TRANSACTIONS

OF THE

PHILADELPHIA ACADEMY OF SURGERY

Stated Meeting, held May 7, 1917

The President, Dr. CHARLES H. FRAZIER, in the Chair

SPLENECTOMY FOR PERNICIOUS ANÆMIA

DR. J. STEWART RODMAN reported the history of a man, aged thirty-nine years, who was admitted to Dr. Sailer's service August 13, 1916, suffering from asthenia. He had been well until five weeks before admission when he began to have daily attacks of abdominal pain, with chills and sweats, and an attack of vomiting every other day. No blood in the vomitus nor in the stools. Lost weight rapidly—thirty pounds during the period. He was markedly pale and anæmic; eyes prominent, skin icteroid; tender under right costal margin; spleen not palpable; no adenopathy—urine albuminous but free from casts and sugar; on admission red blood-corpuscles were 2,580,000; hæmoglobin, 30 per cent. Two weeks later the red count had fallen to 1,050,000 with hæmoglobin 20 per cent. A blood transfusion of 150 c.c. was done September 17, which raised the red count to 3,420,000, with hæmoglobin 30 per cent. October 18, the red count had fallen to 3,100,000 with hæmoglobin 35 per cent. A splenectomy was resorted to October 19, being done by Drs. Allen and Rodman.

The removed spleen was one and one-half times its normal size; was adherent to stomach, pancreas, colon and diaphragm. Moderate hemorrhage. Pedicle clamped and double ligated. Gauze packing to diaphragmatic surface. The gauze was removed five days later. The postoperative course was uneventful. On October 24, five days after the removal of the spleen, the red count had risen to 3,250,000, hæmoglobin 44 per cent.; three weeks later the red count had risen to the normal level of 4,470,000 with hæmoglobin 45 per cent. The patient was discharged home November 15, 1916.

GUNSHOT WOUND OF THE SPINAL CORD

DR. J. STEWART RODMAN reported the history of a man aged thirty-four years, who was admitted to the Presbyterian Hospital, in the service of Dr. F. O. Allen, December 17, 1916, on account of a gunshot wound of the neck.

The bullet had entered posteriorly on the right side at the base of the neck. He was unconscious when admitted but regained consciousness shortly after admission. Temperature 100 degrees. Pulse 80. Complete paralysis of upper and lower limbs. Loss of sensation to upper third of chest. Loss of bladder and rectal control. An X-ray plate showed a bullet in the spinal cord about the level of the fifth cervical vertebra.

Operation.—(Gas and oxygen.) Drs. J. S. Rodman and F. O. Allen.

Laminectomy; spines and laminæ of fifth, sixth, and seventh vertebræ removed. Fourth and fifth vertebræ fractured by bullet, 38 caliber bullet removed from spinal canal at level of fourth cervical vertebra. After lifting bullet from its bed it was seen that the spinal cord was completely divided at this level; wound closed with gauze drainage.

TRAUMATIC BRACHIAL PARALYSIS.

DR. ASTLEY P. C. ASHHURST presented a man, aged fifty-four years, who was referred by Dr. J. H. Baldwin to his service at the Orthopædic Hospital, June 10, 1916. On March, 1916, this man had fallen and injured his left shoulder. One week after the injury the man applied to Dr. Baldwin, who sent him to the Methodist Hospital. Paralysis was present at this time. Dr. Baldwin found the whole limb much swollen, and recognized the presence of an unreduced dislocation of the shoulder (subcoracoid); this was reduced at the hospital under primary anæsthesia by Dr. L. J. Hammond. The patient went home eight days after the dislocation was reduced, in good condition. Two weeks after leaving the hospital he says his arm began to swell; he had considerable constant pain like pins and needles radiating from the shoulder to the fingers. He then returned to the Methodist Hospital, where he remained six weeks, receiving massage and electricity.

Examination, June 10, 1916, three months after the injury, when first seen at the Orthopædic Hospital, showed a healthy looking man, with the left upper extremity hanging helpless at the side of the body. There was no *voluntary motion* below the shoulder except very slight power in the triceps, sufficient merely to extend the elbow a trifle, and very questionable power of pronating the forearm. The arm could be elevated from the side by means of the trapezius acting on the scapula. There was good power in the pectoralis major. There was noticeable atrophy of the deltoid. There was no power to flex the elbow, nor to move the hand or fingers. The hand was slightly swollen. *Passive motion:* at the shoulder external rotation was limited at the sagittal plane, abduction at 35 to 40 degrees (without causing rotation of the scapula); other passive movements were normal except slight loss of full extension of the elbow. There was some grating in the shoulder on motion, and some thickening of the bones.

Electrical examination by Dr. H. P. Boyer, June 12, 1916, showed reaction of degeneration in the deltoid, biceps, triceps and the flexors and extensors of the carpus and fingers. The response was very poor to the galvanic current, and there was practically no response at all to the faradic current.

Treatment consisted in massage and electricity three times weekly. The question of exploratory operation was discussed with the patient, but not urged very enthusiastically, and was not accepted by him.

July 1, 1916. The elbow and hand swell at times. He thinks he has more power in the shoulder and elbow, but none is apparent on examination.

