

OBSTETRIC PARALYSIS, WITH REFERENCE ESPECIALLY TO THE PATHOLOGY AND ETIOLOGY.¹

BY G. F. CARTER, M.D.,
Assistant Physician to the Department for Nervous Diseases, Massachusetts General Hospital.

THAT the occurrence of a certain form of paralysis, involving a number of the shoulder and upper-arm muscles, and occasionally extending to some of the muscles of the forearm, as a result of injury during delivery, is of sufficiently frequent occurrence to warrant more attention than has been given by authors thus far, is proven by the frequency with which they have appeared at the Out-Patient Clinic at the Massachusetts General Hospital for treatment during the last few years.

which electrical stimulation puts all these muscles in action."² Hence, he referred the paralysis to disease of the sixth nerve.

Here, perhaps, it will be well to glance at the derivation of the brachial plexus, from the various nerve-roots. It is made up of the lower four cervical nerves and the first dorsal. It is to be remembered that the fifth cervical receives a branch from the fourth before it unites with the sixth to form the first or highest trunk of the plexus.

Experiments of Ferrier and others, together with anatomical investigations in cases where this type of paralysis has been occasioned by injury to nerves or by pressure from new growths, have definitely proven that the nerve-supply of the muscles most frequently affected by the condition under discussion is derived from the first trunk of the brachial plexus, which is made up by the union of the fifth and sixth cervical roots together with the communicating branch from the fourth.

A reference to the diagram would show that if the fifth and sixth cervical roots were injured at or before their exit from the spinal column, we must necessarily have a paralysis of the serratus magnus, supplied by the posterior thoracic nerve, which arises by two heads from the fifth and sixth cervical roots respectively. This has not occurred in any of the cases coming under my observation, nor in any reported by others, so far as I can learn.

Again, if these roots were injured before their union to form the uppermost trunk of the plexus, paralysis would ensue in the branch to the rhomboids, which does not occur, at least with sufficient frequency to have been noted. The next branch to leave this trunk is the supra-scapular, supplying the supra- and infra-spinatus muscles. This is constantly affected. Hence, since there is neither anatomical nor physiological objection, it is safe to locate the lesion in this trunk somewhere between the branch to the rhomboids and the supra-scapular.

Having located the lesion, we come naturally to the question, What is the manner of production?

Various writers have assigned various causes, the more common of which are:

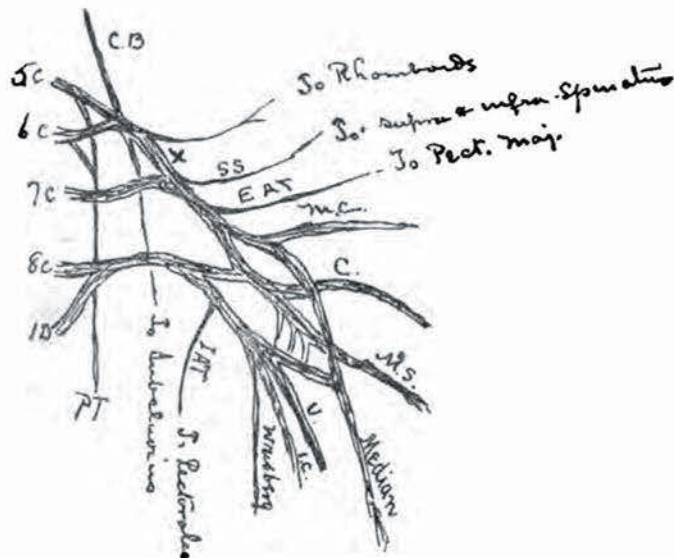
- (1) Pressure in neck from blade of forceps, finger or hook.
- (2) Overextension of arm.
- (3) Pressure in axilla in extracting.

The first cause, namely, pressure in the neck, would seem the most probable, considering the location of the lesion; and, indeed, one case has been reported where this condition would seem to have obtained; but a careful consideration of the surroundings would lead one to conclude that in order to press deeply and hard enough to produce this condition some external evidences of trauma would be produced, and this was the fact in the case reported.

