tory of syphilis excludes this as a cause of the condition; and the changes present do not resemble those found in the red atrophy of liver of British authors. In classifying the case, however, one must take into consideration the clinical symptoms as well as the anatomical changes. These symptoms afford a marked contrast to those of hobnailed cirrhosis; there was no alcoholic taint, no ascites, no enlargement of spleen, nor dilatation of abdominal veins. On the other hand, jaundice was present to a degree most unusual in ordinary cirrhosis, and death took place with symptoms of malignant jaundice. The hæmorrhages which occurred late in the case may reasonably be attributed to the profound blood changes then present, and not as in hobnailed cirrhosis, to obstruction to the blood flow through the portal system. Both on clinical and anatomical grounds, then, the case corresponds to hypertrophic or biliary cirrhosis, "*cirrhose hypertrophique avec ictère*" of the French, except that there was no hypertrophy, but instead atrophy of liver. Whether there had been hypertrophy at some time in the period of fifteen months during which jaundice and other symptoms were present, it is impossible to say; the patient frequently complained in the earlier stages of pains in the hepatic region; pain is more commonly present in enlargement than in contraction of the liver, and so far as this symptom goes it is in favour of an antecedent hypertrophy. With regard to this point, I may here quote a case of Murchison's³ which strongly resembles my patient's. The patient was a girl, aged 12. At the age of 6, she contracted a severe chill from sea bathing; her illness began four years later with jaundice; the liver at that time "reached down almost to the pubes;" later on it was not enlarged. There was at this time slight jaundice and enlargement of the spleen, but no ascites. She died after two years' illness, with symptoms of acute yellow atrophy. At the necropsy, the liver was small and rounded, puckered and irregular on the surface, and weighed only 16 ounces. Comparing this case with that of my patient, there is close correspondence as regards long duration of symptoms, termination by icterus gravis, and *post-mortem* changes. In the former there was great enlargement of the liver at one stage of the illness, and this affords some ground for supposing that enlargement of the liver was the cause of the pain from which M. C. suffered.

The question here arises as to whether "hypertrophic" as a distinguishing term for this form of cirrhosis is not a misnomer, as hypertrophy is not a constant feature of the disease. The size of the liver varies much in individual instances of all kinds of cirrhosis, and it is doubtful whether it is desirable to make hypertrophy an essential characteristic of one variety. On referring to the literature of hypertrophic cirrhosis, I find that nearly all the textbooks describe it as being attended with great increase in the size of the liver, but that they are silent as to subsequent changes in the direction of atrophy that may ensue in cases where life is prolonged beyond the usual period in this disease. Strümpell, however, states "that too much stress has been laid upon this point. If in many cases of hypertrophic cirrhosis the liver has remained large to the end, this is probably in part due to an early death, before there was opportunity for much shrinkage. Cases that lasted longer have presented a contracted liver."⁴ He does not, however, give any references to such cases, and after careful search I can only find accounts of two cases that correspond to the one above reported. One is given by Dr. West;⁵ the patient was a boy, aged 2; the final illness lasted nearly four weeks; the diagnosis during life was acute yellow atrophy; he had had a severe scald of the abdomen four months previously, from which the illness may have dated. The liver was thought to be enlarged a few days before death, but at the necropsy it is stated to be small in size; the weight is not given. Both naked-eye and microscopical appearances exactly tally with those found in my patient; there was here also cloudy swelling of the renal cortex; it would be interesting to know if this is a constant change in such cases. The other case is the one of Murchison's already referred to, and which Dr. West also cites.

These instances, I think, show that if the term "hypertrophic" is applied to this form of cirrhosis, it is well to bear in mind that hypertrophy is not necessarily present in all stages of the disease, and possibly may not occur at all in some cases, at any rate to a degree capable of clinical recognition. This point is not without its practical bearing, for if in a case of atrophy of liver with jaundice the diagnosis was satisfactorily made of intracellular (hyper-

trophic) cirrhosis, the prognosis with regard to immediate danger to life would be more grave than if the alternative lesion, hobnailed cirrhosis with jaundice, were present, for if in the former case atrophy of the liver has occurred to a sufficient extent to be recognised clinically, the symptoms of icterus gravis may at any time supervene, and speedily prove fatal.

The termination by icterus gravis seems to be characteristic of the course of the disease; the distinction from acute yellow atrophy and phosphorus poisoning, in which the same symptoms are present, lies in the fact that in those maladies these symptoms come on in persons in whom there is no evidence of previous liver disease, while in hypertrophic cirrhosis there is a history of jaundice for some time before their onset. The symptoms of jaundice, etc., in the early stages are probably caused by reabsorption of bile from obstruction to its flow, owing to the changes in the minute biliary passages. As the disease progresses, partly from irritation by the retained bile, partly from the increasing atrophy of the hepatic cells, both the final stages of the manufacture of bile by the liver are imperfectly performed, and also the nitrogenous tissue waste fails to be completely converted by it into a form fit for elimination by the kidneys. So long as the kidneys act well grave symptoms may not arise, but after a time the continued passage through the renal circulation of abnormal (toxic) material irritates the renal epithelium, and elimination by these organs becomes more and more faulty.

