STATED MEETING, DECEMBER 7, 1914.

The President, Dr. John H. Gibbon, in the Chair

SNAPPING SHOULDER

Dr. Penn G. Skillern, Jr., presented a man thirty-two years of age, a horse-back rider, who was first seen by him two months ago. Three months previous to that time he had fallen from a horse, but it was not until some time afterward that he complained of pain. During examination there was noticed a marked "snapping" of the shoulder—a definite shock or jar—upon elevating the arm to right angle and upon dropping it; skiagram negative. Dr. Skillern said that he had been able to find but one similar case in literature. This is reported by Reich in 1913, at Frankfort. Upon operating Reich found an abnormal fissure between the short head of the biceps and the coracobrachialis muscles. He accounted for the snapping by assuming that in abduction of the arm one or other of the tendons caught upon the lesser tuberosity of the humerus. He furthermore thinks there is a small breach at birth between the two tendons and that the accident served to increase this gap. He, therefore, proposed the term "*Schnappschulter*," or snapping shoulder. The sound is best obtained by elevation of the arm.

FRACTURE OF CONDYLOID PROCESS OF MANDIBLE

Dr. Robert H. Ivy remarked that fracture of the condyloid process of the mandible, while not extremely rare, is only occasionally met with, and receives little consideration in works on surgery. Most of the textbooks give the briefest possible mention to the injury. Nearly all cases occur by indirect violence, from an upward blow on the anterior portion of the opposite side of the lower jaw. Roe[1] states that in 41 cases of fracture of the mandible examined by him 6 were through the condyloid process, an unusually high proportion of almost 15 per cent. Egger[2] has compiled statistics from various sources, giving the frequency of this fracture as 4.5 per cent. in 365 cases of single fracture of the mandible. In combination with other fractures of the lower jaw, fracture of the condyloid process occurs more frequently, the proportion of cases of multiple fracture with this injury being about

[1] Roe, W. J.: Annals of Surgery, August, 1903, p. 221.
[2] Egger, F.: Beitr. fur klinisch. Chir., 1913, lxxvii, 294.

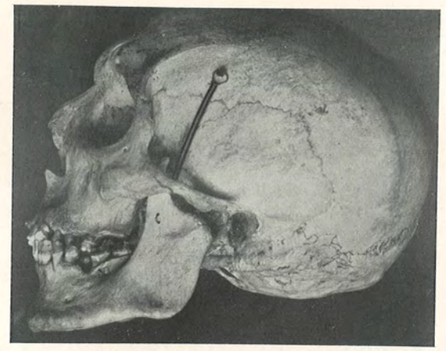

Fig. 1.—Skull, showing fracture of condyloid process of mandible (Cryer).

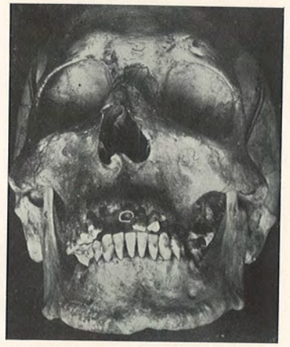

Fig. 2.—Anterior view of skull shown in Fig. 1. Horizontal displacement of condyle is seen on left side (Cryer).

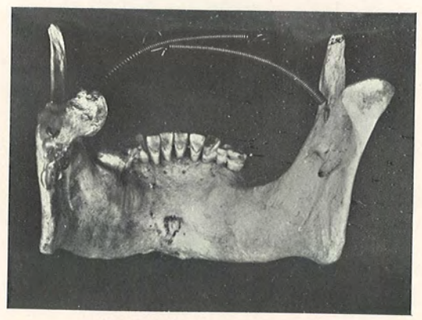

Fig. 3.—Posterior view of disarticulated mandible, showing typical deformity in fracture of left condyloid process (Cryer).

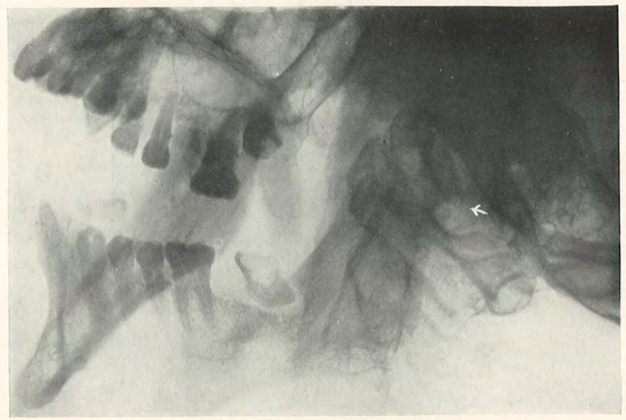

FIG. 4.—Lateral view, showing fracture of left condyloid process of mandible. (Röntgenogram by Dr. Pancoast.)

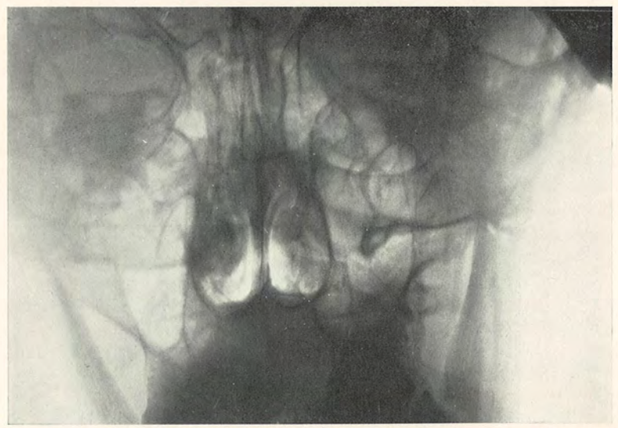

FIG. 5.—Anteroposterior view, showing fracture of left condyloid process of mandible. (Röntgenogram by Dr. Pancoast.)

10 per cent., according to Egger's figures. But in counting the total fractures in these cases the percentage falls to about 5. Of 45 cases of fracture of the mandible recorded at the Philadelphia General Hospital from 1904 to 1908, together with at least 20 others personally examined by the writer within the last four years, only one—to be reported here—was of the condyloid process, a proportion of less than 2 per cent.

Roe, together with other writers, speaks of the frequency of this injury as a cause of ankylosis of the temporomandibular articulation. It would appear that no attempt has been made to classify the fractures as extracapsular and intracapsular. This distinction is of some importance, as the extracapsular fractures would naturally not be so liable to be followed by ankylosis as the intracapsular.

Egger states that fractures of the condyloid process generally occur without displacement, since the fragments are usually held in contact by periosteum and soft tissues. That displacement does frequently occur is borne out by two specimens from the collection of Dr. M. H. Cryer, each of which shows the typical deformity found in these cases (Figs. 1, 2, and 3). The condyle is seen to be drawn forward and inward by the external pterygoid muscle, bringing the upper fragment into a transverse and horizontal position, the portion of the process below the fracture being pulled upward and outward by the masseter, union having taken place with the fragments in this position without ankylosis. One of these specimens well illustrates also the deviation of the chin toward the injured side, first mentioned by Heath.[3]

The following case has recently been under the writer's care:

C. B., aged fifty-eight; male; white; teamster. Was kicked by a horse on the chin to the right of the median line. This resulted in an area of pain and tenderness at the place where the blow was received, and in a second area of pain and swelling on the left side of the lower jaw above the angle. The pain in the latter region was increased by attempts to open the mouth, which could only be done with difficulty. The patient applied for treatment at the Surgical Out-Patient Department of the University Hospital, on May 27, 1914, the day after receiving the injury. Examination showed some contusion of the soft parts in the canine region of the lower jaw on the right side. No crepitus or other signs of fracture were found in this region, and the X-ray was also negative. On the left side, there was a moderately extensive, puffy, tender swelling just below the zygoma imme-

[3] Heath, Christopher: Injuries and Diseases of the Jaws, 4th Ed., 1894.

diately in front of the ear. Deep pressure elicited a point of greatest tenderness just below the normal position of the condyle of the mandible. The lower jaw was not fixed, but could be moved up and down with difficulty. Crepitus was felt at the point of greatest tenderness when this was done. On pressure over the region of the condyle when the jaw was opened, the normal forward movement of the condyle could not be felt. The lower incisor teeth were seen to be deviated toward the left side about half the width of a tooth. The X-ray (Figs. 4 and 5), by both lateral and anteroposterior views, showed a fracture through the left condyloid process of the mandible, somewhat low down, away from the head of the bone. In the lateral view, the upper fragment was apparently drawn forward, producing angulation at the site of fracture.

Treatment.—In view of the very slight deformity present, it was thought advisable to treat the case, at first at least, by simple restriction of movement by means of a modified Barton bandage, not too tightly applied, with instructions to the patient to use the jaw with moderation. By this means it was hoped that ankylosis would be avoided, though it was not greatly feared, as according to the X-ray and clinical signs the fracture was apparently extracapsular. As time went on, no other treatment was found necessary. The condition steadily improved, at the end of five weeks all bandaging was discontinued, the patient was free from pain, and could open the jaws to the normal extent. The very slight deviation of the chin toward the injured side remained, but caused no inconvenience. The condyle probably remained out of its normal position in the glenoid fossa, as a slight depression could be felt in this region instead of the usual prominence.

The case appears worthy of note, particularly on account of the absence of ankylosis, and the good result obtained with simple bandaging. It may be compared in many points with the anatomical specimens shown. The simple line of treatment carried out was suggested largely by the functionally good result evident in Dr. Cryer's specimen. In the literature I find that Roy[4] reports a case treated very similarly to this with equally good results. In no case is absolute fixation of the lower to the upper jaw by means of interdental splints advisable, owing to the proximity of the fracture to the joint with consequent danger of ankylosis. Moderate movement should be permitted in all cases. Where there is extreme displacement of the upper fragment owing to excessive violence, or ankylosis seems unavoidable, excision of the condyle is probably advisable, followed by arthroplasty.

[4] Roy, M.: L'Odontologie, 1913, xlix, 481.

From a study of the skull in which the deformity is so well shown, Cryer suggests that by an anteroposterior X-ray view the horizontal position of the upper fragment should be readily seen, thus confirming the diagnosis of fracture of the condyloid process. Great care must be observed to have the patient's head in exactly the right position in taking the X-ray picture, or the condyle will be overshadowed by the dense bone at the base of the skull. This unfortunately happened in my case. The anteroposterior view taken in every suspected case of fracture of the condyloid process will frequently be of assistance in establishing the diagnosis. By making several plates at slightly different angles it should be possible to show the displaced condyle.

The differential diagnosis of fracture of the neck of the condyle from luxation without fracture should present no difficulty. In fracture there is usually crepitus, the jaws can be closed, while the chin is deflected toward the injured side. In dislocation, the jaws are held open, the chin is deflected away from the injured side, and the condyle makes a distinct prominence well in front of its normal position, though this may be masked by the amount of traumatic swelling present.

