TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, April 2, 1900.

The President, DE FOREST WILLARD, M.D., in the Chair.

PYOPNEUMOTHORAX WITH GREENSTICK FRACTURE OF THE RIBS.

DR. FRANCIS F. STEWART related the following case, occurring in Dr. Hopkins's service at the Pennsylvania Hospital, of incomplete fracture of the fifth and sixth ribs, complicated by pneumothorax, and terminating in death from croupous pneumonia of the opposite side ninety days after the original injury.

A boy, aged six years, was admitted to the hospital immediately after having been struck by the wheel of a coal-cart. The surface was cold and sweaty, the temperature being 97° F., the pupils dilated, the pulse weak and rapid, 144 to the minute, and the respiration 30 and jerky. Great pain and tenderness were complained of all over the left chest, which did not respond to inspiratory efforts. Fracture of the ribs could not be demonstrated. There was neither spitting of blood nor emphysema. The chest was immobilized with adhesive plaster, stimulants administered, and external heat applied. The temperature subsequently rose and fluctuated between 102° and 104° for thirty-three days, when it reached the normal point. The pulse undulated with the temperature. The respirations were embarrassed and averaged 40 to the minute until the chest was opened, when they subsided to the normal. The urine contained a trace of albumen and a few granular casts.

At the end of twenty-four hours the whole left chest was distended with air, the cardiac apex being displaced to the fifth right interspace. Dyspnœa with a short, unproductive cough was noted.

On the fifth day, the conditions not having improved, about four quarts of air and four and one-half ounces of bloody serum were aspirated from the seventh interspace, midaxillary line. Considerable emphysema of the chest wall followed the withdrawal of the needle. This persisted for three days.

On the twelfth day a pneumonia of the right apex developed.

The improvement following the primary aspiration was of short duration, the distention returning and increasing until the thirty-first day, when the heart pulsations could be felt at a point two inches to the right of the sternum. The chest was again aspirated, a large quantity of air with a few drachms of pus being withdrawn.

On the thirty-third day, the signs and symptoms persisting, a rubber tube was introduced through an incision in the sixth interspace, postaxillary line, and about eight ounces of pus and much air evacuated. The temperature immediately fell to normal, the respirations became quiet, and the boy grew progressively

Incomplete fracture of rib.

better until the seventy-sixth day, when he was discharged, the wound having closed, the heart returned to the normal site, and the pulmonary resonance and breath sounds having approximated the normal.

Nine days later he was re-admitted with a fully developed croupous pneumonia of the lower right lobe. He died four days later, on the fifth day of the pneumonic process, and ninety days after the original injury.

The post-mortem disclosed a red hepatization of the lower right lung. The left lung was collapsed, about one-fourth the size of the right lung, and lay in the upper part of the thorax close to the vertebral column. It was dark in color and almost airless, the splenization of the pathologists. The remaining portion of the pleural cavity was filled with air contained in large balloon-like sacs made of lymph. The fifth and sixth ribs were firmly glued together by soft callus and were identical in appearance,

in each the internal bony cortex had given way in the postaxillary line. The fifth rib was resected for closer examination. Nothing worthy of note was discovered in the other organs.

The rarity of partial fractures of the ribs, especially in children, is questioned by many authors, but few have had the opportunity to demonstrate it by autopsy. The "International Encyclopædia of Surgery" mentions a child who, dying of ruptured lung, was found to have sustained a greenstick fracture of two or three ribs on each side. Rib fracture is uncommon in childhood owing to the great elasticity of the thoracic cage, but when it does occur, one would think the conditions ideal for an incomplete fracture. The diagnosis would be almost impossible to make, crepitus, deformity, and preternatural mobility being absent. Costal fracture was believed to have occurred in this case, but its situation could not be localized, although each rib was carefully palpated and an X-ray plate made. The specimen shows the break filled by soft callus, the lower edge and the lower half of the internal plate having yielded as a result of the direct force of the impinging cart-wheel.