In this way the cloudy swelling of the epithelium of the convoluted tubes may be supposed to be originated. Finally, renal excretion is reduced to a minimum, the toxic products arising from reabsorption of bile, from mal-dissimilation of nitrogenous tissue waste by the liver, and non-elimination of it by the kidney, accumulate in the blood, and death takes place from the poisonous action of these upon the central nervous system.

THE RELATIONS OF SUBDIAPHRAGMATIC ABSCESS TO THE THORACIC VISCERA; WITH THREE ILLUSTRATIVE CASES.

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THE separation of the thoracic from the abdominal viscera by means of the diaphragm is incomplete or imperfect at two points: Anteriorly, between the margins of the muscular fibres arising from the ensiform cartilage and the adjoining costal cartilages, the fibres of the diaphragm are scanty or altogether wanting, and the space is filled with connective tissue having in relation with its superior or thoracic aspect the pleura, and with its inferior or abdominal surface the peritoneum. It is at this point, therefore, that we meet with phrenic or diaphragmatic hernia, and it is by this channel that occasionally pus will find its way from the mediastinum to the abdomen or the reverse direction. In 115 cases of suppurative mediastinal disease collected by Hare, three were of this character; in one the pus made its way upward from the abdomen, in two it burrowed downward into an adherent liver.

Posteriorly, the arch of the internal ligament affording passage for the great psoas muscle affords another channel for the passage of fluids upwards or downwards. On its upper surface the diaphragm is in contact with three serous membranes, the bases of the pleura on either side and in the middle, covering the tendinous centre, the pericardium. On its lower surface is found a portion of the general parietal peritoneum.

The viscera in relation with it are the bases of the two lungs and the heart above; the liver, spleen, and both kidneys (particularly the left) beneath; the large end of the stomach is also in contact with it. As a result of these relations it is by no means uncommon to find suppurative disease traversing these boundaries either by means of the weak points already described or by setting up adhesive inflammation followed by perforation. Circumscribed peritoneal abscesses frequently occupy the right and left hypochondria, and Dr. Fagge has described¹ sixteen cases of this sort. In one of them the abscess was on the convex surface of the left lobe of the liver, and there was a perforation through the diaphragm leading into the left pleural cavity. In a very

³ Diseases of Liver, Case CLXXIX.

⁴ Textbook of Medicine, p. 454.

⁵ St. Bartholomew's Hospital Reports, vol. xliii, p. 224.

¹ Guy's Hospital Reports, vol. 19, p. 213.

large proportion of hypochondrial abscesses, according to Morris,² the corresponding side of the thorax becomes affected; pleurisy, pneumonia, pleuritic effusion or empyema result, and the case is very likely to be mistaken for one of chronic pulmonary disease, whilst the abdominal abscess is overlooked. Pericarditis may be caused in the same way, though this is much rarer, and for the obvious reason that the opportunity for the spread of inflammation to this membrane by contiguity is less in direct proportion to the extent of surface involved as compared with the pleuræ.

I have recently seen in London a fellow countryman, now under the care of Mr. E. W. Roughton, on account of a condition which is unquestionably the result of the extension of suppurative hepatic disease, through or behind the diaphragm. The following brief sketch of the clinical history of the case will I think make this manifest.

On January 12, the patient, a robust young man who was travelling in the East, was taken ill; at first with vague symptoms of cold and fever, but afterward with unmistakable signs of hepatic abscess, which on February 1st was opened anteriorly by incision just below the costal margin, discharging eleven ounces of pus.

Three weeks later the temperature suddenly rose, and there were evidences of effusion at the base of the right chest.

On March 2nd the aspirating needle was used and nothing found, and the same result followed several other attempts, but on March 16th a pint and a half of serum was withdrawn by aspiration, and on March 25th a similar quantity.

On April 13th he reached England. After two days' tappings of the chest, pus was found in the mid-axillary line on the level of the fifth and sixth rib. About an inch of the rib was then removed, and the wound thus made has since been kept open.

About May 18th, there were symptoms of the development of a pulmonary abscess, rise of temperature, unpleasant taste in the mouth, decomposition and fœtor of the discharge, foul breath, etc.

On June 12th, he having been seen by Mr. Godlee, the original wound was enlarged and a portion of the rib next below was removed. A sinus was found running in the direction of the nipple, and thought to lead into the lung. The channel of communication, if there be one, as seems probable, between the pleural and hepatic (or subdiaphragmatic) abscess cavities was not discovered, nor was it quite certain in the minds of the operators whether in their digital exploration they were above or below the diaphragm—an uncertainty easily understood by anyone who has operated in similar cases.