Dr. John B. Roberts said that last summer he saw a lady who said she had recovered from a fracture on the left side of the face. She said she had slipped and struck that portion of her head against the corner of a table, and was told that there was a fracture of the lower jaw near the joint. She had looked upon it as a mere contusion. She then went, at the suggestion of her physician, to have an X-ray picture taken, which proved that a fracture of the condyle existed, evidently from direct injury. In the case reported by Dr. Ivy the man apparently received his by indirect injury, as the kick of the horse was received on the opposite side of the chin.

Dr. J. B. Carnett said that he had recently seen a case of the fracture described by Dr. Ivy in a man of advanced years, who had fallen from a second floor window. He was unconscious—at the point of death for many weeks—and the fracture did not receive any treatment. Some months later he sought advice because of lack of alignment of his teeth. He had a depression at the area normally occupied by the head of the lower jaw and it was obvious he had sustained a fracture of some variety. Dr. H. K. Pancoast made a very excellent X-ray picture of his lesion. The skiagraph shows a not uncommon type of deformity in which a fracture occurs through the neck, the head rolls inward, and the bone reunites in that position.

PAINFUL SUBCUTANEOUS TUBERCLE

By H. R. Owen, M.D.
of Philadelphia

A painful subcutaneous tubercle is literally what the name denotes. Were the name changed to painful subcutaneous neurofibroma, not only the chief symptoms but also the pathology would be told. These tumors have been described by A. Petit, Cheselden, Camper, Paget and others. Mr. William Wood [1] in 1812 described them, and gave to them the name they have since borne. The subject is discussed in a few of our modern surgeries and in few pathologies. The older surgeons treated the subject to greater length. Good descriptions may be found in Agnew's Surgery and Gross's Surgery. Of the modern surgeries, DaCosta, Treves, and Rose and Carliss [26] relate the occurrences of these tumors. Whereas painful subcutaneous tubercles are not common, on the other hand they cannot be called rare. When met with, they are not difficult of diagnosis. The seat of the growth of these little tumors is in the subcutaneous areolar and adipose tissue: they are usually found on the extremities, more often on the lower extremities than on the upper. Gross [2] is the only writer whose experience led him to believe that the upper extremity was the more usual location for their growth. He found they occurred more frequently on the shoulder and arm. In one case, which I had the opportunity of seeing with Dr. DaCosta last winter, the tumor was in the subcutaneous tissue of the chest. This specimen was afterward shown before the Academy of Surgery. Brodie [3] reported cases in which the tumor occurred upon the face. Robert W. Smith [4] reported two cases occurring on the fingers, and Sir James Paget [5] removed such a tumor from a thumb. Whereas the painful tubercles usually lie just beneath the skin, they are seldom attached thereto. A painful tubercle has a well-defined capsule which is usually loosely connected with the surrounding tissues. The overlying skin is not usually discolored, but, in the exceptional case when the tumor is attached to the skin, the skin is thin, polished and the superficial blood-vessels are tortuous and enlarged. This, as stated, however, is exceptional, as the tumor is usually freely movable, and the palpating fingers can move the tumor around under the skin within a radius of one or even several inches. In a case in which the tumor

lay in the subcutaneous tissues over the patella, it could be moved over the entire patella.

Such tumors are found in women far more frequently than in men. Neuromata, with which painful subcutaneous tubercles are often confused, are found more often in men. Paget [6] gives the following table of statistics: in 26 cases of neuroma, 19 were in men and 7 in women; whereas, in 28 cases of painful subcutaneous tubercle, 23 were in women and 5 in men. It usually occurs singly, although W. Wood [7] reported a case in which three of these tumors were removed from the tissues overlying the glutæus maximus muscle.

It is either round or oval in shape, and usually about the size of a pea, though it may be somewhat larger. In consistency, it is very firm and it feels elastic when rolled between the fingers. According to Carruthers,[8] the tumor occasionally has a central cavity filled with fluid. In only one case reported, which will be mentioned later, has there been any tendency to ulcerate or break down.

Of the *symptoms,* the most characteristic is the pain which is radiating and neuralgic in type. This pain is greatly increased when the tumor is palpated, as the tumor itself is exquisitely tender; in fact, the tenderness is so marked that the patient is usually very apprehensive about the handling of the region. The patient from whom I removed such a tubercle from above the patella was not only afraid to kneel down because of pain, but, for several weeks prior to the operation, had been so apprehensive of pain, that she walked with her knee stiff, fearing to bend the joint. The tubercle when removed was round, very firm and no larger than a pea.

The pain is not usually continuous, but occurs in paroxysms. These paroxysms may last for many hours if the tumor has received a blow. If such a tumor on an arm or leg receive a blow, the extremity may be thrown into a clonic convulsion. The patient may fall because of pain, and not infrequently faints if the tumor is struck. The pain is often exaggerated during mental emotion, especially during the menstrual period. In the exceptional case, if the tumor has received a blow, the surrounding parts may become œdematous, simulating angioneurotic œdema.

The *structure* of these tumors appears still to be somewhat in doubt; they are now usually classified under "neurofibroma."

Velpeau [9] believed them to be neuromata of subcutaneous nerves. This theory is held by others. In the *American Text-book of Surgery,*[10] we find the statement, "The painful subcutaneous tubercle is connected with a sensory filament of a

cutaneous nerve" and "is usually made up of fibrous tissue." Keen [11] classifies them under neuromata and states, "when one grows on a terminal twig of a cutaneous nerve, it gives rise to so much pain, which is often like an electric shock when touched, that it is in consequence "a painful subcutaneous tubercle." Gross [12] also classified them under neuromata, stating that "a few fine examples of neuroma in the form of the painful subcutaneous tubercle of the hand are on record." Treves [13] and DaCosta [14] classify such tumors under fibromata. DaCosta states that "nerve fibrillæ are now known to exist in these tubercles, a fact which was long denied." McFarland [15] says of the painful subcutaneous tubercle, "it consists of fibro-connective tissue, in which some claim to have found nerve filaments."

In two cases, in which I had the specimens examined, nerve filaments were found in each, the pathological report being "neurofibroma." Some surgeons, however, have not taken the same attitude regarding the pathology.

Agnew,[16] speaking of such a tumor, said, "though it contains no demonstrative nerve elements, being composed only of fat and connective tissue, it undoubtedly has some relation to adjacent nerves, or, it may be that some of the supposed connective-tissue fibres are amyelinic nerve fibres."

Dupuytren [17] stated that he dissected several such tumors with minute care, and never saw even the smallest nervous filaments adhering to their surfaces.

Paget [18] was of the same opinion. He was never able to find existing nerve-fibres in the tumor. He was disposed to think that most of them are only connected with nerves, as ordinary innocent tumors are, that receive a few fibres in their substance.

Because of the fact that the pain of these tumors is so out of proportion to their size, and because he was unable to find nerve structures within the tumor, he believed that the excruciating pain should be assigned to a "functional rather than to an organic disorder of the nerves; to a disorder commencing in the nerves of the part which is the focus of the pain, but transmitted from them to others, which, in the nervous centres, are connected with them."

It cannot be possible that the pain is due purely to altered nerve fibres, as even tumors within nerves are not always exquisitely painful, and, as pointed out by Smith,[19] there is often little or no pain in cases of tumors which have existed in the trunks of nerves.

Stengel [20] classifies tubercle dolorosa under myomata, stating that "myomata of the skin occur in younger patients, even in childhood, and are generally multiple, and often painful." I believe, however, that these must be another variety of painful tubercles. Such tumors have always been described as being benign, but Warren [21] describes one malignant form of these tubercles in which the lymphatics may become involved, but he cites no cases. I was able to find only one case reported wherein the tumor became malignant. This was a case of painful

subcutaneous tubercle reported by Dupuytren,[22] in which the tubercle acquired a schirrous nature and underwent cancerous softening.

The painful subcutaneous tumor may be diagnosed from a neuroma, by the fact that the former is usually single, whereas the latter is more often multiple; the former occurs more frequently in women, the latter in men; the former grow slowly, some attain full growth and remain stationary, and never attain any considerable size; whereas the latter grow consistently and have no limit to their size.

The treatment of the painful subcutaneous tubercle consists in excision. The authors of the *American Text-book of Surgery*,[23] in speaking of treatment, say: "the treatment is excision of the tumor together with the portion of nerve twig in which it grows." It is not always possible, however, to find such a twig. Gross,[24] in summing up the treatment, says there should be "free excision, including a portion of the surrounding healthy integument."

The tubercle can be removed under local anæsthesia. In those which I have removed, however, I used nitrous oxide gas, because of the fact that the tubercles usually occur in the nervous type of women, and because the tubercles were so small that I feared they would be hard to find after infiltrating with a local anæsthetic. Because of the fact that the tubercle is often so small and movable, it is well to fix it with a needle before making the incision so that it may be readily found. Cases have been reported in which the tubercle recurred after removal. Sir Astley Cooper [25] reported such a case in which he removed two painful subcutaneous tubercles from a woman's leg at an interval of a year. Similar cases have been reported by Paget and Tait.

REFERENCES

[1] Wood: Edinburgh Med. and Surg. Jour., vol. viii, 1812.
[2] Gross: System of Surgery, vol. i, p. 235, and vol. ii, p. 1017.
[3] Brodie: Med. Gazette, vol. xxi, p. 926.
[4] Smith: Treatise on Neuroma.
[5] Paget: Lectures on Surgical Pathology, p. 487.
[6] Paget: *Ibid.*
[7] Wood: *Ibid.*
[8] Carruthers: Edinburgh Med. and Surg. Jour., vol. xxxiii.
[9] Médecine Opératoire, vol. iii, p. 101.
[10] American Text-Book of Surgery, p. 412.
[11] Keen: Keen's Surgery, vol. i, p. 761.
[12] Gross: System of Surgery, vol. i, p. 1017.
[13] Treves' Surgery, vol. i, p. 458.
[14] DaCosta: Modern Surgery, 1914, p. 355.
[15] McFarland: Text-Book on Pathology, p. 234.

[16] Agnew's Surgery, vol. iii, p. 624.
[17] Dupuytren: Leçons Orales, vol. i.
[18] Paget: *Ibid.*
[19] Smith: *Ibid.*
[20] Stengel: Text-Book on Pathology, 1906, p. 185.
[21] Warren: On Tumors, p. 60.
[22] Dupuytren: *Ibid.*, p. 542.
[23] American Text-Book of Surgery, p. 414.
[24] Gross: *Ibid.*
[25] Illus. of Disease of Breast, p. 84.
[26] Rose and Carliss: 1914, p. 213.

