded this as a case of Hysterical paralysis and consequently did not include it amongst the cases of puerperal paralysis already described. In case(61)there was inability to flex the left great toe. In case (80) the movements in the ankle and toes were feeble. In this case as already stated, sensation was diminished in the peroneal region, on the same side and the patient complained of a numb cold feeling in the leg. In case (89) the patient could not voluntarily flex the great toe on the right side.

On the left side motor symptoms were found in six cases (4, 58, 59, 60, 72, 74.) In case (4) flexion of the ankle and extension of the toes were weak on the left side and, it will be remembered that, here also sensation was affected in the peroneal area. In case (58) the motor and sensory symptons were somewhat similar. This patient had cramps in the left leg occasionaly for two or three weeks before the birth (twins). In case (59) flexion of the left ankle and extension of the toes was weak, also rotation inwards and adduction of the hip (superior Gluteal nerve), sensation, as already stated, was diminished in the peroneal area. In case (60) flexion of the left ankle was weak, and the leg felt colder to the touch than the right. She complained of weakness and lameness in the leg after getting out of bed. This case is fully described under the puerperal paralysees. P.14. In case (72) extension of the toes on the left side was very weak and, as already stated, there was an area of diminished sensation over the front of the left thigh. In case (74) flexion of the left great toe was weak, sensation was normal, but, as already stated, both plantar reflexes were absent.

My observations, in these cases, were confined to the lower extremities unless where, as in cases (61) and (69) symptons referable to other parts of the body were complained of by the patient. In case (61) , on the second day, the patient complained of a numb sleepy feeling in the left forearm, with a sensation of tingling in the fingers. These symptons disappeared after five days. In case (90) the patient complained of pain like toothache

in the right arm from the elbow to the hand on the ulnar side of the forearm. This patient had a rigor on the third day with febrile symptons. The temperature fell to normal on the eight day when the pain in the forearm was first complained of. The pain passed off in a few days. I look upon these as cases of slight neuritis.

To recapitulate then, we find that the knee jerks were absent on both sides in sixteen cases and unilaterally in fourteen cases making a total of thirty four cases in which the knee jerk was absent on one or both sides of the body. The same importance need not be attached to the cases in which a feeble response was elicited on one or both sides, as we know that the knee jerks vary much in different individuals and even in the same individual at different times of the day.

Ankle clonus was found in four cases on both sides and in ten cases unilaterally. In all the former and in eight of the latter the clonus was very feeble and limited to a few movements. In two cases it was well marked. Both were neurotic in temperament and one of these suffered from septic symptons and subsequent lameness.

The plantar reflex was absent in thirty three cases on both sides and unilaterally in three cases.

Motor symptons were not so common. In two cases symptons were present on both sides, and in both, the flexors of the foot were affected, this being limited to the flexors of the great toe alone in one case. Unilaterally symptons were present in ten cases making a total of twelve cases.

If we refer to the tabulated record of the series of cases now under consideration we find that in a good number of cases subjective symptons such as numbness, pain and cramps were complained of and, in a few cases, a feeling of coldness in one or both limbs. These cases are not taken into consideration here unless, in so far as, they occur in connexion with cases where some disturbance of sensation or motion had been found to co-exist.

Such then is a record of the foregoing one hundred consecutive births. In carrying out this series of observations I tried, carefully, to elimate sources of error in observation as much as possible.

E.G. In testing the knee jerk each patient was directed to close her eyes and in doubtful cases she was asked to clasp her hands tightly and at the same time to make voluntary effort, as if, to pull them apart. (Motor re-enforcement of Jendrassik); also as recommended by Dercum, op., cit., P.29. The patient being in bed was placed on her side with the leg to be examined uppermost and

considerable less flexed than when seated. The reason being that if the leg be too much flexed the muscle will be overstretched and there will be no response.

It will be noticed that in the course of these observations I have avoided the use of the term patellar or knee reflex. Dercum, P.28, says:- "The term is objectionable because it implies a special theory. By some authors it has been and still is regarded as a reflex. However, the time elapsing between the blow upon the tendon and the contraction of the muscle has been repeatedly and carefully measured and in less than would be required for the passage of the impulse from the nerve endings in the tendon to the spinal cord and thence back to the muscle, Beevor, P.35, says:- "The time taken by the phenomenon is too short for a true reflex action".