Furthermore, several of the writer's cases were normal labors, the child being expelled head foremost without the use of forceps, and in one case without the physician's presence. Hence, we must discard this as a probable, while admitting it as a possible, cause, in very exceptional cases.

The second cause, namely, overextension of the arm,

¹ Read before the Boston Society for Medical Observation, February 6, 1893.
² Goway: Diseases of the Nervous System, vol. 1, p. 91, Philadelphia, 1892.



Fifteen of these cases have come under the observation of the writer within the last two years; and a physical examination has revealed certain conditions common to all, with one exception. The affected arm is held by the side in a position of internal rotation, the elbow pointing outward; the fingers are usually semi-flexed; this, however, is not constant.

A careful examination has shown that in every case there has been a paralysis of the deltoid, supra- and infra-spinatus, teres-minor, biceps and brachialis anticus, together with the supinators. In some of the severe cases, there has also been paralysis of some of the extensors of the wrist, or more especially the fingers.

In looking for the location of the lesion we at once think of Erb's paralysis of precisely the same distribution. "Erb found that there is one spot between the scapuli corresponding to the sixth cervical nerve, at

may be quickly disposed of, from the fact that this condition always produces paralysis of the muscles of the forearm and hand primarily, in other words, the ultimate branches of the plexus (that is, the median, musculo-spiral and ulnar nerves), and not the trunks, are the parts injured.

The third assigned cause may be as easily disposed of. Pressure in the axilla must produce a condition allied to, if not identical with, the well-known crutch paralysis, and here the nerve affected more than all others is the musculo-spiral.

Another cause which suggested itself to the writer, and of which little or nothing has been said by the various authorities, but which, nevertheless, is not inconsistent with the conditions surrounding any of the cases thus far seen by him or reported by others, is the stretching of the uppermost trunk of the plexus, either by traction on the head, by the hands or forceps of the obstetrician, by traction on the shoulders in extracting the aftercoming head, or by a rapid expulsion of the head from contraction of the uterus when a shoulder has met with some obstruction, as, for instance, the brim of the pelvis, thus widely separating the head from the shoulders, and stretching the nerve-trunks. It is to be borne in mind, that this result can more easily be brought about in the flabby condition of the new-born child, with the comparatively inelastic nerve-trunks.

The degree and extent of paralysis would depend upon the amount of force used in the stretching.

This view seems to be strengthened by two cases shown at the meeting of the Medical Society of London, on February 24, 1890. I will quote the reports of these cases as they appeared in Braithwaite (vol. ci, p. 249):

"Dr. Sidney Phillips showed a case of Erb's paralysis in a man aged thirty-one. The patient had been in good health till January 5, 1890, when, after drinking too much, he fell down stairs and struck the point of his shoulder; afterwards he found himself unable to use it. On examination the deltoid, pectoralis-major (slightly), triceps, brachialis anticus and supinator longus were found affected. They reacted only slightly to faradism, the deltoid not at all. The muscles were recovering slowly under the use of galvanism."

Dr. Beevor showed a somewhat similar case. "A man, aged thirty-seven, on November 21st was pitched off a cab, and fell on the left shoulder and side of head, stretching the neck. He gradually lost the use of the arm. At first there was some anæsthesia about the shoulder-joint. There was at present complete paralysis of the biceps, coraco-brachialis, brachialis-anticus, deltoid, supra- and infra-spinatus. There was no reaction to the strong faradic current, and the muscles gave the reaction of degeneration."

It will be seen at once that both these cases present symptoms almost precisely like those in the case under consideration. The manner of production of the paralysis in the first case is closely allied to that in the cases that are a result of a rapid spontaneous delivery, where the shoulder, presumably, meets some obstruction and is held back while the head advances rapidly.

The second case, on the other hand, closely resembles, in its manner of production, the cases where strong traction is applied to the head, or shoulders, and conversely the head or shoulders are held back by some obstacle.