September 16, 1916. The patient says that sensation, which was absent below the elbow when he first came to the hospital three months ago, has returned very gradually and now is about normal from the wrist up. In the hand hypæsthesia (no anæsthesia) persists. The patient was seen at this time by Dr. Francis W. Sinkler, who believes the lesion to have been a laceration of the nerves in the axilla. Examination to-day (September 16) shows no power to flex the elbow, though the biceps can be felt to contract voluntarily; there is doubtful voluntary power in the brachialis anticus; but he is unable to flex the elbow even when the forearm is hanging vertical like a pendulum with the arm held horizontal. There is fair power in the triceps. The elbow cannot be fully extended passively. He is able to abduct his shoulder to about half the normal extent, and the deltoid can be felt contracting. There is almost normal active flexion and extension of the shoulder. There is good pronation and weaker supination of the forearm, the latter being accomplished mainly by the biceps, which can be felt to contract though it is not strong enough to flex the elbow.

September 25, 1916. *Electrical examination* by Dr. Boyer shows no change from that of June 12, except that the deltoid no longer shows reaction of degeneration.

April 14, 1917. The patient, who still comes three times weekly for massage and electrical treatments, says that up to about two months ago he could not feel hot water in the hand; he could put it in "boiling water" he says, and not know it. Now, however, sensation is normal. *Active motion:* shoulder can be abducted to 60 degrees, the deltoid seems normally active; flexion and extension of the shoulder are almost normal; internal and external rotation are good, but the latter is limited at the sagittal plane. Flexion and extension of the elbow are good, but flexion is still a little weak. Flexion of the wrist is *very* weak, but there is fair power of extension. There is full supination, and pronation to the mid-position, both of fair strength. There is very little movement in the fingers, consisting only in very feeble flexion and extension; there is no power to separate the fingers. The thumb can be moved slightly in flexion and extension. *Passive motions:* at the shoulder there is no more passive than there is active motion. At the elbow the range of passive motion is from 60 to 160 degrees. Rotation in the forearm is normal. The wrist extends almost normally, flexes two-thirds normal. The fingers and thumb can be flexed half the normal extent, and can be fully extended.

May 4, 1917. *Electrical examination* by Dr. H. P. Boyer: There is marked improvement shown. The deltoid, biceps, triceps, and extensors of fingers do not show reaction of degeneration, and respond fairly well to the Faradic current. The flexors of the fingers still show reaction of degeneration and do not respond to the Faradic current.

Dr. Ashhurst added that he thought the diagnosis in this patient was correctly given by Dr. Sinkler as a laceration of the nerves in the axilla. The laceration probably was slight, consisting rather in stretching than any

actual solution of continuity. The effusion of blood, lymph, and synovial fluid no doubt also was in some measure responsible for the disability. The prognosis probably is good in this case for ultimate recovery even of the hand; though when the patient was first seen, and especially when it was found that reactions of degeneration were so complete, there seemed little hope of ultimate recovery.

Dr. Ashhurst recalled that Duval and Quillain (1898) maintained that all nerve lesions accompanying injuries by indirect violence at the shoulder were either *radicular* or *terminal,* there being no such clinical entities as ruptures of the brachial plexus. Also that Delbet and Cauchoid (1910) had collected 36 cases of paralyses, complicating dislocations of the shoulder: 25 were *terminal,* and were caused by the dislocation; 11 were *radicular,* and were caused *not* by the dislocation, but by the same cause which produced the dislocation. In this series there were no lesions of the brachial plexus proper.

The present case, therefore, supports these investigations.

Dr. T. Turner Thomas said that it has long been the tendency to attribute all traumatic brachial paralyses of a diffuse character to injuries of the brachial plexus because a nerve rupture involving so many muscles could not be located anywhere else. The late results, according to his experience, show that almost every case recovers completely from the paralysis. The sensation is rarely disturbed seriously, and in almost every case the shoulder-joint is stiff and painful, indicating that it was injured.

For six years he had been trying to show that the paralyses in most of these cases is secondary to the shoulder-joint injury and disappears with the complete recovery from this joint injury, sometimes before. The greatest difficulty is in deciding what cases may properly be included under the traumatic brachial paralyses. Some surgeons believe that the Duchenne-Erb paralysis (C V, and C VI) is common in adults and serious, while most surgeons ignore it entirely in their practice, and it is given no place in surgical text-books. Yet few surgeons, probably, would deny that traumatic brachial palsy of varying degree from injury in the shoulder region is frequent but rarely permanent. The fact of the matter is that discussion of the subject is being avoided.

He recognized two main classes of these cases. In the first, by far the most common, the shoulder-joint becomes stiff and painful, but is in no sense flail. These recover completely with the restoration of normal function in the shoulder-joint or even in the presence of a considerable permanent ankylosis. In the second the causal force dropped a half inch or inch below its normal level under the acromion, and later the joint became flail when the pain and muscle rigidity disappeared, and especially when the resulting atrophy became marked. Early removal of the flail condition of the joint and then of motion, the operative stiffness is followed by a complete cure. In other words, the operation puts the joint into the condition found in the first class, which is then overcome.

Not infrequently there will be found in both groups, from the shoulder

to the ends of the fingers, marked pain and tenderness in all of the structures, with pain and stiffness in all of the joints, much worse in the hand than elsewhere. This condition is present in Dr. Ashhurst's case and is now the only condition to be reckoned with. It is not peculiar to shoulder injuries. LeBreton has reported a series of cases following Colles's fracture. In all of his cases with flail shoulder, four in number, except the first seen five years ago, there was more or less swelling in the hand, extending a variable distance upward. It may have been present in his first case before he saw it, nearly five weeks after the accident. He had had at least as many cases without flail shoulder. He doubted if a patient with a marked case of this condition can ever again have a normal hand, because adhesions have developed between all of the tendons and their sheaths, in addition to the trouble in the joints, and he could not believe that the adhesions would disappear and the tendons work freely in their sheaths again.