The observations of Lombard(52) on the knee jerk are well worth recording here:-

"The extent of the normal knee jerk is continually undergoing change. So great are the variations even when the subject is at rest that a correct idea of the activity of the process can be gained only by averaging the results of twenty or more experiments. The average knee jerk varies in amount at different times of the day being as a rule, greatest in the morning soon after breakfast, and being very much less at night. The decline which occurs as the day advances is very irregular, but in general the knee jerk is larger after each meal. Finally the extent of the knee jerk may vary greatly on different days. The causes of these variations of the knee jerk are not only alterations in the muscles and nerves involved in the process, but to a still greater degree changes in the activity of the central nervous system either as a whole or in part. Thus fatigue, hunger, enervating weather, and sleep, conditions which decrease the activity of the whole central nervous system, decrease the average knee jerk; while rest, nourishment and invigorating weather and wakefulness, influences which increase the activity of the central nervous system, increase the average knee jerk".

(52) American Journal of Psychol. Oct., 1887.

Another authority(53) says:-

"Enfeeblement or even complete abolition of the reflexes may occur (1) owing to diminished sensibility or complete insensibility of the afferent fibres.(2) in analogous affections of the central organ (3) or lastly of the efferent fibres. Where there is a general depression of the nervous activity (as after shocks, compression or inflammation of the central nervous organs; in asphyxia, in deep coma, and in consequence of the action of many poisons) the reflexes may be greatly diminished or even abolished and that according to Westphal, the knee jerk and tendo-achilles reflex are not simple reflex, processes, but complex conditions intimately dependent upon the muscle tonus, so that when the tonus of the quadriceps femoris is diminished the phenomenon is abolished"

Now we have found that in no less than 30 per cent of the foregoing cases the knee jerks were absent on one or both sides of the body. As to the pathological cause of this, it is impossible for me tc do more than speculate. We know, however, from what has been said, that the presence of the knee jerk depends on the muscular tone of the quadriceps extensor femoris, which receives its nervous supply from the anterior crural nerve and that most observers now discard the theory of its being a reflex and regard the phenomenon as one of muscle irrilability. It is possible to conceive that pressure on the anterior crural nerve during labour might cause a temporary paresis in the quadriceps muscle, which would have the effect of reducing its tonicity and in this way we might have a corresponding diminution or absence of the knee jerk on one or both sides. That such pressure is sometimes exercised on the anterior crural nerve is, I think, borne out by the fact that women often, during and even shortly after childbirth, suffer from severe pains running down the front of one or both thighs. Such symptons were present, however, only in a very few of my own cases, although they were enquired for, so that I feel we must look to some other source, than a traumatic one, for the underlying cause or causes of this condition.

Toxaemia, within recent years, has come to be recognised as an important factor in the production of various nervous phenomena which were, not so long ago, very imperfectly interpreted, and well defined blood changes have been made

(53) A Text Book of Human Physiology. Landois and Stirling Vol.ii 1891 P.789.

out in connexion with many acute and chronic nervous conditions.

We know also that in some other diseases, E.G. Acute Lobar Pneumonia, the knee jerks are very often absent owing, doubtless, to the toxines which are found in the blood in that disease, and similarly, I beleive the absence of the knee jerks such as was made out in so many of my cases, may be accounted for by the toxic condition of the blood associated with pregnancy and the puerperal state. However this may be I have recorded the facts as I found them, to the best of my ability and the toxaemic theory appeals to me as the best explanation of the condition that can be given.

In only two cases was there evidence of distinct ankle clonus. Ankle clonus is not now regarded as a certain sign of organic disease (Drummond (54) and my own opinion of these cases was that in one case we had to deal with a pseudo clonus in an hysterical patient, and in the other where septic symptons were present, the condition was probably due to toxines either autogenetic or introduced from without.

The plantar reflex was absent in 33 per cent of the cases on both sides of the body and unilaterally in 3 per cent. This is certainly a large number. However, this reflex is not constantly present even under ordinary normal healthy conditions. In females according to Sahl op., cit., P. 779 it is absent in health on both sides in 11 per cent and unilaterally in 1 per cent. It is curious to note that the proportion is exactly three times greater in my own cases, both as regards those occuring unilaterally and those occuring on both sides of the body, namely, unilaterally in 3 per cent and on both sides in 33 per cent. In looking for an explanation to account for the larger number of cases in which I found absence of the plantar reflex I can fall back only upon toxaemia as the most probable cause.

