WARREN (J. C.)

Cervical Rib, and Other Cases

BY

J. COLLINS WARREN, M.D., LL.D.

Reprinted from the Boston Medical and Surgical Journal

BOSTON
DAMRELL & UPHAM, PUBLISHERS
283 WASHINGTON STREET
1896

[Reprinted from the Boston Medical and Surgical Journal of March 12, 1896.]

A CASE OF CERVICAL RIB, WITH OPERATION.[1]

BY J. COLLINS WARREN, M.D., LL.D.,
Professor of Surgery in Harvard University.

MRS. B., thirty-five years of age, is tall and thin and has enjoyed good health. Has had two children. For a number of years has supposed she had rheumatism in her shoulder, and for two or three years much pain. The principal pain is at about the middle of the right clavicle, extending down the arm and sometimes reaching the lower end of the ulna. Of late the power of the arm seems to have diminished, and the pain has increased so that she is frequently prevented from sleeping at night.

On examination a bony tumor is observed behind the middle of the right clavicle, arising apparently from the first rib; overlying it is a large artery which at times appears to give a sensation of pulsation to the whole tumor. The outer border of the tumor is particularly sensitive, on the opposite side of the neck a similar bony prominence is felt, but it is much smaller.

A large rectangular flap was turned up, uncovering the whole region of the tumor, and after the fascia was incised a bony mass was observed upon which lay on the inside the subclavian artery and on the outside the brachial plexus. On further dissection the bony mass was found to be a rib articulating with the first rib by a facet situated a short distance behind the insertion of the scalenus anticus. The scalenus medius was inserted into the cervical rib. This rib was disarticulated and removed piecemeal, nearly up

[1] Read at the first Clinical Meeting of the Medical Board of the Massachusetts General Hospital, December 16, 1895.

to the point of its origin from the seventh cervical vertebra.

The removal of the bone seemed to relax the brachial plexus which had been somewhat stretched by the the arching position of the bone. The wound healed by first intention and the patient has experienced little or no pain since and is recovering the use of the arm.

[The patient was shown at the meeting, about two months after the operation, and expressed herself greatly relieved by the operation. The arm is steadily gaining in strength. The rib was also shown as well as several specimens of cervical rib kindly loaned by Prof. Dwight from the Warren Museum.]

Reference to the literature of this subject shows an exhaustive paper by Ehrich [2] of which the accompanying is an abstract.

Although the occurrence of cervical ribs is not uncommon, cases in which they have given rise to symptoms are exceedingly rare in literature. They are usually accidentally discovered, and possess only an anatomical and embryological interest. Gruber, at St. Petersburg, has described 76 cases; and Pilling, of Rostock, has increased the number to 139. In only three of this large number did the cervical rib give rise to symptoms. Ehrich is able to add two cases from personal knowledge, and five from literature, making ten cases.

Cervical ribs are second in frequency of recurrence to lumbar ribs. They have been found at all ages down to a six-months' embryo. They occur oftener double than single. In Pilling's cases, the proportion was 37 to 16. They always are connected with the seventh cervical vertebra. They have a costal cartilage only in those cases where they articulate with the first thoracic rib or with the sternum.

[2] Beiträge zur klinische Chirurgie, Bd. xiv, Heft 1.

The connection with the first rib is usually with the bone itself, and may be bony or fibrous. It may be connected with the cartilage, and in this event the connection is fibrous.

In the first, or rudimentary form the rib reaches no farther than the transverse process of the vertebra. In the second, or more developed form the rib extends beyond this point. In the third form the rib extends far beyond this point, even forward as far as the cartilage of the first rib, and unites by a ligament or by its end with the first rib cartilage. In the complete form the cervical rib resembles a true rib, and has a cartilage uniting with that of the first rib.

With regard to the relation of the subclavian artery to the cervical rib, the artery always runs over it when the rib is of sufficient length, otherwise the artery runs in front of it and over the first rib. In the cases where the rib has caused symptoms due to pressure in the subclavian artery and brachial plexus, it has seemed to "grow forward" onto them and cause pressure symptoms.

In all the eight cases which Ehrich has found reported, there have been present symptoms of pressure on the brachial plexus. In three cases pressure on the subclavian artery has given rise to aneurism, in the others to thrombosis somewhere in the course of the artery, and interference with nutrition has resulted.

Poland reports a case of double cervical rib in which aneurism was produced on the right, which was cured by digital compression for ninety-six hours. Poland described this as a case of abnormally high first rib, but his description leaves little doubt that he had to do with a case of double cervical rib.

Adams reports a case of double cervical rib, with aneurism of the subclavian on the left, verified by autopsy, which he described as rudimentary or deformed first ribs.

Baum reports a case similar to Poland's, in which the condition was recognized as due to a cervical rib, and the aneurism cured by compression.