The patient has since been receiving tonic and supporting treatment, and is having antiseptic irrigation of the cavity. His general condition is good, but there is a tendency to hectic, and evidence of imperfect drainage.

The case, in my opinion, undoubtedly belongs among those which I am describing.

Perinephritic abscesses are even more likely than these associated with the liver or spleen to be followed by thoracic symptoms, as has been recognised since Bowditch, in 1870, called attention to the importance of early operation in such conditions.

The following case is of interest in this connection, though no direct patulous communication between the large lumbar collection and the fatal pericardial disease was demonstrated:—

A man, 39 years of age, was admitted to the medical wards of the Philadelphia Hospital in December, 1888, complaining of loss of appetite, flesh, and strength, pain in the epigastrium, vomiting after meals, etc. His urine was found to contain a large amount of pus and albumen.

January 19th. He complained of severe pain in the right side, and a slight swelling with induration was noticed just below the last rib posteriorly. This rapidly enlarged, and on the 26th he was transferred to the surgical ward. He was at once etherised and a free incision was made parallel to the last rib and about half an inch below it, beginning at the outer edge of the erector spinæ muscle and extending forward for four inches. The skin, the fascia, the anterior fibres of the latissimus dorsi, and the internal and external oblique muscles being divided, an enormous abscess was reached, which discharged several pints of pus. The perirenal fat had disappeared. The finger inserted into the wound could only reach the lower border of the kidney, which was everywhere surrounded and bound down by fibrous bands so dense that they were almost cartilaginous. They could not be broken up with any force which could be exerted, and the explo-

ration was therefore very unsatisfactory. The kidney was displaced upward and forward, tightly bound to the abdominal wall and to the under surface of the liver, and gave the impression of having been much reduced in size.

An exploring needle failed to reveal the presence of stone. A drainage tube having been put in place and surrounded by iodoform gauze, the patient was returned to the ward. The temperature immediately sank to normal, pus partly disappeared from the urine, the appetite increased, and he appeared to be on the road to recovery, when at about the end of the tenth day he suddenly died with symptoms of heart failure. The necropsy showed that the cause of death was an extensive purulent pericarditis. There was some pleuritis on the left side, and both pleuræ and pericardium were tightly adherent to the diaphragm. The left kidney was enlarged and fatty; the right kidney was bound down as above described, and could not by any degree of force be separated from its abnormal attachments. No stone could be felt through the much thickened and indurated capsule until, upon breaking up the adhesions between the kidney and liver, the upper anterior surface was exposed, when a large calculus surrounded by an abscess was found, partially projecting through the capsule and imbedded in the liver tissue itself, which was ulcerated and bathed in pus. Careful and repeated attempts to reach this locality through the wound in the loin, the body being placed in the position for operation, showed that it was even then quite impossible to do so. The stone and the abscess about it could not have been approached except by an extensive laparotomy performed through the abdominal wall anteriorly.

As I have said, the chance of the transfer of suppurative action from below to above the diaphragm is probably greater in perirenal inflammation than in any other. The superior portion of the kidney lies upon the diaphragm, the lower margin of which crosses the back of the kidney in a direction obliquely downwards and outwards. This relation of the diaphragm is also shown by the depression of the kidney which occurs on deep inspiration. Holden says it descends nearly half an inch. The pleura on the upper surface of the diaphragm is therefore in proximity to the upper posterior perinephric region, and readily becomes, from contiguity of structure, involved in the inflammation.³ The following case, illustrative of these facts, seems to me worthy of being placed on record:—

Mrs. B., the wife of a physician, was born in Maine, in 1854, her family history being noted for longevity and good health. Her father died of pneumonia at an advanced age, and her mother of the same disease at the age of 80. Three brothers died or were killed in the Union army during the war. The remainder of eleven children are now living and well. Mrs. B. resided nearly all her life in Minnesota, and in 1872 removed to Walla Walla, Washington Territory. Until two years ago she also enjoyed excellent health, with the exception of about two months during the winter of 1881. At that time she was troubled with a pelvic hæmatocele brought on by exposure during her menstrual period. From this she entirely recovered, and was well until October, 1886. In that month she passed a small vesical calculus of oxalate of lime, which had caused considerable vesical irritability, but no other serious inconvenience. A few weeks later two more calculi were expelled, and were found to be of the same character. At about this time her urine became purulent, and a sample was sent to Dr. Heitzman, of New York, who pronounced her case one of nephropylitis. During the first part of 1887 she was confined to her bed most of the time. Any muscular exertion or sudden jar, such as might be produced by riding or driving, would bring on a severe chill, followed by hæmaturia and high fever continuing for from ten to fourteen days, during which time her temperature would range from 100° to 103° or 104°. On one occasion it rose to 106°. In May, 1887, after consultation with Dr. D. Hayes Agnew, her husband took her to the sea coast, and she was put upon a course of mineral acids, tonics, the free use of Poland water, etc. Under this her general health improved considerably, but at no time was her urine entirely free from pus, and at intervals it contained blood. In the latter part of 1887, and the early part of 1888, she had symptoms of an acute nephritis or nephropylitis of the left kidney, with evidence of perinephritic trouble, great tenderness on pressure, some swelling, chills, temperature of 103° in the evening, etc. During this attack the urine for the first time became decidedly ammoniacal. The acute symptoms lasted for several days, and gradually subsided, the tenderness disappeared, and the temperature fell to normal; at

