penis, the little tendency of this to descend into the scrotum, and the inner opening close behind the external ring. The latter feature does not help us very much, for it is common for the site of exit of an oblique hernia, the internal ring, to be dragged inwards behind the external ring. Now the test point between the two should be the position of the deep epigastric artery; this is, however, difficult to feel, and if it is thought to be felt, it very possibly, after all, is one's own pulse. On putting the finger into the external ring the horizontal ramus of the pubes, should the inner opening of the direct hernia be large, would be more distinctly felt than in the oblique hernia, where the inner opening has been dragged down, and in such case would be certainly large. The position of the spermatic cord may assist in the diagnosis. Typically, it should be below and to the outer side of the sac, especially if it is the internal direct form. We must bear in mind that its position in the oblique form may vary, and thereby discount some of its diagnostic value in determining whether the hernia is a direct one.

Direct herniae are divided into the external and internal varieties, dependent on the relationship to the obliterated hypogastric artery; the site of the latter varies considerably from being quite close to the epigastric artery or behind the rectus, but its normal situation is considered to be at the outer edge of the conjoined tendon. It is doubtful, however, whether the obliterated hypogastric artery really plays any part in determining the one or other variety; whether this is so or not, anatomically we have two varieties through Hesselbach's triangle—an external one outside the conjoining tendon and an inner one through it. The inner one seems to be the more frequent, but with a sac of large size it is certain that nearly the whole of the triangle is involved. If the sac is of small size the opening in the conjoined tendon may be small and round, or linear, or oval in the line of the fibres; if large the margins of the opening will be felt to be the edge of the rectus and the horizontal ramus. Those herniae which are of gradual origin cause thinning of the conjoined tendon and the spreading out of its fibres over the wall of the sac; the tension of the tendon about the neck of the sac is thus reduced, and strangulation from this cause is not so likely. Should this form occur suddenly there will be splitting of the tendon, with considerable pressure at the neck of the sac, and probably strangulation.

The sac through Hesselbach's triangle, instead of being a single large one, may show two pouches, and two of my cases illustrate this point:

Male, aged 59, had had a left hernia for twelve years. On admission there was a rounded swelling at the side of the root of the penis, and there was evidence of strangulation. The operation disclosed a hernia coming through the conjoined tendon, the outer fibres of which were intact and were causing the strangulation. In addition there was a second pouch, just internal to the deep epigastric artery, which communicated with the former.

Male with a left-sided hernia. The operation showed a finger-like process coming through the conjoined tendon, and external to it was a second pouch separated by some fibres of the tendon. The inner pouch had no contents, but the external one contained the sigmoid loop.

The origin of these herniae is uncertain. Englisch found peritoneal pouches in this region in 2 per cent. of 300 bodies examined, and Rokitsky records also the presence of these pouches. It is possible these diverticula are congenital, and this would be in accord with the views held by Russell and others, who consider similar congenital pouches to be the basis of oblique inguinal and femoral herniae. The age at which the majority of these herniae appear would point to want of muscular support here as an important factor in their development.

A successful radical cure will be largely dependent on the size of the hernia; the larger the hernia the larger will be its neck, and the more difficult will this be to close. What must be aimed at is the effacement of all pouching and the production of a flat or convex surface on the peritoneal side. This may be attained by cutting out the sac and bringing the peritoneal edges together, or, what is a more certain method, after freeing the sac thoroughly at its neck, to twist the sac, transfix its neck with a silk thread, and tie off; the redundant sac may then be cut away or not. In one case, after twisting and passing a stout catgut thread through the neck, I pushed the sac

inwards behind the rectus and then passed the thread through the muscle from behind, thus fixing the sac in this position. In the process of twisting and gathering up the peritoneum, the close relationship of the bladder must be borne in mind and great care taken not to include it. Most difficulty is experienced in effectually closing the opening in the tendon, especially if it is large. The remains of the conjoined tendon on the inner side with the outer edge of rectus must be drawn down and fixed to the remnants of the tendon attached to the horizontal ramus, and to Poupart's ligament behind the spermatic cord; if the opening is large, closure may be difficult and appear imperfect. With a limited external hernia the methods applicable with an oblique hernia may be employed. After radical cure of the internal variety one always fears the possibility of a recurrence, but, as far as I know, no such result has ensued in my cases.

REFERENCE.

¹ *Treatise on Ruptures*, p. 265.