CANCER OF THE PENIS

DR. B. A. THOMAS reported the history of a man, aged thirty-seven years, who was admitted to the Polyclinic Hospital on January 4, 1917, with the following history: He had had a phimosis all his life, and had never been able to retract the prepuce. One year ago he noticed a slight discharge from the penis, but did not pay any attention to it at the time. The condition grew worse for a while, and a few months later the glans penis began to recede from the margins of the prepuce, and to swell at the same time. There has been a bloody discharge from the ulcerated area for most of the time during the past year. At the time of admission the end of the penis presented a huge cauliflower growth, which, together with the œdematous loose connective tissue, measured about four inches in diameter. The growth apparently had its origin in the region of the coronal sulcus on the dorsal aspect of the organ, but at the present time by contiguity has involved three-fourths of the circumference of the infiltrated organ, merely a portion of the glans in the region of the meatus being free. The inguinal lymph-nodes on both sides were palpable. The Wassermann reaction resulted negatively.

On January 5th patient underwent operation, consisting of bilateral inguinal lymphadenectomy and total extirpation of the penis, the incision extending downward from both inguinal regions, meeting and encircling the root of the penis, thence downward, dividing the scrotum to the middle of the perineum, after which the corpora cavernosa were freed from their attachments to the rami of the ischium. The bulb of the penis was then divided, the urethra severed and anastomosed in the perineum at the lower angle of the incision, after which the wound was closed. The histopathological report stated growth to be a squamous-celled carcinoma of the penis, with very early metastasis to the inguinal lymph-nodes.

A few days after the operation, X-ray treatment was begun as follows: For three days, each day, he was given six exposures of ten minutes each,

at different sites. This was repeated in three weeks, and again in four weeks, the last treatment being given after he was discharged from the hospital, which was on February 5. The patient's convalescence was remarkable in the fact that a week after his discharge from the hospital he was employed as a chair-pusher on the boardwalk at Atlantic City. Seen two months after he left the hospital, he was still at this occupation, experiencing no discomfort and had not any incontinence of urine, difficulty on urination, or evidence of contracture of his new external urinary orifice.

HYDROCELE OF EXTREME SIZE

DR. THOMAS presented a man, aged seventy-three years, who was first seen on March 26, 1917, at the Surgical Out-patient Department of the University Hospital, complaining of a huge rupture. He stated he had been the victim of herniæ on both sides for twenty years. Eleven months ago he fell, striking his herniæ, after which swelling began on the left side, and increased rapidly. At the present time the mass is so large that the patient is obliged to carry it in a hammock, suspended from his shoulders, by improvised suspenders. The penis is almost lost to view, becoming invaginated in the tumor, and appears as an inconspicuous dimple on the right side. The act of urination is accomplished by pressing a funnel against the skin below this dimple, which diverts the urine to a receptacle. The tumor is cystic in character, and fluctuates, and seems to be about two-thirds fluid, transmitting light in the lower two-thirds. This swelling, complicating the hernia on the left side, is remarkable chiefly because of its size, measuring 41 centimetres on its vertical diameter, and 81 centimetres in circumference. The hydrocele was tapped, any other form of treatment being out of the question, and sixteen pints of fluid were removed.

MYOSITIS OSSIFICANS PROGRESSIVA

DR. B. A. THOMAS and (by invitation) DR. F. G. HARRISON presented a little girl, four years of age, with the history that about February, 1916, the mother noticed a lump in the child's back in the lumbo-thoracic region, which she says appeared after a fall while at play. This grew larger, and other lumps appeared, and her neck became stiff. She has grown progressively worse. She has never complained of pain. There is no history of any lumps disappearing. There is limitation of motion of the spine, shoulders, and hips. There is a loose body in the right axilla, the others are all immovable.

There is an evening rise of temperature, no cough. Wassermann is negative. She plays around with other children.

Family History.—Father living and well. Mother has pulmonary tuberculosis. She has been deaf for seven years and has grown progressively worse lately. Has had eight children, three dead of causes uncertain, four others, besides patient, well.

Previous Medical History of This Child.—Normal birth. The mother says there was a congenital malformation of the great toe, hallux valgus. The child was breast fed for three months. Had measles prior to her trouble, whooping cough when she fell, and chicken-pox afterward.

INDICATIONS AND TECHNIC FOR REMOVAL OF THE SPLEEN

A paper with the above title was presented by Drs. George P. Müller and Charles H. Frazier.

Dr. P. G. Skillern, Jr., called attention to the very excellent method of controlling the blood-supply in splenectomy which the essayists did not mention; this was suggested by J. C. A. Gerster (*Jour. Am. Med. Assoc.*, August 7, 1915), who believes that ligation of the arterial supply of the spleen at certain points which are more accessible than the deeply situated pedicle will greatly facilitate difficult splenectomies. These points are (1) the splenic artery close to the cœliac axis; (2) the gastro-epiploica sinistra where it reaches the stomach from the splenic. The cœliac axis is readily exposed through the lesser omentum just above the lesser curvature of the stomach and border of the pancreas, and may be made to come within one inch or so of the anterior abdominal wall by hyperextending the spinal column as for gall-bladder operations. This method should be applicable in certain cases of Dr. Müller's Group I, namely, in certain cases of traumatic rupture of the spleen, especially those cases where there is already severe traumatic shock, to which the addition of the surgical shock attendant upon splenectomy might surpass the margin of safety and kill the patient; in these cases mere ligation of the splenic artery with, if thought necessary, stuffing of the great omentum in the splenic rent, should suffice to bring about the immediate recovery of the patient. In cases of removal of the spleen for disease, in which there are numerous vascular adhesions conveying a vicarious exotic circulation to the spleen, ligation at these two points would serve to diminish the hemorrhage, but not to control it entirely.