Pneumothorax must be a very infrequent complication of fractured ribs even when the lung is punctured. This is the only case in 175 of which we have knowledge. West has proven experimentally that there is a strong coherence between the pleural laminæ, not accounted for by the elasticity of the lung, and which is adequate to hold them in contact even though the pleural sac be opened. The lung is also often held to the chest wall by adhesions. Panas asserts that 25 per cent. of all adults have pleural adhesions.

The mechanism of the production of the pneumothorax is not quite clear. Puncture of the lung by the ribs would have probably caused an external emphysema, unless the intercostal structures remained intact. It is not inconceivable that it should have been due to a rupture of the air-vesicles, the result of a sudden severe blow dealt the chest when the lung was hyperdistended, as at the end of a deep inspiration preparatory to a cry of fright. Osler mentions a case which followed heavy lifting.

Air may enter the pleural sac through the chest wall or from a tracheotomy wound, causing a mediastinal emphysema and ultimately a pneumothorax. Money has observed two such cases in twenty-three tracheotomies, and lays down the rule that

the deep fascia should never be raised from the windpipe. It may come from the colon, stomach, or œsophagus, as a result of suppurative or malignant disease. It may be produced by ærogenetic micro-organisms in a suppurative pleurisy. And it may emanate from the lung either from intrinsic disease or from external disease or trauma. Ninety per cent. of all the cases are due to phthisis.

Concerning the diagnosis, the Röntgen ray will contribute, in doubtful cases, to reaching a conclusion, an intense clearness being produced over the air-sac.

The treatment should be the same in all cases, be the cause what it may. So long as respiration is unimpeded, operative interference may be ignored; indeed, a little pneumothorax may be a good thing, giving rest to the affected lung; but if breathing be difficult and the organs displaced, an external opening must be made. Rose reports striking improvement in eight cases of phthisis in which rib resection was practised. He holds that mere aspiration is of little value.

The pneumothorax in this case was severe, was unrelieved by repeated aspiration, and was finally overcome by the introduction of a tube into the chest. The subsequent history would seem to indicate that a free opening at first would have relieved the pressure symptoms permanently, even though it did not permit the expansion of the collapsed lung, which might have been accomplished by respiratory exercises and mechanical means later, when the lung wound had closed. It would be a nice point in surgical judgment to determine just how soon measures for the re-expansion of the lung should be inaugurated. If adopted too early the rent in the lung would be sundered, and the very condition one sought to alleviate would be aggravated. If employed too late, the efforts would be futile, the lung being bound by firm adhesions, the vesicular walls coalesced, and new connective tissue permeating in every direction.

In case of stab wound of the chest, Dr. Hopkins resorted to an ingenious plan of expanding the lung and preventing the further entrance of air into the thorax. A small rubber tube was introduced into the pleural sac, the wound snugly sutured about it, and the joint made air-tight by rubber tissue and collodion. The air was then slowly exhausted and the tube occluded. In this case there was no leakage from the lung. In a persistent pul-

monary leak, however, each expiration lends a puff of air to the general distention, so that an external vent must be established and maintained, unless the lung wound be large and accessible, when it may be sutured, otherwise it must be left to itself, be hæmorrhage not imperative.

Once the pneumonic wound has healed, a total exclusion of the entrance of air through the operative wound should favor a more satisfactory result. Dr. Hopkins has suggested and used in a case of pyopneumothorax a glass tube containing in its outer end a puppet-valve which allows air and pus to escape during cough and deep inspiration, but precludes the entrance of any air from the exterior. The siphon apparatus, invented by a Buffalo dentist and described by Keen, might be employed in these cases if the joint between the skin and the tube be made air-tight. The principle is the same as that of the mercury pump.

The Fell O'Dwyer apparatus for artificial respiration has been suggested to anticipate and combat acute operative pneumothorax. It consists of an intubation set with attached bellows.