In connexion with this part of our subject cases (61, 82 and 89) are interesting. In cases (61 and 89) there was inability to voluntarily plantar flex the left great toe. In case (82) there was inability to voluntarily plantar flex the great toe on either side. When testing the plantar reflex in these cases the result was a flexor response in all the toes with the exception of the great toes indicated, in which voluntary plantar flexion was absent. The response therefore was similar to that found when Babinskis sign is present

(54) Univ. of Durham College of Medicine Gazette, July 15, 1907, P.140.

and might lead one to think that this sign was really present, were we not cognisant of the fact that voluntary plantar flexion of the great toes indicated, was absent, whereas, in Babinskis sign the patient can voluntarily flex all the toes of the foot including the great toe.

Of the twelve cases presenting symptons of motor paresis most were very slight and affected, for the most part, movement of the foot and toes only.

In one case plantar flexion of the toes and extension of the ankle only was affected, i.e., the muscles supplied by the internal popliteal nerve, plantar flexion of the great toe was absent in one case on both sides and in two cases on one side only; in one case it was diminished or weak.

In one case the patient suffered from lameness affecting the whole of the right leg but more especially affecting the peroneal territory. In four cases flexion of the ankle and extension of the toes was weak. There was weak flexion of the ankle alone in one case, and weak extension of the toes alone in another. In most cases, it will be noted, the paresis affected the movements of ankle flexion and extension of the toes, movements controlled by the external popliteal or peroneal nerve, and in seven of those so affected (4, 54, 58, 59, 60, 72, 80.) it will be found that sensation was also affected in some part of the territory supplied by the cutaneous, distribution of the same nerve.

Of the remaining five cases where no diminution of sensation could be made out; one was a case affecting the muscles supplied by the internal popliteal nerve. Four were those cases already referred to in which there was inability to voluntarily flex the great toe or toes only.

We have reasonable grounds here therefore for looking upon the paresis present in these cases as being due to intra pelvic pressure however slight on the lumbo, sacral cord such as I have already described under the puerperal peroneal paralyses. All of these labours were prolonged and difficult. In six instruments were required and of the remaining cases strangely enough two were twin births, one of these latter children was born with the head in the 3^{d} cranial position.

When we come to analyse all the cases in which sensation was affected we find here also that the dulling or diminution of sensation was very slight, and that in all the cases the skin areas affected were included within the

boundary of the cutaneous distribution of the peroneal nerve.

Seven of these were difficult labours, necessitating the employment of long forceps, and in another, labour was prolonged and difficult necessitating the use of forceps at the outlet.

In ten cases labour was prolonged and severe, lasting from 15 to 30 hours, although terminating without instrumental aid. These latter are the kind of cases in which some observers beleive that the patient is most apt to suffer from the effects of intra pelvic nerve pressure.

In only eight cases was labour of the ordinary average type as regards severity or duration. These I have called easy labours. Three of these strangely enough were twin births - a somewhat large proportion to have in 100 births - in one of which, pain and stiffness in the legs was complained of for three months before the birth and in another oedema of the legs weakness and shortness af breath for two months before the birth, and the third suffered from cramps in the left leg for a few weeks before the birth.

Of the remaining five cases one complained of numbness in the right leg for two weeks before the birth, another had a history of severe uterine haemorrhage at intervals of a few days, six weeks before the birth, and in three there was no history of any complaint before the birth.

Here again, therefore, we have, I think, strong enough evidence to satisfy us that the disturbances of sensation, already noted, in these cases was brought about in the most of the cases, at any rate, in the same way as were the motor symptons already referred to:- by pressure on the lumbo sacral cord; for we have to remember in this connexion that eighteen were prolonged difficult labours and that in eight of these instrumental aid was required.

In five of the remaining eight cases, in which labour was easy, there was one or other of such symptons present as pain, cramps, numbness and oedema of the lower limbs and uterine haemorrhage, dating from a period of two weeks to three months before the birth, while in the remaining three cases no such symptons were complained of.

The possibility of intra pelvic nerve pressure, even in easy natural births, need not be ignored, however, when one remembers the exposed position of the lumbo sacral cord as it crosses the ileo-pectineal line to reach the true pelvis.