By ligating the splenic artery at its origin a "safety first" principle is observed, precautionary against hemorrhage due to unforeseen accidents during or after operation; thus, after mobilization and delivery of the spleen its pedicle might be found to be very short and hard to clamp and ligate; and Dr. Frazier mentioned the possibility of the ligature slipping off the pedicle—a catastrophe for which there is no excuse, and one which can be prevented by anchoring the pedicle ligatures with two or three additional small ligatures.

As to the incision, Dr. Müller stated that he employs a long, vertical cut through the left rectus. For upper abdominal work the transverse incision, advocated last year by Moschcowitz, seems advantageous upon anatomic grounds. This incision divides one or both recti transversely two inches above the navel and is continued transversely outward through the flat muscles of the flank as far as conditions warrant. The advantages of this transverse incision are freer exposure and less damage to the abdominal

wall. With the exception of the rectus the muscles and congeries of minute tendons into which they insert are cut parallel with their fibres, instead of at right angles, as with all vertical incisions; for the same reason, the motor nerves, too, escape division. As regards dividing the rectus muscle transversely, the ultimate result is but the addition of another transverse cicatricial intersection to the three or more tendinous ones normally present. The scar resulting from the wound is stronger and its cutaneous portion eventually almost invisible. The transverse incision, however, takes more time, and when time is an important element, the linea alba incision, as advocated by Percy, could be employed.

TRAUMATIC BRACHIAL PARALYSIS WITH FLAIL SHOULDER-JOINT

DR. T. TURNER THOMAS read a paper with the above title, for which see page 532.

DR. NATHANIEL GINSBURG said that he had observed and treated three cases of traumatic brachial paralysis in adults. The first patient (Figs. 1 and 2) was seen in July, 1912, and then presented a total paralysis of the shoulder girdle and arm, except for part of the supraspinatus and trapezius muscles. The intercostal humeral nerve was intact. There were marked trophic changes in the extremity, and he suffered from intense shooting pains in the forearm, hand, and fingers. On January 13, 1912, the injured extremity was caught in a heavy leather machinery belt. He remembered nothing of the injury until he awakened in the hospital, and was then told that his collar bone had been broken. The extremity was bandaged to his side for three weeks, at the end of which time it was discovered that a severe nerve injury had taken place. A careful dissection of his brachial plexus was made in the Polyclinic Hospital, and the cords were found totally disorganized and beyond operative repair.

The second case (Figs. 3 and 4) was observed in the Jewish Hospital in August, 1916. The patient was a fireman, twenty-three years of age, whose left shoulder and lower cervical region were struck by a locomotive running in the opposite direction while he was leaning out of the cab in which he was riding. He suffered a traumatic avulsion of the cervical and brachial nerve trunks, resulting in total paralysis of the left upper extremity, with some sensation persisting corresponding to the distribution of the intercostal humeral nerve. He also sustained a fracture of both bones of the forearm of this extremity near the wrist joint and a fracture of the neck of the scapula. The inequality of his pupils at the time of his admission and also at the present time is marked. Operation, seven weeks after the injury, exposing the left cervical and brachial plexus with division of the outer third of the clavicle revealed the presence of intraspinal avulsion of some of the cervical nerve trunks entering into the formation of the brachial plexus, with complete division of some of the lower trunks. The dissociation of the cords entering into the formation of the brachial plexus was so marked and the perineuritic changes so extensive that it was not possible to satisfactorily make new

FIG. 1. FIG. 2.

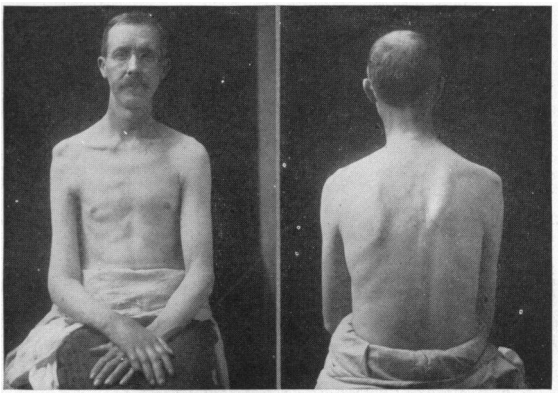
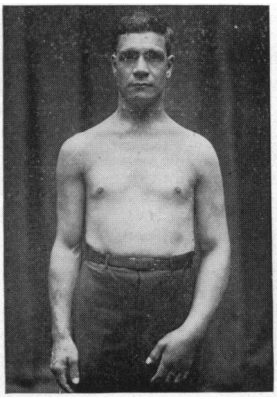


FIG. 1 and 2.—W. F. B., aged forty-four years. Traumatic rupture of brachial plexus. Injury January 13, 1912. Extremity caught in heavy leather belt of machinery. Remembered nothing until he awoke in the hospital, when he was told that his collar bone was broken; the arm being bandaged to the side for three weeks. July 27, 1912: Total paralysis of the shoulder girdle and arm, except for part of the supraspinatus and trapezius; intercostohumeral nerve intact; trophic changes in the extremity and intense shooting pain in the hand and fingers. Operation, July, 1912; disclosed rupture of the brachial plexus trunks.

FIG. 3. FIG. 4.



