STATED MEETING, HELD OCTOBER 6, 1913.

DR. G. G. DAVIS, President, in the Chair.

BONE GRAFTING FOR POTT'S DISEASE.

DR. WALTER G. ELMER called attention to the operation of bone grafting for Pott's disease. He said that great credit is due to the originator of this operation, who utilized the spinous processes of the vertebræ as bone grafts from which a firm bridge of new bone was built up, spanning the area of disease and holding the spine rigid. In doing this, the spinous processes are denuded of their periosteum, cut off at their bases and placed like the links of a chain along the tops of the arches. A subsequent operation was suggested which leaves the spinous processes intact, a bone graft from the tibia being inserted in their tips which are split to receive it.

Tuberculosis of the body of a vertebra is a disease which, if untreated, progresses toward destruction of the vertebral body. Even when proper treatment is instituted the disease progresses beyond that time—gradually losing its activity until finally arrested; then the process of repair begins. It may be likened to a ball rolling down an inclined plane—gathering momentum as it descends—and then out onto a level surface, when the momentum is gradually lost and its motion is finally arrested; so with the disease. The level surface is reached at the moment the child's spine is put at rest, but the disease continues to progress to a point considerably beyond this.

An operation therefore which immobilizes the spine and actually adds to its natural strength would appear to be a wise surgical procedure. The new bone which is formed spreads out in a broad compact mass upon the transverse processes and unites the spinous processes.

The new bone grows but if it does not keep pace with the natural healthy bone of the spine it must exert a corrective influence upon the developing kyphosis.

An operation of this character, requiring, perhaps, forty minutes to perform, and not always upon the most favorable class of patients, must have a mortality. Just what the mortality is cannot be stated. If it should prove to be greater than one per cent. it would make one hesitate to recommend the operation. The operation, however, shortens the treatment and hastens the cure, and must save certain patients that would otherwise progress unfavorably.

A considerable number of patients have now been operated upon in the Orthopædic Department of the University of Pennsylvania—both operations have been employed—every region of the spine has been operated upon—the patients have been children and adults, chiefly children, of course—and in every instance the patients, apparently, have been distinctly benefited.

A support is usually worn for six months after the operation. During the latter part of this period the plaster jacket is discarded and a simple back board of plaster held in place with adhesive straps, or some similar appliance is used.

Dr. Elmer presented two children who had been treated in the Orthopædic Department of the University of Pennsylvania and through the courtesy of Dr. G. G. Davis were now shown.

CASE I.—A boy who had developed a slight kyphosis in the upper lumbar region when brought to the hospital nearly two years ago. He is one of the early cases operated upon. Now a broad compact mass of bone spreads far out on the transverse processes. All other parts of the spine are freely mobile and it flexes readily as he stoops to pick up an object. He walks naturally and is in perfect health so far as one can tell and has been cured for about a year and a half.

CASE II.—A little girl, one of the more recent cases, in which case the feature worth mentioning is the improved line of the spine. No kyphosis can now be seen. Tracings which were made with the lead strip when she was being treated with plaster jackets show quite a little kyphosis in the lower dorsal region—a comparison of those with a tracing made a short time ago shows the difference—this last one shows no kyphosis. The child is strong and healthy and growing, and it is not unlikely that the spine in growing is becoming straighter. She has worn no support for about two months. Both these children had the bone graft taken from the leg.

TUBERCULOSIS OF KNEE.

DR. ELMER presented a little girl to illustrate the favorable outcome of what promised to be a very discouraging case. Four years ago she was injured and was treated by her physician for tuberculosis of the knee. About eight months later she was admitted to the Jewish Hospital. There was then a discharging sinus above the outer condyle of the femur. A tubercular osteomyelitis involved the epiphysis and lower portion of the diaphysis. The bone was opened on the side and the diseased part cut away and curetted out—leaving a shell of bone. She was treated in bed for three weeks—then sent home wearing a fenestrated plaster cast, high shoe and crutches. She was injured later on by one of her playmates, and the disease then invaded the knee-joint which became distended with tubercular pus. She was readmitted to the hospital, the joint opened on both sides and drained, and then followed a long course of treatment.

She was kept on crutches and in plaster for one year, then a Thomas knee-brace, then plaster of Paris and the child walking on the limb.

The sinus closed last January. She has worn no support for eight months. She now walks quite naturally and with free and normal motion in the knee-joint and appears to be in the best of health.

DR. GWILYM G. DAVIS queried as to whether the results in cases of bone grafting for tuberculosis of the spine will be permanent. He had recently seen a skiagraph of a case which had been done over a year ago and it showed a distinct shadow of bone lengthwise in the position of the curve; whether this was the original or new bone he could not say, but at any rate there was bone there. The question may be raised as to whether the fixation will remain. The later history of cases, two or three years after the operation, should be known, as to the permanency of the union.

BILATERAL TEMPOROMAXILLARY ANKYLOSIS.

DR. JOHN H. JOPSON presented a woman, aged twenty, who applied for treatment at the Polyclinic Hospital for an ankylosis of the jaws which was of three years' duration. It began as an arthritis in the course of an illness of acute onset attended by inflammation of most of the joints, including the interphalan-

geal joints, ankles, knees and elbows. She was bedridden for several months, the polyarthritis lasted a year and a half, was attended by contractures of the arms and legs and finally ended in recovery, except for the persistent ankylosis of the jaws and the lumbar spine.

She has a bony thickening over the lumbar vertebræ with fixation in that region and at one time this locality was the site of considerable pain. She wore a spine-brace for a year but later discarded it. The only disability of which she now complains is the fixation of the jaw.

Examination showed practically complete ankylosis of both temporomaxillary joints with no lateral motion present, and only about one-eighth inch of motion upward and downward, which was practically due to springing of the bone. There was an interval of one-sixth inch between the incisors, the lower being a little behind the upper, and the molars were in contact. She could eat only by breaking or cutting her food into small particles and tucking it into her mouth with her fingers.

An attempt was first made to separate the jaws by means of wooden wedges under general anæsthesia, but nothing was accomplished. Three weeks later Lilienthal's operation was carried out on both sides. Ether anæsthesia, and the preliminary hypodermic administration of morphia to prevent vomiting, were used.

After turning down the zygoma, excellent exposure of the temporomaxillary joint was obtained on either side, and firm bony ankylosis was found to be present. The hammer and chisel were used to cut away the condyles and the neck of the bone. No unlocking of the jaws could be obtained until the second joint had been excised when free opening was permitted. A flap from the temporal fascia was turned back into the joint on each side and sutured between the bones, after which the resected portion of zygoma was replaced and held by periosteal suture.

The patient made a good recovery, although there was slight superficial infection on each side. She moved her jaws well after a few days, and was put on solid diet at the end of a week. It was not found necessary to keep anything between the teeth at any time. She ate an apple twelve days after operation by biting into it, and said she could have done so sooner. When discharged from the hospital she had a possible separation of seven-eighths of an inch between the incisors, with a strong bite, and good rotary and grinding movement.

Her general nutrition has rapidly improved. She has gained more than 20 pounds, and eats everything.

The advantages of the method of approach in this operation as described by Lilienthal (ANNALS OF SURGERY, August, 1911) include a good and easy exposure of the joint and the absence of any danger of injury to the facial nerve.

Dr. Lilienthal has reported four cases, three of them operated upon with perfect success, and the fourth still under treatment.

There is some risk of slight infection which may come from the traumatism of the operation, and possibly through the salivary duct and the parotid.

The method consists of making an incision along the zygoma, beginning just in front of the auricle, carried down to the periosteum. At right angles from this, a second incision runs downward in front of the ear for a distance of an inch and a half and divides only the skin. The triangular flap so outlined is dissected downward and forward. The zygoma is divided by carrying a fine Gigli saw around it in two places, after which it is turned down with the masseter muscle and soft parts attached, including a portion of the parotid gland, and fibres of the facial nerves.

When bony ankylosis exists the condyles and the neck on each side are removed with gouge and curette or with hammer and chisel. Arthroplasty is completed by turning in a flap of temporal fascia.

It is usually advisable to operate on both sides at once when unilateral excision will not unlock the jaws, as a two stage operation doubles the danger from ether vomiting which is always present, and which might result fatally. Lilienthal recommends preliminary starvation and morphia half an hour before beginning the ether,—the preparation which proved successful in this case.

UNUNITED FRACTURE OF THE NECK OF THE FEMUR.

DR. JOHN H. JOPSON presented a colored man, aged fifty-one, who slipped and fell on a level floor, October, 1912. He was unable to stand or walk; was taken to a rural hospital where he remained for five days, and was then brought to his home in Philadelphia. He received no treatment, but after several months presented himself at the Polyclinic Hospital, disabled and unable to walk without assistance. Examination showed an ununited fracture of

the neck of the right femur, with a considerable amount of callus around the fracture and three-fourths of an inch shortening.

An open operation was performed through an anterior incision, the joint opened, a large amount of synovial fluid under tension evacuated, the fractured surfaces freshened and a 2½ inch screw introduced through the great trochanter into the head of the bone.

Primary union was obtained. He now has what appears to be good bony union with an inch and a half shortening and a good functional result. He still uses one cane in walking, but is doing a little light work.

ILEOSIGMOIDOSTOMY (LANE).

Dr. John H. Jopson presented a man, aged thirty-eight, who had suffered for 17 years with abdominal pain and constipation. Illness began rather acutely with what was diagnosed as inflammation of the bowels. Pain increased in severity and six years ago his appendix was removed. He was relieved for a time, relapsed again and in the Spring of 1912, Dr. Jopson operated and found adhesions, perigastric, periduodenal, and generalized throughout the abdomen. Extensive division of adhesions was followed by temporary improvement lasting for eight months, when he again relapsed, and reapplied for treatment in June of 1913. He was obstinately constipated, complained of constant pain in the hypogastric region, and was unable to work at his trade as a paperhanger.

He was again operated upon in the end of June. Marked perigastritis and pericolitis were present. The small intestines were practically free of disease, their peritoneal coat being in striking contrast to that of the large bowel and stomach. The stomach was much distended.

An ileosigmoidostomy was made according to Lane's technic, except that the anastomosis was made as high in the sigmoid as possible. The colon was not removed. He remained in the hospital about four weeks. He returned to his work a month later greatly improved, and since then he has gained many pounds in weight. The pains have disappeared and constipation has been much improved. He usually has two or three liquid movements a day, sometimes finding it necessary to use a mild laxative. He considers himself relieved of most of his old symptoms.

THE RELATION OF POSTERIOR SUBLUXATION OF THE SHOULDER-JOINT TO OBSTETRICAL PALSY OF THE UPPER EXTREMITY.

BY T. TURNER THOMAS, M.D.,

OF PHILADELPHIA.

OBSTETRICAL palsy involving the upper extremity only is ascribed almost universally to injury of the brachial plexus affecting, especially, its fifth and sixth cervical roots. It is almost as generally agreed that the much more frequent brachial palsies from injuries of the shoulder region in adults, are due to a similar lesion of the brachial plexus. In a study of the latter, published in the ANNALS OF SURGERY, January, 1911, I concluded that most of them resulted from sprains and dislocations of the shoulder-joint, the essential lesion in both being a laceration of the axillary portion of the joint capsule and the palsy resulting from the inclusion of the branches of the brachial plexus in the adjacent axillary inflammation. Because the obstetrical palsies are, evidently, of the same nature as these adult palsies, I suggested that in many cases they also are due, primarily, to injuries of the shoulder-joint. In June, 1912, in Nos. 23 and 26 of the *Münchener Medizinische Wochenschrift.*, F. Lange published two papers, in which he put forth, essentially the same theory. In the first paper he discussed under the title of "Distortion of the Shoulder" which he ascribed to laceration of the anterior portion of the shoulder capsule, the same group of cases, evidently, which I had described as "Stiff and Painful Shoulders," [1] and had ascribed to laceration of the antero-inferior portion of the capsule. According to my experience and judgment, all sprains and dislocations of the shoulder-joint are associated early with some brachial palsy, as well as with stiffness and pain at the shoulder. In most cases the palsy is mild and transitory,

[1] American Journal of the Medical Sciences, April, 1911.

in some it is very severe, but even in these it is probably rarely permanent. Lange did not refer to the palsy in his adult cases but in his second paper, devoted to obstetrical palsies of the upper extremity, he ascribed most of these palsies to laceration of the capsule of the shoulder-joint. Of his 17 palsied arms (in 15 patients), he regarded 13 as undoubtedly pseudopalsies, due to laceration of the capsule, and in 15 of the 17, he found the same position of the arm as in his "distortions" of the shoulder in adults. According to Lange, Küstner believes that the obstetrical palsies are due to epiphyseal separations of the upper end of the humerus with rotatory deformity, while Finck believes that they are due to preglenoid dislocations of the shoulder.

While the brachial plexus theory is generally accepted, particularly for the obstetrical palsies, there has been much discussion as to how the plexus is injured at birth and a variety of mechanisms have been suggested. The greatest difficulty has been found in accounting for the localization of the injury to the junction of the fifth and sixth cervical roots of the plexus. When a more or less general brachial paralysis follows soon after an injury to the shoulder region, the obvious cause is an injury to the brachial plexus. The relation of an injury of the shoulder-joint to such a paralysis, is much less obvious. It has seemed to me that the localization of the injury to the junction of the fifth and sixth cervical roots rested on an uncertain basis until supported by operations on the plexus. Certain it is that in the great majority of cases, electrical examinations are not made to determine what muscles are paralyzed. The diagnosis is, evidently, made upon the history of a paralyzed upper extremity, first observed immediately after birth, and upon the characteristic internal rotation of the whole limb. Electrical examinations soon after birth are exceedingly unsatisfactory and unreliable and are rarely made. Fairbank,[2] who recently reported probably the largest experience with obstetrical palsy, says that electrical examinations

[2] Lancet, Lond., May 3, 1913, p. 1217.

are not advisable before the end of the second month, the use of an anæsthetic being essential, but by this time the case will probably show definite signs of recovery, so as to render electrical examination unnecessary. Sherren does not test the electrical reactions until the age of three months.[8] The fact that, in most cases, there is practically no disturbance of sensation in the affected limb, although the roots of the brachial plexus are all mixed nerves, has not been satisfactorily explained.