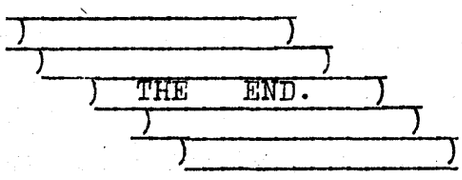
Indeed Lloyd 40, P.1209, states that "Jaccond is one of those who insist that pressure during labour may cause paralysis of the limbs, and that this occurs not only in complicated labours, as Hoffman and others observe, but also after regular and natural labours as Bruns has stated". The pressure origin of these sensory disturbances is further emphasised when we reflect that in the whole of the twenty six cases in which sensory symptoms were made out the area affected was the peroneal one and that in two cases, in addition, the skin area around the hip, supplied by the superior gluteal nerve, was also affected.

I have now come to the conclusion of what has been to me a very interesting study and I feel that the evidence I have been able to gather together leaves no doubt as to the existence of certain forms of paralysis associated with pregnancy and the puerperium. The subject is a large one and has extended to a much greater length than I at first anticipated. It embraces as we have seen, symptoms of paralysis or paresis referable either to the brain, spinal cord or peripheral nerves themselves. It is to the peripheral nerve lesions however, that I have more particularly directed my attention.

The existence of two definite types of puerperal peripheral neuritis; the traumatic, due to intrapelvic nerve pressure, and the non-traumatic due to the other causes already mentioned, has I think, been sufficiently demonstrated.

The exposed position of the lumbo sacral cord to intra pelvic pressure in connexion with labour, has been pointed out. The fact, first drawn attention to by Hunermann, that it contains the fibres, which, after division of the great sciatic in the lower third of the thigh behind the knee, ultimately form the external popliteal or peroneal nerve, has been already noticed, and its important anatomical bearing on the production of traumatic puerperal peroneal paralysis has also been dwelt upon. The different forms of neuritis and multiple neuritis belonging to the non traumatic type due to hyperemesis, sepis, toxines, &c.,have also been considered at some length, and lastly that we may have disturbances of sensation and motion in many cases, where such are not even complained of or suspected, is, I think, brought out by the analysis of the series of consecutive births which we have just been considering. I have made an exhaustive search in the literature of the subject and can find no record of any similar series of observations, and so ~~we~~ have been unable to compare the results obtained, in these cases, with the results of others. My sole aim, in this connexion, has been to arrive at the truth. Facts have been noted simply as they presented themselves to me and I have endeavoured to interpret them to the best of my ability. Whether

my observations may be confirmed, or otherwise, by the observations of others, more competent to judge. I, of course, cannot say, but this I will say, that the work I have done, such as it is, and however imperfectly performed, is the result of conscientious, painstaking observation and reading, and has been a source of, not only pleasure and interest, but of information and instruction to myself.



LIST OF REFERENCES.

Page 1. Note 1. St, George's Hospital Reports: Vol. 1. P. 197, 1866.

Page 2. Note 2. Quain. Dictionary of Medicine, 1902. Also quoted at P. 12.

Page 2, Note 3. Von Hoesslin. Munch Med. Woch, 1905. Also quoted on Pp. 7, 21. 35

Page 3, Note 4. Windschiet. Sammlung Zwanglosen abhandlungen ausdem Gebiete der Frauenheilkunde W. Geburtshulfe V. Max Graefe, Bd. II. 1899. Also quoted on P. 21.

Page 4. Note 5. Leishman. System of Midwifery. 3rd Edition, P. 828.

Page 5, Note 6. Dakin. Handbook of Midwifery, 1897. Also quoted on Pp. 35, 37.

Page 5, Note 7. Ballantyne. Essentials of Obstetrics, 1904, P. 219.

Page 5, Note 8. Beevor. Diseases of the Nervous System, 1898, P. 230.

Page 8, Note 9. Elise Taube. Ruckenmarksaffectionen ün Gefolge Von Schwangerschaft und Puerperium mit Einschluss der unter denselben Verältnissen Auftretenden Neuritis und Polyneuritis, April, 1895.

Page 9, Note 10. Brush. Medical News, 1898.

Page 9, Note 11. Bielschowsky. Myelitis und Sehnervenentzündung, Berlin, 1901.

Page 9, Note 12. Morrell. Puerperal Neuritis; Philad. Med. Journal. Vol.,1902, Jany. 18.

Page 10, Note 13. Fisher. Transactions of the Medical Society of New Jersey, 1875.

Page 11, Note 14. Adams. Lancet, 1880, Vol. II, P. 699.

Page 11, Note 15. Dercum. Text-book on Nervous Diseases by American Authors. 1895. P. 577.

Page 11, Note 16. Neitsehr für Klin. Medizin, 1892. XXI, 5 and 6. Von Leyden.