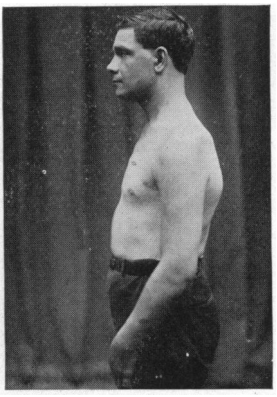
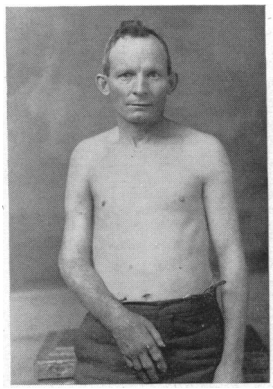


FIG. 3.—C. S., aged thirty-three years; fireman. Traumatic avulsion of the brachial plexus. Total paralysis of the left upper extremity with some sensation corresponding to the distribution of the intercostohumeral nerve. Operation: Partial anastomosis of intact cords. No result attained.

FIG. 4.—Same patient as Fig. 2. Lateral view, showing left upper extremity, following an injury to the cervical and brachial nerve trunks. Fractures of both bones of the forearm near the wrist and fracture of the neck of the scapula, complicating the injury to the nerve trunks.

FIG. 5. FIG. 6.



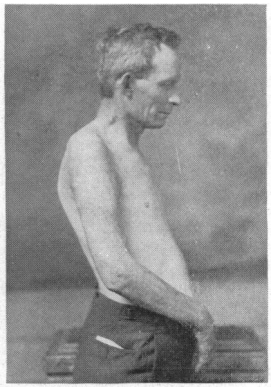


FIG. 5.—C. A. C. Traumatic brachial palsy of the right upper extremity, as result of being struck by a controller in the supraclavicular region, with coincident partial fracture of the head of the humerus. Note the atrophy of the shoulder and right pectoral region, with swelling of the extremity.

FIG. 6.—Same patient as Fig. 4. Lateral view. Note the suprascapular and deltoid and right pectoral atrophy. Some use of the muscles corresponding to the distribution of the median nerve is present. Marked involvement of the ulnar and musculospiral nerves. Decided improvement under massage and electricity.

nerve anastomosis, although a few of the trunks which seemed intact were brought together and sutured. The operation has apparently failed to restore any function in this extremity, for he seems to be hopelessly injured.

In both these cases the primary injury was apparently extreme traction exerted upon the cervical cords, plus direct trauma compressing the brachial plexus between the clavicle and the first rib.

The third patient (Figs. 5 and 6) was seen through the courtesy of Dr. Zion, of Wilmington. The man was injured in a street car altercation, being struck in the right supraclavicular region, and sustaining a partial fracture of the head of the humerus. A careful examination showed a paralysis typical of a traumatic brachial palsy, with some preservation of function corresponding to the motor and sensory distribution of the median nerve. The atrophy and the trophic changes, as shown in the photographs, are characteristic of paralysis of the type under discussion. He did not believe that there was division of all the nerve fibres in this case, but thought a considerable amount of his injury was the result of the trauma sustained by the controller which struck him in the supraclavicular region. With the application of massage and electricity, he has made considerable improvement, although the last examination a short time ago still shows extensive involvement of his musculospiral nerve.

He had been much interested in the surgical treatment of those cases where total division or extensive injury of the whole brachial plexus has taken place. On the cadaver he had found that it is anatomically impossible to successfully transplant cords from the opposite side, because the trunks are too short if carried across the pretracheal region, and also because the shortest route across the neck, which is prevertebral, would necessitate an extensive dissection and expose the patient to grave injury. Again, where there is extensive or complete involvement of the whole plexus on one side, it would not seem wise to jeopardize the integrity of the sound side by longitudinal splitting of the nerve trunks.

It had occurred to him that if the upper intercostal nerves could be transplanted across the axilla into the trunks of the injured nerves, this operation would be indicated, since the intercostal nerves carry both motor and sensory fibres. Cadaver attempts to perform this operation have shown that the chief difficulties are first the danger of opening the thoracic cavity, since longitudinal resection of a number of ribs must be practised, and secondarily the intercostals are of surprisingly small size, even as far posteriorly as it is possible to reach them by the transaxillary route. One of these patients was exceedingly anxious to have this operation attempted, but he could not bring himself to believe that it would be justifiable to expose him to the risks of such an extensive procedure. All of these patients have bitterly complained of the intense neuritic pain in their hands and fingers from which they constantly suffer, and two have requested amputation of the injured extremity.

Dr. Ginsburg thought that Dr. Thomas had a little different conception of traumatic brachial paralysis from that which is generally held. The cases

of traumatic brachial paralysis which appear in the literature largely consist of reports of serious injury to many or all of the cervical or brachial nerve trunks entering into the formation of this plexus. The term is generally employed to express a break in the continuity of the nerve trunks, either partial or total, the severance occurring intra- or extraspinally.

The cases reported by Bristow, Murphy, Frazier, and Skillern, as well as the three patients whose cases he had briefly presented, were instances of injury to the brachial cords, sustained as the result of trauma and confirmed by operative findings. The injury disclosed in this class of cases at the operating table has been one definite and severe injury to the nerve trunks, with coincident perineuritic changes. The class of cases reported by Dr. Thomas would suggest rather a primary shoulder injury without the brachial plexus participating to any great extent; or it may be that in a number of his cases the deltoid muscle has been partially or completely paralyzed by injury of the circumflex nerve, owing to its close proximity to the neck of the humerus. Certainly, relaxation of the capsule of the shoulder joint cannot occur in the absence of partial or complete paralysis of the deltoid muscle, and this at once implies injury to a nerve structure. The absence of operative investigation of the brachial plexus in most of his cases does not sustain the belief that they belong to the type generally termed traumatic brachial paralysis.