The most substantial support of a plexus origin has been furnished, in about the last decade, by a few surgeons who have exposed the plexus in a small number of cases. In most of them the plexus was found enveloped in adhesions, in some the nerves were thickened and in a few one or more roots were found divided and the torn ends retracted. Only the last group, in my opinion, furnish substantial evidence in favor of the plexus theory, and even these need further confirmation. Without operation, it appears that the paralysis recovers spontaneously, in most cases, after a time, and time is not particularly important to these young patients. It has seemed to me that before the plexus should be exposed, definite areas of impaired sensation should be located. If these operations become common, there will probably be fewer complete recoveries of the paralyses than there are now. The operation was advised in one of my cases with posterior subluxation and was refused. That patient has been improving ever since and after about three years has recovered much power in the affected limb. In my opinion, the average surgeon without the facilities for careful study by dissection of the anatomy of this region, should not attempt to lay bare the delicate cords of the brachial plexus in the young child. The plexus is deeply situated in a confined region, surrounded by very important vessels and nerves, the cords of the plexus lying close together interweaving with each other and embedded in a mass of adhesions. Even in the hands of the able surgeons who have re-

[8] Injuries of Nerves and Their Treatment, 1908, p. 209.

ported the results of their operations the proportion of cases showing divided nerve roots has been very small. Fairbank operated on five cases and found rupture of the nerves in only one. This involved the fifth and sixth cervical roots which were torn across at their junction. Even in this case electrical stimulation before operation and of the nerves at operation, " made it certain that there must have been some fibrils passing on from the fifth cervical root or the fifth and sixth cervical to the bulbous common trunk (distal end of rupture), though dissection suggested complete division." Lange exposed the branches of the brachial plexus in the axilla in a case of obstetrical palsy, and found the cause of the paralysis to be the embedding of the nerves in thick connective tissue, for an extent of 4 cm., and found also a diminution and deformation of the head of the humerus. This is the only case of obstetrical palsy, of which I have knowledge, in which the nerves have been exposed in the axilla where they are adjacent to the shoulder-joint. I would suggest that the exudate and adhesions about the plexus, found so uniformly in operations above the clavicle, are the result of extension upward of the blood and synovial fluid from an injured shoulder-joint, which in the new-born is only a few inches below the plexus. The almost recumbent position of the infant would favor this upward extension. Boyer [4] recently reported a very interesting case of obstetrical palsy in a woman who died in an insane asylum, and upon whom an autopsy showed clear evidence of tearing of the cervical roots, on the right side, from the spinal cord, the rupture affecting particularly the seventh cervical. The brachial plexus of the left side appeared normal in size and origin. The roots of the fifth, sixth, seventh and eighth cervical on the right side were much smaller than natural and were reduced to fibrous cords, which were impossible of good dissection owing to the abundance of tough fibrous tissue. Boyer calls attention to the fact that the usual excision of a part of a nerve trunk, as Kennedy suggests, would not have

[4] Proc. Roy. Soc. Med. (Neurological Section), 1912, p. 31.

done good in this case but would have done harm. Mills[5] reported similar findings upon exposure of the cervical portion of the spinal cord by Frazier, in a case of severe brachial paralysis in an adult following an injury to the shoulder region. These cases show conclusively that rupture of the cervical roots of the brachial plexus do occur in some cases, but they do not favor the prevailing view that the rupture usually takes place in the neck at the junction of the fifth and sixth cervical.

My conception of the obstetrical palsies resulted from a previous study of the adult brachial palsies, which in turn had its origin in a study of the anterior dislocation of the shoulder, including its mechanism, lesions and sequelæ. In my judgment, the dislocation is the key to the solution of the problem involved in most of the adult cases. I believe now that the posterior subluxations of the shoulder associated with obstetrical palsies, will prove to be the key to the solution of the problem in most of these cases. Since the adult palsies have led me to study the birth palsies, I wish to state very briefly, my position in connection with the adult cases. The most damaging movement at the shoulder is hyperabduction. Forced external rotation has a similar effect, but is probably of secondary importance to hyperabduction. The capsule maintains the continuity of the skeleton at the joint and takes up, here, the forces applied to the skeleton, so that a break in the skeleton at the joint involves, primarily, the capsule. The end result of hyperabduction at the shoulder-joint is an anterior dislocation, a sprain usually being merely an aborted dislocation. If the joint is immobilized after a sprain or the reduction of a dislocation, a more or less severe palsy of the whole limb will develop because of the involvement of the branches of the brachial plexus in the adjacent axillary inflammation. The palsy and atrophy will be most marked about the shoulder, but occasionally the muscles of the hand and forearm will be most affected, as in Case II. In many cases the palsy improves so rapidly that it is overlooked or ignored. Sometimes it is so

[5] Pennsylvania Medical Journal, 1910–1911, p. 850.

severe and persistent that it cannot be ignored and then is usually ascribed to an injury of the brachial plexus. The best evidence that it is not due to an injury of the plexus is the fact that with the restoration of the normal motion to the shoulder-joint the palsy disappears rapidly. If the dislocation remains unreduced, the palsy will improve slowly, but will never entirely disappear because of the interference with the function of the joint, and perhaps also because of pressure of the dislocated head on the adjacent nerves. I have selected the following adult cases for illustration of different types of brachial paralysis of shoulder-joint origin:

CASE I.—A woman, forty years of age, teacher of drawing. On May 13, 1913, on stepping from a row-boat which began to move away from the shore of a small lake, she grasped a post on the shore with her right hand, keeping both feet in the boat. The boat moved from the shore and dragged her feet until her body was almost horizontal and her right arm in full abduction, in which position she pulled the boat to shore again. She had some pain in the shoulder immediately but it was not particularly noticeable until about an hour later, and on the following day it was worse. On the third day Dr. W. Drummond located severe tenderness over the greater tuberosity of the humerus. On the same evening he manipulated the shoulder to exclude the possibility of a dislocation, and during the manipulations observed a sensation as though the humeral head jumped out of the socket and back again, and felt distinct crepitus. The skiagraph taken on the fourth day seemed to show a fracture of the greater tuberosity, although this was not very clear. The arm was then bound in the Velpeau position, for 14 days, and on removing the bandage, the right arm hung helpless at her side and she could scarcely move a finger. This frightened her very much, because she had recently come from England to take a position as teacher of free-hand drawing, which required perfect movement of the arm. She was compelled to cancel her engagement and go back home. An insurance company, after the examination by its physician, quickly settled with the patient on a basis of five months' incapacity for work, indicating that the insurance physician regarded the paralysis in a serious light. In the three days which intervened

between the removal of the bandages and her departure from the country, there was a considerable improvement in motion and power, especially in the hand and forearm. I had to be content with giving her instruction as to the exercises which she should follow. I heard first from her under date of August 12. She still suffered from pains in the shoulder and arm, but the power and movement of the limb were "wonderfully better." She was still unable to put her hand back far enough to fasten a dress skirt, could not put the hand to the back of her head without pain, and could not raise the arm straight above her head. These, however, are among the last restrictions of movement to disappear. She had fitted up a black-board recently to try her drawing ability and was "quite greatly surprised as to the power of the right hand." All she needs is to apply force enough to stretch the still contracted tissues sufficiently to give her normal motion.

If the paralysis in this case were due to actual rupture of nerve fibres of the brachial plexus, it should have come on immediately after the injury. That the shoulder-joint was the chief seat of injury was evident from the pain and limitation of movement there, and the joint injury with the associated involvement of the branches of the plexus in the adjacent axillary inflammation, will explain every phase of this case. This type is very common, the palsy affecting most and being last to disappear from the muscles of the shoulder region.

CASE II.—Man, thirty-nine years of age, mechanic. On about May 18, 1911, received a heavy blow on his left shoulder from a falling board, while at his work. Suffered severe pain in the shoulder at the time, and during the rest of the day had a peculiar numb sensation in his left hand but continued at his work. On the following day he had no power in it and the power in his forearm and arm were much below normal. Admitted to the nervous ward of the Philadelphia Hospital, May 20, 1911, in the service of Dr. J. Hendrie Lloyd. The following is a very brief synopsis of Dr. Lloyd's examination of the case: Restricted power in arm and forearm and total paralysis of hand. Has no use of any of his fingers. Complete wrist drop. Ribbon shaped area of anæsthesia, about two inches wide, along ulnar side of forearm.

Scapulohumeral ankylosis. Cannot abduct arm to a right angle. Diagnosis: Musculospiral and ulnar paralysis with total paralysis of hand. After seeing the case with Dr. Lloyd, June 6–19, 1911, he asked me to treat it. On the following day I forced the arm into full abduction and external rotation, with the patient under ether, and fixed it in external rotation and almost full abduction on an obtuse angle splint, keeping the patient in bed. Although I cannot explain the rapidity with which the improvement developed, it was striking. On the following day, June 21, the little and ring fingers could be flexed slightly. June 22, could flex all the fingers slightly. With palm turned downward, could extend hand at wrist slightly. The ribbon-shaped ulnar area of anæsthesia had disappeared to such an extent that he could feel pain sense readily, although he still had numb sensations in this area. June 23, could flex and extend thumb fairly well and could flex fingers about one-fourth way toward making a fist. Motion at wrist also increasing. June 27, could grasp objects weakly with affected hand. Still had slight numb sensations along ulnar border of forearm. July 19, considerable atrophy of left arm and forearm. Sensation good in all parts of limb. Movement in left thumb almost as free as in right thumb, but power much less, and last phalanx could not be flexed as far as in right thumb. Could close fingers about three-fourths as well as on right side. Index finger did not flex quite as well as others. Could approximate thumb to all fingers except little finger. Could close fingers best with hand in dorsal flexion at wrist. Could flex and extend wrist almost as well as on right side, either with palm turned upward or downward. Rotation of forearm about as free on left as right side, although the power was much less. Active flexion and extension of elbow almost as free on left as right side but muscles much weaker. Active abduction at the shoulder to about 100 degrees, passive abduction to about 160 degrees.

The patient returned to work August 28, his work consisting chiefly in chipping iron and steel with a hammer and chisel, the latter being held in the affected hand. At first he had much difficulty in holding the chisel firmly enough, and could not have continued at his work if the foreman had not encouraged him to do so. In about two weeks he could do his work satisfactorily enough. The improvement in the whole limb continued, until in about a

year it was practically normal. He says that for a long time the limb has been about as good as it ever was.

In my opinion, the original injury resulted from forced abduction of the arm at the shoulder, with a laceration of the axillary portion of the capsule, perhaps with a temporary dislocation and immediate reduction as the arm fell to the side. The reparative inflammation extended to the axilla involving the branches of the brachial plexus, and was followed by a contraction of the capsule which accounted for the limitation of abduction and external rotation. The tearing of the contracted capsule and the abducted position of the arm, in some way, were responsible for the rapid improvement which followed, and the exercise of the muscles involved in using the improved motion, which became normal, was chiefly responsible for the return of the power to the normal.

CASE III.—Woman, forty-one years of age, weight last spring 130 pounds, now (September, 1911) 112 pounds. Referred by Dr. B. F. Stahl, who suspects a mild tuberculous lesion in the left lung. No tubercle bacilli in the sputum. In December, 1909, she had a large abscess in the left axilla, which was opened and required about four months to heal. Ever since she has had a severe brachial palsy of the whole limb, most marked in the shoulder region, and marked limitation of abduction and external rotation. Muscles of the whole limb are much atrophied, particularly those about the shoulder, the deltoid being so thin that the upper end of the humerus seems almost subcutaneous. In January, 1911, an effort was made to restore motion to the shoulder by "breaking up adhesions" under ether. Passive movements by a masseuse were continued for a long time but nothing was gained. In November of the same year, I tried the same procedure, but fixed the arm in full abduction for 18 days, after which passive motion and massage were kept up faithfully for about seven months. No improvement in movement or power resulted. Electrical examination by Dr. J. W. McConnell, showed that all muscles of the limb responded to the faradic current. I still believed that if I could restore the normal motion to the shoulder, the patient would recover much of her former power, and I proposed a plastic operation on the scar tissue in the axilla to overcome its effect in restrict-

ing motion. She returned in October asking for the operation, which was performed at the Howard Hospital, November 14, 1912. The arm was fixed at a right angle on a splint for three weeks. Soon afterward she began mechanical treatment in the orthopædic gymnasium of the University Hospital, for which privilege I am indebted to Professor G. G. Davis. This treatment was continued until June, 1913, when she left for her summer vacation. She could then raise her arm straight above her head, by anterior elevation but could not raise it as far by lateral elevation. The improvement in power was general in the whole limb and was still continuing. She could play on the piano, could swing light Indian clubs, and do many other things that she had not been able to do since before the axillary abscess had developed.

As I view this case, the axillary abscess resulted in essentially the same condition as the shoulder-joint injury in the preceding cases, except that in this one the involvement of the branches of the brachial plexus in the scar tissue produced a more severe and unyielding condition than is usual after the joint injury. The release of the nerves from this dense scar tissue must be a slow process. How much return of power will ultimately occur, remains to be seen.

Posterior subluxations of the shoulder-joint associated with obstetrical palsies are only now beginning to receive the attention they deserve. Fairbank says, "Anatomically, there is no doubt about the subluxation." He has notes of 40 cases of obstetrical palsy seen during the last few years, 35 of them in the "last three years or so," and of the subluxation he says it "has received little or no attention in this country" (England). Excluding three of his 40 cases, seen before the subluxations were appreciated, 28 of the remaining 37, or 76 per cent., showed subluxation of varying degree. Nine out of my 12 cases, or 75 per cent., showed subluxation. That they have received little attention is to be accounted for by the fact that they are peculiarly obscure (see Figs. 1, 2 and 3). I had never had any particular interest in obstetrical palsies until I realized that they were generally supposed to be due to the same cause as the

adult brachial palsies from injury to the shoulder region. I then sought a case for study and this was furnished me by the kindness of Dr. R. H. McCombs. I approached the case with the thought of its having, possibly, a shoulder-joint origin. Although a peculiarity in the conformation of the shoulder immediately attracted my attention, it was some time before I realized that the patient had a posterior subluxation of the shoulder. I also realized, at that time, that there was something peculiar about the anterior part of the shoulder, the real nature and significance of which I could not interpret. From my study of this case, as already reported, I concluded that the dislocation was probably the cause of the palsy or pseudopalsy. The cases which I have since seen, have only confirmed that view. In seeking important papers, I did not look up congenital dislocations of the shoulder and for that reason overlooked Whitman's very important paper on this subject.[6] He called attention to the frequent association of these congenital dislocations with obstetrical palsies. He regarded most of them as being secondary to the paralysis resulting from an injury to the brachial plexus. Fairbank supports Whitman's view. F. Lange who supports the shoulder-joint origin of most obstetrical palsies, disputed the existence of dislocation in these cases.

The theory that these palsies are due, uniformly, to rupture of fibres of the brachial plexus had its origin and became firmly established without taking into account these frequent subluxations. I cannot agree with Whitman and Fairbank that the dislocation is due to the paralysis, but prefer to believe that the paralysis is due to the dislocation, and that the term, pseudopalsy, applied to most of his cases of obstetrical palsy, by Lange, serves a useful purpose. If this can be proved, then it follows that if the dislocation is recognized and completely reduced early enough, in most cases there will be a complete return of function and growth of the affected limb. The chief responsibility will then lie with the obstetrician and family physician.