Dr. P. G. Skillern, Jr. said that he attended a case at the University Hospital Dispensary during the summer which was very much akin to the one described by Dr. Owen. The patient was a male, aged twenty-nine years, who for two years had had a sensitive spot at the upper outer portion of the left leg, and he had pain in the leg at night. He had had a skiagram taken and was said to have an osteoperiostitis. An X-ray taken under Dr. Skillern's direction was negative. On the upper outer portion of the left leg was a minute mole the size of a millet seed. Touched by the tip of an ordinary probe this little tumor was the seat of excruciating pain. The tumor was removed under novocaine suprarenin infiltration. A clinical diagnosis was made of neurofibroma. Histologically, the condition was a small encapsulated growth, a hæmangioma, beneath the skin. Last summer he saw a case with an exquisitely tender subcutaneous tubercle over the internal condyle of the right femur, which might have been diagnosed neurofibroma, but which cleared up under antigout treatment. The diagnosis of these subcutaneous gouty nodules must always be borne in mind in surgical cases.

Dr. Owen, in closing, said that the case which prompted him to write the paper was that of a young lady, twenty-one years of age, who had a small tumor over the patella for a number of months. It had been treated for some time by ointments. Finally the knee became so painful that a splint was applied. On one occasion the tumor had been diagnosed a ganglion and had been struck by a book with the hopes of rupturing it, whereupon the young lady fainted. The leg was thrown into a clonic convulsion by this blow. When she came under my observation she was walking with a stiff leg. She was so apprehensive of pain she would not bend the knee. Since the removal of the tumor she has had no further trouble.

NEPHROLITHIASIS IN CHILDHOOD

Dr. J. S. Rodman presented a boy of twelve years upon whom he had operated at different times for bilateral kidney stone. The boy has always been undersized but otherwise, except for whooping-cough, has been healthy, until four years ago, at which time he had a severe attack of cerebrospinal meningitis. He was confined to bed for nine weeks and most of the time was delirious. Since then more or less severe headaches have been rather frequent. During the summer of 1910 he passed bloody urine for the first time. The hæmaturia was not accompanied by any abdominal pain, and, in fact, the latter has never been present. The urine returned to normal after a course of medical treatment, only to become bloody again after a lapse of several months. He has never passed gravel and his general health has remained good despite the loss of considerable blood in the urine, which has always, during the past month, been dark red in color. There has been some sediment of late in the urine.

Physical examination showed an apparently healthy boy somewhat small for his age. A careful detailed examination showed nothing abnormal. Neither kidney was palpable, nor was there marked tenderness over either kidney area.

Examination of the urine showed specific gravity 1020, color light red; trace of albumen; no sugar; no casts; moderate number of urates; macroscopic and microscopic blood.

The X-ray report showed stones in both kidneys—one large stone in upper pole of right kidney and one large stone and two smaller ones in the left kidney. The large stone in the left kidney was in the pelvis, the other two in the other pole. It was decided to remove the stones at different times, so that, on February 10, 1911, the right kidney was attacked under ether anæsthesia through the usual oblique incision. On exposing the kidney the stone was readily felt and removed, through an incision into the cortex. Rather free bleeding was encountered, but was easily controlled by catgut sutures. The stone was hard and about the size of an almond. The wound was closed with gauze drainage.

Following this operation the boy's recovery was uneventful, after rallying from rather marked operative shock. The gauze was removed at the end of forty-eight hours and the wound stopped draining urine one week after operation. The child was discharged three weeks after operation in satisfactory condition, the wound having entirely

healed. On several occasions after the operation there was blood in the urine, although it had disappeared at the time of leaving the hospital.

On November 12, 1911, he was readmitted, his health having been good in the meanwhile. His urine had not contained blood in the interim. A second X-ray examination showed, as before, one large and two smaller stones in the left kidney. On November 16 the left kidney was exposed and the larger stone in the pelvis immediately felt. The kidney cortex was incised and a smaller calculus in the lower pole, about the size of a large pea, and a soft stone resembling a blood clot felt and removed. The larger stone in the pelvis was also removed and was about the size of a small pigeon egg. The boy lost somewhat more blood during this operation than the first, but again the bleeding stopped upon suturing the kidney, wound closed, as before, with gauze drainage. His convalescence from this operation was exceedingly stormy. Shock was profound, and for forty-eight hours suppression of urine made us fear that he would die. Cupping, external heat, salt solution and hot packs finally started elimination, but for one week his condition remained desperate. After this convalescence became established. The gauze was removed at the end of forty-eight hours, as before. He was discharged December 23, 1911, five weeks after operation in excellent condition. The wound had healed, having ceased draining urine ten days after operation. The urine report at the time of his second discharge from the hospital showed pale amber, flocculent sediment; specific gravity 1018; reaction acid; small ring of albumen; no sugar; no casts; few leucocytes; few pus cells; few epithelial cells, and a moderate number of urates. His health has been excellent since the last operation, he has grown rapidly, and, strangely enough, does not now suffer from headaches. At no time since the second operation has there been blood in the urine.

Dr. Rodman remarked that the subject of kidney stones in children had received but scant attention in comparison to the wealth of literature on the same subject in adults. Several important articles have appeared, however, during the past ten years, which deal largely with the etiology and pathology of stones. Despite the fact that most of the text-books of surgery dismiss the subject with the mere statement that renal calculus in children is common, the more recent literature would seem to indicate just the opposite. Nephrolithiasis in children is rare, but bladder-stones, with which we are not concerned in this report, are common. Age, sex, and race have some influence.

Thus, in Rafin's series of 39 cases, 2 of his own and 37 collected from literature, 5 were from one to five years, 18 from five to ten years, and 12 from ten to fifteen years. There were 24 boys and 11 girls in this series. Again, in the Mousseaux series of 77 cases there were 51 boys and 26 girls, while in Neupaner's series of 100 cases only 5 were girls.

It would seem that stone is more common in Hungary, Upper Silesia, England, Turkey, the country of Altenberg, Germany, and the town of Weida, near Jena. As to the actual etiology, much diversity of opinion is found. Ebstein believes that certain salts excreted from the blood and retained by the kidneys cause damage to the renal cells, thus forming the necessary organic material for the formation of stones. Joseph, in a report of 42 cases in infants with necropsy, found an albuminous material filling the tubules, and believes that this substance is the foundation of stone. He attributes its formation to altered metabolism. Klemperer and Brugsch speak of a renal stone diathesis which is brought about by a change in the metabolism, probably an excess of stone-forming salts in the blood stream. This diathesis expresses itself through diseases of the stomach and central nervous system. Rosenbach believes that the damage to the renal cells is not primary, as Ebstein claims, but rather secondary, due to a blocking of the urinary stream. In support of this theory Muschka states that blocking of the urinary stream produces swelling of the tubule walls and thus causes stone deposition. Kubitz believes that stones are composed chiefly of uric acid and its salts. Ebert, however, considers that uric acid infarcts are so common in infancy as to be almost physiologic. He considers that endemic conditions play an important rôle in the formation of sediments in the kidney parenchyma and pelvis. A gouty heredity is frequently found. For instance, Gibbons reports six cases of kidney stone in children, all of whom had had gouty parentage. Calcium contents of the water and gastro-intestinal disturbances may also play a part.

The pathology of renal calculus depends entirely upon whether the stones are primary or secondary. By a primary stone we mean one which forms independent of infection and is usually round or oval, smooth, without processes into the calyces, hard, and on section their structure is more uniform and artistic. The chief point of difference is that they have a lower percentage of calcium. Such a stone causes little damage to the kidney substance. The pathological changes that are found are due to congestion, and consist in thickening

of the capsule, exudation into the glomeruli, cellular infiltrations, and cell degenerations. On the contrary, secondary stones, being always the product of infection, are almost invariably accompanied by grave renal destruction. According to Ebert, the most common kidney stones are composed of sodium urate. In Mousseaux's series there were, of 77 cases, 55 urate stones, 12 mixed urate and oxalate, 1 pure oxalate, and 9 phosphatic. He states that cystin and xanthin stones are almost never found in children. In the series collected by Rafin, where the chemical composition was mentioned, there were: uric acid 5; oxalic acid or urate 4; phosphate of lime 4; carbonate of lime and phosphates 4; urates and phosphates 2; urates and oxalates 2.

In the symptomatology of kidney stones as occurring in children one is struck by the infrequency with which renal colic is mentioned. In fact, pain does not seem to be a prominent factor. It was entirely absent in my case, and writers on the subject have mentioned its infrequency. Hæmaturia is an important symptom, as is sediment in the urine.

Certainly the diagnosis rests almost entirely upon the X-ray. Here it must be remembered that not all varieties of stone are equally impermeable to the rays. The softer uric acid stones do not, for instance, throw as definite shadows as the harder varieties. The treatment, of course, is surgical, once the stone is formed and symptomatic. Renewed importance must be attached, however, to subsequent medical treatment, as surgery cannot cure the stone-forming diathesis. There is no doubt that the kidney possesses definite solvent properties, as is shown in the experimental work of Rosenbach on oxamide stones. These substances were placed in the kidneys of dogs, and when the organs were subsequently removed marked absorption had taken place. What is true of unilateral kidney stones is also true, in general, of bilateral calculus. In a series of 76 cases, 38 were bilateral, according to Legen. Kubitz collected several series of kidney stones, reported by different authors, occurring at all ages, and found that as an average 18.7 per cent. were bilateral. An ascending infection of the sound kidney following cystitis of course predisposes to secondary stone formation. In this way unilateral stone may become bilateral, since calculus is so frequently followed by cystitis. Other case reports, as those of Nash, Jaffrey, and Parkinson, remark upon the relative infrequency of kidney stones in children. Out of 96 operations, Morris states that none was under ten years. R. C. Dunn states that in 283 cases there was only one under ten years.

BIBLIOGRAPHY

Rafin: Annal des Malades Genito Urin., vol. i, No. vi, March 2, 1911.
Kubitz: Doppelsitige Nephroliathiasis.
Rosenbach: Deut. Zeit. fur Chirur., September, 1911.
Ebert: Med. Klinik, No. x, 1912.
Treplin: Archiv fur klin Chirur., 1904.
Kraus: Deut. Medizinische Woche., 1907.
Eisendrath: J. A. M. A., June 26, 1909.
Joseph: Virchow's Archiv, 1911, 205, xxiv.
Mandhle: Lancet, London, 1906, i, 1961.
Jaffrey: Report of the Society for Study of Diseases of Children, vol. vi, 1906.

APPENDICULAR OBLITERATION

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Much confusion exists in the minds of surgeons as to the significance of the term chronic appendicitis. As it is usually understood it refers either to a state of persistent low grade inflammation involving one or more coats of the appendix, or to recurring attacks separated by intervals during which it may be more or less free from the process or products of inflammation.