Dr. Penn G. Skillern, Jr., remarked that Dr. Ginsburg, in his discussion of Dr. Thomas's paper, said that for the relief of cases of traumatic brachial paralysis where the spinal rootlets themselves were torn asunder, such as reported by Dr. Frazier and himself in 1911, he had conceived the idea of dividing the intercostal nerves and anastomosing their proximal ends with the distal portion of the brachial plexus. Such an anastomosis, even granting that it is practicable, would be but a drop in the bucket and quite like sending a liliputian on a giant's job, as far as concerns making up the loss of the great number of motor fibres possessed by the brachial plexus, especially when one considers that the upper six intercostal nerves carry only enough motor fibres for the supply of the small intercostal muscles alone; how far would these few motor fibres go when it comes to innervating the great muscular masses which move the upper limb?

Dr. T. T. Thomas quite agreed with Dr. Ginsburg that there are two kinds of traumatic brachial paralyses. What he was trying to show is that there are a great many in which there is probably no injury to the brachial plexus. No one who heard or read Dr. Frazier's paper of 1910 or 1911 on this subject, with its detailed report of a case in which the spinal canal was opened and an intraspinal rupture found, could fail to believe that real ruptures take place. On looking up the paper of Madame Klumpke on traumatic brachial paralysis of the lower arm type, he was struck by the number of cases that she collected which, with the one she reported, were almost exact counterparts of the one reported by Dr. Frazier. This type shows absolute loss of sensation and motion and never recovers. The cases he had been reporting have recovered fully from the paralysis and never

had serious impairment of sensation. Moreover, they all had associated injury of the shoulder joint.

PARALYSIS OF BOTH TRAPEZII MUSCLES AFTER ABLATION OF CERVICAL LYMPH-NODES, WITH PROPOSAL OF A NERVE-ANASTOMOSIS OPERATION FOR CURE

DR. PENN G. SKILLERN, JR., presented a man, aged eighteen years, referred by Dr. Thomas Tigam, who was admitted to the Polyclinic Hospital (No. 31152) on April 24, 1917, for removal of recurrent tuberculous cervical lymph-nodes. He was discharged, cured, on May 3, 1917.

He had been operated upon one year before elsewhere, for on each side there was an operative scar four inches long along the posterior border of the sternomastoid muscle—diseased nodes evidently having been removed from the occipital triangle, and the trapezius branch of each spinal accessory nerve had been resected, for both trapezii were paralyzed and atrophied, bringing to the surface the deep anatomy of the shoulder girdle and base of the neck (Fig. 7). The patient stated that he noticed his shoulders drooping forward when he got up from bed after the operation.

The photograph shows beautifully the extent to which both shoulders droop forward. Both clavicles are prominent, and the supraclavicular fossæ are so deep that apical tuberculosis is suggested (Fig. 8). The upper border of the scapula with its notch can be plainly felt just beneath the skin: the vertebral border can likewise be felt. The spine of the scapula and supraclavicular fossa are easily palpable. In other words, conditions are such as would be expected from a knowledge of the origin and insertion of the trapezius muscle, given the presence of atrophy of this muscle. The head, too, is inclined forward. The fresh operation incision was made by the author to remove recurrent tuberculosis of the lymph-nodes: when the upper limb of this incision was made the scar from the previous operation was excised, so that the situation of the latter is indicated. It was necessary to divide the sternomastoid to reach enlarged nodes beneath its upper third; during this manœuvre the sternal branch of the spinal accessory nerve was seen sinking into the sternomastoid muscle and was lifted up with the muscle without injury. The region of the old scar on the left side of the neck was not reoperated upon. The levator scapulæ muscles stand out prominently and subcutaneously on both sides. Loss of function of these muscles is well compensated.

A similar case was presented by Vosburgh before the New York Surgical Society on April 22, 1914 (ANNALS OF SURGERY, 1914, lx, 762). In the discussion which followed, Mathews said he had seen the spinal accessory nerve accidentally divided and the injury not followed by shoulder drop, and also when its division was necessary, neurorrhaphy could be performed with very good expectation of reunion. Dowd, referring to the relative importance of the spinal accessory nerve and the branches of the cervical plexus in the innervation of the trapezius muscle, stated that in a much used

method of removing tuberculous lymphnodes the branches of the cervical plexus (III and IV) are sacrificed and the spinal accessory alone is preserved; and that while in many instances this is sufficient to provide good innervation to the trapezius, in other instances it might not be sufficient. Eliot found in a number of instances the development of these nerves differed very materially. In some cases the terminal branch of the spinal accessory passing to the trapezius was exceptionally well developed; in others it was not developed so well, while in rare instances it was entirely absent. Eliot also found that with a weak spinal accessory supply, the branches of the cervical plexus supplying the trapezius were exceptionally well developed, and *vice versa;* this might be accounted for by variations in the anastomosis between the spinal accessory nerve and the cervical plexus. In those cases where the spinal accessory supply of the trapezius was well developed, the degree of anastomosis between the cervical plexus and the spinal accessory was not well marked.