[6] ANNALS OF SURGERY, 1905, xlv, p. 110.

To prove this the essential thing is to show that the dislocation occurs at birth and is traumatic in origin. While it is possible to have a dislocation and a rupture of the brachial plexus occur at the same time, this is not likely or, at least, is not likely to be frequent. We have no positive evidence that the subluxations are due to paralysis. Stimson, like Whitman, included under congenital dislocations of the shoulder, all dislocations present at birth or developing as the result of injury to the brachial plexus, and, like Whitman, regarded the true congenital dislocations as rare. But while Whitman considered those secondary to an injury to the brachial plexus, as the most frequent, Stimson[7] thought it probable that the most frequent variety was due to force applied to the shoulder at birth. He had 5 cases, all backward dislocations; four of them, possibly all, occurred at birth. Both Whitman and Fairbank say that the shoulder-joint is injured at birth in some cases, and Fairbank states that it would be impossible to say that the dislocation did not occur, in some cases, coincidently with the plexus injury at birth. In one of his cases, the physician who was present at the birth of the patient, diagnosed the dislocation of the shoulder at that time, but Fairbank concluded that the physician must have been mistaken. In 5 of his 28 cases with subluxation, he completely reduced the dislocation without operation. The earliest period at which he has seen a reducible subluxation was 2 months. The dislocation in this case had probably existed some time previous to the reduction, which brings its origin close to birth. Of the 28 cases, 14 were in the first year of life. In 18 of the 28, electrical examination, under an anæsthetic, showed no signs of paralysis. Of the 10 remaining, 7 showed only some weakness of the extensors of the back of the hand. It will be seen, therefore, that in at least four of his cases, the paralysis had entirely disappeared within the first year of life, and in 11 it had almost entirely disappeared. A paralysis which disappeared so soon, could hardly be expected to produce, secondarily, a subluxation of the shoulder that would be irreducible without operation.

[7] Fractures and Dislocations, 1907, p. 610.

I have had only nine cases of obstetrical palsy with subluxation which, I confess, is a small experience upon which to base a dispute concerning the obscure etiology of these cases. I believe, however, that there is in every one of these nine shoulders positive evidence that the subluxations developed at birth from direct pressure against the anterior portion of the shoulder pushing the humeral head backward. It should be borne in mind that these subluxations have been, practically, overlooked until recently. Close observations of them have not yet been reported. In my second case the subluxation was easily recognized although it was of milder grade than in the first, but as in the first I was conscious of the fact that there was something peculiar in the conformation of the shoulder which I did not understand. I was imbued with the idea that all that was necessary was to reduce the dislocation and from my operative experience in the first case, I was convinced that the chief obstacle was connected with the alteration in the glenoid cavity and with the anterior portion of the capsule. I met these conditions in operation on this second case by dividing completely the anterior portion of the capsule and removing the upper anterior margin of the glenoid cavity. Although I restored much of the restricted abduction and external rotation, and the function and development later improved remarkably, I did not completely reduce the dislocation. This became more obvious in the after-treatment when I could palpate the shoulder freely without pain to the patient, and it was then that I discovered what I believe will throw a new light on the subject of obstetrical palsy. If the examining finger is passed from behind over the upper surface of the acromion, on the normal side, it will come upon the rounded upper end of the humerus just in front of the anterior edge of the acromion. By the same manœuvre on the affected side, the finger will not find the smoothly rounded upper end of the humerus, just in front of the acromion. What I had not recognized before was that the anterior portion of the acromion was bent downward and as the finger passed forward it continued in contact with this portion of the acromion a slight distance

downward (see Fig. 1 *a* (*A*), and Fig. 4 (*A*). This change in the shape of the acromion was present in varying degree in all nine of my cases with posterior subluxation.

My only purpose at present is to call attention to its presence and to its probable significance. I am not prepared to describe the deformity in detail because its characteristics vary. This is probably due to the fact that the pressure which is responsible for it is not always applied exactly in the same place. The most important variation was found in my last case, in which the posterior dislocation was more marked than usual. The downward projection of the anterior portion of the acromion was slight or absent and merely changed the normal inclination of the acromion from the anterior margin downward and backward, so that it was horizontal or slightly curved from before backward, which showed that the anterior portion had sustained pressure from above. In this case, however, there is evidence that the coracoid process had received considerable pressure. Efforts to show the deformity by the X-ray have not been satisfactory (see Figs. 5, 6, and 7) [8]. This may be due in some cases to the fact that the abnormal portion of the acromion is cartilaginous as shown by operation in two cases, and in others to the difficulty in bringing out by the X-ray the difference between the normal inclination of the acromion and the change produced by the pressure. As one would expect

[8] The downward projection of the acromion which is easily palpable and even visible in Case I—Fig. 1*a* (*A*) and Fig. 4 (*A*)— is not shown in the skiagraph (Fig. 5, right shoulder). In Case II it is easily palpable and its borders can be outlined, yet it scarcely shows in the skiagraph, Fig. 6 (right shoulder). In Case VIII it was not present although the acromion seemed depressed as a whole and was more horizontal than on the normal side. There is shown in all three cases, by the X-ray, a change in the plane of the acromion. On the normal side it is seen as a thick plate of bone, due to its inclination downward and backward from its anterior to its posterior border. On the affected side, in all three cases, it appears to be thinner, indicating that it occupies a more horizontal plane, which is to be explained by a downward pressure on the higher anterior portion, during birth. Figure 5, right shoulder, seems to show that the humeral head and acromion have been largely worn away, by rubbing against each other during movement. In the normal or left shoulders, the lower margin of the shadow of the acromion marks the posterior margin. This is not so

from the fact that the deformity has been overlooked, it is an obscure one. A careful examination is necessary to establish its presence and outlines. The downward projection of the acromion seems almost to fuse with the upper end of the humerus and it is a little difficult to determine when the examining finger is on this portion of the acromion and when on the humerus. It is most evident in the older patients and in them seems to be ossified.

The explanation for it seems obvious. For my cases, at least, it offers positive evidence for what Stimson had already suggested, *i.e.*, that most of the congenital dislocations of the shoulder are probably the result of direct pressure backward on the humeral head by the bony wall of the maternal pelvis, during birth. He says that some of the paralytic forms have been described as "obstetrical paralyses." He also says: "In my four cases, Scudder's two, and Cumston's, the right arm was affected, in Gaillard's the left; and it seemed possible that as the right shoulder is in front in the great majority of births, the cause might be its pressure against the arch of the pubis. Against this or, at least, limiting it, is the double dislocation in Küstner's and the breech presentation in one of mine." My cases furnish a striking confirmation of Stimson's observation. In 11 out of my 12 obstetrical palsies, the right arm is involved.

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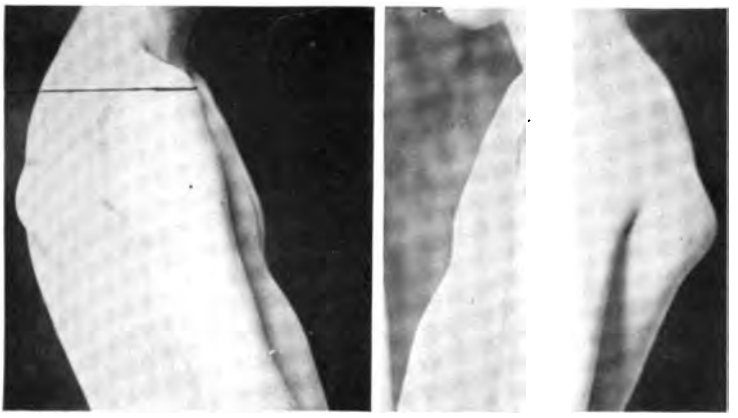
certain on the affected side. If on this side the lower margin in the skiagraph represented the anterior border, it would mean that this has been bent downward.

A mild downward displacement of the humerus is shown in the three cases. The posterior displacement cannot be shown by this exposure and only with difficulty by any other. Note the abscence of the separation between the clavicle and acromion on the affected sides. Figure 5 (right shoulder) seems to show complete fusion of the two bones. There is a bony protuberance at the site of this joint in this patient. The same union of the two bones seems to be shown in Figure 6. In Figure 7, the outer end of the clavicle can be faintly traced, indicating that bony union is not present in this case. The X-ray shows clearly that these are not cases of epiphyseal separation. The small range of movement in the affected shoulder of Case VIII might account for the nearly normal shape of the humeral head (Fig. 7), and probably accounts for much of the atrophy of the muscles (see Fig. 15).

a FIG. 1. b

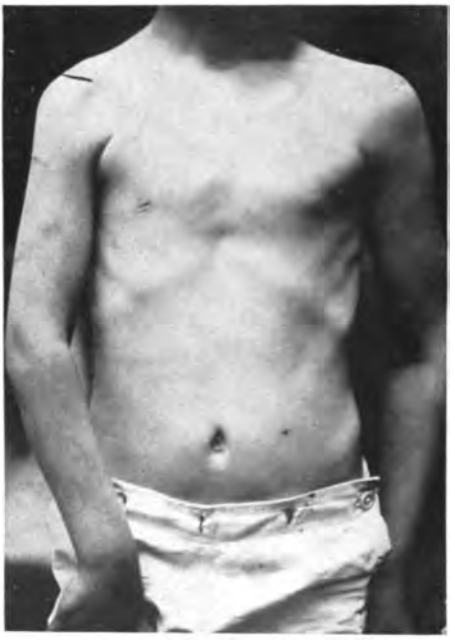


a FIG. 2. b

a FIG. 3. b

Fig. 1 (Case I), Fig. 2 (Case II), and Fig. 3 (Case VIII) illustrate the mild grade of posterior subluxation in the right shoulder, which is shown by the slight flatness anteriorly. Fig. 1a, *A* shows the turning down anteriorly of the acromion. The acromioclavicular joint is obviously involved in this case. It is the only case in which the bending down of acromion can be seen.

FIG. 4



Case I. Comparison between the two shoulders discloses a flatness anteriorly in the right one. The turning downward of the acromion is faintly discernible at *A*. In the other cases careful palpation was necessary to detect it. In this case there is a bony protuberance at the acromioclavicular joint which accounts for the diagnosis of fracture of the clavicle at birth.

FIG. 5a.

Case I. Right shoulder.

FIG. 5*b*.

Case I. Left shoulder.

FIG. 6*a*.

Case II. Right shoulder.

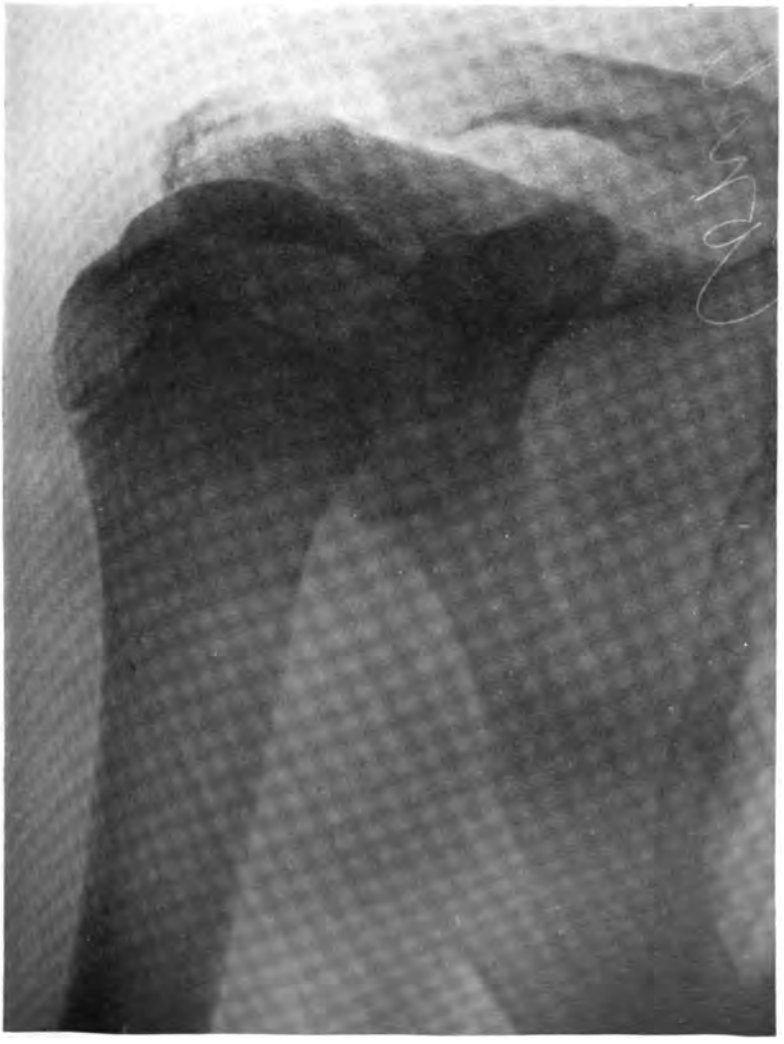
FIG. 6*b*.

Case II. Left shoulder.

FIG. 7a.

Case VIII. Right shoulder.

Fig. 7b.



Case VIII. Left shoulder.

FIG. 8.

FIG. 9.

Figs. 8 and 9 show degree of active elevation of arm. **Mechanical obstruction and not lack of power prevents greater elevation. Patient shown in Fig. 8 has the better development and use of the limb.**

FIG. 10.

Case III. Posterior subluxation at shoulder and anterior dislocation of radius at elbow. Marked compensatory hypertrophy of whole left limb, probably due to unusual helplessness of affected limb.

FIG. 11.

Case VI. Shows limitation of extension at the right elbow, which is about the same in Case IV and in one case without subluxation of the shoulder. Comparison with the other arm shows the internal rotation.

FIG. 12.

Case II.

FIG. 13.

Case V.

FIG. 14.

Case VIII.

FIGS. 12–14.—Three different positions in which the limb was dressed after operation.

FIG. 15.

Case VIII. Atrophy of whole limb marked, of shoulder and arm muscles more marked than in any of the other cases. The higher of the two prominences seen anteriorly is the edge of the acromion, the lower the coracoid process.

Fairbank, however, says of his cases that " The two arms were affected in an equal number of cases."