Hodgson and Choper report cases in which thromboses were produced in the distribution of the subclavian, attended with a lowering of temperature, and interference with the nutrition of the arm.

Coote operated on a case in which an exostosis growing from the end of a cervical rib lifted up the subclavian so as to simulate an aneurism. Pressure symptoms were relieved by the operation.

Planet operated and resected the end of a cervical rib for symptoms due to pressure on the brachial plexus. The pleura was opened during the operation, but no harm resulted, the pneumo-thorax even disappearing. Recovery from the symptoms followed the operation.

Fischer operated upon an exactly similar case.

Ehrich's first case was that of a seventeen-year old female, for whom Madelung extirpated a cervical rib for symptoms of pressure in the brachial plexus and subclavian. The use of the arm was recovered, but pulsation never returned in the brachial.

The second case was a male, twenty-four years of age, on whom Karg operated for pressure in the subclavian and brachial plexus, and found the subclavian compressed between two ribs, which were connected with the sixth and seventh cervical vertebræ. After the operation a small aneurism of the subclavian was found. The pressure symptoms disappeared.

The symptoms produced by cervical ribs may be classified as local and functional. The second group, functional symptoms, may be also divided into two groups: (1) symptoms due to pressure on the brachial plexus, and (2) those due to pressure on the vessels.

The local symptoms are:

(1) A bulging, instead of the normal depression of the parts, just behind the posterior border of the sterno-mastoid muscle and above the clavicle.

(2) A visible and tangible superficial pulsation high up in the supraclavicular region. (This may be absent if thrombosis has taken place, or if, as often happens, the subclavian runs in front of and not over the rib.)

(3) The presence of a smooth, immovable tumor of bony hardness, in the supraclavicular region.

The functional symptoms are:

(1) Disturbance of the circulation, such as aneurism, believed to be due to the sharp bending of the subclavian, or compression symptoms, such as thrombosis, attended with pallor and coldness of the arm, perhaps gangrene of the fingers and muscular atrophy. (This may be in part due to the compression of the plexus.)

(2) Symptoms due to pressure on the brachial plexus are motor and sensory disturbances, such as pareses, severe neuralgiac pain and paresthesia, numbness, etc.

Other bony tumors in the same region, for example, existing from a first rib, may produce the same symptoms, though they are usually less marked.

The prognosis after operation is good.

Since the above paper was written, four other cases have been published.[3]

In addition to Ehrich's paper I find reference also to one by Tilmann[4] who reports the case of a seamstress, forty-four years of age, who had suffered for seven years with pain in the left side of the neck and had trifling sensation in the left arm with loss of strength and emaciation of the muscles. During the operation the left pleura was opened; but this did not

[3] Bernhardt: Berliner klin. Woch., No. 4, 1895.
[4] Deutsche Zeitschrift für Chirurgie, Bd. xli, p. 330.

interfere with convalescence. The relief from pain was marked, but four months later the muscles had still not regained their strength. Tilmann refers to the fact that in most of the cases the symptoms of pressure do not show themselves until middle life, and attributes it to the fact that the disappearance of fat with advancing years leaves the bone more prominent.

[Reprinted from the Boston Medical and Surgical Journal of April 16, 1896.]

A CASE OF FRACTURE OF THE ASTRAGALUS WITH DISLOCATION INWARD: SUCCESSFUL REDUCTION BY INCISION AND DISPLACEMENT OF TENDONS.

BY J. COLLINS WARREN, M.D., BOSTON.

THERE are two points of special interest in this case. The more important of the two was the irreducibility of the dislocation, owing to the presence of the tendons of the tibialis anticus, the flexor longus pollicis, and the flexor longus digitorum between the larger fragment, which was dislocated, and the smaller fragment, which remained in its place. The second was the successful reduction of the dislocated fragment after a free opening had been made.

C. S. K., a carpenter, forty-four years of age, fell from a "Safety" bicycle on May 22, 1891. He was riding down hill, and as he fell his right foot struck on wet, sloping ground at the side of the road, and turned outward. He was carried home, and seen soon after by Dr. Joseph W. Heath of Wakefield, who called Dr. Charles Jordan in consultation.

On examining the ankle, Dr. Jordan found the astragalus thrown inward and upward on the external malleolus, which brought the tibia directly on to the os calcis. Ether was given, and an attempt of an hour's duration was made to replace the bone, but without success.