As the term is used by the pathologist it may refer not only to the above conditions but also to the results of previous inflammation of the appendix, as evidenced long after the infective process has passed by thickenings, fibrosis, cicatrices, strictures, kinks, and by destruction, absorption and replacement of various portions of its coats, particularly the mucosa. In the former instance the process is still active, though it may be sluggish; in the latter condition it is inactive except as its results may cause disordered conditions. It is the difference between a pathological process and a terminal pathological state. A good parallel may be seen in the chronic endocarditis which, still harboring microörganisms, continues slowly to attack the valves of the heart, as compared with the *so-called* chronic endocarditis which has become sterile and quiescent but acts through the defects and distortions of the leaflets which have been created. Active chronic disease of the appendix betrays itself under the microscope by œdema, hyperæmia, or by the cellular infiltrations which are the hallmarks of chronic infective processes. At a later time the evidences of an active process may be entirely lacking and in their stead we find only the end results above mentioned. It would lead to more accurate thinking and analysis of the true conditions if we were to speak of the former group as chronic active appendicitis and drop the term appendicitis entirely as descriptive of the latter condition, calling it instead appendicular sclerosis or obliteration, as the case may be. We would then be brought forcibly to face with the fact that not all chronic active appendicitis is productive of symptoms, or better perhaps, recognizable symptoms. In a series of 5500 appendices removed by Dr. John B. Deaver, 500 were removed in the course of a laparotomy for other conditions. Of

these, 112 (32.4 per cent.) were found normal and 388 (77.6 per cent.) presented well marked evidence of active or already established inflammatory changes. Of these 388 there were 71 (14.2 per cent.) which had undergone complete obliteration. It is a *reductio ad absurdum* to maintain that more than three-fourths of the entire population have been subject to appendicitis as we know the disease. We must therefore assume that chronic infective processes may go on in the appendix without producing diagnostic symptoms, or that the appendix normally undergoes certain retrogressive processes in the nature of atrophic fibrosis and obliteration. The latter view has been strongly championed by Ribbert. The argument in favor of physiologic involution of the appendix rests chiefly on the fact that the incidence of obliterative processes increases directly as the age, reaching as high as 50 per cent. in the seventh decade of life. When we reflect, however, that an appendix once obliterated is always obliterated the argument loses much of its force, since it is obvious that from whatever cause obliteration proceeds the percentage of frequency must rise with increasing years, just as in the case of gall-stones, which nobody considers a physiologic process for that reason. It is entirely probable that the process is favored by the general atrophy and sclerosis associated with increasing age, but to assume that it is an example of isolated old age in a particular organ, or, what Gowers speaks of as abiotrophy, is no longer tenable. Against this view are (1) the early age at which the process may begin. Obliteration, according to McCarty, may begin as early as the fifth and be complete at the tenth year of life. In the second decade from 3 to 17 per cent. show partial to complete obliteration. This is the period of active growth rather than of degenerative processes. (2) In an operative series the incidence of obliterated appendices does not increase directly with the age, but follows closely the curve of inflammatory diseases of the appendix. Thus in 100 consecutive cases the age incidence was as follows:

First decade	0	Fifth decade	18
Second decade	10	Sixth decade	11
Third decade	31	Seventh decade	3
Fourth decade	27		

The greatest number of cases fell between 20 and 30 years, corresponding to the period most susceptible to recognized appendictis.

(3) Clinical evidence points clearly to the importance of previous appendiceal inflammation. In 52 consecutive cases operated upon with a diagnosis of chronic appendicitis, 30 gave a history of previous sharp

attacks and 17 had had mild local symptoms. In 48 cases in which the appendix was removed incidentally, 5 gave a history of sharp, definite attacks in the past, 9 of indefinite probable attacks, and 6 complained of chronic indigestion. The history of one case is particularly significant. A man, aged twenty-three, was admitted to the German Hospital with a diagnosis of obstruction of the bowels. Nine months previously he had had a severe attack of acute appendicitis. At operation there were found peri-appendicular adhesions, beneath one of which a knuckle of small intestine had been caught and strangulated. The appendix itself was completely obliterated and inactive.

(4) Operative findings usually suggest previous inflammatory processes. It is not common to find an obliterated appendix swinging freely on a normal meso-appendix. Usually the mesentery is contracted, kinked, or absent. The appendix is frequently subcæcal, paracolic, or bound beneath the terminal mesentery. Often it is subserous. Peri-appendicular adhesions definitely inflammatory in origin were present in 25 per cent. of this series. The attempt of Lane and his followers to attribute most of the appendicular scleroses and obliterations to the consequences of ptosis seems forced in view of the numerous instances of omental and pelvic adhesions which do not admit of any such explanation. That many obliterated appendices do not present peri-appendicular adhesions seems to be due to two facts, namely, the facility with which simple plastic adhesions are later spontaneously released by natural processes leaving no trace behind, and also to the nature of the process of obliteration, which takes two chief forms, and leads us to a consideration of the fifth and pathological reason for assigning infection as the cause of the process.

(5) Obliteration occurs as the result of certain types of acute appendicitis or in consequence of chronic infection of a persistent character with or without exacerbations. It is not exceedingly uncommon to find appendices the mucosa of which has become completely gangrenous without gangrene of the outer coats. This is a consequence of a severe mucosal infection usually aided by increased intra-appendiceal pressure due to proximal blockage of the lumen. If now the obstruction ceases to operate as by the discharge of a concretion into the cæcum or by the softening of a strictured segment, drainage will take place into the cæcum, the mucosa will slough away leaving granulating surfaces which will cohere before epithelialization can take place by continuity from the cæcum. Or, if a perforation occurs at one point and the patient be fortunate enough to recover without removal of his appendix, the end result will be a fibromuscular vestige devoid

of lumen. In these types of appendicitis permanent peri-appendicular adhesions will often be formed. The case above reported, of rapid obliteration following acute appendicitis with obliteration as a sequel, probably belonged to this class. More frequent than this is the sclerosis and obliteration which results from chronic catarrhal and interstitial processes. I have examined many appendices removed incidentally in the course of abdominal operations for conditions foreign to the appendix in which unmistakable evidences of chronic active inflammation of the organ were present. This occurs not infrequently in the entire absence of any of the recognized symptoms or signs of appendicitis. That this is true is also shown by the large number of cases which present evidences of antecedent inflammation without a history suggestive in any way of appendicitis. All the steps of obliteration can be traced. Cellular infiltration occurs in the outer coats and excites the deposit of fibrous tissue which impedes the blood and lymphatic circulation, renders the organ less elastic, and thus subjects the mucosa to increasing pressure during the periods of œdema and congestion consequent upon the more or less severe exacerbations of infection. In addition to this there is a gradual contraction of the newly-formed diffuse cicatricial tissue. Under these influences the mucosa becomes thin, the glands gradually disappear, the mucosal stroma, and often the lymphoid tissue, undergoes pressure atrophy and disappears. The encroaching fibrous tissue joins across the gap now microscopically minute and appendicular obliteration is complete. Such a process may go on without involving the serosa of the appendix. No adhesions are excited and so slow and inconspicuous may be the whole process that symptoms of any moment may not be called forth, and if they do exist they are most often misinterpreted. Thus, in the 52 cases operated upon with a diagnosis of chronic appendicitis 8 had had a long standing history of indigestion prior to the development of acute attacks and 7 had mild local symptoms preceding a definite seizure which made the diagnosis.

The cause of the symptoms in appendicular obliteration is not only an interesting but important consideration. In what manner does an appendix cause symptoms after it has been reduced to a thin fibromuscular cord devoid of any chronic inflammatory process? That simple removal of such an appendix does abolish symptoms in the majority of cases there can be no question. On the other hand, it is a well-known fact that appendectomy, particularly in this type of case, does not always cure or relieve the symptoms. In 100 cases of chronic appendicitis followed by Stanton with reference to end result, 64 were

cured and 36 were unsatisfactory, in that relief was not obtained or other lesions were found to have been the cause of the symptoms. Graham and Guthrie reported 85 per cent. of cures or improvement, 10 per cent. followed by return of symptoms, and 5 per cent. unimproved. Scudder and Goodall attempted to follow 3000 appendectomies done in the Massachusetts General Hospital, but were able to trace only 640. Of these 94.6 per cent. were cured, but the returns fell so far short of the entire number that this higher percentage is not convincing.

The reasons for failure are various. It is granted that a certain small percentage represents mistakes in diagnosis, the lesion being in no way connected with the appendix or the adjacent bowel. The greatest interest, however, centres in other conditions of the ileocæcum and ascending colon about which it is being attempted to build up pathological and clinical entities. The most important of these are cæcum mobile, pericolic membranes and Lane's ileal kink. The discussion of these conditions is not the purpose of this paper, but I wish merely to point out that it is quite unnecessary to refer all failures of appendectomy to the existence of special conditions such as those mentioned.

There are three types of symptoms referable to the obliterated appendix: (1) Those which are referred to other regions of the abdomen, most commonly the epigastrium; (2) local symptoms; (3) general symptoms consequent upon disturbance of function of the bowel.

In this series 4 cases presented epigastric symptoms alone. In 6 others epigastric symptoms were combined with local symptoms. In 2 cases the symptoms were such as to cause suspicion of duodenal ulcer, and in 4 gall-bladder disease was suspected. The occurrence of epigastric symptoms has been plausibly explained by the assumption of reflex nervous influences set up by irritation of the nerve supply of the appendix. In such appendices the ganglion cells of the plexuses of Meissner and Auerbach can easily be seen in a degenerated state. The mechanism exists, therefore, for such action and there seems no reason to doubt that it occurs. Removal of the appendix and with it the irritated ganglionic centres and nerve fibrils should relieve reflex symptoms. Graham and Guthrie's excellent statistics as to cure, above quoted, related particularly to this "dyspeptic" group of chronic appendicitis, and Deaver, Moynihan and many others have placed this type of appendiceal disease on a firm footing as regards its existence and cure.

What is not so well understood, in my opinion, is the fact that local symptoms of appendicular disease do not spring directly from the

appendix itself. The appendix in common with other portions of the alimentary tube has no perception for pain or power of localization. Its sympathetic nerve supply does not possess this ability and it is doubtful if any spinal fibres reach the appendix. Local symptoms are called forth only by inflammation propagated to other structures possessing sensibility or through the medium of traction upon structures which have spinal innervation, normally the meso-appendix, abnormally acquired adhesions.

In these chronic sclerotic or obliterated appendices, therefore, it is not the inert appendix that is responsible for localizing symptoms, but its shortened and fibrous meso-appendix, the acquired adhesions to adjacent mesentery or parietes, or adhesions of the cæcum, colon or small intestine, the consequences of peritoneal infection and, most important, retroperitoneal lymphangitis, which disturb the motility of the bowel and under conditions of distention or activity or during peristalsis excite pain. The appendix in many cases acts as a guy rope attached to the tip of the cæcum preventing foreshortening and emptying of the cæcum by the longitudinal muscles.

Disturbance of function of the ileocæcum manifests itself by a further train of symptoms, chief of which is constipation. It is probable that in some cases chronic toxic manifestations are a result. Just what proportion of the "grisly troop" enumerated by Lane and Metchnikoff are due to this cause remains to be determined.

Appendectomy releases the cæcum from the tether of an adherent appendix and the contracted meso-appendix. At times other symptom-producing adhesions are released as well. In other cases through ignorance of the exact organic cause of symptoms or because of operative difficulties the essential factors are left behind when the appendix has been removed. It is asking too much to expect that simple appendectomy will relieve all symptoms due not only to the appendix but also to complications secondary to the appendicular disease but no longer dependent upon it. Just what constitutes a normal arrangement of the ileo-cæco-colic region, how much divergence may occur without symptoms, what type and situation of adhesions are most troublesome, and how to remedy them, are questions that do not at present permit an answer, but it is clear that the attachments of the bowel in the ileo-cæcal region have a most important bearing upon function and symptoms and that it is the surgeon's duty at present to observe and digest before generalizing.