The dislocations of the shoulder in the adult are almost always anterior, those associated with obstetrical palsy are practically always posterior. The only autopsy report on a congenital dislocation of the shoulder, found by Stimson, was of a double anterior dislocation reported by R. W. Smith.[9] After reading Smith's paper, published in 1847, I would agree with Stimson that in all probability this was not a case of congenital dislocation. In my opinion, the great majority of dislocations of the shoulder in adults are anterior because they are due to hyperabduction, which can produce only an anterior dislocation. The few posterior dislocations that do occur in adults, are probably due to direct violence pushing the humeral head backward. The fact that practically all dislocations of the shoulder occurring at birth are posterior, is probably to be accounted for by the same mechanism, as the child is coming through the birth canal. Lange, in discussing Finck's idea of a preglenoid dislocation in these cases, maintained that a dislocation of the shoulder, to occur at all, must be complete, and that such a dislocation in the new-born could be shown by the X-ray. Neither Finck, nor any other writer, he says, has established in this way, a dislocation of the shoulder in the new-born. He adds that the application of strong force during birth would result rather in an epiphyseal separation than in a dislocation. There would be much force in these statements, if we ignored the fact that all dislocations are not produced in the same way, and this fact has not received much attention. The anterior dislocations are the result of indirect violence exerted through hyperabduction of the humerus and the first strain at the shoulder comes on the axillary portion of the capsule which must tear before a dislocation can take place. I have tried in several infant cadavers to produce an anterior dislocation by hyperabduction and have obtained each time an epiphyseal separation or a fracture of the upper end

[9] Fractures and Dislocations, 1847.

of the humerus. The capsule was stronger than the humerus as suggested by Lange. Direct pressure backward on the head is not likely to fracture it. The X-ray will not show a typical dislocation of the shoulder in these subluxations, because they are not typical as we know dislocations. (see Figs. 5, 6 and 7). The X-ray will, however, show a slight downward displacement, and a change in the normal shape of the head, probably due to abnormal pressure and retarded growth. I agree with Lange, for the ordinary dislocations in adults, that they must be complete. The humeral head cannot remain resting on the glenoid margin in the subluxated position. It must glide over into the completely dislocated position or back to its normal place in the socket. But in these posterior dislocations associated with obstetrical palsies the head remains resting on the posterior edge of the glenoid cavity in the subluxated position because of the obstructing anterior portion of the acromion bent down by the same force which pushed the head backward at birth, and possibly by a coracoid process that was also pressed downward and backward. The head cannot jump back into the socket because of this obstacle. Here is a very satisfactory explanation for some of the obstinate difficulty in reduction, encountered by Whitman and Fairbank, and which I found in four of my cases. Other obstacles develop in time, as from contracted muscles and other soft tissues and changes in the head of the humerus and glenoid cavity. In the early stages this abnormal portion of the acromion may be the only serious obstacle to reduction. In one of my cases, a boy ten months of age, I removed this obstruction and then had little difficulty in accomplishing the reduction or in maintaining it. In two other cases complete reduction could not be accomplished even after removal of this obstacle. Since this abnormal condition of the acromion was present in all nine of my obstetrical palsies with posterior subluxation, I have no doubt that it will be found by others.

In looking for the subluxation, the best sign, is the absence of the normal prominence of the upper end of the humerus, in front of the acromion, as determined by the palpating finger,

together with the presence of an abnormal prominence just below and behind the posterior margin of the acromion. The degree of displacement varies considerably in my cases, although in none is the dislocation complete. The amount of fat and the mild grade of displacement, may make the conformation of the shoulder so nearly normal that the subluxation will be overlooked unless one has in mind the possibility of its presence and makes a careful examination. I overlooked it in two of my early cases.

If a dislocation of the shoulder in the adult produces a brachial paralysis without rupture of nerve fibres, a dislocation in the new-born is much more likely to do so because of the much more delicate and sensitive muscles and nerves. This will account, I believe, for an interesting difference between the two groups of cases. In the new-born the paralysis seems to be complete in most or all cases for a time. In the adults, it is rarely complete. In both there is usually a tendency to rapid improvement. In a case, without dislocation, seen with Dr. L. C. Peter, about six weeks after birth, the palsy had almost entirely disappeared, yet immediately after birth the palsy was complete, according to the statement of Dr. Peter, who is a neurologist of experience. It is generally agreed that in the majority of cases, the paralysis spontaneously recovers. Reports of cases in which the extent of the paralysis is made evident by electrical examination, are conspicuous by their infrequency, and in this respect they are very similar to the adult brachial palsies from injury to the shoulder region. Fairbank found that in most cases the paralysis had largely disappeared by the end of the second month, as determined by electricity. In his series of 40 cases, the nerves appeared to have completely recovered or showed every sign of recovering at the time of his report in, at least, 60 per cent. of the cases. In several of the remaining 40 per cent., the residual paralysis affected one or more muscles of the forearm only, the bulk of the paralysis having entirely disappeared. It should be borne in mind that 14 of his 28 subluxation cases were in the first year of life, how many of the other 12 cases without subluxation he does not say. The

inference is that more than 60 per cent. of all his cases recovered from the paralysis completely, at a later period. Sherren says that about 70 per cent. of his cases recovered spontaneously, and that in many the paralysis had completely recovered at the age of three months, before which period he did not test the electrical reactions. But spontaneous recovery from the paralysis does not mean a functional recovery, as in 28 out of 37 of Fairbank's cases, there still remained a subluxation, which is not mentioned by Sherren. I have seen two cases in which the relations of the skeleton were normal at the shoulder and throughout the whole limb. In one case as already stated the child had recovered almost full use of the limb in about six weeks. I have seen this case recently and normal function and development have been present so long that the mother has almost forgotten about the palsy. In another case, now an adult, the patient has had full function in the previously paralyzed limb for many years. She has a clear recollection of the palsy in her early years, but it disappeared so gradually that she does not know now how long it lasted. This suggests what I believe to be true, *i.e.*, if the shoulder-joint relations are normal in a case of obstetrical palsy of the usual type, the limb will gradually recover full motion and function and will have its full growth. In a third case, the sister of one of my patients with subluxation, the shoulder-joint relations are normal, but there is some limitation of extension at the elbow indicating that an injury occurred there at birth. Now the function of the limb is practically normal, and such impairment as still exists is to be accounted for by the limitation of movement at the elbow.

If in an adult the dislocation remains unreduced, the associated palsy gradually disappears, but never completely. After years of persistent effort the power and motion may recover to a remarkable degree. The improvement in motion is responsible for the improvement in power, and the return of normal power is impossible because the return of normal motion is impossible. Stimson gave as one of his reasons for thinking that the most frequent variety of congenital dislocation of the

shoulder was probably traumatic (and not secondary to paralysis), "that the limitations of motion closely resemble those of the similar traumatic dislocations in adults." As I see these cases of obstetrical palsy with posterior subluxation at eight to ten years of age, especially the two which were incompletely reduced about two years ago, they are nothing more than old unreduced dislocations of the shoulder. Such limitation of movement and power as is present, is to be explained by the displacement in the shoulder-joint. Both Whitman and Fairbank believe that sometimes the displacement in the joint is the only obstacle to complete recovery. I believe that this is true of practically all early cases. In long standing cases, permanent changes have taken place, particularly, in the bones, and in some cases there is a marked lack of growth in the limb. Reduction of the dislocation will improve these very much, but of course will not restore the limb to the normal. It cannot be expected to restore the normal shape of the humeral head and glenoid cavity, although these may improve from long continued movement with the bones in normal contact with each other. While the affected limb may be shorter than the other and atrophied, we may expect improvement in size and strength. This has resulted already in my second case operated on, to a very satisfactory degree, and in the first case, the improvement is almost as satisfactory (see Figs. 8 and 9). It is of interest that the displacement in the first is more marked than in the second.

In one of my cases there was the usual posterior subluxation of the shoulder with the bent down condition of the acromion, and in addition an anterior dislocation of the head of the radius (see Fig. 10). Fairbank had a similar case and thought the radial dislocation congenital in origin. I prefer to believe that, like the shoulder dislocation, it occurred at birth and is traumatic in origin. Electrical examination by Dr. J. W. McConnell, did not reveal that any muscle was completely paralyzed, but while the muscles of the arm from the shoulder to the elbow showed the same atrophy and weakness as in the other cases of subluxation of the shoulder at about the same

age, unlike these, from the elbow to and including the hand, the atrophy and weakness were much more marked than above the elbow. This suggests that the muscles from the shoulder to the elbow suffered the usual palsy from a subluxation of the shoulder and from the elbow down they suffered the combined palsy consequent upon the shoulder and elbow dislocations. In Case IV, in addition to a subluxation at the shoulder, there is an abnormal prominence about the radial head and a turning of the forearm inward in the cubitus varus position. In Case VI, there is a considerable limitation of extension at the elbow (see Fig. 11). It becomes more than probable, therefore, that the elbow as well as the shoulder suffers from trauma in some births. In Case III, the hand is fixed in flexion, which I am inclined to ascribe to contraction of the flexors, although I have not had the opportunity of studying this case carefully.

In this discussion, I have not considered two groups of cases, those in which the brachial plexus is injured without flail-joint and those with flail shoulder-joint. I excluded the first because none of my cases seemed to be in that class, and the second or flail-joint type, for the same reason and because they seem to be exceedingly rare. Whitman mentioned the latter, but not in such a way as to infer that any of his cases were of this kind, and Fairbank did not mention them. I have not seen any, nor have I seen a report of such a case in the literature, although my search was not at all thorough. If in a case of obstetrical palsy, I found the anatomical relations at the shoulder normal, no other deformity in the bones of the limb, the sensation normal, and after several months the electrical reactions normal, I would not worry much about the ultimate outcome of that case. Any limitation of movement in the shoulder-joint from contraction of the capsule would gradually disappear, I believe, from persistent manipulations by the mother or nurse, and the normal function of the whole limb would recover, in time, completely or practically so. From my experience and study of obstetrical palsy, it seems to me that we have been paying too much attention to the brachial plexus and too little to the skeleton. Obvious injuries of the

skeleton, like fractures of the clavicle and humerus, both of which were present in one of my cases, receive attention, but the less obvious injuries, especially those of the shoulder-joint, have been largely overlooked. In any case I would look first to the shoulder. If this were the general teaching and practice, I believe that there would be much fewer permanent obstetrical palsies. If there was present a subluxation of the shoulder and the physician in attendance at birth had this possibility in mind, he would probably find it in most cases and would probably reduce it immediately. The palsy would then gradually disappear, although this might require months or years. If the dislocation is first recognized months or years after birth, the first consideration should be to reduce it. But while the condition has received little attention as yet, the work of Whitman and Fairbank show that the subluxation is very difficult of reduction. Of his 28 cases, Fairbank could reduce only five without operation. Whitman, who used the non-operative method of reduction, found that in the more extreme cases it is impracticable to complete the reduction at one sitting. He applied a plaster case after the first attempt and undertook the further correction after an interval of two weeks. In all the cases, he says, there is a strong tendency to return in some degree to the original posture. I have had, as yet, the opportunity of attempting reduction in only five of my nine cases with subluxation. In my first and second I failed to reduce completely by operation. In the third, I tried the Whitman non-operative method of reduction after exposing and removing the obstructing portion of the acromion, and accomplished complete reduction rather easily. But soon after the removal of the case the subluxation recurred and the limb took the position of internal rotation again. It could easily be reduced again by rotating the arm externally. I attribute this result to the fact that the posterior part of the capsule was made longer than normal by the subluxation and was not shortened after the reduction. The abnormal changes in the humeral head and glenoid cavity from the ten months' duration of the dislocation, probably favored the gliding of the head into the dislo-

cated position. I expect later to shorten the posterior part of the capsule and the overlying rotator tendons in this case. (This has been done since the reading of the paper.) In my fourth attempt at reduction, I merely removed the obstructing portion of the acromion, without shortening the posterior part of the capsule and rotator tendons, because I was satisfied that this would not suffice to hold the head in its normal position in internal rotation which, in this case, forced the head into the subluxated position every time against any resistance I could safely offer. The humeral head was much altered in size and shape and I preferred to permit a greater range of movement at the shoulder, *i.e.*, of the head from the normal position to the subluxated, in the effort to obtain a wider range of movement of the arm in external rotation and abduction. The findings in the fifth case differed also from the others. As we are only now beginning to appreciate the frequency of these subluxations, the best method of treating them has not yet been worked out. It is likely that immediately after birth non-operative reduction will be easy, that the difficulty will increase as the child grows older and the prospects of complete recovery grow less. My first two cases, which I have been able to watch for two years or more, and particularly Case IX, show that after years much improvement in motion and power can be obtained. It is of much importance that these young patients can afford to wait a long time for the gradual return of power.

Lange in 8 cases, following Hoffa, improved the usefulness of the arm, especially external rotation, by doing an osteotomy below the middle of the shaft of the humerus and obtaining union with the lower fragment in external rotation. The object was to overcome the obstinate internal rotation. The operation was followed by much improvement; for instance children, who could carry the arm only to the waistline before operation, learned to comb the hair, carry the hand to the mouth, button the clothes at the back, etc. But my patients, even after incomplete reduction of the subluxation by opera-

tion, showed much more improvement than this, they could carry the hand higher and had nearly full external rotation. Case IX with a mild subluxation has recovered almost a normal arm from exercises alone, without reduction of the subluxation. Osteotomy does not improve motion of the arm, which can only be done at the joint, but merely improves external rotation at the expense of internal rotation. It should be borne in mind that Lange attributes the limitation of movement at the shoulder, to an epiphyseal separation of the upper end of the humerus, in these obstinate cases. I have no doubt that the existence of subluxation in these cases, will become generally recognized, when it will become obvious that the best place to improve the movement of the arm, is at the shoulder-joint and not at the middle of the humerus.

Conclusions.—In the great majority of cases of obstetrical palsy of the upper extremity, the primary cause is not rupture of the brachial plexus but an injury to the shoulder-joint, the plexus and its branches becoming involved in the adjacent axillary inflammation. Electrical examinations will fail in most cases to demonstrate actual nerve paralysis after two or three months and before that time they are not advisable (Fairbank and Sherren). Detailed reports showing accurately the extent of the nerve paralysis by electrical examination, are conspicuous by their infrequency.

In most of the cases in which the brachial plexus has been exposed by operation above the clavicle, rupture of the plexus has been assumed because of the presence of adhesions about the plexus and thickening of the cords. The very few cases in which the roots have been found ruptured, need further confirmation because of their very small number and because of the great difficulty in dissecting accurately the delicate and interweaving roots. Fairbank, evidently, experienced this difficulty and Boyer, in an autopsy, found the plexus impossible of good dissection because of the abundance of tough adhesions. The presence of these adhesions is best explained, in my opinion, by the extension a few inches upward of the

blood, synovial fluid and inflammatory exudate, from an injured shoulder-joint. Lange by operation in the axilla, found the cause of the paralysis to be the embedding of the branches of the plexus in thick connective tissue in the axilla, and found also a diminution and deformation of the head of the humerus.