The question of impairment of sensation in these cases is an important one. Indeed, Burr,³ in an examination of nine cases, failed to discover loss of sensation in any, and concludes that the lesion must be in the anterior horns of the spinal cord, or, in other words, that we had to do with a poliomyelitis, and suggested by the title of his paper the name, "Spinal Birth-Palsies."

Now, on analyzing his cases, it appears that in only five was he able to test the sensation, and these varied in age from three months to two years in four cases, the other being five years old. It will certainly be allowed that to test the sensation, accurately, in a child of two years or younger, is very difficult, if not impossible; and it is a well-known fact that sensation returns excepting in very limited areas, even after section of sensitive nerves, such as the median, or ulnar.

Thorburn,⁴ after describing the areas supplied with sensation by the various nerve-roots of the brachial plexus, says: "The exact lateral extent of the bands of skin supplied by each root can hardly be determined, and is, indeed, probably not a fixed quantity; the boundaries are usually ill-defined, and there can be little doubt that vicarious conduction of sensory impressions readily arises, as in other varieties of anæsthesia."

Furthermore, in the second case quoted above from Braithwaite, it was especially stated that "at first there was some anæsthesia about the shoulder-joint," seeming to imply that even this was a temporary condition.

If we need further proof that the paralysis is due to injury of a nerve and not to inflammation of the spinal centres, it is to be found in the clinical history of many of these cases. It is a well-known fact that the paralysis due to a poliomyelitis rarely, or probably never, entirely disappears, and that if improvement takes place, it is usually within the first few months from its onset. With the class of cases under discussion, the opposite is the rule.

The diagnosis of this condition is comparatively easy. The paralysis is rarely noticed before the second or third day, when it is noticed that the child does not move the arm, also that it is in a position of internal rotation, the elbow pointing outwards, the forearm hanging listlessly, and if the case is severe, the fingers semi-flexed. After a few days the reaction of degeneration is well marked in the affected muscles; and undoubtedly, if we were able to test carefully, we should find some diminution, not necessarily loss, of sensation over the area supplied by the fifth and sixth cervical roots, namely, the outer aspect of the shoulder and upper-arm and radial side of the forearm as far as the styloid process of the radius or base of thumb.⁵

The prognosis in these cases may be said in a general way to be good, but recovery is frequently exceedingly slow. One patient, now three years and eleven months old, whom I have had under observation since birth, has improved more during the last eighteen months than ever before, and is still apparently gaining. A few cases, on the other hand, recover completely in a few months. That the very great majority of cases get well, or practically so sooner or later, would seem to be indicated by the

³ Boston Medical and Surgical Journal, vol. cxxvii, p. 285.

⁴ Thorburn: Surgery of Spinal Cord, p. 42.

⁵ Gowen: Diseases of the Nervous System, vol. 1, p. 210.

fact that none of the physicians connected with the nervous department of the Massachusetts General Hospital has ever seen the condition, dating from birth, in an adult patient; and so far as the writer has been able to discover, only one case (Lovett's⁶) has been reported where the paralysis has persisted to adult life.

The treatment in these, as in all cases of injuries of nerves, is important, although simple. It consists in the use of passive movements, massage and electricity. Galvanism over the affected muscle and through the region of the brachial plexus, frequently applied (two or three times weekly) for months, seems to be the best means at our disposal for combating the contractures which take place in the offending muscles, and regenerating the affected nerves.

Lovett's suggestion as to the use of the Velpeau bandage to prevent the relaxation of the ligaments of the shoulder, is undoubtedly a very valuable one.

I have tabulated, as well as possible, the cases reported by Lovett and Burr, together with my own.

Case I by Lovett, and Case IV by Burr, are apparently the same.

LOVETT'S CASES.

No.	Side.	Presenta-tion.	Duration.	Remarks.
1	Right	Head	9½ hours	"Strong traction on the head combined with pressure on the fundus was necessary."
2	Right	....	....	"The labor was a particularly easy one."
3	Right	Head	....	"A difficult labor, forceps were used." Patient now 19 years old, arm not very useful.
4	Left	Head	....	"Long tedious labor and forceps delivery."
5	Left	....	....	"Cross birth, possibly central paralysis."
6	..	....	....	No account of labor or distribution of paralysis.
7	Left	Footling	....	Forceps applied to after-coming head.
8	Right	Head	....	"The labor was not a very hard one, but forceps were used."
9	Left	Head	....	"Forceps were used."