In this series but one case of associated Lane's kink and Jackson's membrane was observed, and in this instance there were omental ad-

hesions to the parietal peritoneum in the right iliac fossa. Whether the disease of the appendix had been responsible in this instance for the other abnormalities it is impossible to say but the evidence of former adhesive inflammation in this quarter is at least suggestive.

Constipation, at times amounting to intestinal stasis, was the rule in this series. In only 5 were the bowels said to be regular. Two were inclined to diarrhœa. Twenty-five, or about half, were troubled by constipation and in 20 no note was made of the condition of the bowels. The appetite in general was good. Nausea and vomiting were rare, except in connection with a history of definite seizure of pain in previous attacks. Indigestion was admitted in 26, denied in 3, not mentioned in 23. Some form of pain or distress was complained of in every case in which a pre-operative diagnosis of chronic appendicitis was made. It was variously described as dull, aching, dragging, sticking, sharp, crampy and soreness. In 27 cases it was in the right iliac fossa alone, in 5 cases in the epigastrium alone, in 6 cases in both, in 2 it was general, in 3 there were radiations to the right loin and thigh, and in 9 it was aggravated by exercise or activity. The symptoms dated back according to the history from 4 days to 25 years, with an average of more than 5 years. Only 7 gave the duration in months, and in 33 it had been a matter of years. Females predominated, 31 to 21. The leucocytes averaged 8620 per cubic millimetre with a minimum of 4600 and a maximum of 14,500. The few cases which showed some fever, leucocytosis and evidence of inflammatory exacerbation were not instances of complete obliteration. When the obliterative process has reached the cæcal junction there is no longer opportunity for bacterial invasion, a condition dubbed by Morris, protective appendicitis.

The 46 cases of incidental removal of obliterated appendices were distributed among 11 different abdominal diseases, to enumerate which would serve no purpose. It is a curious fact, however probably a mere coincidence, that 7 were removed during operations for extra-uterine pregnancy. During this same period the total number of cases operated on for this condition was 19, so that one in three of the cases of extra-uterine pregnancy presented obliterated appendices. As all these cases gave evidence of chronic or subacute tubal disease it is not beyond the bounds of possibility that the previous appendicitis had been the true starting point of the subsequent extra-uterine pregnancy through the well-known tendency of infective processes from the appendix to communicate disease to the tubes, which in turn would predispose to tubal gestation.

For the privilege of analyzing 100 consecutive cases of appendicular obliteration operated upon by Dr. John B. Deaver I wish to thank him as well as to acknowledge that my opportunity for observing clinically the conditions to which I have directed attention in this paper are largely due to my association with him. In conclusion it should be recognized that:

(1) Appendicular sclerosis and its terminal stage, appendicular obliteration, differ pathologically and clinically from chronic active appendicitis.

(2) Three types of symptoms are to be considered: (*a*) reflex, due to irritation of the nervous mechanism of the appendix; (*b*) local, due to mesenteric and peritoneal contractions and inflammatory bands or adhesions affecting the appendix, cæcum, ileum or ascending colon; (*c*) consecutive symptoms, general and local, consequent upon disturbed function of the ileocæcal region.

(3) Simple appendectomy avails for reflex symptoms, but in local and consecutive symptoms only in so far as the operation permanently frees symptom-producing contractions, sclerosis or adhesions.

(4) The determination of these latter conditions and the appropriate treatment therefor awaits further observations and experience.

Dr. John B. Deaver said that he believed and could prove by bacteriological research, that the appendix is responsible for the majority of cases of cholecystitis. According to reports from the Laboratory of the German Hospital 25 per cent. of the cases of gall-bladder operations showed the colon bacillus.

The typhoid bacillus is next to the colon bacillus in causing infection of the gall-bladder, but that the colon bacillus predominates there is no question.

Dr. John H. Gibbon urged on behalf of the original title of this paper, "Obliterative Appendicitis," that it was the better title, because the paper shows distinctly that the obliteration of the appendix was probably of inflammatory origin. It is a term also that has been used right along and is descriptive of obliterative results of inflammatory change.

Dr. Pfeiffer, in closing, said, in explanation of the title "Appendicular Obliteration," that it was simply to call attention to the fact that the ending "itis" in "obliterative appendicitis" is misleading, unless it is thoroughly understood that the inflammation is past. One sees obliterated appendices of recent date in which there is still an active inflammatory process; but, in the vast majority of obliterated appendices, there is no more inflammation. The object is to call attention to the fact that there are no inflammatory processes present.

TYPHOID SPINE

WITH REPORT OF FOUR CASES

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Over one hundred cases of typhoid spine have been reported since the publication of the first paper calling attention to this condition by Gibney in 1889. Gibney expressed the opinion that in typhoid spine there is "an acute inflammation of the periosteum and the fibrous structures which hold the spine together." The next important paper on this subject, a few years later, was by Osler, who, unfortunately, in reporting some of his own cases described the condition as a pure neurosis. The pathology of typhoid spine has been the subject of much theoretical discussion along the lines of the divergent views expressed by Gibney and Osler.

The only reported autopsy examination was not performed with sufficient detail to throw much light on the lesions present. The only complete post-mortem study of which I have any knowledge is that made by J. Torrance Rugh in a case some years after the disappearance of the acute symptoms.

The earlier cases of typhoid spine were observed before the days of the X-ray or before X-ray technic had developed sufficiently to demonstrate the spinal lesions. Even in many of the recently reported cases skiagrams were not taken. Thus far, less than 30 cases of typhoid spine have been reported in which X-ray pictures were taken and in some of these the skiagrams were negative. To this list I have added three personal cases in which the X-ray disclosed definite bone changes. Sufficient evidence has been accumulated to prove definitely that Gibney was correct in his original view that an inflammatory organic lesion does occur in these cases.

That a pure neurosis might possibly simulate, to a certain extent, the true inflammatory organic lesion of typhoid spine just as it might simulate any other organic lesion cannot be denied, but in view of our present knowledge of the subject such confusion should not occur. In other words, those cases which only simulate typhoid spine, whether because of a neurosis, a toxæmia, or any other cause, but which do not present

organic changes should henceforth be excluded from the list of true typhoid spine cases. The fact that the skiagram has been negative in a few cases does not in itself disprove the presence of an organic lesion; the bone changes may have been too slight to be demonstrable or the pictures were either faulty, or, when taken early in the course of the disease, were negative, when later ones might have shown bone changes, as in my third case.

The statistics on the reported cases of typhoid spine have been collected and analyzed by Cutler, Silver, Halpenny, Rogers, Gaudefroy, Elkin and Halpenny, and others. It has been found that fully 85 per cent. of the cases occur in males. The youngest patient was eight years and the oldest fifty-six years, but the majority were between twenty and thirty-five years.

Typhoid spine occurs as commonly in mild cases of typhoid fever as in severe ones. In the vast majority of instances the affection is located in the lumbar spine or in it and the immediately adjacent thoracic or sacral vertebræ, although it has been reported affecting only the thoracic or cervical vertebræ, or, as in a case reported to this Society by Dr. Elmer, involving only the sacro-iliac joint. Commonly only two adjacent vertebræ are involved, though, rarely, several may be.

Pathology.—That the affection is located so commonly in the lumbar spine is due to various factors. Fraenkel found typhoid bacilli more frequently in the vertebræ of the lumbar region than elsewhere, due probably to the relatively larger amount of bone marrow in them. The lumbar spine is also normally subjected to greater stress and strains than is the remainder of the spinal column. Silver has further suggested that, in addition to the greater amount of cancellous tissue offering low resistance to the typhoid bacilli, there is the possibility of direct infection from the adjacent lumbar lymph-nodes. Typhoid spine is almost never a fatal affection, hence post-mortem study of recent cases is wanting.

The clinical evidence points to the lesion being a spondylitis with periostitis, enchondritis and deposit of inflammatory exudate. The X-ray has demonstrated absorption of the intervertebral disc and slight destructive changes in the bodies of the vertebræ as the earlier changes; and later, bone proliferation from the periosteum and bone deposition along the lateral ligaments producing firm bony ankylosis of the approximated adjacent vertebral bodies.

The infrequency of suppuration in the vertebræ as compared to typhoid lesions in other bones has never been satisfactorily explained.

The cause of referred pains and rhythmical contractions is some-

what problematical. They may be due to neuritis from extension of the inflammation and this seems suggested by evidence of organic nerve lesions in some cases. Again they may result from meningitis. Positive Kernig's sign has been noted but only rarely. Lumbar puncture has shown the tension of the spinal fluid increased in a few instances and normal in others. Pressure on the spinal nerves or nerve roots by inflammatory exudate seems the most probable cause. Those cases in which there are alternations of the referred pains and rhythmic muscular spasms suggest that whatever irritation is present in those cases must be located at some point where the motor and sensory fibres are separated one from the other. This would imply an exudate exerting pressure on the anterior and posterior spinal nerve roots proximal to their passage through the intervertebral foramina. The rhythmic contractions being synchronous with the pulse, would indicate they were due to pressure which would alternately be increased and decreased as the blood was forced through the pressure area.

The onset of symptoms was usually gradual, but in many was abrupt and acute, occurring in a few cases during the febrile period, most often during convalescence, and quite frequently some weeks or months, in one case four years, after recovery from typhoid fever.

There seems no doubt that the typhoid bacillus is the cause of the lesion. The presence of typhoid bacilli in bone marrow, especially of the spine, in patients dying of typhoid fever has been shown by Quincke and by Fraenkel.

Various forms of slight trauma or exposure to wet and cold were given as the immediate cause for the onset in many cases. It is quite probable, however, that the spinal lesion was already present and that the trauma merely aggravated it or first called attention to its existence. This would seem to be the case in those patients in whom acute symptoms developed within a few hours after receipt of the trauma.

The symptoms of typhoid spine can be classified as (1) constitutional, (2) local or spinal, and (3) referred.

Constitutional Symptoms.—The patient's temperature in one case was normal, but in all others reported in which the temperature was given it was elevated, seldom reaching 103° or 104° F., but in one of my patients going to 106° F. in the first twelve hours. Fever usually subsided in a few weeks and persisted only two months in the longest instance recorded. The pulse-rate increased with the fever. The Widal tests, when taken, have been positive. Leucocyte counts have not been reported very frequently and have varied from 6000 to less than 18,000.

Great mental irritability has been noted in several instances, due probably to weakness from prolonged illness, present toxæmia, and harassing pain. A few patients threatened to commit suicide. This irritability in its various manifestations has been one of the main arguments in the past for regarding typhoid spine as a neurosis. As one writer has pointed out, if these patients with their painful organic lesions are treated as cases of neurosis, ordered out of bed, placed on exercises, etc., it might reasonably be expected that they would display "neurotic" symptoms.