The best evidence showing the primary cause of these obstetrical palsies is only now becoming properly recognized, *i.e.*, the frequent association with an obstetrical palsy of a posterior subluxation of the shoulder-joint. The presence of the bent-down condition of the acromion cannot be explained on the basis of a brachial plexus injury and, in my opinion, will prove to be the key to the whole situation (change in the shape of the coracoid process may also result from the pressure). Its presence in all of my cases with posterior subluxation, makes it practically certain that it and the subluxation are due to direct pressure by the maternal pelvis during birth and that the joint injury is the primary cause of the palsy. The most striking evidence of a shoulder-joint origin of the palsy in my cases is afforded by the progress of the condition in them after the improvement of the joint condition. The nine cases in which a more or less severe palsy was permanent, showed a posterior subluxation of the shoulder-joint in each. In two of the three cases in which there was no subluxation, full function has returned. In the remaining case, there is full power of all the muscles and full motion of all the joints, except the elbow, the only impairment of function being due to the limitation of extension at the elbow.

Immediately after birth the reduction of the subluxation will probably be easy. After a few months it becomes very difficult, probably because of the obstruction offered by the bent-down portion of the acromion, possibly change in the coracoid process, and by the changes in the surrounding soft tissues. When the abnormal portion of the acromion becomes ossified, it should prove to be a practically insuperable obstacle. The first indication at any stage is to reduce, the next to obtain the best possible motion at the shoulder-joint.

Obstetrical palsy without dislocation, in most cases, will be associated early with limitation of abduction and external rotation which will gradually disappear, the rapidity depending upon the force applied in stretching the contracted capsule and other soft tissues. The palsy will also gradually disappear but will continue for some time after the motion is complete. If an existing subluxation is reduced immediately after birth, complete recovery will probably follow in the same way. If reduced later, complete recovery will be prevented according to the degree of permanent change in the bones and other tissues from the continuance of the subluxation. The condition which develops is very similar to that associated with an old unreduced dislocation of the shoulder in an adult, the lack of growth being due chiefly to the interference with function during the growing period.

The chief responsibility in these cases, according to my view, will fall upon the physician in attendance at birth. The failure to recognize the frequent occurrence of these subluxations is due to their peculiar obscurity, but when once suspected they can be detected by careful examination. The recognition of the absence of the humeral head or tuberosities immediately in front of the acromion and of the presence of an abnormal prominence behind the acromion, is sufficient for diagnosis. The association of anterior dislocation of the head of the radius, abnormal prominence of the radial head, limitation of movement in the elbow, as found among my cases, indicate that the elbow is also subject to injury at birth. Injuries of the skeleton of the upper extremity, associated with obstetrical palsy, offer a fruitful field for further study. I fully agree with Lange when he says that " the day for the let alone treatment of obstetrical palsy has passed by."

In conclusion I wish to express my indebtedness to Professor G. G. Davis for his encouragement shown in the transferring to me of three cases with posterior subluxation from his service in the University Hospital, and to Dr. J. W. McConnell for his interest and assistance, as a neurologist, in my cases and in other phases of the work.

CASES OF OBSTETRICAL PALSY WITH POSTERIOR SUBLUXATION OF THE SHOULDER-JOINT.

CASE I.—Reported in ANNALS OF SURGERY, January, 1911.

CASE II.—Girl, ten years of age, referred by Dr. A. G. Tinney. Has been reared by grandparents and nothing is known of the birth except that the right arm has been palsied since. It is very little shorter than the left, but is much atrophied, held in marked internal rotation, and can be rotated externally only to a slight degree. Can carry the limb at the side of the body, but when unconscious of being observed, as at play, the forearm is flexed in front of the body, the arm is held in slight abduction and the shoulder is depressed, which position attracts attention to the crippled condition. Cannot flex elbow to a right angle, can abduct arm at shoulder to about a right angle but passive abduction cannot be carried much further. Seems to have some power in all the muscles of the limb, but all are weak, some weaker than others, dorsal flexion of the wrist being particularly weak. She generally uses her left hand because of the difficulty in using the right. For instance, she cannot raise her hand high enough to write on the black-board at school, except with much straining, and when she does the whole limb trembles and her writing becomes illegible. The anterior and outer portion of the acromion is bent downward and seems to be almost directly in contact with the humerus, but this was not observed until after the operation.

Operation (August 8, 1911).—At University Hospital, in service of Professor Edward Martin. With arm in abduction, capsule exposed by axillary incision between coracobrachialis muscle and large vessels and nerves, and subscapularis muscle divided. Capsule opened anteriorly from upper to lower part of joint. Finger in joint felt nothing abnormal except poorly developed and irregular head. Anterior and upper portion of glenoid margin removed with gouge and scalpel, to permit the head to be pushed upward and forward to its normal place, but this met with only partial success. Almost full external rotation was obtained. Patient then turned over and posterior portion of capsule exposed by incision along posterior margin of deltoid and division of tendons of infraspinatus and teres minor. Capsule divided, head pushed upward and forward, and an effort made

to hold it there by shortening of the capsule and divided tendons. Anterior part of capsule and subscapularis muscles sutured, and then both skin wounds, a small drain being left in each. Dressings. Arm fixed in full abduction and external rotation by a plaster case. Both drainage tubes removed in 48 hours, and primary healing obtained. Case removed August 20 and arm brought to side of body, gradually by changing the angle of fixation. When all fixation was removed, there was a severe palsy of the whole limb, but sensation was good throughout. Could flex and extend little finger and thumb, but could not move other fingers. Could not flex or extend elbow or rotate forearm. This palsy gradually disappeared and in about six weeks the power was better than before the operation. At the present time it is almost as good as in the left, and she has schooled herself to use it in preference to the left, although there is still considerable mechanical obstruction to movement at the shoulder, probably due chiefly to the bent-down condition of the acromion against which the humerus impinges, and to the incomplete reduction of the dislocation. Whereas before operation her crippled condition was apparent, practically all the time, it is evident now only when she raises both arms up above her head.

CASE III.—Boy, nine years of age. Referred by Dr. H. D. Beyea. Birth difficult, lasting about 60 hours, instruments finally being employed. The physician who delivered the mother, told her that the shoulders were very broad and that, in using instruments, he had pulled so long and hard that he was exhausted. Paralysis of right arm noticed by nurse during first bath. The only deformity noticed at the time, by the physician, was a turning inward of the left foot, which soon disappeared without treatment. As the child grew the whole right upper extremity gradually became shorter than the left, but developed some power in various parts. It is now atrophied as a whole, but much less above the elbow than below. There is a posterior subluxation of the shoulder, and a complete dislocation, anteriorly, of the head of the radius (See Fig. 10). This dislocation can be reduced almost completely, but recurs quickly when the pressure is removed. The anterior portion of the acromion is bent downward. There is a very marked compensatory hypertrophy of the whole left upper extremity.

At the University Hospital, January 22, 1912, an operation

was done to prevent recurrence of the radial dislocation. The radial head was nearly normal in shape as was the capitellum of the humerus. The lesser sigmoid cavity of the ulna had lost its normal concavity and was somewhat convex, and there was an abnormal prominence on the ulna just below. This was removed, the lesser sigmoid fossa reshaped with a chisel and curette, and the soft tissues cut away to permit the radial head to occupy its normal position. It was held in place by overlapping of the divided orbicular ligament. Wound closed. Fixation of limb at a right angle by an anterior splint. Primary healing. Splint removed on nineteenth day. February 17, 1913, there was improvement in gripping power of hand, and slight rotation of forearm, which parents had never noticed before operation. When I saw the patient again a few months later, the dislocation of the radius had recurred and all improvement in power of limb had stopped. My object had been to prevent recurrence of the elbow dislocation with the hope that it would be followed by a sufficient return of power in a few months to warrant the attempt at correction of the shoulder dislocation. The failure with the elbow condition caused the parents to decline further interference. If I had had a second chance to operate, I would have excised the head of the radius, and if permitted, would have attacked the shoulder later.

Case IV.—Boy, four months and three weeks old. Obstetrical palsy of right arm, with posterior subluxation of shoulder and turning down of anterior and outer portion of the acromion. Mother very obese. Has had four children and all were delivered with instruments, but the birth of this child was the most difficult of all. After the head was born there was considerable difficulty in delivering the rest of the body, particularly, the right or now palsied arm. Immediately after birth the child was much cyanosed and recovered its normal color only after some effort and time. The paralysis of the right arm was observed soon after birth and was complete. There has been very little return of power since. For past five weeks, has been receiving electrical treatment in the nervous dispensary of the University Hospital, by Dr. J. W. McConnell, and seems to have improved faster in that time. The patient had been referred to the nervous dispensary from the orthopædic department, by Professor G. G. Davis, who later turned it over to me. The child could lift the

whole limb forward about 30 degrees. There was a well-marked wrist drop, but it was not noted at this time that there was any fixation of the wrist in flexion. There were no movements in the fingers except very slight when the palm was tickled. There was marked limitation of passive abduction and external rotation at the shoulder-joint. These notes were taken October 25, 1911, the first time I saw the child, but the parents did not return with it, and I did not see it again until August 18, 1913, when I looked it up to learn what its condition was. There had been a considerable improvement in power in the whole limb, although it was still a much crippled limb. Voluntary abduction at the shoulder to about a right angle, and passive to about 160 degrees. According to my recollection and the statements of the parents, this was a considerable improvement. The whole limb was still held in marked internal rotation and passive external rotation was very much limited. There is an abnormal prominence of the head of the radius and the forearm is turned inward in the cubitus varus position. There is some limitation of extension at the elbow. The hand occupies the wrist drop position and cannot be extended passively to the straight position, although there is considerable gripping power in the hand. The parents are not yet disposed to permit anything to be done to the limb.

CASE V.—Boy, ten months old, referred from orthopædic department to nervous dispensary of University Hospital, to be examined by Dr. McConnell, and then to me. Weight at birth said to be 13 pounds. Mother small, weight 108 pounds. Birth difficult. Head presentation. Instruments used. Right arm completely helpless immediately after birth. Now has characteristic internal rotation of whole limb, and passive abduction is much limitated. Can hold light objects in hand. Has a little power in wrist and elbow, and raises limb at shoulder almost to horizontal. Atrophy of whole limb, but not extreme, and limb slightly shorter than its fellow, which seems to show slight compensatory hypertrophy. Normal angle on outer side at elbow is lost. Dr. McConnell observed a mild grade of posterior subluxation at the shoulder, which is evident only on careful examination. He also thought he detected a turning downward of the anterior and outer portion of the acromion, which I was satisfied I could feel, but the mild grade of dislocation and the amount of fat made the shoulder so nearly normal in conformation that it

would be necessary to have the possibility of the subluxation in mind and to examine carefully for it in order to find it.

The patient was etherized at the University Hospital, in the service of Professor Edward Martin, August 7, 1913. The subluxation was now more obvious and the bent-down condition of the acromion readily felt. By manipulating the lower end of the humerus outward in abduction and backward with the right hand, and using the thumb of the left hand as a fulcrum behind the humeral head, the latter was forced almost if not to its normal position where it could be felt in front of the acromion. It was evidently covered in great part by the abnormal portion of the acromion, which obscured it. When the pressure was removed, the subluxation quickly recurred. An incision was made about an inch and a half long, along the anterior portion of the acromion. This exposed a triangular projection of the acromion downward for about three-quarters of an inch, which was cartilaginous. The deltoid was detached from its margins, when it was easily pushed upward by the handle of the knife. The humeral head was then rather easily pushed forward and upward to its normal position, when there was a considerable gap between the cut margin of the deltoid and that of the abnormal portion of the acromion from which it was detached. As this was easily bent upward it was not removed except for about a half inch of its tip, and no attempt was made to close the gap between it and the detached deltoid. The skin wound was closed by catgut sutures, a dressing applied, and the limb fixed by a plaster case, with the arm at the side, the elbow in right angle flexion and a little posterior, and the humeral head pushed upward and forward to its normal position. The case was removed August 28, and the arm allowed to hang at the side. The humeral head was in good position. Six days later, the arm hung in the internal rotation position and the head was in the subluxated position, although by external rotation it easily took the normal position. It seems obvious that the posterior portion of the capsule must be shortened before the humeral head will be prevented from slipping back into subluxated position. I had hoped that this shortening would have resulted from the traumatic inflammation following the efforts at reduction and the rest in the fixed position. The change in the bones from the long continued pressure in the abnormal position probably had something to do with the tendency to recurrence of the

subluxation. (The posterior portion of the capsule and overlying rotators have been shortened since the printing of the paper.)

CASE VI.—Referred from orthopædic department to nervous dispensary of University Hospital and then to me. Boy, five years of age. Birth difficult. Instruments used. The attending physician told the mother that the arms were engaged over the child's head in what he called a "locked labor." A neurologist diagnosed a rupture of the brachial plexus and told the mother that it was the most complete he had ever seen. He exhibited the case before a society, when the child was a few weeks old. There is a posterior subluxation of the right shoulder and the anterior portion of the acromion is bent downward. There is marked limitation of external rotation and of abduction, the limb being held in internal rotation. It is considerably shorter than its fellow and there is some limitation of extension at the elbow (see Fig. 11). The hand is held in dorsal flexion and can be flexed, passively, only to the straight position. Has considerable grasping power in the hand and can raise the whole limb forward about 45 degrees at the shoulder. He seems to be unable to move the wrist or elbow, but in his efforts to do so he raises his whole limb from the shoulder and the wrist and elbow are held rigid. This rigidity and the contractions of the muscles of the arm and forearm which can be seen and felt show that he has considerable power which he cannot use.

Operation (at the University Hospital, September 4, 1913, in the service of Professor Edward Martin).—Semilunar incision along the margin of the acromion about 2½ in. long. Anterior and outer portion of the acromion bent downward. It was cartilaginous and when the deltoid was detached from it, was bent upward easily to a level with the bony portion of the acromion. A good exposure was obtained of the upper end of the humerus through the wound. After repeated manipulations the head could be pushed upward and forward to its normal level with the arm in internal rotation, but could not be held there when the arm was turned in external rotation. There was strong resistance to external rotation until the subscapularis, some fibres of the coraco-humeral ligament and some of the lower fibres of the pectoralis major were divided, and considerable force was employed to overcome the remaining resistance. This resistance seemed to come chiefly from contracted soft tissues, including the

capsule and tendons, but the exact seat of the resistance could not be determined. Plain catgut sutures were passed through the skin and deltoid to close the wound. Dressing applied and arm fixed in abduction to a right angle and in full external rotation. Healing by first intention. Arm still in case.