² *International Encyclopedia of Surgery*, vol. 5, p. 997.

³ Roberts, *Am. Jour. of the Med. Sci.*, vol. lxxxv, 1883.

about the same time a slight cough developed, accompanied occasionally by a pleuritic stitch referred to the region of the lower ribs on the left side. A diaphragmatic pleurisy was at this time suspected. During August and September she had profuse sweating, chiefly at night, her temperature varied from 100° to 102° , her pulse and respiration were abnormally frequent, her complexion pallid, and she lost during this time about 25 lbs. in weight. On October 11th she started east with her husband for the purpose of seeking further professional assistance. During the journey she developed a distressing cough, with severe bronchial and laryngeal catarrh, hurried respiration, and considerable pleuritic pain. She reached Philadelphia on October 19th, and was seen by Dr. William Pepper and Dr. D. Hayes Agnew. Various methods of treatment were tried to control the cough and fever, to promote the absorption of the fluid, and to sustain the general health, but the steadily increasing effusion into the left chest continued until, on November 11th, it was thought proper to perform paracentesis thoracis. About 20 ounces of creamy laudable pus were withdrawn, and temporary relief occurred, but the chest rapidly refilled, and on November 26th it was decided to open and permanently drain the pleural cavity. A portion of the sixth rib on the left side was resected in the axillary line by Dr. Agnew, a pint of fluid was evacuated, and a drainage tube inserted. There was again a temporary improvement, which seemed to be favoured by washing of the pleural cavity, boracic acid, listerine, and weak solutions of corrosive sublimate being tried at different times. For some weeks she seemed to lose no ground, but then began to fail noticeably, and was sent to Atlantic City, where her nurse and her husband accompanied her.

In spite of a slight improvement produced by the change of scene and air, it became before long evident that a competent cause for the production of a dangerous hectic condition still existed. Although she ate better, and there was some improvement in her muscular strength, the night sweats and high temperature still continued, and on Sunday, February 10th, I was asked by Dr. Agnew and Dr. Pepper to visit her at Atlantic City. I found her in the condition above described.

On looking over her temperature chart from January 1st, I found that the evening temperature ranged from 102° to 104.5° almost without exception. Her respiration varied from 20 to 30, her pulse from 90 to 120. She was losing weight and becoming dispirited. The urine contained a variable quantity of pus, was acid in reaction, had a specific gravity of from 1020 to 1026, contained a considerable amount of albumen and a few epithelial cells from the convoluted tubules, but no casts were discoverable. On carefully reviewing the history of the case, it seemed to me apparent that, beginning with the pyelonephritis at the end of 1886, there had been a continuous suppurative process going on in the left kidney which had resulted in either a renal or a perirenal abscess, first encysted, later finding its way through or behind the diaphragm and opening into the left pleural cavity, the date of the opening being probably about the time of her journey eastward in October, 1888. If this opinion were correct, it was evident that any operation on the chest walls with the object of producing obliteration of the pleural cavity (Estlander's operation had been discussed) would be useless, as would also any attempt to procure effective drainage by an opening situated above the diaphragm.

I stated the case plainly to her husband and to Dr. Thomas Reed, who was in attendance at Atlantic City, and proposed immediate incision through the loin so as to open up and explore the region of the left kidney. The patient thought that she would prefer, if this was necessary, to have it done in Philadelphia, and accordingly returned with me on the same evening. Two days later, February 12th, my opinion having been concurred in by Drs. Pepper and Agnew, I proceeded to operate with the kind assistance of the latter gentleman.

An incision was made just below and parallel with the last rib, as in the operation for nephrolithotomy. The skin, fascia, some fibres of the latissimus dorsi, and the external and internal oblique muscles having been divided, the perirenal space was opened up, the fat which normally occupies that region having disappeared. Exploration with the finger revealed an irregular nodulated and apparently contracted kidney fastened tightly by lymph bands to all the contiguous structures, particularly at its upper extremity.

At this point, a few adhesions having been broken up with the finger, an outflow of pus followed, and an opening through the diaphragm, or at its posterior margin, was easily recognised,

admitting the point of the finger. No stone could be discovered by either the touch or the exploring needle. Fluid injected through the opening in the chest wall immediately appeared at the wound in the loin, showing a free and uninterrupted communication.