BURR'S CASES.

No.	Side.	Presenta-tion.	Position.	Duration.	Remarks.
1	Right	Head	....	2½ days	Forceps.
2	Right	Head	....	Day and night	Forceps. (Sister of preceding.)
3	Right	Brow	....	3 days	Forceps. Distribution of paralysis different. Extraction of shoulder difficult, strong traction on an arm.
4	Right	Head	....	7 hours	Forceps.
5	Right	Head	....	2 hours	Forceps. "Extraction of shoulders difficult, necessitating additional traction by the head."
6	Right	Head	O.B.F. Gradual change to R. Transverse.	20 hours	Forceps. "Extraction of shoulders difficult, accoucheur being obliged to pull on head so forcibly that he was afraid the vertebra would dislocate."
7	Right	Head	....	16 hours	Forceps. "There was some delay in the delivery of the shoulders, and the accoucheur wrapped a towel about the infant's head and pulled."
8	Right	....	....	....	Forceps.
9	Right	Head	O.L.A.	9½ hours	"Strong traction on the head combined with pressure on the fundus was necessary."

My own cases are as follows:

No.	Sex.	Age.	Side.	Presenta-tion.	Posi-tion.	Time of Labor.	Remarks.
1	M.	2 mos.	Left	Breech	..	....	Mother etherized.
2	F.	7 wks.	Right	Head	..	....	Forceps.
3	F.	2 yrs.	Both	Breech	..	Long	Improving.
4	M.	4 mos.	Right	Head	..	7 hrs.	Forceps. (Died August, 1892.)
5	M.	5 wks.	Left	Head	..	Long	Forceps.
6	M.	5 wks.	Left	Head	..	....	Forceps.
7	F.	3 mos.	Left	Shoulder	..	3 or 4 hrs.	Version. Both arms affected first. Right well in 2 mos., left improved rapidly of late. Now 3 yrs. old.
8	M.	4 wks.	Right	Head	..	....	No operative interference.
9	M.	3 yrs.	Right	Breech	..	Long Dif.	Much improved of late.
10	M.	1 yr.	Right	Head	..	Short	Born before arrival of physician.
11	M.	10 wks.	Left	Head	..	11 hrs.	Forceps.
12	F.	2 dys.	Left	Head	O.R.A.	14 hrs.	Forceps. Now 4 yrs. old. Has improved more in last two yrs. than before.
13	M.	3 wks.	Right	Head	..	9 hrs.	Traction on head in extracting shoulders.
14	M.	6 wks.	Right	Head	..	....	Forceps.
15	F.	1 mo.	Right	Head	..	....	No operative interference.
16	M.	2 mos.	Right	Head	O.L.A.	....	Forceps high up. Some improvement of fingers.

I am indebted to Dr. J. J. Putnam for notes in Case 16.

Lovett's Case VI has no history, hence we have statistics in thirty-two cases. Forceps were used in twenty cases, having been applied in one case to the after-coming head. It is therefore apparent that they are not a necessary factor in the production of the condition in question.

There is no direct history of traction by the arm except in Case III reported by Burr; and here we have a different type of paralysis. There are three breech cases. In one, both arms were affected; the others were one right and one left. In the one case where version was performed, we have the history of disturbance in both arms, one of which quickly recovered and the other improving rapidly at the end of three years. In Lovett's Case VII, a footling, the left arm was affected. Here forceps were applied to the after-coming head, an operation which would probably not be performed until traction on the body had been pretty thoroughly tried.

In Lovett's Case VI, the labor was characterized as a "particularly easy one," and in Case X, my own list, the child was born without assistance and before the arrival of the physician. In these cases, it seems to me, that the only explanation one can offer is, that in the rapid advance the shoulder met some resistance, for example, the pubic arch, and the strong contraction of the uterus caused the stretching of the nerve trunk.