I was asked to see the case on the following day. On examining the joint under ether, I found it possible to move the astragalus about freely beneath the

integuments and to push it beneath the articular surface of the tibia, but impossible to hold it in position. The limb having been carefully prepared for operation, a curved incision about six inches in length was made beneath the internal malleolus, and the astragalus exposed. The bone was found to be attached to the tibia by the internal lateral ligament. A small portion of the outer part of the bone had been broken off and remained in place. The line of separation appeared to be above the line of the deep canal on the inferior surface of the bone occupied by the calcaneo-astragaloid ligament. On inspection of the interior of the joint, the cause of the irreducibility became at once apparent, the flexor and tibial tendons having become hooked under the articular end of the tibia and thus placed between the fragments of the broken and dislocated bone. The tendon having been withdrawn from this position, the astragalus was replaced with ease. The tendons now seemed to act as a clamp, and to hold the fragments of the bone firmly together.

Rubber drainage-tubes were allowed to remain in the ends of the incision, as there had been some comminution of the bone and bruising of the soft parts. An aseptic dressing having been applied, the foot and leg were placed in a posterior wire splint. Some suppuration followed, but not enough to interfere with the healing of the greater portion of the wound. A sinus was left, through which a few crumbs of bone were discharged. The patient was confined to his bed for ten weeks. The sinus remained open for twelve months, but he returned to work in about six months from the time of injury. One year from the time of the accident he was able to do nearly a full day's work. A year later another small piece of bone was discharged.

He was examined for me by Dr. James S. Stone,

November 25, 1895, four and a half years after the injury, who reports as follows:

There is an elliptical scar six inches long encircling

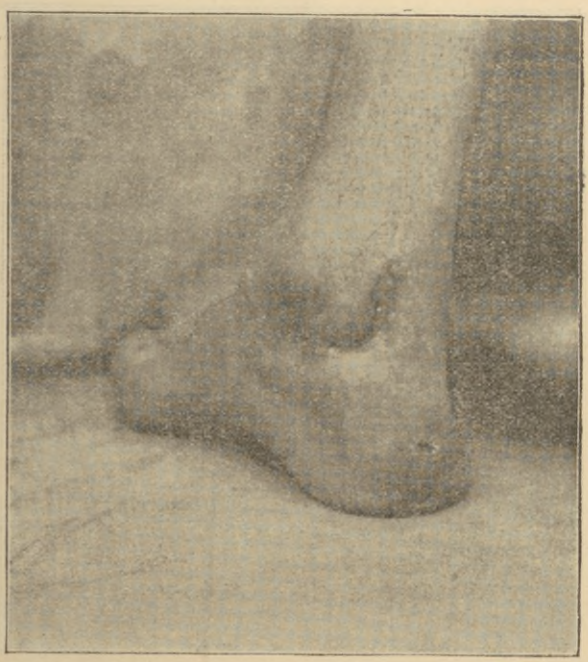

FIG. 1.

the internal malleolus (Fig. 1). The arch of the right foot is somewhat exaggerated. There is a slight condition of claw-toe. The patient walks well, except in going up and down stairs. Here, of course, the limitation

of motion in the ankle-joint is much more noticeable than in walking on level ground. There is no pain except under the ball of the foot after long standing

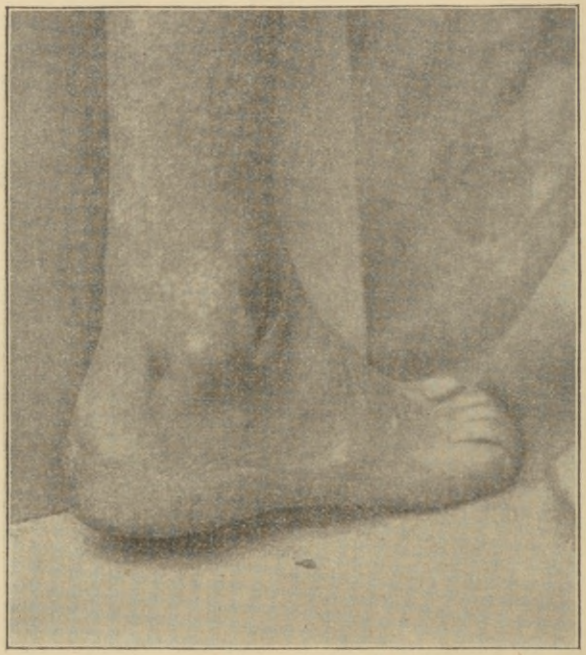

Fig. 2.

or exercise. The motion of flexion and extension is limited to about ten degrees; most of this comes through the tarsal joints rather than in the ankle-joint itself (Fig. 2). Eversion and inversion are impossible. There is a slight atrophy of the right calf

muscles, the measurements being 12½ inches on the right side and 13¾ on the left side.

The patient makes no complaint of his feet, beyond some tenderness on the soles. So far as the injured ankle is concerned, it gives him no trouble to walk. He is able to run up and down a ladder, and he walks without perceptible limp.