CASE OF ACUTE APPENDICITIS,

WITH SLOUGHING OF ABDOMINAL MUSCLES AND SEVERE TOXAEMIA: DOUBLE VACCINE TREATMENT: RECOVERY.

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We have deemed this case worthy of record on account of some unusual and instructive features.

It is a case of very rapid gangrene of the appendix associated with a high degree of toxicity; the recovery being due, in the first place, to the prompt removal of the appendix as early as eight hours after the acute onset. At the operation there was scarcely a trace seen of any reaction against the infection from which the toxæmia resulted. After the removal of the appendix no further trouble arose from peritoneal infection, but an infection of the subperitoneal tissue set in, properitoneal cellulitis, which resulted in extensive sloughing of the abdominal muscles of the right side of the abdomen, severe toxic signs and symptoms, and a long illness comprising more than two months of a dangerous state, and thereafter a tedious convalescence. The organisms present were the colon bacillus and the *Streptococcus faecalis*, the latter being the more destructive. Throughout the illness there was marked slowness of reaction and of healing in the wounds. When the toxæmia was at its height, oedema of the feet, legs, and lower part of the back appeared. The heart-beat remained persistently quick throughout the illness (110 to 120 per minute), and was 96 six months after the beginning of the illness. As further evidences of severe toxæmia, it may be mentioned that there was some muscular tenderness and absence of knee-jerks. A part of the internal oblique and transversalis muscles, 15 in. long by 4 in. wide, came away as one slough, leaving a large irregular space which required several incisions before it healed, on account of the difficulty in providing drainage for such parts left in its process of irregular healing. Regurgitant sickness lasted three days, to be followed by incessant hiccup for nine days, and widespread poly-arthritis later. A most important clinical feature was the varying activity of the kidneys as evidenced by the amount of urine secreted. In spite of the extensive sloughing of the abdominal muscles and the six free incisions there is no herniation. The abdomen has become asymmetrical from the unopposed traction of the muscles on the left side.

Previous History.

J. G. S., aged 45, whilst shooting during the week-end before his illness, felt some discomfort in the right iliac fossa, and on looking backwards now he realizes that undoubtedly there had been attacks of pain, tenderness, and discomfort in the same region, which warning signs were not considered worthy of attention. On the Tuesday after this week-end's shooting he felt indisposed, but no more so than during the previous attacks. After taking some calomel and salts that night he felt quite well in the morning.

History of Illness.

Whilst talking to one of his partners about 4.30 p.m. on the Wednesday he had a sudden attack of abdominal pain, which was very severe and lasted some time. He was seen in consultation with Dr. Niall at 8.30 p.m. when he was at once struck with the great alteration in his appearance. There had been no sickness. His temperature was 101.2° and his pulse 120. The abdominal pain was still very severe. On examination his abdomen did not move well in the lower part with respiration. He had some difficulty and pain on micturition. Over the lower part of his left rectus the note to percussion was impaired, and, what is important, the situation of maximum pain and tenderness corresponded with this area of impaired resonance. In view of his serious condition he was removed to a nursing home and seen again four hours later by us with Dr. Niall. His temperature was still 101.2°, his pulse had risen to 130, there had been no sickness, the pain was still severe. But his appearance and general condition showed a marked alteration for the worse. It was extremely impressive to see such rapid and continuous downward progress in the general appearance, quite out of proportion to the other physical signs, within eight hours from the attack of severe abdominal pain in the afternoon. On the evidence of such rapid poisoning, immediate operation was recommended and undertaken.

Operation.

Dr. Mennell gave the anaesthetic, and the assistants were Dr. Niall and Dr. Irving Pinches. The abdomen was opened by an incision through the right rectus. The intestines were a little distended, and there was no fluid in the general peritoneal cavity. Underneath the lower part of the left rectus was found a perforated gangrenous appendix containing a faecal concretion. It was situated amongst the small intestines, where it had every chance of infecting a large area of peritoneum in a very short time. There were no signs of adhesions about it. Indeed, the most striking feature of the operation was that there was no sign of the peritoneum reacting against the infection; there was found no lymph, no adhesions, no redness of the intestines, and no free fluid in the abdominal cavity. The appendix was clamped, ligatured, removed, and the stump invaginated. The wound was closed, except for a gauze drain which passed through the situation where the appendix had been to the pelvis.

After-history.

First Day: The next morning the temperature had fallen to 99° and pulse to 100. He was given 25 c.cm. of anticolon serum because it was known that the colon bacillus is responsible for the greater part of the infection in these cases, and its antiserum seems of value in limiting and localizing the infection. He was much troubled by sickness.