Local or Spinal Symptoms.—Pain over the spine has been the most constant and prominent symptom, as well as usually the first to attract attention. The local pain, however, has sometimes been overshadowed by the greater intensity of the referred pains. Local pain over the site of the disease has usually been absent when the patient was at complete rest in bed, but was elicited by movements of the spine, whether by turning in bed or tests applied in making an examination. Downward push on the head or shoulders, jarring on the heels and efforts at bending or twisting the spine have aggravated this pain. The patients have protected themselves against exciting the pain, in the manner characteristic of cases of acute inflammatory lesions of the spine, by transferring weight through their arms and hands to their pelvis, thighs, bed, or chair; and picking articles from the floor by flexing the knees and hips rather than bending the spine. The pain has disappeared during the subsiding stage for days or weeks to recur on resumption of active exercise or labor.

Tenderness was elicited either over the spinous processes in the median line, or over the transverse processes in all cases. In some tenderness over the anterior surface of the bodies of the vertebræ could be elicited by deep abdominal palpation.

The spine in the affected region was stiff and spinal muscles were rigid in practically all cases. In some scoliosis was present, in others the normal lumbar lordosis was lost, and in a small percentage a vertebral prominence or definite kyphosis developed in the later stages. In but very few cases was there local swelling or redness. In only three or four cases did the disease result in suppuration requiring incision and drainage.

At the present day the X-ray in the later stages of the disease affords the best proof of the existence of a local spine lesion. In this connection I cannot commend too highly the method, which is not in general use, employed by Dr. Henry K. Pancoast of taking

lateral views of the spine to bring out details unobtainable by the usual anteroposterior exposures.

Referred Symptoms.—Aside from the purely local pain in the spine the great majority of typhoid patients experienced severe or even excruciating pains radiating in one or more directions, as around one or both sides of the lower chest or abdomen, down one or both lower extremities, and into the testis. The referred pains were usually intermittent in character and very often were most violent and persistent at night, requiring opiates to procure sleep. The referred pains might persist from a few minutes to several hours at a time and then cease and recur after minutes or hours. These pains were commonly brought on or aggravated by any movement involving a strain on the spine, as turning in bed, lifting a leg, coughing, sneezing, etc. In a few cases the hot-water bottle was efficacious in controlling the pains. Complete fixation of the spine by a body plaster cast, spinal brace or extension apparatus usually gave prompt and marked relief.

Quite frequently tenderness was present over the same areas as the pain radiations. Occasionally muscular rigidity of an intensity which varied on different days, or even at different hours of the same day, was encountered in those cases in which pain was referred to the abdomen.

A few cases of typhoid spine have exhibited a curious rhythmical alternating contraction and relaxation of the abdominal muscles on one or both sides. These contractions usually have been synchronous with the pulse beat, and in one reported case they could be abolished by compression of the upper abdominal aorta. The contractions have arisen spontaneously with the patient at complete rest in bed, or have been started up by movements affecting the spine. They would occur rhythmically for a few moments up to three or four hours, and cease only to recur later. The individual contractions have been mild at one time and violent at another, or might start mildly and become vigorous, giving rise to discomfort varying from slight annoyance to great distress, and leaving the muscles sore, as if violently over-exercised, after the contractions cease. The contractions have occurred at intervals during which the referred pains might be either present or absent. The contractions as well as referred pain might be present on one side of the abdomen at a certain stage of the disease and on the other side at another stage. Rhythmical contractions of abdominal muscles were present in two of my patients. In one reported case muscular twitching of the thigh was noted.

The patellar reflex was increased in the majority of instances in

which it is mentioned, was normal in a few, and rarely was diminished. Ankle-clonus was observed in several cases and Kernig's sign rarely. Hyperæsthesia or paræsthesia of areas on back, abdomen or lower extremities was noted in several cases and not found in others. Muscular atrophy sufficient to indicate nerve lesion occurred infrequently.

Diagnosis.—The diagnosis of typhoid spine usually should not be difficult. The existence or recent history of typhoid fever, the characteristic localized acute spinal symptoms, the suggestive referred symptoms, the constitutional disturbances, and later the X-ray findings afford an unmistakable picture in the typical cases. Difficulty as to the diagnosis, however, may arise under certain circumstances. Not all pains in the back of typhoid patients are due to typhoid spine. Doubt may arise as to whether or not early symptoms in a given case are due to the gradual onset of a typhoid spine or due to some of the more common but less serious forms of backache. Continued observation and study of the further course of the affection will soon disclose the correct answer to the question.

In cases of acute onset with predominance of the referred symptoms, the local symptoms in the spine itself may easily escape observation, unless the possibility of typhoid spine is kept in mind and these local signs are sought for. If the possibility of a spine lesion is not given proper consideration then various erroneous diagnoses may be made. The constitutional symptoms of fever, pulse-hurry and leucocytosis, plus the referred symptoms of pain, tenderness and rigidity of sudden onset present a fairly complete picture of any of the forms of intra-abdominal inflammation or suppuration.

The particular lesion which the typhoid spine will simulate under such circumstances is dependent on the abdominal region to which the symptoms of pain, tenderness and rigidity are referred. In such circumstances, however, it may be found that some special symptom of the disease under consideration is wanting, that the local signs are a little too diffuse or that there are other inconsistencies in the picture or course of the affection viewed as a whole. But even then the picture so closely simulates the conditions for which immediate operation is indicated that, unless the possibility of spinal lesion is considered, the patient is apt to be subjected to a needless laparotomy.

Again, the presence of mild spinal symptoms may be recognized and yet the constitutional disturbance plus the referred symptoms and their location be so very characteristic of an intra-abdominal lesion that two erroneous possibilities present themselves—either that a spinal and an abdominal lesion exist independently of one another or that an

abdominal suppuration occurred first and the spinal symptoms arose secondary to a toxæmia, metastasis or direct extension from a retroperitoneal infection. If the diagnosis is uncertain under such circumstances it will usually be wise for the surgeon to delay operation until reasonably certain of the situation. The X-ray cannot be depended upon when the early pictures are negative, as it may require weeks for bone changes to develop to the extent that they can be shown by skiagraphs.

Prognosis as to life seems entirely favorable as none of the patients died of the typhoid spine lesion. Suppuration to the extent of requiring evacuation has been very rare. It is possible that small foci of pus might form and be absorbed. Absorption of one intervertebral disc with osseous ankylosis of the two adjacent vertebræ may be expected. Occasionally changes of the same type have involved more than two vertebræ. Kyphosis may or may not develop, or, as pointed out by Silver, may be present and obscured by heavy overlying muscles. By proper support of the spine until ankylosis occurs kyphosis can be prevented. A relapse to the extent of return of pain and tenderness is not uncommon during the subsiding stage from too early resumption of activity, but, unlike inflammatory spinal affections, typhoid spine, once arrested, does not tend to recur. Symptoms disappear in a few weeks or months, as a rule, but in Brownlee's case they persisted for 21 months. The ultimate functional result is usually perfect. If only two vertebræ are ankylosed the adjacent joints apparently are able to compensate for the lost mobility.

Treatment.—The best form of treatment is mechanical. The spine should be placed at as near absolute rest as possible. This may be accomplished by either plaster-of-Paris cast, spinal brace, or by continuous traction from head and feet. Pain often has ceased abruptly after fixation of the spine. Excessive pain can be relieved by the local application of heat, by aspirin or sedatives, but often opiates will be needed. Elimination should be pushed to combat the toxæmia. In prolonged cases vaccines may be of service.

Case I.—M. B. M., male, aged fifteen years. Patient of Dr. T. H. Mackenzie of Trenton, N. J. After a week of prodromal symptoms patient went to bed the day following Thanksgiving, 1907. High fever, up to 104° F., for two weeks, constipation, tympanitis and rose spots. Three or four days after first getting out of bed in February, 1908, was hit with a severe pain in the back and along the right sciatic nerve. Following day pain shifted from right to the left sciatic nerve distribution and continued there

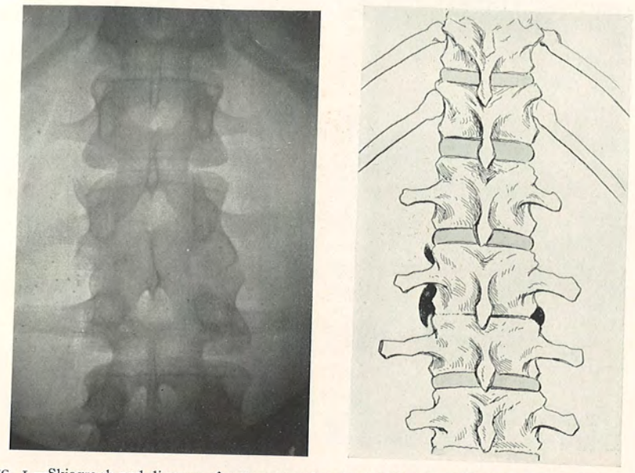


Fig. 1.—Skiagraph and diagram of anteroposterior view of Case I, taken seven years after onset of typhoid spine symptoms.

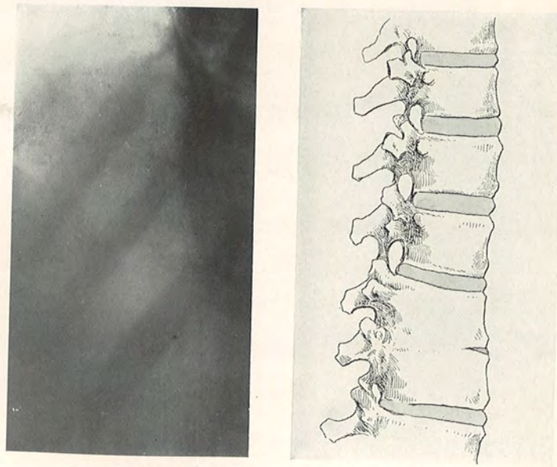
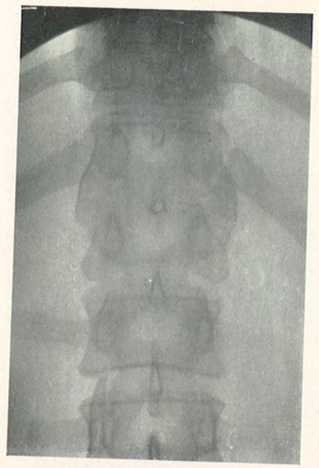


Fig. 2.—Skiagraph and diagram of lateral view of Case I.



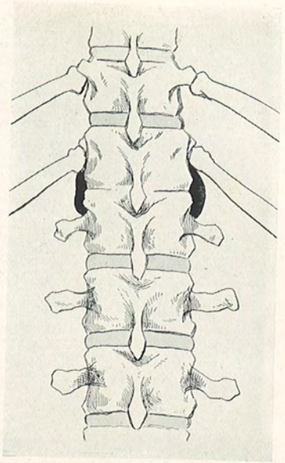


FIG. 3.—Skiagraph and diagram of anteroposterior view of Case II, taken seven years after onset of symptoms.