[Reprinted from the Boston Medical and Surgical Journal of May 7, 1896.]

PERFORATING ULCER OF THE DUODENUM.[1]

BY J. COLLINS WARREN, M.D.

THE following is the account of the previous history of the case furnished to me by Dr. G. H. Francis, of Brookline:

"W. C., age fifty-two. Family history good. Had a severe sickness when serving in the war, the nature of which was very doubtful. Six years ago, when in the Rocky Mountains, had a very sudden and violent abdominal attack, with severe pain, extreme tympanitis and very great distention and stoppage. He recovered in about six weeks. Since that time he has had frequent and sudden pains over the region of the pyloric end of the stomach. He would take a quarter-grain pill of morphine and in a few hours would be relieved. The diagnosis was neuralgia of stomach. I was called to see him at 1.30 on the morning of Friday, December 16, 1892. He had very severe pain in the region of the pyloric end of stomach without any localized tenderness. There was very marked rigidity of the abdominal muscles. After taking a subcutaneous injection of three-eighths of a grain of morphine, he had some relief and procured a few hours' sleep. In the morning there was no marked change. In the afternoon there was less rigidity, and a marked tenderness could be found at the original seat of pain. The pain

[1] Read at a meeting of the Warren Club, March 3, 1896.

seemed to have extended down and a little back. Saturday not much pain, slight distention of colon. The pain and tenderness extended down almost to the region of appendix. Sunday, pain not very severe; tenderness less marked in original seat, but easily found in region of appendix. No tumor felt. Considerable tympanites."

I was called to see the case in consultation with Dr. G. H. Francis and Dr. T. E. Francis the following morning.

On examination the principal seat of pain and tenderness was in the right hypochondrium, extending downwards towards the right iliac fossa. The temperature had ranged above 100° since the beginning of the attack, and was, on that morning, 100.5°, the same as the previous evening. The pulse was slightly, but steadily, increasing in frequency and was then 100. There had been no vomiting on the morning of my visit, but the patient had vomited after taking some drink on the previous day. The general condition of the patient appeared to be good, although there was a dark circle under the eyes. On consultation it was decided that his condition was a grave one; that the diagnosis was doubtful, but that the most probable explanation was a perforation of the appendix, and that in any event an exploratory operation should be advised. This advice being accepted, the operation was immediately performed by me, being assisted by Drs. G. H. Francis and C. L. Scudder.

An incision was first made in the region of the appendix; and, on exploration of that organ, I found it to be in a perfectly healthy condition and free in the abdominal cavity. The finger, introduced from the upper end of the incision, in the direction of the seat of greatest tenderness, brought out, when withdrawn, flakes of yellow fibrin. The incision was gradually

enlarged until it finally extended in a semicircular direction from the iliac fossa to the margin of the cartilage of the ninth rib. As the flap thus made was turned back, it became evident that the seat of the inflammation was in the neighborhood of the right hypochondrium. On reflecting back the ascending and transverse colon, a perforating ulcer of the duodenum was discovered, which formed the centre of an inflamed area, around which the adjacent coils of intestine were glued together, shutting it off partially from the general peritoneal cavity. There was no collection of pus within this area, but its walls were covered with a deposit of yellow lymph. The lacerated bowel, having been partly isolated, the opening was closed by a number of silk Lembert sutures, without any attempt to refreshen its edges.

The toilet of the peritoneum was then made as carefully as possible, the infected portions being douched out with boiled water. A drainage-tube surrounded by iodoform gauze was laid from the point of intesti nal suture to the middle of the abdominal incision giving ample vent to any fluids which might form. The rest of the external wound was united by silk sutures and a voluminous antiseptic dressing was applied. The patient recovered well from the ether and was quite comfortable Sunday night. The temperature was slightly lower the next morning, but the pulse had risen to 120. He was free from pain during the day, but complained of great thirst, vomiting constantly a brownish substance after drinking. The temperature continued to rise from that evening, and the patient continued to fail until death took place on the afternoon of the third day. There was no movement of the bowels at any time. No post-mortem examination was made, but the wound was reopened. On removing the stitches Dr. Francis found the tube

and packing lying in a canal entirely shut off from the abdominal cavity by adhesions. The lining of the canal was gray and sloughy. The edges of the hole into the intestines were sealed. One of the stitches had cut through but left no opening.

[Reprinted from the Boston Medical and Surgical Journal of May 21, 1896.]

A CASE OF TOTAL EXCISION OF THE SCAPULA FOR SARCOMA.[1]

BY J. COLLINS WARREN, M.D.

THIS case seems worthy of record, as it is the first case of excision of the entire bone performed at the hospital.