Dr. Harte said that he was inclined to think that greenstick fracture of the rib is of much more common occurrence, particularly in children, than is generally considered. He had seen cases where the side had been crushed in and had had an opportunity to examine the patients post-mortem where this condition of affairs was evident. He believed that many injuries to the ribs in children are of the greenstick variety. Yet all recognize how difficult it is to make a positive diagnosis in these cases, owing to the anatomical difficulties which exist and the surrounding of the injured rib by one above and below it, which naturally act as splints or supports; consequently, crepitus and preternatural mobility are impossible to determine. Fortunately, the treatment in all instances is the same, and as a rule the results are most satisfactory.

With regard to the pneumothorax very little has been written, and then the subject is usually dismissed by writers in a very few lines. On the other hand, he thought that pneumothorax is not a very serious condition. Air in the thorax at any time, as a rule, will soon disappear. This condition occurs very frequently in fracture of the ribs, and rarely gives a surgeon any concern. Many mechanical devices for the relief of pneumothorax he considered as nothing more than surgical toys and of no practical

advantage. Exhausting the air from the pleural cavity will not facilitate the closure of the wound in the pulmonary pleura. On the other hand, it really makes the conditions more favorable for the escape of air from the lung into the pleura, by reducing the air-pressure in the pleura and allowing the escape of air from the lung into the partial vacuum in the pleura, tending to keep up a constant flow of air at all times from the lung into the pleura. The experience of surgeons in empyemas, where a large opening has been made into the pleural cavity, has been usually most favorable, and the presence of air in the pleural cavity does not in any way militate against the lung's expanding. In cases where there is evidence of intrapleural pressure, he would advise opening the chest wall and treating it as though it were a case of empyema.

Dr. Le Conte said that he saw this case probably at its worst. The pressure from the pneumothorax was sufficient to push the heart over to the right side, so that the apex beat was almost in the region of the right nipple. When such a condition exists as a result of fluid in the pleural cavity, no one would hesitate to open the pleura and insert a drainage tube or resect a portion of rib. It is not the fluid but the pressure from the fluid that causes the alarming symptoms. If, therefore, air in the pleural sac causes alarming pressure symptoms, why should one not apply the same rule, *i.e.*, relieve the pressure and allow the lung to collapse by opening the pleura. As a result of the pneumothorax this child later developed a pyothorax, and it necessitated opening the pleura with drainage, and the moment the pleura was opened the child began to improve.

ACUTE CHOLECYSTITIS COMPLICATING TYPHOID FEVER.

Dr. Thomas R. Neilson reported the case of a man, aged forty-two years, who, on the evening of May 14, the fifty-eighth day after admission with typhoid fever which had pursued a mild course, but had relapsed, and was then apparently proceeding to convalescence, complained of a sharp pain, which he located in the epigastric region, and which, he said, followed immediately after he had reached to a small table, close by the right side of his bed, for a glass of water. At the time when he complained first

of this pain, the temperature was 99 1/5° F., the pulse 82, the respiration 20. The bowels had been freely moved that day, and the tongue was clean. The pain was considerably relieved by simple measures (soda mint, etc.). The next day, however, the pain was still present, although not severe, being referred to the same region, and there was no change in the pulse or temperature. By the morning of the following day the pain was somewhat more marked, the temperature was 100°, the pulse 96, respiration 24. Examination of the abdomen again failed to elicit any marked tenderness in any part of it. Through the day the pain continued, tending to be paroxysmal, and being referred, but quite indefinitely, to the right hypochondriac region, although the patient also complained of it at times in the lower portion of the abdomen. The evening temperature was 99 1/5°, the pulse-rate had increased to 104, and the respiration was the same as in the morning.