Page 11, Note 17. Deutsche Med. Woch, 1900. Nr 43. Eulenburg.

Page 11. Note 18. Beevor. Diseases of the Nervous System. 1898, P. 121.

Page 11. Note 19. Eulenburg. Realencyclopadie. 1901. S. 569.

Page 12. Note 20. Redlich. Neurot Centralblatt, 1901, Nr. 9.

Page 12. Note 21. Strumpell. Neurot Centrall. 1898, Nr. 13.

Page 12, Note 22. Gowers. Lehrbuch der Nervenkrankheiten. Deutsch Von Grube. 1892.

Page 12, Note 23. Lerbuch der Nervenkrankheiten. Oppenheim. Quoted also on P. 22.

Page 13, Note 24. Mills. Univ. Med. Mag., Philadelphia, May, 1893.

Page 21, Note 25. Reynolds. Puerperal Neyritis connected with Pregnancy and the Puerperal State. Brit. Med. Journal, Oct. 16th, 1897.

Page 21, Note 26. Deutsche Med. Woch., 1895. Eulenburg. Quoted also on Pp. 23, 28.

Page 22, Note 27. Mobius: Munch Med. Woch., 1887, Nr. 9; und 1890, Nr. 14; 1892.

Page 22, Note 28. Saenger. Referat. im Centralbl F. Gynak, 1900, Nr. 10.

Page 22, Note 29. Remak. Neuritis und Polyneuritis. Wein, 1899.

Page 23, Note 30. Soloweiff. Centralbl. F. Gynak, 1892, Nr. 8.

Page 23, Note 31. Stembo. Deutsche Med. Woch.. 1895, Nr. 29.

Page 23, Note 32. Wharton Sinkler. Jour. of Amer. Med. Assoc., Feb. 25th, 1905.

Page 24, Note 33. Kast. Deutsche Archiv. Klin. Medizin, 1886, Bd. 40.

Page 25, Note 34. Thomas. John Hopkins Hospital Bulletin. Nov. 1900. No. 116, Page 282. Also quoted on page 32.

Page 26, Note 35. J. C. Welch, M. D. Med. News, Philad. Oct. 19th, 1895, P. 428.

Page 26, Note 36. Chas. J. Aldrich, Amer. Gyn. and Obstet. Journal, Aug. 1889, P. 142.

Page 27, Note 37. Mills. Univ. Med. Mag., Philadelphia; Vol. 5, April 1893. P. 508. Also quoted on Pp. 33 and 34.

Page 28, Note 38. Mader. Neurolog. Centralbl., 1893, No. 4.

Page 29, Note 39. Mader. Korrespondenzblatt. Fur Schweizer Ärzte, 1901.

Page 29, Note 40. LLoyd. New York Med. Jour., December 22nd, 1906.
Also qouted on P. 33.

Page 29, Note 41. Twentieth Century Practice of Medicine, Vol. XI, 1897, P. 307. Lloyd.

Page 31, Note 42. Head. Injury to the Peripheral Nerves in Man. "Brain," Part CX, P. 202.

Page 33, Note 43. Hunermann. Arch. F. Gynakol., Vol. XLII, 1892, P. 307.

Page 34, Note 44. Playfair. Science and Practice of Midwifery, 1889, Vol. 1, P. 243.

Page 34, Note 45. Windscheid. Neurs Pathologie und Gynaekologie, August, 1896.

Page 34, Note 46. Bianchi. Des Paralysies traumatiques des membres inferieures chez les nouvelles accouchées. These de Paris, 1867.

Page 34, Note 47. Le Fèbre. Des Paralysis traumatiques des membres inferieures consequitives à l'accouch. laborieux. These de Paris, 1876.

Page 34, Note 48. Huber. Monatsschr F. Geb. Hülfe W. Gyn. Ap., 1899. Bd, IX. H. 4. Zur prophylaxe der neuritis puerperales.

Page 35, Note 49. Dr. Biggs. Lancet, October 19th, 1907.

Page 36, Note 50. Sahl. Diagnostic Methods; 1906, P. 927.

Page 37. Note 51. Quain'a Anatomy. Vol. III, Part II, 1895, P. 324.

Page 74, Note 52. Lombard. Amer. Jour. of Psychol., Oct. 1887. P. 140.

Page 76, Note 54. Drummond. Univ. of Durham College of Med. Gazette, July 15th, 1907.

Page 75, Note 53. A Text Book of Human Physiology. Landois and Stirling, Vol. II, 1891, P. 789.