A. W., fourteen years of age, was in good health before the present disease. There is no history of similar disease in the family. Two months before entrance the patient fell on his back, hitting the right shoulder-blade. Immediately after this a soft swelling was noticed over the right scapula, which subsided somewhat under the use of liniments. When the general swelling disappeared, a hard lump was left behind which has doubled in size in the interval. He has lost flesh and strength since the appearance of the tumor and looks somewhat anemic. The entire right scapula appears to be involved in a firm elastic non-inflammatory growth (Fig. 1). The skin is normal in appearance and freely movable over the tumor. There is no pain or tenderness on pressure in the tumor, no glands are to be felt in the axilla or above the clavicle.

December 28, 1895. Total excision of the scapula, according to the Treves method, was performed. The subclavian artery was controlled by digital pressure by Dr. H. H. A. Beach. A vertical incision was made along the inner border of the scapula; and a second incision at right angles to this was made over the

[1] Read at a Clinical Meeting of the Medical Board of the Massachusetts General Hospital.

spine, beginning at the acromion process. The skin flaps having been reflected from the tumor, the tra-

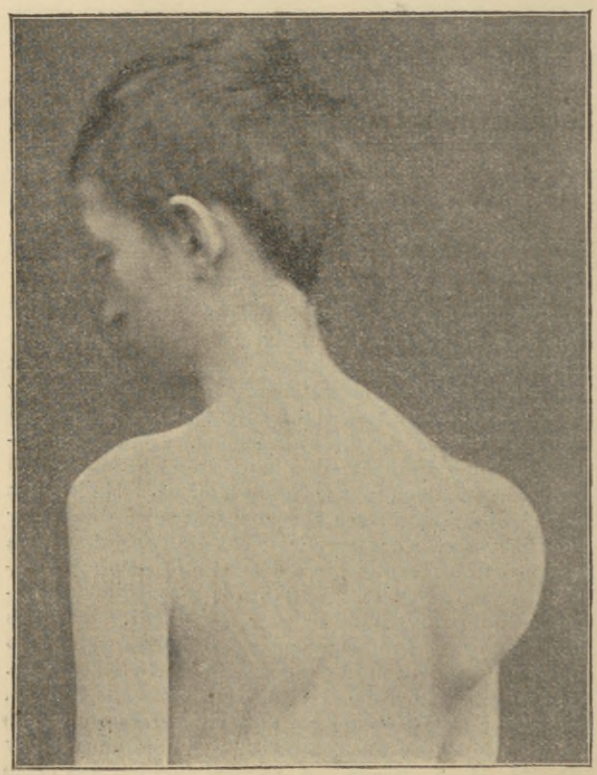

Fig. 1.

pezius was separated from the inner and superior border of the bone. The acromion process was then separated from the clavicle, and the coraco-clavicular

ligament was divided. The muscular attachments at the outer borders of the bone were next severed, and

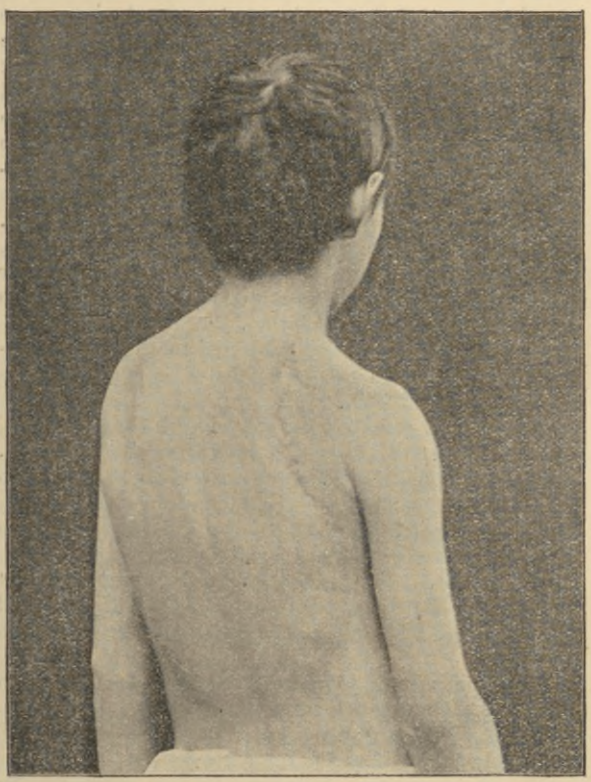

FIG. 2.

the tumor was seized and lifted upward, forward and outward. This movement brought into prominence the coracoid process, which now projected backwards.

The muscular attachments of this process being divided, the shoulder-joint was opened, the glenoid cavity liberated and the scapula removed. Two small glands at the inferior angle of the scapula were also removed. The hemorrhage was slight during the operation, about thirty vessels being tied. A thick layer of the capsule of the bursa beneath the deltoid was stitched to the periosteum at the outer end of the clavicle. The trapezius and the deltoid muscles were stitched together and all divided muscular tissues connected with the arm were attached when possible to the muscular stumps springing from the thoracic wall. The wound was united with silkworm-gut sutures, and a small gauze drain was left in for twenty-four hours in the axilla. There was little shock, and the wound healed by first intention.