In view of the weakness of the patient, the uncertainty as to the condition of the opposite kidney, and the satisfactory result of the operation, it was deemed best to make no further exploration. Two large-sized drainage tubes were placed in the wound, which was then packed with iodoform gauze, and covered with a large antiseptic dressing. The patient reacted well, and for some time the case appeared very promising. The average temperature was much less, on several evenings not going above 99° .

Her appetite and general strength improved, and I felt hopeful as to her ultimate recovery. The suppurating cavities were washed out twice daily with various antiseptic solutions, hydro-naphthol being the one which we came finally to prefer. In about two weeks there was a sudden failure in general strength, a recurrence of chills and night sweats; delirium, at first nocturnal, and then constant, of a low typhoid type; refusal to take food, a rapid running pulse—in fact, every symptom of impending dissolution.

I suspect now that these symptoms coincided with the formation of other abscesses in both kidneys, but at the time they appeared to be septic in character. Greatly to my surprise, the patient, after reaching the brink of dissolution, reacted, gradually regained strength and intelligence, recovered to a certain extent her appetite, and on March 13th, considerably improved in general health, and with a much diminished discharge, left Philadelphia for her home in Washington Territory. The subsequent course of her case may be briefly compiled from letters written me by her husband.

During the trip across the continent her temperature, which at the time of her leaving had for two weeks ranged from normal in the morning to 101° in the evening, rose steadily, until at last on the evening she reached home it touched 104° . After rest this subsided, and subsequently there was no marked exacerbation of fever, but a gradual failure in strength, increasing anorexia, irritable stomach, etc. The condition of the suppurating cavities remained unaltered, and drainage was good.

Antiseptic washing was carefully used, and every possible means that could be thought of for sustaining her strength and prolonging her life were employed by her husband and his medical friends in a most careful and intelligent manner. In spite of this she sank steadily, and died on May 9th.

I cannot complete my report of this case without bearing witness to the great courage and patient endurance of the patient herself. They were factors of so much importance that I am sure they prolonged her life for many weeks. The final cause of death was undoubtedly exhaustion from the septic condition originating in the kidneys themselves.

The report of the necropsy is as follows: "On the night of May 9th, 1889, we made a *post-mortem* examination of the body of Mrs. J. E. B. about four hours after death. On opening the left chest the pleura was found firmly adherent all the way around to the chest wall, and the left lung was completely collapsed, except the portion behind and above the left clavicle. The lining membrane of the cavity was covered by a thick, tenacious pus, and the cavity would probably contain a quart and a half of fluid. At the time of examination it was empty, and was well drained. The heart and pericardium were not examined. The liver was adherent to the abdominal walls and diaphragm, otherwise it was apparently healthy. The intestines were matted together, and gave evidence of chronic peritonitis. The left kidney was completely disorganised and firmly bound to the contiguous tissues and organs. Capsule adherent. Pelvis was filled with pus, but no evidence of calculus. In the kidney there was an abscess containing four or five ounces of pus, which was of green, muddy colour, very thick and slightly offensive; only a slight amount of kidney tissue remained, and this was on one side of the unopened abscess. The tract from the perinephritic abscess—the one opened by the surgeons—was behind the diaphragm to the pleural cavity. The right kidney was very much enlarged. The capsule was adherent; the pelvis contained pus. A secondary abscess, the size of an English walnut, was found. It contained pus of the same character as that in the left kidney. No other organs were examined."

The clinical history of this case is one of exceptional clearness and distinctness. The development of the perinephritic irritation

as a sequel to the nephropylitis and the subsequent formation of a subdiaphragmatic abscess are stages in the progress of the case which are easily recognised, as is also the localised pleuritis of the inferior portion of the pleural sac, a condition so common in all cases of abscess in contact with the concavity of the arch of the diaphragm, whether splenic, hepatic, or renal.

In Bowditch's series of ten cases of abscess of the perirenal region there were unequivocal auscultatory indications of pleuritic or pulmonary complications in seven, although in four of them the rational signs were extremely slight.

The fact that the perinephric abscess originated in this case in unmistakable suppurative disease of the pelvis of the kidney greatly facilitated the interpretation of the clinical history. In several recorded instances the pulmonary involvement has occurred so early, or the previous symptoms have either been so vague and insidious, or so inaccurately observed, that the empyema has been supposed to be the primary disease.

In obscure cases it will often be found that a history of flexion of the thigh upon the pelvis, of pain in the loin, or at least of distinct lameness about the hip, will indicate the cause of the thoracic disease. Niemeyer has dwelt upon the value of the position of the thigh as evidence of perforation of the pelvis of the kidney into the connective tissue.