It is especially noted, in several of the cases, that there was strong traction by the head, and it is fair to assume that in the breech, footling and version cases there was traction on the body in extracting the after-coming head; hence, may we not conclude that in all, or nearly all the cases of this type, this one necessary factor, namely, stretching the trunk, composed of the fifth and sixth cervical nerves with the communicating

branch from the fourth, exists, either produced by traction on the head or shoulders with the forceps or hands, or by pressure from behind when the shoulder has met some obstruction.

If our conclusion is correct, under ordinary conditions we expect to find the right shoulder affected in cases where the position was O. L. A., and in other cases where the right shoulder met the obstruction; and it is interesting to note in this connection, that in the few cases when the position has been ascertained this rule follows. In the two cases where the position was O. L. A., also in the one case of O. R. P., we find the right shoulder affected; on the other hand, when the position was O. R. A. the left shoulder is the affected one. In the case (X) where the labor was short and delivery spontaneous, the right shoulder was affected. Is it not fair to assume that this was an O. L. A.?

In the breech and other presentations involving the birth of the head last, we might expect to find either or both sides affected, as was found to be the fact above.

While I am well aware that the statistics here presented are too meagre to establish any rules in the matter, may we not formulate the following provisional conclusions?

(1) The upper-arm type of obstetric paralysis is due to a stretching of the upper trunk of the brachial plexus, during process of delivery.

(2) This is brought about by traction on the head or pressure on the breech when the shoulder is retarded, or by traction on the shoulder when the head is retarded.

(3) The prognosis, as a rule, is good, although recovery may be delayed months or years, permanent disability being rare.

LAPAROTOMY IN TUBERCULAR PERITONITIS.¹

BY S. J. MIXTER, M.D.

IN choosing the above subject for a paper, I have two distinct points in mind: first, to call out opinions as to the relative frequency of cases of true tubercular peritonitis or those of so-called granular peritonitis, and the curability of either or both by operation; and second, to report a single case selected from a number in my practice, but one which seems to illustrate better than any that I found reported, a perfect example of true tubercular peritonitis cured by operation.

On talking with some of the students in my clinics, I have found that there is an impression prevailing among some of them at least, that cases of chronic peritonitis cured by laparotomy are not cases of a true tubercular process; that they are so-called granular peritonitis and the bacillus of tuberculosis is not present. This idea they gathered, and whether or not it has been intended to be conveyed by the lecturer, it is certainly a prevalent one among these men. On looking up reported cases I find no reason to think this a correct view of the matter, and I should rather incline to the belief that most of these cases were true tuberculosis, and that the exceptions were the granular cases, whether recovery followed operation or not. Osler, in his very thorough article on this subject speaks of cases resembling in general appearance and in certain ways, tubercular peritonitis, where the

nodules found scattered over the peritoneal surface are not tuberculous, but are either fibrous, syphilitic, lymphomatous, or even carcinomatous in character. Cases are also mentioned where, following operation (the patient having died of some acute disease some time after), the nodules have been found to be undergoing a degenerative process; and it is possible that cases of so-called granular peritonitis may be the results of a previous tubercular process. On this point I have no opinion to offer, but simply make the suggestion that the line of distinction between the two is not at all a sharp one.

In looking up the literature of the subject I am impressed by the fact that a large number of cases is reported where careful microscopical examination of small portions of the peritoneum, removed for that purpose, has been made, and that in almost all such cases, true tuberculosis was found. I say "true tuberculosis" advisedly; and my statement may be questioned by those that only accept the demonstration of the presence of Koch's bacillus as a sure proof of tuberculosis, but to those I say that, though I find many reports of the presence of the bacillus, I find very few indeed where it is stated that it was sought for and not found. This may be negative evidence, but I wish to state after a study of the subject from its surgical and historical side (by the latter, meaning reported cases), that the evidence, negative and positive, points to the presence of a tubercular process even in the majority of the chronic peritoneal inflammation cured by opening the peritoneal cavity. I am told by one good authority in pathological matters, that it is absolutely necessary to prove the presence of bacilli in these cases to show that the process is a tubercular one, and by another authority, also a good one, that any one should be able to distinguish between the tubercular and the non-tubercular process on inspection of the interior of the affected abdomen.