The boy has since been subjected to the Coley antitoxin treatment on the principle of a post-operative treatment for sarcoma.

The patient was first inoculated with three minims, January 20, 1896, thirty-two days after the operation. After four hours the temperature rose to 101.8°. No constitutional symptoms. Eighteen hours after inoculation the temperature had reached normal again ; the pulse was scarcely affected at all.

Second inoculation, January 22d, six minims. Eight hours later the temperature was 99.8° and remained so during the 22d and 23d, striking normal again on the 24th.

Third inoculation, January 23d, eight minims. No reaction. The temperature, which at time of inoculation was 99.2°, steadily came down to subnormal, so that eight hours after the temperature was 97.2°.

Fourth inoculation, January 24th, six minims. No local or constitutional reaction. Temperature and pulse continued close to normal.

Fifth inoculation, January 27th, eight minims. Eight hours later the temperature rose to 99 8°. Slight constitutional symptoms.

Sixth inoculation, January 28th, ten minims. One hour and a half after injection the temperature began to rise, and in six hours reached 101°. Normal again in twenty hours. No constitutional disturbance. Slight local reaction, that is, redness and swelling.

Seventh inoculation, January 30th, ten minims. No reaction whatever.

Eighth inoculation, January 31st, ten minims. Eight hours later the temperature rose to 102.2° without any constitutional disturbance. Considerable local reaction. The temperature did not touch normal again until February 2d, when the last injection (ten minims) was given without reaction of any appreciable kind.

The syringe used had a glass barrel ground at the ends to hold the needle and piston collar. The plunger was of asbestos, which was heated in a flame while the other parts were boiled. The skin was prepared several hours before injection by scrubbing with ether and corrosive and dressing with a corrosive pad.

These injections were all given in the afternoon between three and five o'clock. The material used was the filtrate containing the toxic products of the streptococcus of erysipelas and the bacillus prodigiosus.

Notwithstanding this treatment two small glands appeared at the lower end of the dorsal wound about one month later. These were promptly removed and there has been no recurrence since.

The patient when last seen, on June 10th, was in excellent health and was able to use the forearm with ease, but was able to lift the elbow only a few inches from the side of the body. The contour of the shoulder (Fig. 2) is remarkably well preserved.

[Reprinted from the Boston Medical and Surgical Journal of June 25, 1896.]

A CASE OF GANGRENOUS CYSTITIS, WITH EXFOLIATION OF THE BLADDER WALL; RECOVERY.

BY J. COLLINS WARREN, M.D., LL.D.

THE following case is reported, not only on account of the great rarity of the affection, but as an illustration of the reparative power of the bladder and the bearing of the same upon surgical operations contemplating removal of a large portion of the bladder or even the entire organ.

Mrs. X., thirty-eight years of age, and of good general health, was married in 1887, but had no children. A condition of vaginismus and sensitiveness in the neighborhood of the meatus rendered coitus impossible. For the relief from this condition Dr. W. L. Richardson dilated the vagina on January 31, 1893. During convalescence from this operation it was noticed that the urine contained a certain amount of sediment and that the symptoms of vesical irritation were marked. The first sign of any irritation of the bladder was noticed by the patient in August, 1892, but had not been of sufficient severity to give rise to any complaint. After leaving St. Margaret's Hospital on February 15th, the symptoms of cystitis became more marked, and finally so severe as to oblige her to return to the hospital on February 28th.

An examination of the urine was made February 22d, with the following result: color, normal; reaction, very alkaline; specific gravity, 1.018; urophein, normal; urea, slightly diminished; chlorides, normal; indoxyl, slightly increased; uric acid, in-

creased; phosphates, increased; albumin, good trace; sugar, absent; amount and character of sediment, much. Great quantities of crystalline. Triple phosphates. Much pus, bladder epithelium and blood.

March 5th the patient complained greatly of an obstruction of the flow of urine, and on examination of the meatus a foreign substance was observed by Dr. Richardson, protruding from the urethra. On being called in consultation by Dr. Richardson, I found, on examination, what was apparently a slough, about the size of two joints of the little finger protruding from the meatus. It was decided to etherize the patient, and to make a thorough exploration of the bladder.