In one of Dr. Bowditch's cases we may find an excellent example of the importance of these symptoms in cases in which the patient comes under observation only in the later stages. He was called to see a young man who was supposed to be dying of phthisis, and who was expectorating large quantities of pus. There was complete dullness over the lower lobe of the right lung, with bronchial breathing and coarse râles. Dr. Bowditch was at once struck by a peculiarity of the man's attitude. He seemed sitting as on one glutens, in order apparently to relieve the other side. A history of lameness, together with pain in the right loin of three months' duration, was elicited. The lumbar fold of that side was found obliterated. On this evidence an incision was practised in the loin, pus was reached, and the case made a good recovery.

Dr. Duffin calls attention⁴ to a case quoted by Dr. Dickinson in which an abscess opening into the groin was traced, on *post-mortem* examination, along the track of the psoas to the kidney, and adds that the great diagnostic importance of the symptoms of flexion thus produced will appear, if read in connection with another peculiarity of these abscesses, namely, their tendency to implicate either the pleura or lung, and by partially emptying themselves upward, to cause empyema and pulmonary complications. The symptom of flexion was absent in this case, but the other symptoms, the tenderness, the localised pleurisy, followed by empyema, were quite in accord with the history of a large proportion, or even of a majority, of cases of perinephric abscess in which for any cause operation through the loin is delayed. It should never be forgotten, in such cases, that the thoracic complications are not only the most frequent but also the most important, coming on in an insidious and latent manner; they should always be sought for, even when the symptoms point exclusively to the abdomen, because the fact of the existence of abnormal thoracic signs has an important bearing on the treatment and prognosis of every case of perinephric abscess. On the other hand, the thoracic symptoms may completely mask the renal. Dr. Bowditch, in his report upon the ten cases already alluded to,⁵ records the following additional cases: A boy of weak constitution and of a consumptive family was seized with severe pain in the right side of the abdomen, and at the same time a distinct prominence below the liver became manifest. Soon after the pain lessened a cough began. A month later there was a dullness below the middle of the right lung; three weeks afterwards a pint of pus was discharged by coughing, followed by a lessening of the tumour under the ribs. The empyema was tapped a little later and a small quantity of pus obtained. The patient died, and at the necropsy a cavity was found in the lower lobe of the lung, which communicated by an opening through the diaphragm with an abscess above and back of the kidney, and surrounding the upper half of this organ.

A man, aged 50, who had been suddenly seized with pain in the right hypochondrium, followed in two and a half months by cough and the expectoration of foetid pus, was found to have a perirenal abscess.

In another case of the same character pain in the right renal

region was followed by lameness of the right hip with flexion of the thigh, and three months later by cough and purulent expectoration. Opening the perinephric abscess was followed by immediate and permanent relief.

Dr. Bowditch makes the following remark in reference to these cases: The chief complications in connection with, and in consequence of, an abscess below the diaphragm are often very latent in their progress and really at its beginning the more important features of the case. They may be the cause of death, and they are certainly liable to produce long-continued wasting disease.

A few further examples of cases of this kind may serve to illustrate the interesting and important points involved. Trousseau long ago⁶ emphasised the importance of early operation. He said that though sometimes the result of perinephric inflammation is a partially encysted abscess—the abscess remaining limited to the perinephric layer of fat and showing no disposition to extension beyond the lumbar region—yet at other times the inflammation gains the cellular tissue, occasionally even passing that barrier and reaching the pleura or lung, ending there in pleurisy or pneumonia, the pus sometimes penetrating even into the bronchial tubes. These, he added, are the terminations and complications which result from too long delaying surgical intervention. This has been observed by MM. Demarquay, Cosco, Cazalis, and Bernutz, and a case is reported by Dr. Rayer, in which there was a vomica in the lung attributable to no other cause than a perinephric abscess.

M. De Beauvais has reported⁷ a case of empyema in a tuberculous patient which was caused by the rupture into the right pleural cavity of a hydatid cyst situated between the liver and the diaphragm.

Martini⁸ records a case of chronic pyelonephritis of the right kidney, followed by perinephritis and escape of the pus into the right pleural cavity through a perforation through the diaphragm. In a short analysis of twelve cases of perinephric abscess contained in Schmidt's *Jahrbücher* (1865), it is stated that five perforated the pleura.

Gull reported⁹ the case of a man aged 36 who died of pleuropneumonia, and in whom there was found at the necropsy an abscess within the capsule of the kidney, which organ was adherent to the diaphragm, the latter being much softened at one spot, though not perforated. Just above the softened spot the left lung was adherent, and was in a state of gangrenous pneumonia. Dr. Owen Rees reports¹⁰ the case of a patient aged 17, in whom a large abscess of the kidney had passed upward behind the diaphragm, and caused pneumonia of the base of the left lung.