CASE VII.—Boy, three years old. Difficult labor, but instruments not used. Complete palsy of right arm at birth. Much pain on moving arm from side in first few weeks. I saw this child about two years ago, going to its home for the purpose and finding the parents, who were foreigners, hostile to my desire for an examination. An operation on the brachial plexus had been advised soon after birth, and the power and movement of the limb had improved very much without it. My examination at that time did not develop a dislocation. Recently I traced the case to another part of the city, and found that the power of the limb was much improved. The mother states that it is not much below that of the opposite one. There was still, however, considerable limitation of abduction and external rotation in the affected shoulder, and on examination of it at this visit I discovered a mild grade of, but distinct, posterior subluxation with a bending downward of the anterior portion of the acromion. The improvement in power was so marked and so general that it seemed to me evident that the shoulder-joint condition was the only obstacle to complete recovery. My failure to recognize it in my first examination is easily explainable. It was only the second case of obstetrical palsy that I had seen and the subluxation was of much milder grade than in the first which I regarded as mild for a dislocation of the shoulder and which had never been recognized before, although the boy was then 7½ years of age. It emphasizes the obscurity of the deformity and the necessity for care in the examination.

CASE VIII.—Boy, sixteen years of age. Difficult labor. Instruments used. Child was much cyanosed and recovered with difficulty. The physician in attendance said that the arm was broken, but he did not immobilize it. He advised rubbing with alcohol and said that the child would outgrow the palsy which affected the right arm from birth. At about eighteen months of age he was taken to a consultant who recognized a dislocation of the shoulder and said that the ligaments were twisted. Examination now shows that the muscles of the whole limb are very weak

and much atrophied, those of the shoulder and arm most, of the forearm less and of the hand least (see Fig. 15). Can raise the whole arm forward almost to a right angle. Flexion at the elbow is very weak, of extension much stronger but still much below normal. Rotation of forearm very weak. Movements of wrist and hand fairly strong but much weaker than of left side. The posterior subluxation is marked. The acromion has not the normal inclination from the anterior margin downward and backward but is more horizontal from before backward, indicating that it had sustained pressure from above downward, especially at its anterior portion which is normally the higher and would first receive the pressure from some object above it. At operation, the coracoid process showed distinct evidence of having been bent backward at birth, which may have protected the acromion from the marked bending downward seen in the other cases.

Operation (September 22, 1913).—At the University Hospital, in the service of Professor Edward Martin. Incision along anterior and outer margin of acromion, through the deltoid and exposing the upper end of the humerus. The sharp bending downward of the anterior portion of the acromion discovered in the two preceding operations, was not found, but the more horizontal position was evident. It seemed to be bent downward slightly as a whole. External rotation was stubbornly resisted until the subscapularis tendon and the underlying capsule were divided, when there was a considerable gap between the divided margins. With the arm in external rotation, the humeral head could be pushed forward so far that there was no prominence behind the acromion, but it could not be pushed forward and upward far enough to make a prominence in front of the acromion. It could be seen that this was prevented by the contact of the head against the coracoid process, which seemed to have bent backward considerably at birth. The patient was then turned over and an incision made through the posterior fibres of the deltoid, exposing the tendons of the infraspinatus and teres minor, which were divided near the greater tuberosity with the underlying capsule. The finger in the joint found the glenoid cavity flat from side to side but concave from above downward. With the head pushed as far forward as possible, the margins of the tendons and capsule were overlapped by catgut sutures about 1½ inches. Both wounds closed with a small drain in the posterior

one. A dressing and a plaster case holding the arm in abduction to a right angle and external rotation, were applied. Case opened posteriorly and small drain removed on sixth day. No infection and dressings not removed since.[10]

CASE IX.—Girl, nearly five years of age. Very difficult labor. Instruments used. Shoulders very broad. After delivery of face, the severe cyanosis caused the physician to hurry the rest of the delivery by hooking his finger under the right axilla and pulling, when he felt and heard a "crack." Examination afterward excluded a fracture of the humerus which was suspected, but there was a complete paralysis of the whole limb. Dr. J. W. McConnell saw the patient at this time and has followed its course since. He diagnosed an injury of the brachial plexus, but asked me to see the case about two years ago. The power and movement had improved considerably by this time, but the whole limb was still very weak and there was considerable limitation of abduction and external rotation at the shoulder. Not finding a dislocation of the shoulder, I concluded that suitable exercises would restore normal motion and that this would be followed by normal power of the limb. These exercises have been kept up since. I had the second opportunity of examining this child very recently. I expected to find that normal motion had returned, but there was still slight restriction of abduction and external rotation, and this led me to examine the shoulder for an overlooked subluxation which I found together with a bending downward of the anterior portion of the acromion. It was of mild degree but distinct, notwithstanding which the persistent exercises had produced nearly normal motion at the shoulder and power of the whole limb. This case is a striking evidence of the influence of motion on the palsy. In size, shape and nutrition there is no discernible difference between the two limbs. It shows only in the mild restriction in the

[10] The case was removed after six weeks and exercises began to restore motion. Whereas before operation the arm was so weak that the hand could not be brought to the mouth at meals, except by resting the forearm on the table and moving the head toward the hand; twelve days after removal of the case he wrote, "the stiffness is out of the arm so (far that) I can lift it halfway over my head without the assistance of the other. I can take off my hat, blacken my shoes and turn on the electric lights." I believe that this early improvement means, merely, that from the better joint conditions he can make more use of the power he had before operation.

range of movement in the affected limb. The subcutaneous fat is greater than usual for this age, and gives to the affected shoulder almost if not perfectly normal roundness. This is the second case in which I overlooked a mild subluxation on my first examination (see Case VII).

It may be argued that the failure to recognize the subluxation in this and Case VII in my first examinations shows secondary development of the subluxation from an injury to the brachial plexus. I am satisfied that it merely indicates a lack of familiarity with the condition at the time of my first examinations. Both cases were seen only a short time after I saw my first case, in which I recognized the dislocation only after a prolonged examination. I thought it of mild grade but, with the exception of Case VIII, it was the most aggravated of all my cases. The two that were overlooked are about the mildest. I saw Case VII at about 8 months of age, this one (IX) at about three years of age. Fairbank says that at the end of two months the paralysis has so largely recovered that electrical examination is usually unnecessary. Such a paralysis is hardly likely to develop secondarily a subluxation after 8 months or three years. My failure to recognize an existing subluxation in these two cases is easily accounted for by its mild grade, the amount of fat and my inexperience. I had not then developed what I regard as the pathognomonic sign, the absence of the normal prominence of the upper end of the humerus immediately in front of the acromion. This last case is a striking example of what can be accomplished in birth palsy by restoring motion to the shoulder-joint. Reduction of the subluxation is the great indication because perfect motion can occur only in a perfect joint.

DR. ASTLEY P. C. ASHHURST said that he had recently seen at the Episcopal Hospital a child of two years or thereabouts, who had been injured in birth; there was complete flaccid palsy of the upper extremity, and *complete loss of sensation* in the limb, and this had persisted unchanged since birth. This child will chew its own fingers, frequently injuring them in this way, and sometimes burning or scalding them.

Again he had recently operated, at the Episcopal Hospital, on a boy of twelve years who presented partial flaccid paralysis of the upper extremity due to injury at birth, the shoulder-joint

was almost flail-like, and if his arm happened to get into the position of extension (behind the patient's body), the head of the humerus became subluxated anteriorly, caused him pain, and he had to pull this arm forward with the other hand. There was also persisting paresis of the muscles supplied by the radial nerve. There was no posterior subluxation of the head of the humerus.

Another case was that of a baby with typical "obstetrical palsy" of the arm sent from Dr. Harte's service in the Orthopædic Hospital to the nervous department for examination. Dr. Boyer found reactions of degeneration present, but on account of the extreme youth of the patient it was not possible to determine very accurately which muscles were at fault.

Last winter he saw, at the Episcopal Hospital, two brothers (one about twelve years old, the other about seven years) who had been similarly injured in birth. In both patients there was distinct posterior subluxation of the shoulder, and the head of the humerus could be felt back of the acromion. Typical paralysis was present, but great improvement had occurred since birth.

Last winter he saw at the Orthopædic Hospital a baby only a few weeks old, who had been injured in birth, by attempted but unsuccessful version. When born the arm was held across the front of the neck, with the elbow highly elevated, the forearm fully pronated, and the palm of the hand looking forward, and being in a position above the opposite shoulder. The limb rebounded to this position when attempts were made to bring it down. The head of the humerus was clearly palpable beneath the spine of the scapula, and in the axilla was a bony prominence, probably the glenoid or coracoid. There was practically complete paralysis. The mother was directed to manipulate the arm daily, and she brought the patient back for observation at frequent intervals at first. The child is now nine months old. Now the head of the humerus stays in the glenoid, and can be felt projecting forward in front of the acromion as is normal; it is not palpable beneath the spine. Great improvement has occurred in the paralysis, and is continuing; only recently there has returned very slight power of extension of the wrist and fingers. Otherwise there is complete paralysis of the musculospiral nerve.

Dr. Ashhurst remarked that it has been maintained by Duval and Quillain (*Arch. Gén. de Méd.*, 1898) that there are no such clinical entities as paralyses due to lesions of the brachial

plexus, only two types existing, radicular and terminal, affecting either the spinal motor roots or the nerve trunks below the plexus. It appears to be the contention of Dr. Thomas that nerve lesions of any kind are of extreme rarity, and if not altogether hypothetical at least are secondary in causation and importance to lesions of the shoulder-joint.

The cases he had now cited seemed to him to demonstrate: First, that pure nerve lesions occur (Cases I and II) and may be of much greater importance than any injury to the shoulder-joint even if this is present (Cases III and V); and second, that, as Dr. Thomas has pointed out, posterior subluxation of the humerus is a frequent lesion, often overlooked and perhaps may be the cause of persistence of paralysis (Case IV).

There can be little doubt that surgeons who see many of these cases will have their interest stimulated in the pathogenesis and treatment of the lesions by this further very important contribution made by Dr. Thomas to the surgery of the shoulder-joint.

DR. THOMAS, in closing, said that he did not mean to say that none of these cases of birth palsy were due to rupture of the brachial plexus but he believed that none of his twelve cases were. He thought it fair to say that most cases are not. There was no doubt in his mind about rupture of the nerves in Boyer's case.

With regard to anterior luxations at birth, he had not seen them. The only autopsy report of a congenital anterior luxation of the shoulder-joint which Stimson could find is one reported in Stimson's book, observed in 1847 by Smith, which was a double anterior dislocation. Stimson concluded that Smith did not have a congenital dislocation in this case, and after reading Smith's report he would agree with Stimson.

CANCER AND PRECANCEROUS CONDITIONS.*

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AT no time in the world's history has that ancient, pitiless and ubiquitous, hence most dreaded enemy of mankind, cancer, been studied so generally, so systematically, so unceasingly as during the recent past. State and philanthropist the wide world over have entered upon its pursuit with unlimited energy, talent and means, and if the quest has not been entirely fruitful, no unbiased critic can say that it has been fruitless. Much has been revealed concerning the history, pathology, and treatment of carcinoma, even though its direct or exciting cause remains the great unsolved problem of the day, as it has been of the ages.

Unfortunately too, and it should be candidly admitted, but little additional information has been given to the clinician which might enable him to detect unerringly, in its early stages, a foe so stealthy that mastery over its victim is ofttimes complete before its recognition, since a disease strictly local, and therefore curable primarily, has become, through metastases, a general, constitutional and incurable one. Not only is this true of deep-seated and internal carcinomata, as one might reasonably expect, but almost is true of superficial or external lesions, susceptible of either palpation, sight, or both.

Important, superlatively needful, as it is to ascertain, if possible, the cause of cancer, are we not, in its search, neglecting valuable means already at hand, facts proven to the hilt, which if employed rightfully and in time would undoubtedly save thousands where hundreds are now being saved?

Will it not startle some of you, experienced surgeons that you are, to know that 90 per cent.[1] of the cases of cancer of the

* Annual Oration. October, 1913.

[1] Childe.

cervix are inoperable when first seen by a surgeon; that 90 per cent.[2] of gastric carcinomata are inoperable; the same with 29 per cent.[3] of those in the breast, and, on account of its more rapid course, a larger number of cancers of the tongue and mouth? Mark you, I do not mean only that so many cases are unfavorable or fairly late ones, but are actually inoperable; in other words, without a reasonable chance of removing the disease. What does this mean to us as citizens of the United States where there are upward of 40,000[4] deaths from cancer annually, and where, as in Great Britain, perhaps, one man in eleven and one woman in eight[5] dies of the disease?

Why it means that 15,000 at the least die of cancer of the stomach. How few are saved one is, for the cause of so heavily handicapped surgery, ashamed to state. In not a great many more is the slightest attempt made to save life, the most done being a palliative gastro-enterostomy. How many here have saved such a patient? Your essayist candidly admits that he has not rescued a single one, and does not expect to, unless it be by accident or fortuitous circumstance, until an entirely different order of things obtains. So long as gastric cancer is looked upon as a medical affection and treated as such until starvation threatens its host, when, only as a *dernier ressort,* a surgeon is called in to assume the responsibility for a death which is no longer doubtful, but only a matter of time, just so long, I maintain, will surgery be impotent. Naturally the physician, nearly always through pride of opinion, waits until he can by symptoms, signs, test meals, skiagrams, etc., etc., make a positive diagnosis. When this can be done the case is no longer operable. We, as surgeons, know it, and yet keep on doing palliative operations, which may or may not palliate, but which certainly, at the very best, are only of temporary benefit, while their deterrent effect upon others with operable conditions is far-reaching and permanent. To them their friend

[2] Munroe and Bottomley.
[3] Halsted.
[4] Chas. H. Mayo.
[5] Roger Williams.

or acquaintance died, not from cancer, but an operation; hence they themselves will have none of it.

When it is realized that the situation is about as bad in uterine cancer, not much better in cancer of the mouth and tongue, and only somewhat better in mammary carcinoma, then I say that it is time for surgeons to teach, write and act collectively and in unison. Operations upon advanced cases of carcinoma should neither be practised nor sanctioned, unless for the best of reasons. We have all, through a mistaken sense of duty to the patient in hand, performed useless, or worse, harmful operations, and in every such instance have increased the croakings of the pessimist, in and out of the profession, and unconsciously made it more difficult to rescue the operative surgery of malignant disease from that obloquy which now rightfully rests upon it as a whole. The results of individual operators, in particular regions to which they have given special attention, have done something, it is true, to inspire hope, if not to create a justifiable optimism concerning a disease that. not so very long ago, was looked upon, no matter where situated and with or without operation, as hopeless. But, as intimated above, and the argument is frequently used and pressed home, has not the patient a right to demand the slim chance of cure that has been held out to him, even when the surgeon of experience feels assured there is no chance at all? I unhesitatingly answer in the negative and for the following reasons, though of course I wish it clearly understood that by advanced I mean inoperable and not border-line or doubtful cases. By inoperable, to repeat, we mean a condition no longer local, but general, and one which cannot, therefore, with reasonable certainty be extirpated on account of metastases to adjacent or distant tissues or organs. In the first place your essayist does not hesitate to affirm that he has little faith in the spontaneous recession of a carcinomatous growth after incomplete removal. as he has seen no such result in any of the many operations he has himself done, assisted in, or seen others do, after a fairly large experience of the disease in more than thirty years of practice. Nearly, if not all, of such instances can be more

rationally explained by a modern and enlightened pathology. A majority of them were abdominal growths and, moreover, were sarcomata. Sarcoma is a less stable growth than carcinoma and one can more readily believe, even though he does not comprehend how and why, that such neoplasms may, in some mysterious manner, undergo retrogression after a rapid, active, even luxuriant growth. I have never known spontaneous recession of a sarcoma to occur, but have seen it take place after free use of X-rays and Coley's toxins in a few instances. In most of these, again, the mass underwent retrograde changes only temporarily, later on to resume an unwonted activity and destroy its victim. But as diminution often, and seemingly complete disappearance occasionally, has occurred coincident with the use of various non-operative measures, I am willing to admit that it may follow incomplete removal by the knife. But every surgeon of experience must admit that nearly always the more active varieties of sarcomata, the large spindle and small round-celled varieties, the latter particularly, are made worse and life is shortened by incomplete removal. In such circumstances a masterful inactivity on the surgeon's part is best.