The patient was then placed in the lithotomy position, and traction was made with the dressing forceps upon the protruding mass, which gradually emerged from the urethra, which was greatly distended by the operation. A fresh hold was then taken with the forceps, and rolls of sloughing tissue continued to be pulled out until a membrane the size of a small pocket handkerchief had been extracted from the bladder in one continuous mass. A large quantity of pus escaped as the last corner of the slough was withdrawn from the urethra; the bladder was then washed out with an evacuator and carefully examined for stone and sloughs. Bimanual examination of the interior of the pelvis showed the uterus to be in good condition, but somewhat retroflected by an indurated mass, which occupied the region of the fundus of the bladder. No disease of the uterine appendages could be detected.

No constitutional disturbance followed this operation. There was at first complete incontinence of urine. The bladder was daily washed out with a weak solution of permanganate of potash and later boracic acid. No more slough was evacuated from

the bladder. The patient was at times able to retain small quantities of urine, but suffered from incontinence, chiefly at night. She left St. Margaret's in a greatly improved condition on May 2d.

The following is Dr. Whitney's report of his examination of the specimen :

The specimen from the bladder of Mrs. X. was a thin membrane, one side of which was relatively smooth and covered with incrustation of triple phosphate crystals. The other side was ragged and was infiltrated with opaque, greenish-yellow pus. Microscopic examination showed the membrane to be largely made up of fibrous tissue, traversed here and there by the remains of blood-vessels.

When stretched out, the membrane measured twenty by fifteen centimetres. Besides this there were several other smaller fragments.

There was no trace of an epithelial surface to be found, nor were there any muscular fibres.

Its character is similar to that of the submucosa of the bladder.

During the summer, the period between the evacuations of urine greatly increased, reaching two and one-half hours. As the patient did not, however, have full control of the bladder during the day, she was advised to wear a rubber urinal, which enabled her to go about much more than before. An examination of the bladder with the catheter in October, 1893, showed that there was a residual urine of about two ounces retained behind a bar at the neck of the bladder after efforts on the part of the patient to pass water. A report from the patient, on January 24, 1894, shows that she is able to go about as much as when in ordinary health, and has been able to dispense with the apparatus She still finds some difficulty in emptying the bladder, the urine passing in quantities of about three ounces, at intervals of a minute, until

about seven ounces in all have been passed. It seemed, therefore, that at this time the bladder had regained its power to retain urine in considerable quantity.

At the last report from the patient, October, 1895, there was no difficulty in retaining or passing urine, and her general condition was excellent. The examination of the urine showed it to be normal.

Exfoliation of the mucous membrane of the bladder may be complete or partial; it may include the submucosa and the musculur tissue, or it may only involve the epithelial layers.

It is a rare event, and, including the case under discussion, has been reported but 56 times in all literature.

The exfoliated membrane may be only a small portion of the mucous membrane alone, or the slough may consist of the entire lining of the bladder *en masse*, with or without the muscular coats. In the case reported by Morez [1] the slough included a portion of all the coats, even the peritoneum. Recovery followed. The cause of the process may be:

(1) Severe septic involvement of the submucosa from cystitis, or extension.

(2) Trauma causing extravasation of blood into the submucosa.

(3) Obstruction of the arterial supply to the mucous membrane by retention of urine, pressure of intra-pelvic tumors, pressure of a child's head or instruments during delivery, by pressure of a gravid retroflexed uterus.

The lesion is by far more common in women. Stein [2] found but five cases out of 50 in males. The

[1] Wien. med. Woch., 1877, No. 51.
[2] Journal Cutaneous and Genito-Urinary Disease, July, 1894.

45 cases in women were either due to pressure during delivery or to the pressure of an incarcerated retroflexed uterus.

In men the causes are retention of urine, stricture of the urethra, stone in the bladder, acute or chronic cystitis.

In females, though most of the previously reported cases have been due to pressure and ischemic necrosis, still intense bacterial infection of the submucosa is an effective cause, as in the case of Orlowski [3] in which the bacterial infection of the coats of the bladder took place by extension in a case of dysentery in a girl three years old; necrosis and gangrene with elimination of the gangrenous portion through the urethra, followed. Or as in the case reported by Lockhart [4] in which in a young married woman suffering from moderate cystitis, necrosis and exfoliation of the mucous membrane of the bladder followed a few days after an attempted perineorrhaphy. The membranes included portions of the mucous, fibrous and muscular coats. Recovery followed without complications. This case corresponds as closely with my case as any of the other reported cases.

Stein [5] reports a case in a man, associated with pyelitis and stone in the bladder. Microscopic examination of the exfoliated masses showed necrosis of the mucosa and submucosa.

The prognosis in men is grave, in women favorable.

Of the eight reported cases of this disease in males, two died (Southam's and Clarke's), six recovered. In Cabot's and Marchand's the exfoliated membrane was only epithelial.