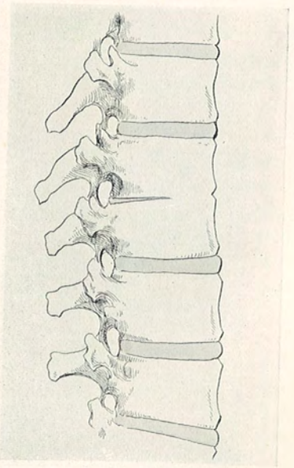
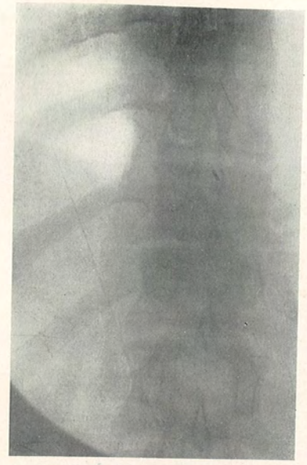


FIG. 4.—Skiagraph and diagram of lateral view of Case II.



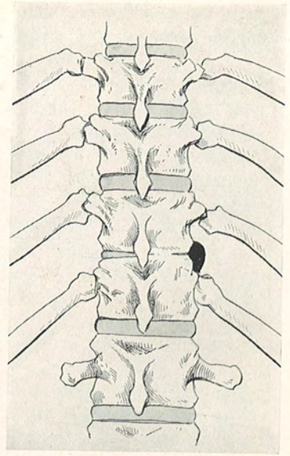
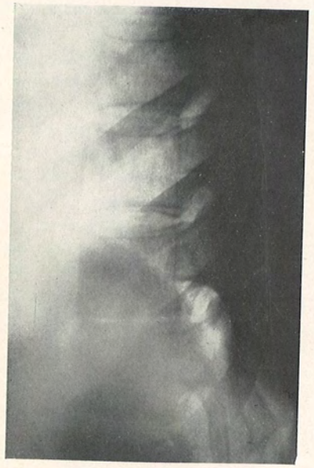


FIG. 5.—Skiagraph and diagram of anteroposterior view of Case III, six months after onset of symptoms.



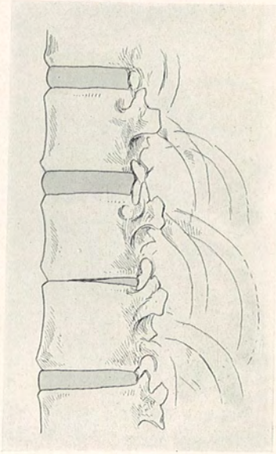


FIG. 6.—Skiagraph and diagram of lateral view of Case III.

for one month, when it stopped and pain shifted back to right sciatic for the next month. During all this time remained in bed. Had pain in lower back, made worse by movements.

Through the kindness of Dr. George H. Parker and Dr. Mackenzie I saw the patient at his home in April, 1908, at which time he complained of pain in the back and in the right sciatic distribution, both of which were aggravated by spinal movements. Right sciatic nerve was tender to the touch. Normal lumbar curve was lost. Spine was rigid. Tenderness most marked in mid-lumbar region. Made a diagnosis of typhoid spine. A plaster cast was applied by suspension method the following day, with 50 per cent. betterment in the pain within the next few days, and at end of two weeks pain had almost completely left. By end of third week cast had softened and was removed. Pain recurred in mild form. Cast reapplied for another three weeks, after which patient got up from bed and gradually resumed his activities.

His only skiagrams were taken on December 3, 1914, nearly seven years after the onset of his typhoid spine. X-rays show complete absorption of the disc between the second and third lumbar vertebræ with ankylosis between these two vertebræ. There is a slight kyphosis in this region.

He still continues to have occasional pain in form of backache, never severe and never interferes with whatever he is doing.

Case II.—J. M. A., male, twenty years of age. Painter by occupation. Indulges freely in athletic sports, musculature well developed. Normal weight 138 pounds. Height 5 feet 6 inches. Previous medical history negative. Had mild attack of typhoid fever beginning October 6, 1907. Normal course till November 1, when he developed right femoral phlebitis. Christmas day sat up out of bed for first time. Gradual resumption of activity. During the last week of January, 1908, fell on ice while skating, but experienced no ill effects at the time. On the following day experienced a sudden severe pain in the back on attempting to rise from a stooping position. Pain continued in less severe form till February 3, when it extended to the right side of the abdomen. The patient was then confined to bed and treated for lumbago. About this time there was an almost total suppression of urine. Only three ounces of urine were obtained by catheterization after a period of 20 hours. Urine highly acid, specific gravity 1028, no sugar, no albumen. Complained of slight headache and aching pain in the back of neck. Mind slightly confused and later muttering delirium. The temperature taken infrequently was subnormal until February 16, when it was 102.4° F. Thereafter was subnormal mornings and elevated in afternoons, but gradually subsiding

for next eight days, after which it remained normal and subnormal. Profuse sweating occurred during febrile period.

On February 10, patient began to have what he described as rhythmic "pulsations of the abdomen." These pulsations were slight at first and had a duration of only five or ten minutes, later on becoming more violent and persisting without intermission for hours.

The patient was examined at this stage by his brother, a physician, who observed that all of the abdominal muscles participated in violent, painful rhythmic contraction and relaxation, always at the rate of 104 or 106 to the minute, and not synchronous with the pulse. These convulsive abdominal movements would persist for upwards of six hours at a time and then cease, but on patient getting out of bed would recur in all their intensity, and were accompanied by pain at each contraction. The only relief obtainable was by having some one stand over him and press down heavily with flat hands on his abdomen. The contractions were so forcible that they almost lifted the entire weight of his heavy brother. The manual pressure would not cause contractions to cease but made them bearable. After contractions had ceased any attempt to relieve pressure immediately was followed by recurrence of contractions, but after waiting a few minutes pressure could be gradually released without recurrence.

The brother came to Philadelphia February 21, seeking advice, and the diagnosis of typhoid spine was suggested to him. He returned to the patient with the expectation of applying a plaster cast and bringing him to this city. On the night of February 21, the muscular spasms were the most violent they had been at any time and persisted without remission all night long, then ceased abruptly and patient slept continuously for 36 hours thereafter and remained drowsy and stupid for several days without contractions or pain. On March 6, following a trip to the toilet, mild contractions and pain recurred for a few minutes. It was noted that the normal lumbar lordosis was lost and that spine was straight for 14 inches.

On March 10 there were noted feeble contractions on the left side with pain and a "sore spot" in left iliac region.

On March 12, 1908, he entered the University of Pennsylvania Hospital. He was 20 pounds under weight. Complained of slight pain in left flank when he began to move about, but pain ceased on further movements. Abdomen was slightly rigid anteriorly and laterally on left side; some rigidity of spine and loss of normal lumbar curve but no kyphosis. There was a point of tenderness on deep pressure posteriorly at the side of the last dorsal vertebra. Reflexes normal.

Skiagrams taken on March 15 disclosed a small area of osteoporosis of last thoracic vertebra and small amount of bone proliferation on the left side of body of same vertebra. X-ray pictures of the spine in those days were not very clear cut and the exact details of lesion were uncertain. Patient left hospital the following day without notice.

I next saw him November 26, 1914. He stated that he had no further trouble after leaving the hospital and was soon able to get about freely and in a couple of months returned to his occupation of painting railroad cars.

In the fall of 1908 he practised cross-country running of 7 and 8 miles daily with fellow-members of a club, and the same fall, and yearly since then, has played regularly on a foot-ball team. Although a small-sized man he is able to lift a 100-pound weight above his head with one hand. He has not experienced any difficulty whatsoever from his spinal lesion.

On examination his spine has normal outlines, is supple, and gives no evidence of kyphosis. The X-ray, however, November 26, shows complete absorption of the intervertebral disc between the last thoracic and first lumbar vertebræ, with approximation of these two vertebræ and complete bony union along their lateral ligaments.

CASE III.—J. W. C., male, aged twenty-nine. Professional base-ball pitcher. Four years ago mild catarrhal jaundice for ten days. Eight months ago mild attack of pleurisy, uncertain as to which side of chest. Venereal history negative.

March 20 to 24, 1913, violent gastro-intestinal disturbance, at Birmingham, Alabama, following ingestion of tainted food, with gradual recovery.

April 10, 1913, while in Boston, began to feel generally miserable and developed fever, because of which he returned to Philadelphia, his home city. Widal reaction negative weekly for four weeks, and then positive, at which latter time rose spots first appeared and were numerous for few days, then disappeared; mild abdominal tympany. Spleen not palpably enlarged. Temperature up to 102° and 103° F.

On May 10 temperature, having been around 99° for four days, abruptly rose to 103° coincident with onset of pain and tenderness over gall-bladder; no jaundice. Fever continued at 101° to 103° for ten days, then gradually declined, but some soreness persisted over gall-bladder.

On June 10, sufficiently recovered to go to Atlantic City. June 25, went to Maine. Soreness still present in biliary region. Applied a fly blister, and soreness ceased. August 1, rejoined his

team in Philadelphia against his physician's advice, went on western trip and gradually resumed active exercise.

September 1, while swinging bat at a pitched ball, was seized with violent pain over the lower ribs on the right side. Rested for several minutes, then was able to bat balls to the infield, although it caused him considerable pain. After going to bed that night pain recurred with increased severity and he developed a temperature of 106° F. with delirium. Pain increased by deep breathing but no friction sounds audible. Strapping of chest gave marked relief. Was ordered general sponge baths and colonic irrigations. Following day temperature 104–105°, then returned to near the normal in five or six days. Pain located at right costovertebral angle continued in lessening severity, and was made worse by motion such as turning in bed; rigidity and tenderness of upper right abdomen. His symptoms were suggestive of possible diaphragmatic pleurisy, or of infection in gall-bladder, liver or kidney, or in subdiaphragmatic or perirenal regions.