Second Day: The temperature was 97.8° and the pulse 120; the measurement of urine falling from 12 oz. on the first day to 7 oz. The abdomen was somewhat distended, and on the outer side of the wound there was tenderness with some white swelling and oedema of the skin. Sickness was incessant.

Third Day: The temperature remained a little subnormal and the pulse 112 to 116. Regurgitant sickness without effort was still present. On examination, it was found that the white swelling and oedema on the outer side of the wound had spread up towards the loin. The tenderness was only present at its margins, the more central parts being more or less anaesthetized by the infiltration of the tissues with serum. The dullness over this area was thought to be due to inflammation and swelling of the omentum, epiploitis, which had, though rather tardily, begun its work of attempting to clear up the intraperitoneal infection. Dr. Mennell administered chloroform and the gauze drain was changed. Nothing could be found to account for the spreading oedema in the loin. The patient merely felt that the right side of his abdomen was stiff. The only sign of improvement that day was the measurement of urine rising to 25 oz.

Fourth Day: The sickness ceased to-day, but was replaced by a most violent and distressing hicough which allowed the patient little rest night or day. He was seen in consultation with Sir Thomas Barlow. There were no signs in the lungs. The stomach was much dilated. The oedema in the right loin had spread upwards and now reached the back. It was sharply defined by Poupart's ligament, the crest of the ilium and the lower ribs. This distribution pointed to the cause of the oedema being within the abdomen rather than in the cellular tissue of the abdominal wall.

Fifth Day: The temperature had risen to 100.2° and the pulse fallen to 100; the patient at last reacting to the infection. Since the sickness had stopped the patient obviated all question of rectal irrigation by consuming large quantities of fluid. The urine measurement for this day was no less than 71 oz. The hicough continued unabated. The wound showed no sign of repair, was dry, and covered with a greyish film. The swelling in the loin had become bright red, the redness following the white swelling. Two long incisions were made into it through the skin and oedema. The cause was felt to be cellulitis of the subperitoneal tissue, so that the external oblique was also incised in the direction of its fibres. Bloody fluid alone escaped. Sir Almroth Wright cultivated from both the anterior and lateral wounds the colon bacillus and the *Streptococcus faecalis*.

Sixth Day: Both temperature and pulse were a shade lower. A vaccine containing 5 million of the *Streptococcus faecalis* was given.

Seventh Day: Condition much the same. Hicough still present, resisting all remedies. A vaccine of 5 million colon bacilli given. The swelling of the loin was subsiding.

Ninth Day: Vaccine of 5 million of the *Streptococcus faecalis* given. The urine was found to contain albumen, and reached the maximum measurement of 87 oz. The loin swelling was improving slowly with hot dressings. Oedema over both feet appeared to-day.

Eleventh Day: The general condition remained about the same; the hicough was very distressing; the loin was certainly better, the oedema subsiding, there had been no further spread since the incisions had been made, but the wounds showed no signs of healing, remaining as clean cut as when they were made. The oedema of the feet had spread to the legs, particularly to the right. The urine measurement had fallen to 64 oz.

Twelfth Day: A vaccine of 3 million of the *Streptococcus faecalis* given. Slight improvement in general condition. The hicough, which had been most distressing, intractable, and incessant, ceased to-day. But the urine measurement had fallen to 24 oz. for the twenty-four hours, and the oedema had extended to both thighs and buttocks.

Thirteenth Day: Temperature 101°, pulse 114. The urine measurement had risen to 37 oz., but the oedema extended to half-way up the back. There was no facial oedema. The albumen was still present in the urine, but not increased in quantity.

From this time for ten days the pulse and temperature remained raised, varying from 100 to 120 and from 100° to 101°. The urine measurement rose slowly to an average of about 55 oz.

Twenty-fourth Day: Whilst doing the dressing the end of a black slough was noticed on the right side of the wound at the bottom of it. By pulling on it this slough, 15 in. long by 3 in. to 4 in. wide, was removed without effort or haemorrhage. Dr. L. S. Dudgeon, who examined the slough, reported that it consisted almost entirely of necrosed muscular tissue. It had an irregular fluffy layer of connective tissue on one surface. It would seem that the slough consisted of the greater part of the internal oblique and transversalis, the fluffy necrosed connective tissue being part of the latter muscle. By syringing out the cavity left by the removal of the slough it was possible to define the attachments of these muscles. The oedema of the legs, etc., had largely subsided.