The next morning, May 17, the patient vomited what was evidently bile; the temperature rose to 102 3/5°, the pulse to 120, and the respiration to 28. The abdomen was slightly tympanitic, pain in the region before described persisted, and was intense at times, and on palpation he found some tenderness close to the costal border, in the region of the gall-bladder. There was nausea at intervals, and eructations, and considerable flatus passed by the bowel. The condition of the patient grew worse through the day, his temperature in the afternoon rising to 103 4/5°, and the pulse to 130, with poor volume. Pain was more severe and vomiting again occurred in the evening. The general condition was far from promising; nausea was unrelieved by treatment, and, besides that, hiccough was added to the already distressing state.

Early the following morning a chill occurred, and after that there was vomiting again. The temperature was then 103°, and by eight o'clock it was 104°. Examination of the abdomen revealed its condition to be as on the day previous,—slight distention, some tenderness in the region of the gall-bladder, but not of a marked degree. There was, in addition, some muscular rigidity in the right upper quadrant, and some elastic resistance near the costal margin at the ninth and tenth ribs could be detected. There was hyperleucocytosis, the count being 12,350. The patient was in a condition of extreme anxiety and depression, and although the outlook was not promising,—the temperature at noon being 103 2/5° and the pulse 136,—operation was advised and

agreed to. Immediately, as soon as the necessary preparations could be made, the abdomen was opened.

On opening the peritoneum, the gall-bladder, the surface of which was dark-red and dull in appearance, presented in the wound. It was distended, and on breaking away numerous light and recent adhesions which had formed between it and the surrounding viscera—especially the transverse colon—it was found to be markedly lengthened upward and inward. When the gall-bladder was incised, there first flowed out a thin, watery mucus, then bile and mucus, and last of all a fluid more viscid and unmistakably pus. The walls of the gall-bladder were thickened, soft, and friable, and were deeply congested, bleeding easily when punctured and incised.

Evacuation having been accomplished, fresh iodoform gauze was substituted for that first packed around the gall-bladder, a rubber drainage tube inserted into the latter, and the margins of the opening made in the fundus were secured by silk stitches to the parietal peritoneum at the upper angle of the wound, which latter was, for the remainder of its extent, closed with silkworm-gut sutures. A copious dressing of sterile gauze was applied.

The patient bore the operation well, and was none the worse for the ether, which was most carefully given. There was little, if any, shock. The temperature fell to 100 3/5° F., and three hours later to 99 3/5°, accompanied, however, by a fall in the pulse-rate from 138 to 124. By six in the evening the temperature rose again, reaching 102 3/5°, but after that it slowly fell, remaining for the greater part of the next forty-eight hours between 99° to 100°, the respiration ranging from 20 to 26, and the pulse from 122 to 140.

The patient experienced but little relief from the operation,—none besides freedom from the severe pain which he previously had. Hiccough and nausea, particularly the former, were most obstinate and became very distressing. The abdomen was not tender, save, of course, in the region of the wound, nor was it markedly distended; but the accumulation of gas in the intestines was an annoying feature. The bowels were moved with difficulty by means of calomel and enemata.

The patient got but little rest on account of the persistent hiccough, which yielded but for short intervals to varying medication. Vomiting occurred several times, but the patient was

able, for a considerable number of hours, to take small amounts of liquid nourishment. Rectal alimentation was, of course, resorted to in addition. From the wound there was a free discharge of bile, requiring many gauze pads to absorb it, besides the gentle changing of the dressing.

On the afternoon of May 20, the beginning of the third day after the operation, the patient vomited freely, and his condition became emphatically worse. Tympanitis increased, hiccough became more violent and constant, nausea more persistent, the temperature rose to $100^{3}/_{5}$° F., the pulse grew weaker, although no more frequent, and a low delirium developed. In short, the picture of septic peritonitis was complete. Death occurred at 4.30 on the following morning.