Reporting two cases of operative paralysis of the spinal accessory nerve, Bailey (ANNALS OF SURGERY, 1901, xxxiii, 558) states that serious disturbances of motion in both sternomastoid and trapezius immediately following operation, which obtained in his patients, contradicts the more common experience, for in most cases the paralysis which results from section of the nerve is not particularly disabling. Large pieces of the nerve are resected for spasmodic wry-neck without fear of serious loss of motor power; and in only a few of the reports of accidental section is any mention made of paralytic results of consequence. This is explained by the additional supply to the trapezius from the cervical plexus. When the sternomastoid is totally paralyzed, freedom of movement of the head and neck is impaired, but it is not abolished; even when both muscles are entirely put out of service, the erect position of the head is not seriously interfered with. With the rare exception of penetrating wounds at the base of the skull, extracranial lesions of the spinal accessory are always confined to the external branch, and are nearly always traumatic. Neuritis of this nerve is rare.

Paralysis of the trapezius is indicated by great disability in raising the shoulder and in adducting the shoulder-blade. The arm cannot be elevated much above an angle of ninety degrees; the sufferer is practically deprived of the use of his arm for all heavy work. Complete trapezius paralysis is a serious calamity to any one, but especially to a laboring man. Forming, as it does, the most important support of the shoulder, the loss of the trapezius practically does away with the power of lifting weights which are at all heavy. The deltoid, in losing its support, loses much of its usefulness, and lifting must be done by the flexion of the forearm and by a bending of the whole body.

The assumption that occasionally there is a variation from the customary route by which the motor impulses pass from the spinal cord to the trapezius receives some support from the fact that the trapezius is not, in its anatomic relations, a fixed muscle. In man it may be congenitally absent in whole or in part; in the lower apes it is supplemented by another similar muscle called

FIG. 7.—Oblique view of post-operative trapezius paralysis, showing forward droop of shoulders and of head. Note relative prominence of bones of shoulder girdle. Fresh scars due to reoperations for diseased nodes.

FIG. 8.—Anterior view of post-operative trapezius paralysis. Note depth of supraclavicular fossæ, simulating the depression produced by apical tuberculosis.

the spinocervicalis. Bailey takes this variation in the case of the trapezius to be as follows (Fig. 9):

The spinal centre situated between the first and fifth cervical segments of the cord is fixed and constant. As a general rule, the cells of this centre send their axons to the trapezius through both the spinal accessory and the cervical nerves. But sometimes there is a variation from this arrangement in that all the axons pass to the muscle in the spinal accessory, leaving the cervical nerves without function, as far as the trapezius is concerned. Under these circumstances, the motor impulses reach the trapezius exclusively through the spinal accessory, and section of it consequently means total palsy.

What can be done for operative paralysis of the spinal accessory nerve?

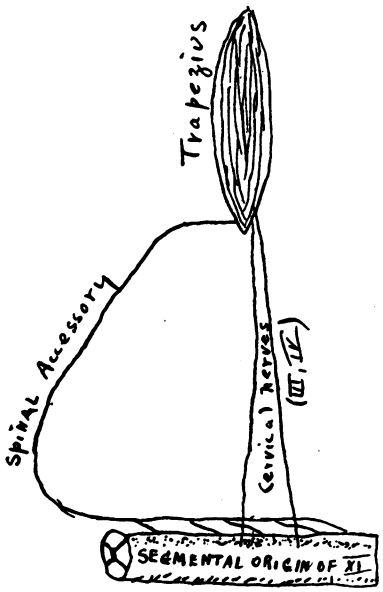


FIG. 9.—Scheme showing kindred segmental origin from cord of nerves supplying trapezius. The suprascapular nerve arises chiefly from the fifth cervical segment.

We have seen that, according to Mathews, the spinal accessory nerve can be accidentally divided and the injury not followed by shoulder drop. At times the nerve is intentionally severed at operation for the purpose of thorough extirpation of diseased lymph-nodes; here immediate suture of the severed ends is, of course, indicated. In Bailey's second case neurorrhaphy was performed about six weeks after the original operation. The cut ends of the nerve were found to be considerably separated—an inch or more. Within a few weeks from the suturing, the electric reaction improved.

What is to be the treatment when the trapezius branch of the spinal accessory nerve has been extensively resected, and the distal portion of the nerve, beneath the trapezius, can alone be found? The gap is too great for tubulization to be practicable, and nerve transplantation would be of doubtful

utility. For such a case the author suggests the following nerve-anastomosis operation. He would have attempted it in the present case, but for the presence of pus in the operative field.

The suprascapular nerve, which supplies the supra- and infraspinatus muscles, is in close relationship with the trapezius branch of the spinal accessory nerve as it enters the trapezius muscle. The suprascapular nerve is derived from the fifth and sixth cervical segments; the spinal portion of the spinal accessory is derived in part from the fifth cervical segment. It is proposed, then, to isolate the trapezius branch of the spinal accessory and the suprascapular nerve; to split the suprascapular nerve, and to anastomose the proximal stump of the split portion of the suprascapular nerve to the distal trapezius stump of the spinal accessory. This proposed nerve-anas-

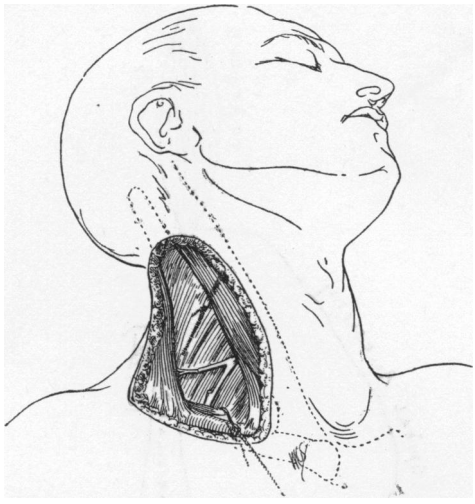


FIG. 10.—Sketch showing author's proposed nerve anastomosis operation when there is a wide gap between ends of resected spinal accessory nerve. The suprascapular nerve is seen split above the retracted omohyoid muscle and the split end has been anastomosed to the distal end of the spinal accessory close to the border of the trapezius. The missing portion of the spinal accessory nerve is indicated by shading. The proximal portion of the latter appears from beneath the sternomastoid.

tomosis is at least as rational as the anastomosis of the spinal accessory with the facial nerve, and probably more rational, because of the close segmental relationship of the suprascapular and spinal accessory nerves.