It is now accepted that gastric ulcers, diverticulitis, pericæcal inflammations, and benign tumors undergoing inflammatory action so closely at times mimic malignancy as to baffle the most experienced and observant surgeons. Consequent upon and with the appreciation of this fact, few instances of supposed cure have followed exploratory and incomplete operations for abdominal cancer, and fewer still are likely to be reported subsequently. This is a day for cold, hard facts, and not for the perpetuation of surgical vagaries that had birth in the fancy of observers who, however able, were not possessed of the means now employed and accessible to all.

Further, even if I could be convinced that occasionally an undoubtedly carcinomatous mass may in some strange, vague and inexplicable manner pass away, I should still look with disfavor upon partial removal. It is just as likely, more so I think, to happen if not stirred and whipped into an un-

wonted activity by incomplete operations; for often have I witnessed the latter, but never, I repeat, the former process.

A further, better and less speculative reason for non-interference is that the surgeon should not hold himself higher than the law which says " the greatest good to the greatest number." Great as our obligations to individual patients are, they are greater to all of our present and future clientele and to the cause of surgery. No one can or will deny that the best of laws, under the most beneficent government, exceptionally work individual hardships. Finally, such belated and ill-starred procedures first raise, then destroy false hopes in patient, family and friends and in addition thereto cause needless anxiety, suffering and expense. Palliative operations for the relief of pain, dyspnœa, pyloric, intestinal or other forms of obstruction are manifestly proper and should be done, even more frequently than they are, but only with the thought of relieving a definite symptom and not with the slightest hope of effecting a radical cure. Moreover, such a purpose should be fairly stated to the family of the patient, so that responsibility can be placed where it rightfully belongs. Were this always done there would soon come a better appreciation, professional and lay, of the inestimable benefits of early operation and, as surely, the infinite hazards of delay. And with it will come, what is desirable, a public sentiment which demands early operation in superficial lesions that are apparent and exploration in deep-seated ones which, from their nature are not apparent.

Let us turn from inoperable to operable cancer and see what can be accomplished if such patients are divided into early, fairly early, and late or unfavorable cases, the same classification made of patients with acute affections such as appendicitis, peritonitis, strangulated hernia, intestinal obstruction, diseases of the gall-bladder, etc.

The pessimist, and he is still about, will find as much to make him decry operative results in any of the above conditions as in cancer, if he will only consult the various hospital reports the country over and then make a sum total of the enormous

number of unnecessary deaths resulting from conditions which were once simple, local, and therefore, nearly always curable by early operation. It is needless for any member of this Academy to take that trouble, as it is only necessary for him to recall how often he and his assistants are telephoned to, and then usually at night, or worse, the wee, sma' hours of morn, to see, for the first time, some valuable member of society either actually dying, or in a condition to preclude operation at the hands of any surgeon of judgment. There will be others, again, so extremely ill that one thinks carefully, balancing every argument for and against operation before coming to a decision; others still more favorable from an operative standpoint, and yet toxic enough, through delay, to make the operator think many times as he prepares for operation, how much better it would have been if some one had not already blundered. Surgeons are largely responsible for such a condition in all of our hospitals, for just so long as they are willing and continue to operate upon such patients, just so long will they be furnished.

That such patients with acute disease sometimes unexpectedly recover after operation is, of course, quite true, and justifies the taking of many chances. But such is not true of advanced carcinoma, where a reasonable knowledge of pathology makes it next to certain that nothing can or should be done in the way of surgery. We are not depriving the patient of any chance at all, or one so slight as to be negligible, whereas we are giving others their chance of an early and beneficent operation by compelling them to see and understand the value of timely action. Is there a man here who has not seen one or many women conceal from their relatives and friends tumors of the breast, on account of their dread of an operation, giving nearly always the same reason—that some friend had been unsuccessfully operated upon?

But to be more specific and less general, let us consider briefly a few facts made plain by the last report of the Cancer Commission of Pennsylvania, prepared with great care by its Chairman, J. M. Wainwright.

There were four hundred cases reported by surgeons throughout the State and, while the number is not great, it is enough to give a fairly accurate knowledge of conditions which obtain in Pennsylvania. Bad as they are, the statistics probably indicate a more favorable condition than actually exists, as a record is usually not made of the most advanced cases which do not come to operation at all.

Only 68 per cent. of the superficial carcinomata and 48 per cent. of the deep-seated ones are operable when first seen by a surgeon. The superficial lesions had been apparent to their hosts eighteen months before a surgeon was consulted, and in deep growths well-marked symptoms of the disease had been present fourteen months. In superficial growths thirteen months had elapsed, on an average, between the time the family physician was first consulted and the date of operation; and in deep-seated ones, a year.

In 3 per cent. of the cases of cancer of the breast the physician first consulted failed to make a local examination, and in 13 per cent. advised local applications or "waiting to see what develops."

In gastric cancer the first physician consulted made no local examination in 9 per cent. and gave bad advice in 20 per cent.

In cancer of the cervix no local examination was made in 10 per cent. and bad advice given in 20 per cent.

In cancer of the ovary no local examination was made in 14 per cent. and non-intervention advised in all of them.

In conclusion Wainwright says: "This work was undertaken to show, if possible, just where the greatest responsibility lies. It is, of course, to be proportioned to the medical profession on the one hand and the general public on the other. There is the greatest possible room for improvement in both, but of the two it would seem that the medical profession should show a marked improvement first. We cannot view with complacency the fact that, as a general average, cancer patients have been under the care of their family physicians more than a year before they applied for a radical cure."

This report shows clearly enough that only a comparatively few patients afflicted with cancer get the benefit of an operation while the disease is local, simply for the reason that metastases will, in the vast majority of instances, have occurred before a surgeon is consulted. If only a single one of the nearest lymph nodes be involved the disease is no longer local, but becoming general, and the chance of cure less than one-third what it would have been had operation taken place before such involvement. For instance, in the cases of mammary cancer operated in the Johns Hopkins Hospital since 1889, 80 per cent. of those without glandular involvement, and only 25 per cent. of those with axillary infection, were cured.

I am not aware that any one has attempted to indicate just when the lymphatic glands first show involvement in the several regions of the body where carcinomata frequently arise. It is safe to assume that it very generally does occur within a twelve-month on an average. In cancer of the tongue, mouth, breast, and cervix uteri it will take place sooner I feel certain, and in the skin, lip, large intestines, and rectum, probably later. The little knowledge we now have is conjectural and based upon the time when there is palpable enlargement. This avails next to nothing, as it will vary with the accuracy of the local examination, the region, and the amount of fat and other tissues superlying such enlargement.

In the mammary gland cancer will cause palpable enlargement of the axillary nodes in rather more than a year; according to Gross (15.6 months), Winiwarter (14.7), Oldekop (16.5).

Finney states that such enlargement occurred in the patients treated at the Johns Hopkins Hospital in from ten to thirteen months, and that 84 per cent. of such patients showed axillary involvement when first consulting the surgeon. Of W. T. Bull's series 65 per cent. showed palpable enlargement when he first saw them. Finney's opinion is undoubtedly nearer the truth, based as it is upon a larger number of cases and formed at a much later date, when the significance of such involvement is

so much better appreciated. In my own series of private cases enlarged axillary glands could be felt, or at least I thought so, on an average of 11.2 months after the patient noticed the original growth. But to show how misleading such evidence is, nearly all of my cases, early and late, exhibited demonstrable enlargement when the axilla was dissected. But when the microscope would have first shown evidence of the transference of cancer cells from the original focus to the nearest lymphatic gland is what we would like to know. That it varies with the age of the patient, site and variety of the growth is probable. Young women with numerous and patent lymphatics present earlier and more general metastases and therefore are less favorable subjects as a rule for operation than elderly women. Yet it is my opinion that too forcible and dogmatic statements have been made concerning the prognosis of cancer in young women. One of the best known pathologists, connected with one of the largest clinics in the country, recently wrote: "The woman under thirty-five years of age with carcinoma of the breast who lives more than two years after its discovery, however early and however radical the extirpation, is almost unknown."[6] I have had many such patients.

One, twenty-one years old, operated on in May, 1900 (adenocarcinoma), has since married, borne at least two children and is perfectly well. No axillary involvement.

Another, twenty-four years old, operated on June, 1904, is now a trained nurse and is robust in every way. Tumor was a typical scirrhus with moderate axillary involvement.

Another, thirty-three years old, had a typical scirrhus with considerable axillary involvement, so great, indeed, that on account of it and her youth I gave a very gloomy prognosis to her physician and family, predicting recurrence within a year. She has seen me regularly since, and on the fifth anniversary of her operation (March, 1913), she was examined and found to be free from recurrence.

A fourth and still more significant case was that of a young woman thirty-three years of age, sent to me from Wilkes-Barre.

[6] Wilson, St. Paul Med. Jour., June, 1913.

FIG. 1.

She was nearly five months advanced in pregnancy when she was operated upon in the Jewish Hospital, in November, 1905. She had a typical scirrhus of the left mammary gland with moderate axillary involvement. At the present time, nearly eight years after operation, she is perfectly well.

That metastases to axillary and even supraclavicular glands may occur very early, and not in young women either, is shown by the report of another case. A maiden lady, fifty-six years of age, was sent to me for operation on June 3 last. She had not the slightest knowledge of any trouble in her breast until five weeks previously. At that time there was a slight induration in the upper and outer quadrant of the right breast about one and a half inches from the nipple. It was painless. Very soon the entire breast became involved and three weeks later she consulted her physician. There was no history of trauma at any time. At the time when she visited me the entire mamma was involved, skin red, and its local temperature very much increased. It looked like an acute inflammation, as shown by the photographs and drawing which I had made. The axillary glands were greatly enlarged, so much so as to cause moderate œdema of the arm. There was also a lump in the subclavian triangle as large as an English walnut. The breast was adherent to the costal wall. The opposite mamma was quite normal and the axilla as well. It was recognized as a typical example, and the most acute one I have ever seen, of what Volkmann has described as carcinomatous mastitis. I declined to operate, as all of the four cases I had previously seen and operated on died; three of them within six months and one in fifteen months. A two weeks' trial of X-rays was made, at the end of which time she being no better but worse, radium treatment was begun. She was only able to take a few treatments, as her general condition grew rapidly worse. The entire breast became, so her physician Dr. Bird tells me, "as purple as an egg-plant." She died August 9, just three months after the disease was first recognized.

We have said that the location of the growth and its variety influence axillary and other metastases. Adenocarcinoma has little tendency to cause metastases, glandular or otherwise. Encephaloid or medullary cancer does so quickly. Scirrhus stands midway between them.

Growths in the outer hemisphere are likely to cause axillary and supraclavicular involvement earlier than similar lesions in the inner hemisphere; *per contra,* the latter the more surely and the more quickly cause involvement of the liver, mediastinum, vertebræ, and the opposite breast in the order named. From the arrangement of the lymphatic vessels this is just what should be expected. The mediastinum was, until recently, thought to be most obnoxious. Handley has clearly shown the liver to be more so. I am not certain that the mediastinum should even be placed second. My own series indicates clinically a larger per cent. of metastases to the bones, particularly the sternum, vertebræ, and long bones than to either the liver or thorax, and gives to them the melancholy distinction of first place. That the liver and lungs may both be more often found involved at autopsy I grant, but this may be, I think is, due to the fact that the abdominal and thoracic cavities are systematically opened and their contents carefully examined, while the osseous system, unless suspected, is not examined. That many metastases to liver and lungs occur subsequently to those in bones I have not the slightest doubt.

Terminal pathology is valuable, but the pathology of the living is far more so, and upon it surgery must advance if it does so at all. Many of my operations have been followed by intercostal neuralgia, paraplegia dolorosa, involvement, with and without fracture, of humerus and femur, before there were either symptoms or signs of abdominal or thoracic complications. A well-taken skiagram will usually locate the lesion.

In August, 1912, I was asked by my colleague, Prof. Anders, to see in consultation a woman from Illinois, who had been operated upon for carcinoma of the breast the preceding November by a distinguished Western surgeon. The patient had come East to spend the summer and had been taken in June, while staying near Boston, with intercostal neuralgia. Nothing seemed to give her relief but opium. Early in August she came to her sister who lives near Philadelphia. When I examined the cicatrix it was

FIG 2.