I saw the patient for the first time on September 12. Temperature was then 99.6°, pulse 90, and respiration 20. He complained of pain in upper right abdomen. Pain was most severe at night, when it would persist for hours, preventing sleep, but would disappear during day while at complete rest in bed, only to reappear on motion, as getting out of bed or turning in bed, and had diffuse tenderness over upper right anterior and lateral abdomen and hepatic area. Most marked point of tenderness was at right costovertebral angle. Lungs and pleura showed no abnormalities; deep inspiration no longer painful; reflexes normal. On sitting up in bed pain was increased and he supported his weight by his hands in the way characteristic of acute spinal cases. Being asked to raise his hands said he could not do so, as back felt "too weak" to sit up unsupported. Spinal muscles were tense on both sides and the dorsolumbar spine was rigid. Tenderness over last dorsal and first lumbar vertebræ was slight in the median line but more marked over right transverse processes of same vertebræ. Reflexes were normal. On standing erect he supported his body weight by his hands placed on pelvis. On attempting to pick up an object from the floor he kept spine rigid and flexed the hips and knees in the same way as a case of acute Pott's disease. Downward pressure on head or shoulders evoked complaints of increased abdominal pain. He was returned to bed when it was observed that he had slight rhythmical alternating contraction and relaxation of his upper right abdominal muscles for the next two or three minutes, and pain was so aggravated by the various manipulations that it persisted in severe form for a full hour. Curiously enough the local pain in the spine was so

trivial in comparison to the referred pain in the upper abdomen that it was only with extreme difficulty that this intelligent patient could be convinced that the trouble was in the spine and not within the abdomen. A diagnosis of typhoid spine was made and the patient was sent to the University of Pennsylvania Hospital. Radiographs of the spine taken the following day (September 13) and on September 14 and 16 failed to show any abnormalities. He was kept at rest in bed. Pain was most marked at night and apparently was relieved somewhat by a hot-water bottle. On September 16 a plaster cast was applied from axillæ to the hips without relief of pain. Aspirin and bromides had no effect. Morphia was required for sleep. Three days of the cast had no effect on the pain, and in response to the patient's urging it was removed to enable him to reapply the hot-water bottle which he would place over the lateral wall of the abdomen and chest rather than over the spine. The urine repeatedly exhibited a trace of albumen, many hyaline and granular casts, an occasional red blood-cell, and great excess of leucocytes, but by October 1 the red cells and excessive leucocytes had disappeared from the 24-hour specimen. Examination of the blood showed 4,470,000 red cells, 9900 leucocytes and 80 per cent. hæmoglobin. The differential count gave 56 per cent. polymorphonuclears, 31 per cent. lymphocytes, 7 per cent. large mononuclears, 4 per cent. transitionals, and 1 per cent. eosinophiles.

On repeated leucocyte counts the highest number obtained was 11,100 on October 3. Widal test (September 27) was positive; Wassermann (September 25) and Von Pirquet (October 1) tests were negative. Blood cultures (October 3) were sterile. From a culture of the fæces (October 1 and October 10) a paratyphoid organism and non-motile, rod-like bacteria of the aërogenes type were isolated. Urine was examined bacteriologically but report has been lost. Nothing very suggestive was found.

His temperature the first five days after admission to the hospital varied daily between 98° and 99°, then showed an upward trend and for twelve days ranged chiefly between 99° and 101°, going down occasionally to 97.6° and up to 102°. On October 1, the day extension was applied to head and neck, the temperature reached 102°. The following day it did not go above 99.6°, and thereafter continued lower, being entirely normal or subnormal during his last month in the hospital.

On September 20 and November 22, 1913, exhaustive general examinations from the neurological stand-point were made by Dr. Wm. G. Spiller. The only deviation from the normal he could discover was a diminution in the intensity and promptness of the

right upper abdominal (epigastric) reflex at the first examination, but this defect was barely noticeable at the second.

Beginning on September 17 and continued daily thereafter for two weeks, colonic irrigations of from two to three quarts of normal saline solution were employed at the suggestion of Dr. Alfred Stengel, who had observed following this treatment prompt cessation of symptoms in a number of similar post-typhoidal cases. The irrigations seemed especially appropriate in this case because of a year's long constipated tendency, but they had no beneficial effect on symptoms and were discontinued because the manipulations attending their administration and expulsion aggravated the pain. Thereafter the constipation was corrected by paraffin oil aided by various laxatives.

From the time the patient entered the hospital he continued to have intermittent pain and intermittent rhythmical spasms of the muscles on the right side of the abdomen. The pain and rhythmical spasms might occur together or independently of one another, and either or both would be excited by movements in bed. When either or both were present they might persist for a few minutes only, or for hours at a time. Pain was particularly severe for hours continuously almost every night, partially relieved by hot-water bottle, but sleep often not obtained by anything short of opiates. The rhythmical spasms were synchronous with the pulse, were observed chiefly on the right side, and then would pull linea alba to the right. After cessation of a long continuance of the spasms the muscles would be sore as after vigorous exercise in one unaccustomed to it. Adhesive strapping and tight circular bandaging of the abdomen, applied during times cast was off, somewhat relieved the distress of the rhythmic contractions but did not stop them. During the intervals free from rhythmic contractions the muscles of the upper right abdomen were more or less rigid. Efforts at deep palpation excited an increase in the rigidity.

On September 26, X-rays were negative. Plaster cast was applied that day, but with no relief, and was removed two days later. Cast reapplied morning of September 30, under different conditions from former ones, but pain being made worse it was removed in the evening of the same day. On October 1, obtained a longer bed for patient and applied extension to head and legs, which was continued until November 5. This was promptly followed by relief of pain and spasms, and after two days they both ceased entirely for several days. On October 15 X-rays were negative. About this time a recurrence of marked pain, tenderness and rigidity in upper right abdomen without muscle spasm again raised the serious question which had already been considered frequently, as to whether or not there was an intra-abdominal or retroperitoneal abscess. The history of two previous attacks of biliary trouble, the preceding urinary findings, and the negative X-rays at this late stage of the spinal disease, all contributed to the difficulty of the situation. The right-sided symptoms, however, suddenly ceased and a day or two later mild pain, tenderness, rigidity and muscular spasms appeared on the left side for the first time. The left-sided symptoms were never severe and disappeared in a few days.

On November 5 was measured for a spinal brace, but to enable him to sit up in bed at once a plaster cast was applied. The cast proved uncomfortable and sitting up in it caused mild recurrence of right-sided pain and twitching, and it was removed on November 8. Thereafter no pain except when he turned in bed. November 15, the spinal brace applied. November 18, X-rays for first time demonstrated slight changes in the form of absorption and new bone deposit along the edges and sides of the bodies of the eleventh and twelfth thoracic vertebræ. On November 26, out of bed for first time, and on November 28 left the hospital, being then able to walk with difficulty, owing to muscular weakness. An X-ray taken December 17 showed narrowing of intervertebral space and more bone deposit. He continued to wear the spinal brace till February, 1914, when parts of it were removed, and a month later began leaving brace off part of each day, finally abandoning it altogether about May 15. In July he began light exercise and at end of August was given permission to go the limit in exercise. He was not able to regain his old-time form as a pitcher before the end of the season, but this seems more likely to have been due to his not having pitched for two seasons, during which he passed through two prolonged illnesses, rather than to any difficulty existent in the spine. He could pitch fast balls satisfactorily but did not have the usual control over his curves. As he described the situation, his pitching was of his usual calibre at the beginning of previous seasons, and with more practice he felt he would regain control as he had in previous years as the season progressed.

His last X-ray was taken on March 17, 1914, and shows absorption of the intervertebral disc with ankylosis of the eleventh and twelfth thoracic vertebræ. He had no kyphosis, no pain nor tenderness and no apparent limitation of spinal movement when last examined in August, 1914.

Case IV.—J. H., male, thirty-seven years of age; Belgian; sailor. Admitted to service of Dr. Alfred Stengel at University of Pennsylvania Hospital on September 5, 1914. Had been ill for six days. On admission, tongue coated, spleen uncertainly palpa-

ble, considerable tympanites; temperature 102° F., pulse 124, hæmoglobin 60, red blood-cells 4,090,000, white blood-cells 4800, urine a trace of albumin, hyaline and granular casts. Widal positive two days later.

On September 20 had urticarial eruption on back and right arm which left the following day. By October 30 temperature practically normal.

On November 2 complained of pain in left iliac and left sacro-iliac regions. On November 4 sacro-iliac region was strapped with adhesive plaster. On following day it was noted strapping had not relieved pain; on November 8 was still complaining of some pain and there was some tenderness over left sacro-iliac joint.

On November 10 it was noted that pain and tenderness were not constant. On November 18 X-rays of spine, sacro-iliac joints and right hip negative. On November 20 pain variable. Patient refused to sit up though encouraged to do so.

On December 3, I first saw the patient by the invitation of Dr. Stengel, who has kindly permitted me to report this case from his service.

Patient is a Belgian, at present somewhat neurotic, and, by reason of his understanding English only imperfectly, it is rather difficult to obtain accurate information from him. He complains of pain in the lower back, right sacro-iliac region, right lower abdomen and right thigh. He presents distinct localized tenderness posteriorly over the middle and lateral aspects of the third lumbar vertebra and over the right sacro-iliac joint. Anteriorly there is no midline tenderness at or above the umbilicus on deep pressure. Below the umbilicus fairly deep pressure does not cause any distress, but on making firmer pressure so that the palpating fingers finally come in contact with the body of the third lumbar vertebra the patient cries out and squirms away from the examiner's hand.

The normal lumbar curve is lost and the lumbar spine is held rigidly. Efforts at forward or lateral flexion or hyperextension cause pain. The patient turns over or sits up in bed with difficulty because of increased pain. He apparently has ample strength to handle himself readily but on moving exhibits the awkwardness characteristic of patients having an acute spinal inflammation. On sitting up with his feet over the side of the bed he persists in supporting his weight by his hands placed on the mattress. Downward pressure on his head causes pain in the midlumbar region. His knee-jerks are present and equal on the two sides.

A second set of X-ray pictures were taken with negative results. On December 8 weight extension was applied to both legs and in 48 hours all of his pains were decidedly better. On

December 9 daily colonic irrigations with normal salt solution were begun. On December 19, 1914, hæmoglobin 80 per cent., red blood-cells, 5,310,000, leucocytes 9000. Patient continued to improve. On January 2, 1915, leg extension discontinued because pain had practically disappeared, but remained in bed till January 19, when he was up in wheel chair for first time, and his fourth X-ray was negative. Sacro-iliac tenderness is gone. Lumbar spine still rigid. Lumbar curve still wanting. Has distinct tenderness over lateral aspects of third lumbar vertebra, but median tenderness nearly absent.

He is being skiagraphed each week both with expectation of showing bone changes ultimately in his lumbar spine and with intention of ascertaining at what stage organic changes sufficient to be shown by the X-ray take place.

REFERENCES

Cutler: Boston Med. and Surg. Jour., cxlvi.
Elkin and Halpenny: British Journal of Surgery, vol. i, 1913–1914.
Elmer: Trans. Acad. Surg., Philadelphia, 1912, xiv.
Fraenkel: Mitteil a. d. Grenzgebeit d. Med. u. Chir., 1903, xii.
Gaudefroy: Contribution a l'Etude des Complications Osseuses de la Fievre Typhoide, 1913, Lille.
Gibney: Trans. Orthop. Assn., 1889, ii.
Halpenny: Surg., Gyn. and Obst., December, 1909.
Osler: Johns Hopkins Hospital Reports, vol. iv, 1895, 73.
Quincke: Mitteil a. d. Grenzgebeit d. Med. u. Chir., 1898–1899, iv.
Rogers: Bost. Med. and Surg. Jour., March 6, 1913.
Rugh: Personal communication on case to be reported.
Silver: Amer. Jour. Orthop. Surg., 1907–1908, v.

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