It is to clear up some of these doubtful points that the reader reports a case to-night which may be used as a central point around which to group various theories and conjectures as to the pathological nature of these processes; and also to call attention to certain differences in the surgical treatment, and to the results following laparotomy which have certainly been as brilliant as those following any operation devised by modern surgery, for the relief or cure of a disease formerly considered fatal in most cases. Osler has written so clearly and so well upon the whole subject of peritoneal tuberculosis that there is little need of further work in that direction at present.

It is not intended to refer here to the subject of encysted tubercular peritonitis or to the question of tuberculosis of the tubes in the female as causing a general peritoneal infection. There are, perhaps, cases of this kind where a cure, or disappearance of symptoms, may take place without surgical interference of any kind, but they are certainly far from common. It is also true that a cure may follow one or more aspirations or tapings of the abdomen; but the best treatment is without doubt the opening of the abdominal cavity, separation of adhesions as far as possible, perhaps followed by washing out the belly with warm water, salt solution, or even some antiseptic.

The following is an abstract from the Carney Hospital reports:

Sylvina Q., age thirteen, born in Portugal, entered the Carney Hospital July 10, 1892. Previous history

¹ Read before the Boston Society for Medical Observation, February 6, 1893.

There is one other point that seems to me of importance, and which is exemplified by the case to which I have referred, and that is, that occasionally, in consequence of partial injury to some of the nerves — at least I presume that to be the case — the paralysis of certain muscles is complicated by the spasm of other muscles not entirely paralyzed. This little child had at one time quite a strong spasm of the flexor muscles of the fingers, which I was afraid was going to give considerable trouble, and also spasm of the pectoralis, which still persists to some extent. The most marked instance of this which I have seen was in a case brought to the Massachusetts Hospital about nine months ago. The arm with the elbow flexed was drawn up into the position of a boxer defending his face, and although it could be pulled down without great difficulty it almost immediately returned to its former position when it was released. I think that Dr. Carter's observations are valuable in several particulars, particularly as pointing out the real explanation of the pathology, an explanation which it is possible may lead now and then to the avoidance of the trouble, and also in pointing out the probability, which I hope represents the truth, that the long-delayed recovery, as a rule, makes its appearance at last.

DR. C. M. GREEN: I have been a good deal interested in this class of cases ever since the papers of Dr. Lovett and Dr. Burr; and I am glad to have heard Dr. Carter's presentation of the subject this evening. Dr. Carter's explanation of the probable cause of obstetric paralysis of the arm is to me very convincing. It seems quite improbable that the paralysis can result from undue pressure of the forceps on the child's neck, for even in face presentations the blades need rarely, if ever, impinge upon the neck, but are properly kept from doing so. But in the delivery of the after-coming head, and in the extraction of the shoulders after the fore-coming head is born, strenuous traction is often necessarily exerted upon the neck, and apparently in some cases the brachial plexus is thereby unduly stretched and paralysis results. That great traction on the neck is not necessarily followed by paralysis is, of course, quite evident; I have never had a case of brachial paralysis following labor in my own experience, and yet I have often been obliged to exert great traction on the neck in the delivery of the after-coming head in difficult cases.

The case cited by the reader as occurring in Dr. Richardson's practice I had the opportunity of seeing; in fact, I assisted in the delivery of the child. Interference was indicated when the head was in the superior strait, O. L. A. The high forceps operation was performed, and the head was delivered without extreme difficulty: but the child was very large, it was found to weigh eleven and three-quarters pounds, and the extraction of the shoulders seemed almost impossible. A good deal of force was necessarily exerted upon the neck, that is to say, the neck was subjected to much stretching from traction on the head, in order to accomplish delivery of the shoulders, or even to bring the shoulders low enough to enable the operator to extract the arms. In this case, the neck was certainly subjected to sufficient traction to stretch the brachial plexus: but it was a question of possible injury to the child, or the loss of it altogether. And it must be remembered that to save foetal life the obstetrician must work rapidly; for a child presenting by the head can no more breathe after the birth of

REGULAR Meeting, Monday, February 6, 1898, DR. J. W. FARLOW in the chair.