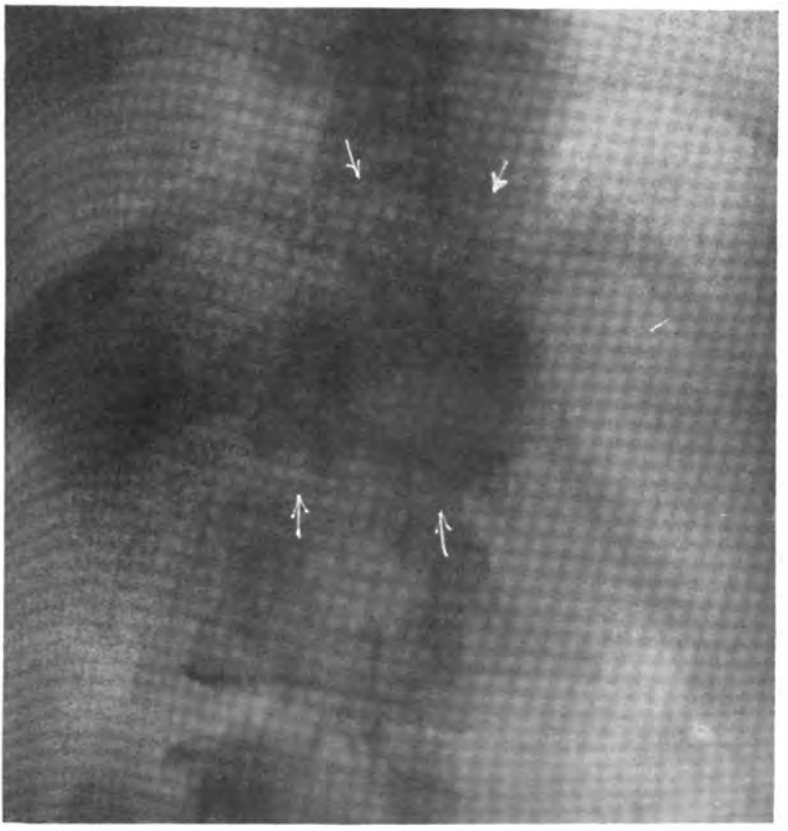
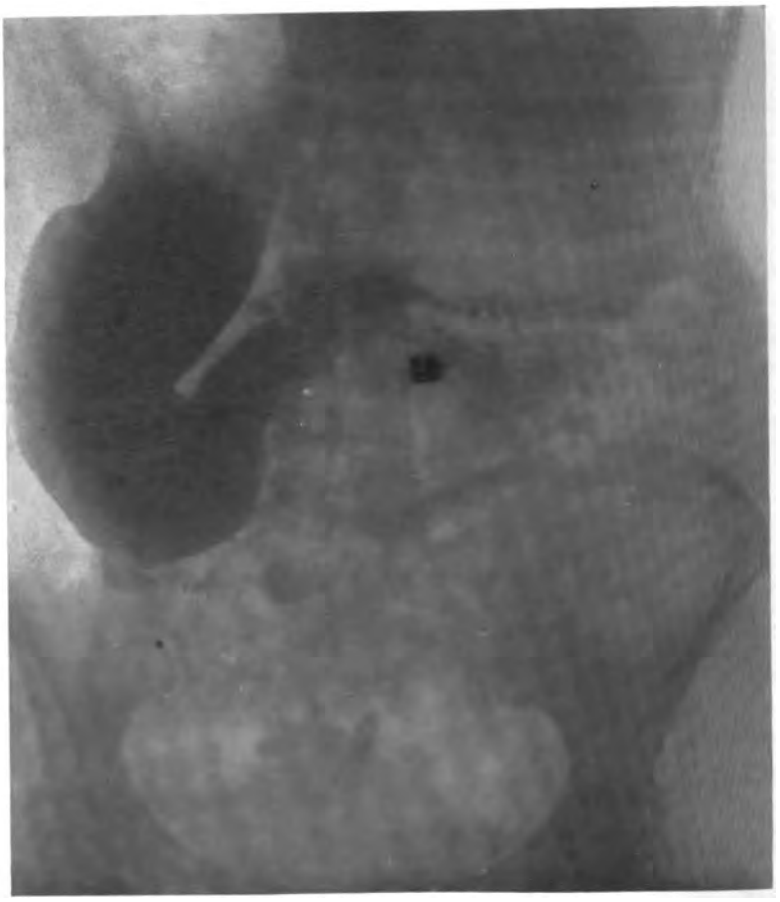


FIG 3.



found to be smooth, supple, and absolutely free from disease. Her only symptom was intercostal neuralgia. A careful examination of her back led me to believe that certain vertebræ were affected, and I gave her sister and husband a very guarded prognosis, plainly stating my fears. A skiagram was made the following day by Dr. Pfahler which served to confirm my opinion. The operator was at once written to for further information. His report showed an early scirrhus, and that a favorable opinion as to a radical cure had been entered in his notes. He was in every respect warranted in thinking so at the time, and certainly had done a very complete operation. During the next month the patient was, I learned, better, then worse alternately. Soon after her return home in October, or less than a year after operation, she died. Spinal metastases had taken place before operation and could not have been suspected. There is no other rational explanation of this case and the following ones in my own practice which are briefly outlined.

One of them, a married woman of thirty-two, was operated on in May, 1908, and died December, 1910, thirty-one months after operation. To the very end the cicatrix and surrounding structures were absolutely normal. Intercostal neuralgia began within a year after operation, and a palpable tumor of the spine, apparently beginning in the intervertebral disc between the eleventh and twelfth dorsal vertebræ followed later, a skiagram of which is shown. At the time of her death, from reports made to me, it must have been enormous. Strangely enough she did not have paraplegia, as the growth was forward instead of backward. She could not walk well, however, for a year before her death.

In January, 1909, I operated on a married woman, thirty-nine years of age, for a well-marked scirrhus with pronounced, but not extensive, axillary involvement. During the meeting of the Congress of American Surgeons two years ago she was one of thirty cases exhibited to show the post-operative result. Although the scar was perfectly normal, so was the axilla, and she had gained in weight, looked perfectly well and was doing all of the cooking and housework for herself and family, she reported to me that she was not sleeping well on account of a pain in her side at night. A careful examination convinced me that it was intercostal and probably the result of metastasis to a vertebra which was tender upon pressure. A skiagram was made the following day which

confirmed my fears. The third and fourth lumbar vertebræ showed involvement.

In September, 1910, Mrs. C., aged sixty years, was operated upon for a large scirrhus of the breast with great axillary involvement, the extent of which was not appreciated, though it was palpable, before operation, she being a very stout subject. She had known of the enlargement in her breast more than two years. When I expressed surprise that she had allowed it to remain so long her reply was: "It does not hurt me now, I feel perfectly well and am only consenting to removal because my physician tells me that it should be done." There were no enlarged glands above the clavicle or evidence of abdominal or thoracic metastases. On this account, notwithstanding its duration and the marked axillary involvement, I was disposed to advise operation and give her the chance. After a most extensive operation she made a rapid recovery, going home in less than two weeks. To my surprise her health remained excellent for 13 months. She then began to have pain in her back and side. A skiagram showed metastases to the eleventh and twelfth dorsal and second lumbar vertebræ. She lived several months longer and I am informed that local recurrence was manifest at the time of her death. This was to have been expected from the duration and extent of the disease at the time of operation.

A fifth case, aged thirty-one, also well advanced in pregnancy, between 6 and 7 months, was operated upon in her house in this city, she declining to enter a hospital, in May, 1905. She was delivered at term of a healthy female child. Three years and four months later she was delivered of a healthy male child. She had seemed entirely well in every way until this last pregnancy, when a recurrence in the scar near the axilla was noticed in the last months of gestation. Thirty months after the first operation she called at my office with a friend, upon whom I had also operated for cancer of the breast, and both of them appeared absolutely free from recurrence. One of them is still well, more than eight years after operation. I was not again consulted until a month after her last confinement, at which time there was a large mass the size of an orange, almost ready to ulcerate. From the statements made by patient, trained nurse, and physician, the tumor must have grown with startling rapidity during the last month of gestation and the month of lactation. Such has been the progress

of most of the malignant tumors that I have encountered in pregnant women. In November, 1909, or forty-two months after she was operated upon she died of frightful convulsions which began a fortnight earlier. Prior to the first convulsion, and between the others, the patient suffered from severe headache and backache, due, I doubt not, to metastases to vertebræ and cranial bones, there being no other rational explanation of her symptoms. Her kidneys were sound but her liver was enormous. Drs. Musser, Miller and myself were of this opinion. Autopsy was not allowed.

I have records of another case operated on early in 1904 for Dr. P. S. Donnellan. Within eight months she began to have intercostal neuralgia and died within a year of apoplexy. She had what I have frequently called a "succulent" breast, plump, vascular, with the glandular tissue well marked and lymphatics abundant. I remember that Donnellan at the time of operation was struck with and questioned me as to the expression (succulent).

She had never borne children though married many years. Her age was forty-eight. There were probably both spinal and cranial metastases. I had never at that time employed the Röntgen rays for diagnostic purposes.

In addition to these five cases, which I saw during the final stage of their illness, I have letters from the family physicians of others which cause me to suspect that they, too, died of spinal metastases. I have records of two very interesting cases treated in Louisville, Ky., where the osseous system was involved. In one of them a spontaneous fracture of the surgical neck of the left humerus followed a large scirrhus of the left mamma which the patient concealed from me for weeks. She was never operated upon. The fracture was slow to unite, her appearance suggested cachexia, and when pressed closely, but only then, did she show me her breast. I had noticed that although an elderly married woman, her breast was always artfully concealed even when my dressings were applied. I thought I had never seen one so modest. When I saw a large mass ready to ulcerate the reason for the slow union of her fracture was apparent.

The other was a maiden lady, fifty-five years of age, the daughter of a prominent surgeon and the sister of a physician. Although she knew of a tumor in her breast for twenty years she never mentioned it to either father or brother. When she came to my office with a younger but married sister she would not allow

her to enter my consulting room. She explained to me that she had kept it a secret from her family and friends and had only been made to seek advice on account of the very rapid growth of the mass during the previous few months. It was not painful. Sarcomatous degeneration of a benign tumor seemed clear. After much insistence she accepted operation. It proved to be sarcoma. In six months she began to complain of rheumatism in her right hip. In time a tumor of the femur, showing in Scarpa's triangle, developed and before her death attained large size. There was never local recurrence. I was absent from Louisville when she died and no autopsy was made.

I have reported these cases and could cite others to show how frequently, and how early metastases to the osseous system may take place. So unhappy has been my experience of them that when one of my operative cases, which I had considered relatively safe, begins to complain of intercostal neuralgia, backache, or rheumatic pains uninfluenced by antirheumatic treatment, I am disposed to throw up my hands and await the inevitable.

I expressed this opinion to the late Maurice H. Richardson, who was at the clinic above referred to and who spent four hours with me examining all the patients, gross specimens and microscopical slides. He agreed with me that the bones were more frequently involved than is generally believed and said that his experience had been much as my own. America has produced few surgeons with so wide an experience, who observed and thought so accurately and who always reported his convictions so conscientiously. One always felt after Richardson had spoken on a subject that the last word had been said.

But unexpected manifestations, such as above detailed, in a disease so protean in its nature as cancer, while discouraging, should also emphasize the necessity for earlier operation. There was a time when every one of the cases I have referred to could have been saved. A time when the original focus in the breast was inconceivably small, a diseased cell, a germ, something, we know not exactly what, but we do know that

for a time it is strictly local. It may remain so for weeks, months or years, varying with the organ affected, the abundance of its lymphatic supply and possibly other influences of which we know little. The evidence that carcinoma is at first strictly local is so complete and overwhelming as to leave no possibility for doubt, if one carefully considers it and is uninfluenced by the masters of a former generation, who were as slow to acknowledge and put into practice the discovery of Moore as they were to accept the inestimable blessing offered to them by Lister.

If the disease were constitutional one could never hope to effect a cure by local measures, and so long as they were practised in a partial, incomplete, and faint-hearted manner upon unfavorable cases a cure practically never resulted. But when operative limits were extended even unfavorable cases were sometimes, but rarely, cured. More extensive procedures upon average cases brought a still greater measure of success, and now, free removal of early lesions is generally followed by a permanent cure. Operations for mammary cancer yield 80 per cent. of cures if practised before the disease has spread to the nearest lymph-nodes, and a larger per cent. of early, strictly local carcinomata of the lip and larynx yield to excision. According to Judd, 93 per cent. of the traced cases of epithelioma of the lip at the Mayo clinic were permanently cured. Sir Felix Simon reports 85 per cent. of cures in local laryngeal growths.

But, unfortunately, there is no way by which a clinical diagnosis of cancer can be made with certainty even after it has ceased to be strictly local; much less can it be done beforehand. Taking all cases as they present themselves to us at the present time—early or local ones, fairly early or those with moderate involvement of the nearest chain of nodes, and unfavorable or late ones, in other words, where there is greater infiltration of the tissues around the original focus and more extensive glandular infection, but still safely removable by the knife—we must be content with a number of five-year cures ranging from 10 to 50 per cent. and upward, varying with

the organ, variety of growth and whether the part affected is deep or superficial. For example, carcinomata of the alimentary tract from mouth to anus are permanently curable in about one-fourth of the cases (Butlin, Kocher, and Mayo); whereas carcinomata of the mammary gland give upward of 50 per cent. of five-year cures (Cheyne, Dennis, Rodman).

It is true that I have selected the best available statistics, as we will never be stimulated to greater endeavor in any other way. We want and should only be satisfied with the best, not average results.

Great an advance as this is over what was accomplished formerly, we cannot view existing conditions with indifference and should aim at something which will save nearly all, instead of half our patients. There is but one way in which it can possibly be done, and that is by operating in the precancerous stage. I am well aware that the term "precancerous" will be objected to for at least two reasons: first, that there is not always a precancerous stage; second, that when it does exist it does not necessarily mean that cancer must eventuate. Both objections are granted. The term is a convenient one, however, and in the lack of more accurate knowledge as to the exciting cause of cancer we are justified clinically in its use. I had hoped to show, and will do so in a future communication, that there are definite conditions precedent to carcinomata, variously situated, far more frequently than has been appreciated.

These conditions may be internal as well as external, and are frequent and suggestive enough to warrant the term "precancerous" and, when encountered, demand a more radical treatment than has hitherto been accorded them. Furthermore, that prompt and efficient means, entirely within our reach, nearly always either cure incipient carcinomata or, what is still more desirable, prevent them. Moreover, and it is to say the least suggestive, that such precancerous conditions are inflammatory, inasmuch as a mild, low-grade, chronic inflammation, due to long standing irritation and resulting in either ulceration, hyperplasia, or cicatricial tissue, is present in all of them.

This, in turn, means diminished arterial supply with lessened physiologic resistance of the cells undergoing metaplasia. While there may be in addition something more necessary, extrinsic or intrinsic, to initiate the cancer process, this much is always present, a suitable soil, if you please, and would seem enough in itself to cause cancer.

The past month has been a notable one in bacteriology, inasmuch as Noguchi and Flexner, of the Rockefeller Institute, have definitely reported the discovery of the germs causing rabies and infantile paralysis respectively. Cancer may be the next enemy to capitulate, and, if so, let us hope that it will be to either one of these distinguished investigators, or some fellow countryman.

And yet it does not follow that a positive demonstration of the microbic origin of carcinoma will be immediately, or soon, followed by the discovery of a cure. Let us not forget that for more than thirty years the cause of tuberculosis has been known, and yet a remedy for it has not been found. Let us also hold fast to that which is good and known to be effective, early and radical operation, and, keeping constantly before us the unpleasant fact that the cancer menace is an ever-increasing one, in this and every country, threatening, though not so frequently, the young as well as those of middle and maturer years, and the further fact that its diagnosis in the incipient stage is difficult always, and ofttimes impossible, will not our most fruitful results unquestionably be in the direction of preventive rather than curative operations?