Of the 46 cases occurring in women, including the

[3] Centralblatt f. Chir., November 17, 1888.
[4] Montreal Medical Journal, July, 1891.
[5] Loc. cit.

present one, only nine died. In women expulsion of the necrotic mass is much more easy than in men.

Gottschalk[6] refers to three fatal cases caused by pressure of a retroflexed gravid uterus.

Fenwick[7] showed a specimen of entire exfoliation of the mucous membrane from the bladder of a man, removed through perineal section done for relief of long-standing purulent cystitis.

Haultain (cited by Fenwick), collected 53 cases of this disease, 33 of which were associated with pregnancy, and 20 due to septic infection, etc.

One of the immediate results of the process of necrosis and elimination may be spontaneous rupture of the bladder wall.

A secondary result is the deformities caused by the cicatricial tissue in the process of repair. Any suppurative cystitis involving the submucosa cannot be cured without some contraction of the bladder.

Restoration of the sloughing structures and complete return of the normal bladder functions have been noted in many of these cases. The capacity of the urinary bladder for repair, even under the most unfavorable circumstances, is illustrated by many of these cases, notably those of Morez, Fenwick and Lockhart.

This capacity of the bladder for repair has also been demonstrated in cases of resection of a large portion for any cause.

One of the most remarkable cases illustrating the possibility of the restoration of the bladder is that of Loumeau, of Bordeaux.[8] The case was that of a woman thirty-five years of age. During an operation for the removal of adherent and suppurating uterine

[6] Archiv. f. Gynæcol., 1894, vol. xlvi.
[7] Lancet, January 27, 1894.
[8] Chirurgie des Voies Urinaires, 1893.

appendages, all of the bladder except the portion lying upon the vagina containing the orifices of the ureters, was accidentally cut away. A new bladder was formed by suturing the peritoneum to the portions still left.

This vesico-cutaneous sac was treated just as in suprapubic cystotomy. Recovery resulted, and nine months after the operation the bladder held 360 grammes of urine.

Watson refers to four cases of extirpation of the bladder, with three recoveries.

Large portions of the bladder have been successfully removed in cases of cancer of the bladder.

BIBLIOGRAPHY OF CASES.

Lever. Guy's Hospital Report, Series 2, vol. viii, 1853.
Luschka. Virchow's Archiv, Bd. vii, 1854.
Maunder. Transactions of the Pathological Society, London, vol. viii, 1862.
Martyn. Transactions of Obstetrical Society, July, 1863.
Lee. London Medical Times and Gazette, vol. ii, 1863.
Spencer-Wells. Two cases. Transactions of Pathological Society, London, vol. xv, 1864.
Hausmann. Monatschrift f. Geburts., Bd. xxxi, 1868.
Moldenhauer. Arch. f. Gynæ., vol. vi, 1869.
Brandies. Arch. f. Gynæ., vol. vii, 1870.
Schatz. Arch. f. Gynæ., 1870.
Philip. British Medical Journal, 1871.
Wardell. British Medical Journal, 1871.
Godson. British Medical Journal, 1871.
Whitehead. British Medical Journal, 1871.
Hutchinson. American Journal of Obstetrics, 1874.
Bell. Edinburgh Medical Journal, 1875.
Morez. Wien. med. Woch., Nos. 51 and 52, 1877.
Frankenhauser. Arch. f. Gynæ., 1877.
Doran. Obstetrical Transactions, London, 1881.
Jacobi. New York Medical Journal, September, 1882.
Harrison. American Journal of Obstetrics, Supplement, January, 1882.
Krukenberg. Arch. f. Gynæ., vol. xix, 1882.
Hewett. Obstetrical Transactions, London, 1883.
Aveling. Obstetrical Transactions, London, 1883.
Hurry. Edinburgh Medical Journal, May, 1884.

Pinard and Varnier. Annales de Gyn. et Obstet., 1886.
Clarke. Transactions of Pathological Society, London, vol. xxxix, 1888.
Boldt. American Journal of Obstetrics, 1888.
Haas. Munchen. med. Woch., vol. xxxvi, 1889.
Marchand by Posner. Virchow's Archiv, 1889.
Rasch. Transactions of Obstetrical Society, London, vol. xxxi, 1890.
Haultain. Edinburgh Medical Journal, vol. xxxv, 1890.
Cabot. American Journal of Medical Sciences, February, 1891.
Begouin. Arch. clin. de Bordeaux, 1892.
Lockhart. Montreal Medical Journal, vol. xx, 1892.
Southam. Two cases. Medical Chronicle, Manchester, vol. xviii, 1893.
Fenwick. Lancet, January, 1894.
Stein. Journal Cutaneous and Genito-Urinary Diseases, July, 1894.
Gottschalk. Archiv. f. Gynæ., vol. xlvi, 1894.
Orlowski. Centralblatt f. Chir., November 17, 1888.