Dr. Gibbon remarked that about a year ago he operated for empyema of the gall-bladder following typhoid fever. It was a young girl who had been in the wards of the Pennsylvania Hospital, suffering from a typical attack of typhoid fever. She had been at home for about ten days when she returned to the hospital, saying that she had been taken sick with a pain under her right costal border, and her mother the day before discovered a tumor in this position. She had some fever. The tumor was very easily outlined in the gall-bladder region, and there was very little rigidity of the abdominal muscles at the time. There was no general distention, but the symptoms were acute; the woman had fever, and the operation seemed to be urgent. When the abdomen was opened the gall-bladder came into view very much distended, and there was at first a copious discharge of mucus and then pus. This girl got well without any trouble. The sinus closed entirely. He looked up her history in the medical ward afterwards and found that several times during her typhoid fever she complained of pain in the region of the gall-bladder. Once or twice at night she was given morphine for this pain. Each time it went away, and the pain complained of on readmission was, the patient said, in the position and of the same character as that which she had when ill with typhoid fever.

Dr. Harte remarked that as a rule the operation for cholecystitis immediately following typhoid fever is not a favorable operation, as the patient's condition necessarily is always very much below par. He had had an opportunity to operate on two cases of cholecystitis following typhoid fever, but in both of these

instances the patient had quite thoroughly recovered from the typhoidal attack, and consequently was well able to withstand the result of the surgical operation. Both of these cases did perfectly well and made very satisfactory recoveries. Attention had been called to the fact that the first fluid to escape from the gall-bladder of Dr. Neilson's case was serous in nature. His experience is that that is nearly always the case in these conditions. The first fluid is usually serous in character, then sometimes serum stained with bile, and then, lastly, the pus is usually found down at the bottom of the gall-bladder, often accompanied with masses of calculi which it surrounds. This condition of affairs, of course, is entirely dependent on the effect of gravitation, and of course the relative positions will be influenced by the position the patient has assumed prior to the operation.

NEPHROLITHIASIS.

Dr. John B. Deaver reported the case of a man, thirty-three years of age, who for two and a half years had complained of an aching pain in the back, which increased on motion, but was relieved by rest. The pain radiated from the anterior superior spine of the ilium, through the groin to the left testicle and across the back. The pain was intense at times. No tenderness over the region of the left kidney. Micturition was unattended by burning or pain except when a catheter was used. There was a time when the patient was compelled to rise two or more times at night to evacuate his bladder. When constipated, or when tympanitic distention existed, the pain was exaggerated. He never suffered from nausea or vomiting during the acute exacerbations. An X-ray taken a week before admission to the hospital revealed the presence of a stone in the left kidney, also a second shadow about which there was some doubt. July 19, 1899, a vertical incision about three inches long was made in the left loin over the kidney and the organ exposed. A stone was felt in pelvis of the kidney, a cyst containing blood was discovered in the upper part of the organ. The pelvis was incised and the stone removed. The cyst was evacuated, the two incisions closed with silk sutures. The wound was packed and allowed to heal by granulation. Cure resulted.

MOVABLE KIDNEY AND HYDRONEPHROSIS.

Dr. Deaver also reported the case of a woman, aged twenty-one years, who was first attacked with dull aching pain in the left loin in November, 1896, since which time she has had numerous attacks of this pain, at times associated with nausea and vomiting. Immediately following the attacks of pain blood would appear in the urine, but an X-ray examination was negative. December 14, 1899, a vertical incision, three inches long, was made in the loin over the left kidney. The perirenal fat was dissected away and the kidney exposed. On examination, the pelvis of the ureter and the first part of the ureter were found to be dilated to the size of a small lemon. There was no stone present. The dilated portion of the pelvis and of the ureter was incised in the long axis of the ureter and clear fluid evacuated. The surplus portion of ureter was cut away and the wound sutured. The kidney was explored for stone, but none found. The surface of the kidney was scarified and the organ anchored in the wound with gauze. The patient made a satisfactory recovery.