Dr. Barkely reports¹¹ the case of a patient aged 22, in whom there was an abscess of the right kidney with firm adhesions between the liver and the diaphragm, empyema and abscess of the same side.

There are on record several interesting examples of perforation of the diaphragm in the reverse direction, that is, of empyemata becoming subdiaphragmatic or lumbar abscesses.

Dr. A. W. Foot has reported¹² a case of empyema of the left side following an acute pleurisy, in which the pus was discharged two inches below the twelfth rib close to the left side of the spine, and another in which an empyema of the left side passed downwards behind the left internal arched ligament into the left psoas muscle and emptied into the vertebral canal. Dr. Foot remarks that the passage of an empyema through the diaphragm is its rarest mode of exit through the chest, and adds that when the pus does take this direction, the psoas muscles are, from their anatomical conditions, frequently invaded.

Dr. Hayden has recorded¹³ a case of "limited" empyema on the right side which passed through the diaphragm, opened through the right hypochondrium, and discharged three quarts of pus. It took its origin in pleurisy three months previous. When the patient came under observation, he had a fluctuating tumour in the right hypochondrium. The liver was displaced downwards and the heart upwards. Dr. Hayden thought that a differential diagnosis lay between, first, hepatic abscess with vertical enlargement of the liver; second, hydatids of the liver; third, peri-

⁶ *Clinical Medicine*, vol. 3.

⁷ *Bulletin de la Société Anatomique de Paris*, 1844, vol. xix, p. 147.

⁸ Schmidt's *Jahrbücher*, 1864, vol. cxxiv, p. 93.

⁹ *Lancet*, July 4th, 1863.

¹⁰ *Ibid.*

¹¹ *Ibid.*

¹² *Dublin Journal of Medical Sciences*, vol. lv, 1873, p. 40.

¹³ *Ibid.*, vol. xlvii, 1868, p. 225.

⁴ *Medical Times and Gazette*, September 24th, 1870.

⁵ *Medical and Surgical Report of the Boston City Hospital*, 1870.

hepatitis with displacement upwards of the diaphragm; and fourth, circumscribed empyema with perforation of the diaphragm and displacement of the heart and liver. The diagnosis which was finally made of empyema entering the abdomen and penetrating the diaphragm was rather presumptive than positive, and rested largely upon the history of the previous pleuritis.

Dr. Williams mentions a case in which an empyema pointed in the right hypochondrium, and was mistaken for abscess of the liver.

Dr. Townshend describes a case of abscess of the liver pouring its contents into the areolar tissue of the right side, in front of the ribs, by penetrating the diaphragm, yielding fluctuation, and quotes a similar case from Morand. Andral, in his *Clinique Médicale*, Observation 20, gives the following case: A phthisical man, about three weeks after admittance into the hospital, was attacked during an evening exacerbation of hectic with acute pain in the line of the left costal cartilages, accompanied with quick and shallow respiration, which was entirely costal; and pain next extended into the hypochondrium and groin. He sank rapidly, and died about a month from the date of admittance.

Large tubercular cavities were found in both lungs; the base of the left lung adhered to the diaphragm, and surrounded and strictly limited by this adhesion was a vast collection of pus, which passed through an opening in the diaphragm, of an inch and a half in diameter, with blunt and smooth edges, into the abdomen; it seemed to have pushed the peritoneum before it, and lodged between the spleen and the walls of the abdomen, where it was surrounded by adhesions, and contained in a large cavity with villous walls.

In this case, which has been so often quoted by writers on empyema, there was evidence during life of a purulent collection in the abdomen, and no diagnosis made of penetration of the diaphragm.

There is, moreover, no statement as to the evidence afforded by auscultation of the left side, which probably would have been of no special value, owing to the existence in the corresponding lung of extensive tubercular excavation.

Krause gives two cases of perforation of the diaphragm by empyemata; in one the matter pointed at Poupart's ligament, and was opened as a psoas abscess; in the other, the matter burst into the transverse colon by two apertures, through which faeces passed upwards into the right pleural cavity, which had been the seat of the disease. In a case reported by Mohr, there was perforation of the diaphragm near the vertebral column, and the pus descended behind the peritoneum along the psoas muscle, with abscesses and fistulous channels in the thigh, extending down to the knee.

Dr. J. Guiot reports¹⁴ a case of a woman in whom, at about the time of the disappearance of an empyema after operation, there appeared a large purulent collection opening at the umbilicus. There does not seem to have been very distinct evidence of direct communication between the two, nor does it seem to have been carefully sought for. The patient recovered.

M. Velpeau reported¹⁵ a case of empyema which emptied itself in the lumbar region. A later exploration of the purulent cavity in the loin revealed its communication with a denuded and necrosed rib, the result of the extension of the inflammation of the costal pleura.