DR. CARTER read a paper on

OBSTETRIC PARALYSIS, WITH ESPECIAL REFERENCE TO THE ETIOLOGY AND PATHOLOGY.¹

DR. J. J. PUTNAM: I have been long interested in these cases, and I am aware that some of the obstetricians consider them to be of rather slight importance, and almost certain to do well. In our experience at the hospital some of them have been very serious, although it seems highly probable that most of them finally recover. We have, however, a very conspicuous instance of only a partial recovery, it is said, in the present German Emperor, and where the recovery is long delayed, arrest of development would be likely to occur. In regard to the mode of production of the paralysis, it seems to me that Dr. Carter is entirely correct in supporting the theory of stretching of the cervical root. It was always unsatisfactory to me to adopt the old theory of pressure. It seemed impossible that the forceps should slip down so far as to reach the upper branch of the brachial plexus and that they should always injure the same point. The spinal theory is, one of my friends has told me, taught to some extent in Germany, but I have not been able to find any definite reference to it.

In regard to the case to which Dr. Carter referred, it was a case of Dr. W. L. Richardson's; and in his absence I will say that Dr. Carter's statements are correct, and that the child at the end of two months has recovered so as to extend the fingers, although feebly. I presume that the other muscles will recover in time.

¹ See page 434 of the Journal.

² Pick: Annals of Surgery, 1892, vol. xvi, 554.

the head while the shoulders are still undelivered, than he can in breech cases while the head is arrested in the superior strait. As I understand Dr. Carter, he has found that in head presentations the paralysis affects the anterior arm; that is, the right arm in O. L. A. cases, and the left arm in right positions. Is this explainable by the fact of greater pressure on the anterior shoulder against the symphysis?

DR. CARTER: That is a question I have not been able to decide. That is my theory.

DR. C. P. PUTNAM: What is the proportion of cases in which forceps was used?

DR. CARTER: Twenty out of thirty-two.

The object of this paper was to show that the forceps was not responsible for this form of paralysis, that the injury was done after the head had passed out where it was not meeting with resistance, but the shoulders were being held back and there was traction on the head.

DR. WALTON: I am afraid I cannot add anything to what has been said. I can only say that I thoroughly endorse Dr. Carter's views regarding the etiology. It has never seemed to me that the previous explanations were satisfactory. The pressure of the forceps may be almost at once eliminated for certainty. As Dr. Carter has said it would seem almost impossible that one could produce such pressure on these yielding parts as to produce a lasting paralysis without some external signs. The explanation offered of spinal lesion it seems to me we can practically throw out, although we can imagine a disease or lesion at that point in the spinal cord where the fifth and sixth roots arise, yet the prognosis would militate strongly against such a theory inasmuch as such a pathology would leave a permanent residue. We are really left with this explanation of Dr. Carter's as the only satisfactory one, and he is certainly to be congratulated for working it out so carefully and satisfactorily. This theory also explains those cases where a similar paralysis occurs in the adult following a fall on the shoulder which separates the shoulder violently from the head. Here there is no dislocation to cause brachial paralysis, no local pressure, and no other cause excepting stretching of the plexus to explain the trouble. As far as the prognosis goes it is rather surprising that there is such a difference of opinion. Some obstetricians treat this subject very lightly, and tell the family it will rapidly recover and does not amount to much. Whereas we have on the other hand, the views of certain writers who state that the prognosis is very bad. My experience would lead me to place the prognosis somewhere between these two extremes. I have never seen an adult with remnants of obstetrical paralysis. I did not know, by the way, that it was certain that the Emperor's paralysis was obstetrical paralysis. I think we may fairly say the prognosis for ultimate recovery is good, but that the trouble may persist many years.