A second case of movable kidney was in the person of a man, aged twenty-four years, who, after convalescing from an operation for chronic appendicitis, returned to the hospital to obtain relief from pain in the left renal region from which he had suffered intermittently for several years. The patient can only recall the pain, and say that it was excruciating, and that it did not extend into the penis or along the course of the ureter.

The second severe attack of pain, referred to left renal region, occurred while the patient was convalescing from his operation for appendicitis, and had the characteristics of kidney colic; the pain was referred down the course of the ureter and into the testicle of the corresponding side. This attack was not accompanied by nausea or vomiting, nor was the urinary examination attended by any positive results. The pain persisted, and shortly after the onset urination was attended by pain. Urinary examination, also X-ray examination negative. A vertical incision of three inches was made in the loin, commencing at the border of the twelfth rib at the postaxillary line, on the left side, the perirenal fat was broken through, when it was discovered that the kidney held a lower plane than normal. The kidney was brought into the wound and explored with a negative result. The kidney was anchored in the wound with gauze. The wound was packed with sterile gauze after the method of treating movable kidney. Recovery followed.

NEPHRECTOMY FOR HYDRONEPHROSIS.

Dr. Deaver further reported the case of a man, thirty-eight years of age, who from early boyhood had suffered from paroxysmal attacks of pain in the right side, referred along the right ureter. During these attacks had a desire to urinate immediately, the pain ceasing at the end of micturition. When surrounding circumstances prevented micturition, he would strike his right side sharply; this relieved the pain to some extent. These attacks would take place either several times a day, or at intervals of one or two months. The quantity of urine passed varied from one-half ounce to twenty ounces.

This condition continued until four years ago, when he noticed a swelling in the right loin of about the size of an apple, accompanied by a sharp pain. In three or four days the tumor partially disappeared. Then for several years the tumor slowly increased in size until again about the size when first noticed. One year ago he had an attack of jaundice lasting three or four months, and since this time the tumor has been growing rapidly until it occupies the right hypochondriac, the right lumbar, the right iliac, and the umbilical regions.

The urine was frequently examined and always pronounced normal. His appetite is always good; he has not lost weight.

A blood examination showed hæmoglobin, 65 per cent.; red corpuscles, 4,500,000; leucocytes, 4,000,000; so it was practically normal blood. Believing the kidney to be in the condition of a hydronephrosis, an operation was done by the extraperitoneal route. This operation was particularly easy, from the fact that it was a large cystic organ. The cyst was exposed and aspirated; that reduced it. There was one common cyst, consequently there was no trouble in evacuating, after which the remaining part of the operation was very simple. It was terminated by suturing the wound and anchoring the ureter, after tying the distal end. This patient has recovered without a bad symptom.

The specimen consists of a mass of tissue, kidney shaped, fifteen by six centimetres in size, which is attached to the walls of an apparent cyst. The walls of the cyst are about five milli-

metres thick and are in direct contact with the remains of the kidney proper.

The interior of the kidney is in direct communication with the cyst cavity and forms part of the side of the cyst. The interior of the kidney has practically disappeared, and the stroma has changed so as to form several incomplete compartments, all in contact with main cyst cavity and opening into it.

The walls of the kidney proper are ten millimetres thick.

MALPOSITION OF KIDNEY.

Dr. John H. Gibbon spoke of a case of malposition of the kidney which he had recently seen in the dissecting-room. The organ, which was of normal size, was more or less firmly attached in the left iliac fossa, receiving its blood supply by a very short vessel from the external iliac, and having a correspondingly short ureter. The fact that the kidney was fixed in this position, together with the length of the renal artery and the ureter, shows that the kidney had always occupied the iliac fossa; this anomaly suggests the necessity of always palpating the kidney before making an incision to reach it. One can readily imagine the varied complications of diagnosis which a diseased kidney so placed might give rise to, and such complications would be greatly increased if the right kidney should be so anomalously situated.