TWENTY-SEVEN CASES OF DEFORMITIES OF THE EXTREMITIES TREATED BY MEANS OF THE SCREW CLAMP.¹

By NICHOLAS GRATTAN, F.R.C.S.ED.,

Senior Surgeon County and City of Cork Hospital for Women and Children.

I HAVE the honour to exhibit to you to-night a girl, M. S., now aged 13, whose femurs I fractured in July and September, 1888, by means of a special screw clamp. Before the operation she was so badly knock-kneed that she could with difficulty walk 200 yards; now she can walk eight miles at a stretch. I am also able to show you the girl, C. S., operated on a year ago, and the boy, H. W., on whom I operated about ten months ago. You will see that these children are perfectly cured of their deformities. These cases are typical ones, and a like result has

followed in all my cases which have been treated by means of this clamp. I have already exhibited this instrument to you, and described the details of the operation which have been published in the JOURNAL, February 9th, 1889.

Since then I have operated on eight bow legs, one case of angular deformity of the radius and ulna, and ten of knock-knee. These, added to one case of knock-knee operated on by Dr. Ashley Cummins, and my seven published cases, make a total of twenty-seven. All these have been cured almost without pain, and absolutely without any constitutional disturbance whatever. The greater number of these cases are in this city, and can be seen at any time.

An extended use of the instrument has been followed by more experience. At first I found it extremely difficult to cut across the bones of very young children, owing to their bending. This difficulty has been overcome by approximating the arms of the clamp. You will see that the clamp has proved successful with a girl, aged 14 years and 11 months, and I doubt if even this is the extreme limit of age at which it may be used. In the first instance I failed with the little girl, N. M., because the clamp cracked at the hinge. I immediately had a stronger clamp made, and, instead of having the arms rubber-covered, had the steel highly polished. I have had also a small racket screwed on the under surface of the clamp, each notch of which corresponds to opening the arms half an inch. By this means I have done away with the necessity of screwing together the arms, and have expedited the operation. I see no difference between the effects of the rubber-covered arms and the polished steel. I have had no skin wound since I have used this latter; and from my experience of the polished wedge, where the pressure is double that of the arms, there is no necessity for any padding whatever.

I now complete all my knock-knee operations by means of the clamp alone, do not jerk the leg inwards, thus preventing any chance of injury to the external lateral ligament of the knee; but after the limb has been broken I take it in my hands, and feel that all the fibres of the bone have been torn across, and set the ends together in their new position. In my last set of cases I used a curved long splint; a Liston splint is fitted to the limb, and is cut across where I expect to fracture the femur. The cut ends are joined by means of a curved piece of flat iron; the splint then somewhat resemble the curved stave of a barrel, and my knock-knee cases are cured with a slight out-bow corresponding to this curve. The bow-legs have also been broken across by means of this steel wedge. No padding whatever has been used, and no skin injury has resulted.

I now give the details of the cases.

C. S., aged 12½ years, admitted into the Children's Hospital, March 22nd, 1889. Knock-knee right extremity. March 23rd, 1889. Fractured her right femur with the screw clamp, 2½ inches above the knee-joint. Used steel wedge. Arms of the clamp opened 4½ inches. March 24th. Temperature normal, free from pain. April 3rd. Applied a plaster-of-paris splint, giving the limb a slight out-curve. This was removed on May 30th. On June 20th she was walking about the ward without assistance. Result of operation: deformity is entirely cured. I examined her limb on December 31st, 1889. She has completely recovered, and no difference can be detected between her two extremities.

H. W., aged 3½ years; double knock-knee. May 22nd, 1889. Made three attempts to fracture his right femur, but failed, owing to the elasticity of the bone; the arms of the clamp were separated from 3½ to 4 inches. May 25th. Fractured his left femur in the first attempt: arms of the clamp separated 3½ inches; applied a curved long splint. June 22nd. Bone united. June 30th. Fractured his right femur 2 inches above the joint in the second attempt; arms of clamp separated 3½ inches. July 4th. Bruises have quite disappeared. August 1st. Bones firmly united, and on August 30th the little fellow was walking about; he has been cured with a slight out-bow; result is extremely satisfactory.

J. C., aged 13 years 14 days; knock-knee, right extremity. June 18th, 1889. Succeeded in fracturing her right femur on the fifth attempt; arms of clamp open to 4½ inches; there was but one very slight abrasion; applied a curved long splint. June 19th. No pain or uneasiness. June 27th. Opened the bandages; skin abrasion is quite healed; limb is in good position. August 1st. Bone firmly united; deformity completely cured.

J. C., aged 1 year 8 months; double bow-legs. July 19th. Under chloroform fractured his left tibia and fibula; straightened the limb; used the steel wedge, the arms of the

¹⁴ *L'Union Médicale*, vol. xxii, p. 546, 876.

¹⁵ *Journal de Médecine et de Chirurgie*, vol. vii, p. 407, 1840.

¹ Read before the Cork Medical and Surgical Society.