DR. C. R. BURR: I am apparently the only advocate here to-night of the spinal origin of this disease.

Dr. Carter has rather doubted my ability to test sensation in the young child, but even an infant is quite capable of determining whether or not it feels a pin-prick and of expressing its feelings in a forcible manner. In the five cases so tested I got not the slightest evidence of impaired sensation.

Another point which attracted my attention was the irregular distribution of the paralysis, that is, all

the muscles supplied by a common nerve were not necessarily paralyzed. This was very evident in two of the nine cases which I reported. In the first of these, three of the muscles supplied by the posterior interosseous nerve were paralyzed, namely, the extensor primi internodii pollicis, the extensor secundi internodii pollicis and the extensor indicis; while two were operative, namely, the extensor communis digitorum and the extensor minimi digiti. In the second case, of the three muscles supplied by the musculospiral nerve, namely, the coraco-brachialis, the biceps and the brachialis anticus, the first was the only muscle which could be moved.

A pressure neuritis, as I have seen it, runs a definite course of a few weeks; or at most, of a few months' duration; but several of the cases which I reported, had already lasted many months and one five years. I do not think, therefore, that until our knowledge of the pathology of this affection is fuller than at present we are warranted in considering it other than a form of acute anterior poliomyelitis. If any autopsy had ever been obtained, this theorizing as to the nature of the lesion would be unnecessary.

After my paper had been written, there was brought to the Children's Hospital an infant nine months old. It had the characteristic symptoms of obstetric paralysis. The thumb was folded across the palm, the fingers flexed over it; the forearm extensors were paralyzed, also the upper-arm flexors; the elbow was turned to the front. I examined the child with considerable interest. There was not the slightest history of obstetric paralysis. Three weeks previously the mother had noticed for the first time that the child could not raise the left arm. This was a second child and there was a history of instrumental delivery. It occurred to me: Is this an obstetric paralysis? The symptoms were identical, but the history was different. There had been no illness since birth save a "bronchitis" six weeks before, and it is inconceivable that had the arm been paralyzed at birth it should have remained unnoticed for nine months.

As long as the theory has been ascribed to me, I am pleased to hear it has also been advanced in Germany.

In brief, this theory is that since there is at birth a physiological congestion of the foetal brain and cord, which is directly proportionate to the obstacles encountered, and since also the gray matter of the cord and that of the anterior horns in particular, is more vascular than the contiguous tracts, it is conceivable how traction at this juncture might result in capillary extravasation and subsequent degeneration of the ganglion cells. This I conceive to be the common etiology of the affection, though of course, along with this, there may be a forceps paralysis as well.

DR. J. J. PUTNAM: I believe there is not the slightest question that poliomyelitis of this type occurs both with adults and children; and within two months we have had at the hospital a man fifty years old with a typical paralysis of this sort. Furthermore, I believe it is possible that poliomyelitis may occasionally occur in foetal life, but the upper-arm type of birth-palsy is seen far too often to admit of its being ascribed to that cause. Then, moreover, as this case of mine shows, the reaction of degeneration sometimes does not come on for several weeks after birth; whereas after poliomyelitis occurring in foetal life we should probably have the child born with the reaction of degeneration. Of course, it might occur just at the moment of birth

and be due to capillary hæmorrhage; but it seems almost incredible that we should have a hæmorrhage limited to such a small portion of the spinal cord, and yet occurring so often in that same portion.

DR. WALTON: It has struck me that an additional argument against the spinal origin is that in some cases the lesion is bilateral. It would certainly be surprising to have a double lesion of the cord whereas stretching of both brachial plexuses, for example in a breech presentation, is not at all improbable.

DR. CARTER: With regard to the case Dr. Burr mentions, a reference to the anatomy will show that there is a branch from the musculo-spiral which supplies the muscles paralyzed; injury of that branch would paralyze just those muscles, hence I would suggest that the injury may have been purely a local one and not an injury to the plexus or nerve-roots.