DR. NATHANIEL GINSBURG said that it is not unusual to find in the dissecting room that the spinal accessory nerve occasionally breaks up into a plexus in the substance of the sternomastoid muscle, and fails to reform into the nerve trunk which generally leaves the upper posterior border of this muscle to pass to the trapezius muscle, and with the third and fourth cervical branches to form the subtrapezius plexus. It does not follow that division of the spinal accessory nerve will always be succeeded by shoulder drop, with anterior rotation, because the cervical nerves may suffice to innervate the muscle.

In the patient presented, it is apparent that bilateral division of the nerve

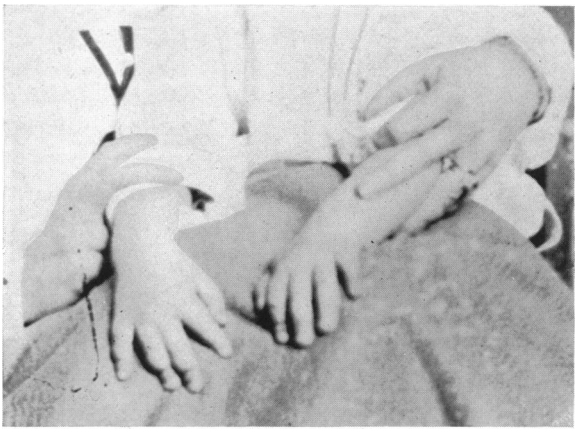


FIG. 11.

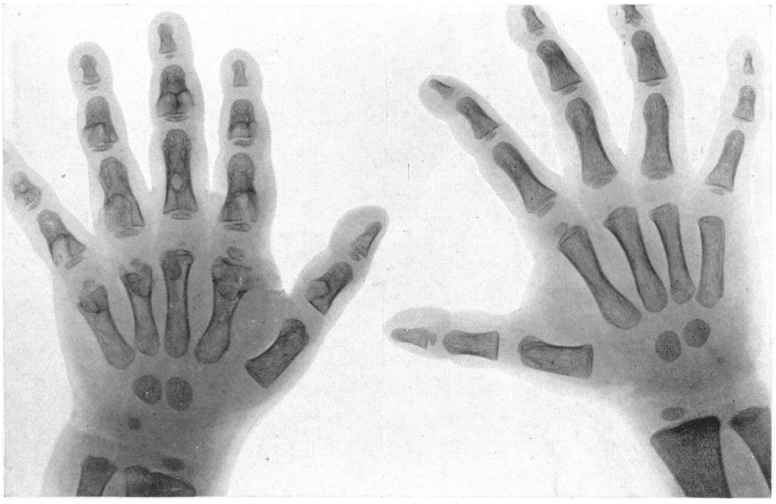


FIG. 12.

supply of both trapezii muscles has taken place, and that the injury is not confined to the spinal accessory nerves alone. It is not unlikely that the nerve supply of the rhomboideus major and minor has likewise been cut, since there is evidence of relaxation of these muscles. The introduction of a firm interscapular ligament of fascia lata would perhaps be of assistance in this case in bringing and maintaining the normal position of the scapulæ.

MULTIPLE ENCHONDROMATA OF HAND

DR. A. BRUCE GILL presented a male child of two and a half years, whose X-ray photographs (Figs. 11 and 12) showed multiple enchondromata of the right hand only. Four metacarpals and nine phalanges are involved. X-ray plates of the other bones of the body show no evidence of enchondromata.

The child is healthy and well developed. He has never been ill with the exception of a furunculosis about a year ago. His parents are healthy and there is no family history of enchondromata, or hereditary deforming chondrodysplasia, as Ehrenfried terms it, for a period of at least three generations.

The child's parents first observed three or four months ago that his right hand seemed fatter, as they thought it, than it had been before. He has never complained of any pain or any discomfort in the hand, and he uses it for all ordinary purposes. Examination showed demonstrable enlargement of several of the phalanges and the metacarpals.

The subject of multiple enchondromata, or hereditary deforming chondrodysplasia, together with its literature, has been presented well in recent years by Boggs in the Transactions of the Association of American Physicians, Philadelphia, 1913, by Ehrenfried, Jour. A. M. A., May 15, 1915, by Ashhurst, ANNALS OF SURGERY, 1916, vol. 61, p. 167, by such others as Oberndorf, Clark and Atwood, Fragenheim, Schmidt, Lubarsch, Carman and Fisher, and others referred to in the above papers.

Various theories as to its etiology have been advanced, and many diseases such as syphilis, tuberculosis, and other infections, rhachitis, thyroid deficiency, trophic changes in the central nervous system have been suggested as causes. But the best opinion appears to be that it is a congenital condition due to abnormal *anlage* in the intermediary cartilage of the bones involved, and that frequently heredity plays a part. Certain cases said by Boggs to have been reported in the new-born, and the case here presented in a child two and a half years of age strongly indicate that the condition is truly a congenital one. The hereditary influence cannot always be traced, nor is the underlying cause of the congenital abnormality apparent.