Twenty-eighth Day: The temperature rose to 101°, the pulse to 132, the urine measurement fell to 20 oz. The patient complained of headache and pains in the joints.

Twenty-ninth Day: The temperature rose to 103.2°, the pulse to 140 to 170. Both elbows, wrists, shoulders, jaws, and ankles were swollen, most of the swelling being extra-articular; there was a little fluid in the joints. The urinary measurement fell to 16 oz. for the twenty-four hours.

Thirtieth Day: The joints had improved a little. The temperature was 100.2°, the pulse-rate 146, and the urine measurement 29 oz.

Thirty-first Day: Improvement continued. Temperature 98°, pulse-rate 134 to 106, urine measurement 24 oz. Joints much more comfortable; oedema about them largely gone.

Thirty-third Day: Under chloroform, a localized abscess under external oblique in loin opened.

Thirty-fifth Day: Vaccine containing 5 million colon bacilli given.

Thirty-seventh Day: Under chloroform, a localized abscess above Poupart's ligament opened.

Forty-sixth Day: Vaccine of 10 million colon bacilli and 5 million *Streptococci faecalis* given.

Forty-seventh Day: Patient very ill; temperature 96.8°, pulse-rate 134. Constant complaint of cold. Improved later in the day. The central wound in the abdomen now contains many pockets from which small sloughs have been removed.

Fifty-second Day: Temperature 100.6°, pulse-rate 130, urine measurement 60 oz. Previous to this date the patient had been wandering in his mind, and had had difficulty in sustaining conversation, but had been quite clear for an answer or two. Now his memory was obscured, he recognized people, but talked nonsense incessantly. Sleep very deficient and broken. Incontinence of urine for the first time.

Fifty-third Day: Examined under anaesthetic, and incision made over the front of the right rectus high up. From here it was possible to follow a track up the rectus and over the ribs, where it curled backwards like a bishop's crook. This was opened up and all the side drained through the dorsal incision.

Fifty-fourth Day: His condition after the operation was more serious than it had ever been; temperature 101.4°, pulse-rate 140, extreme mental excitement, confusion and irritability, incontinence of both urine and faeces.

Fifty-fifth Day: Slight improvement. Temperature still 101.2°, pulse-rate 120, quieter; incontinence still present.

Fifty-sixth Day: Five million *Streptococcus faecalis* given in vaccine.

Fifty-eighth Day: Much better. Temperature subnormal.

Sixty-first Day: Vaccine of 5 million *Streptococcus faecalis* given.

Sixty-ninth Day: Vaccine of 5 million *Streptococcus faecalis* given.

Seventieth Day: Sat up out of bed for an hour.

Ninety-fifth Day: Left the home and motored to Littlehampton. All wounds had healed, except the lowest part of the central wound; his pulse continuing rapid, about 120, his calves were tender and his knee-jerks gone.

When seen three months after he had left the home, his pulse-rate was 96, his knee-jerks had returned, his muscles were no longer tender, and his stomach was smaller. The right side of the abdomen was smaller than the left. There was no stiffness,

bulging, or herniation. There was no hair on the right side of the abdomen as there was on the left, and the umbilicus was asymmetrical, being pulled to the left. There was no trouble with the bowels; he slept well, ate well, and was very well in general health. But he was unable to read for long, did not like driving his car in traffic, and in general was unable to fix his attention for long or maintain a mental effort.

NOTE BY SIR ALMROTH WRIGHT.

When first examined the pus was found to contain a mixture of the colon bacillus and the *Streptococcus faecalis*. A vaccine was made from the former and a small dose administered; and at the same time, pending the isolation of the *Streptococcus faecalis*, a small dose of *Streptococcus faecalis* which we had in hand was administered.

From the list of blood results it will be seen that the first opsonic index to the streptococcus was 0.28, and that it kept well up above the normal during the whole course of the treatment, and it was never allowed to go down below the normal. It was clear from the first that the *coli* infection was subordinate in importance to the streptococcus infection, and from the first blood examination to the *coli* an opsonic index of 1.12 was obtained. The rest of the *coli* indices are set down in the second column. Gradually as treatment went on the opsonic index kept high above the normal, and the *coli* infection became less and less until finally it died away.

The *coli* inoculations, which had been undertaken alternately with the streptococcus inoculations, were now abandoned. Soon afterwards the streptococcus inoculations were abandoned, for the streptococcus opsonic index was maintaining itself at a satisfactory height.

Date of Blood Examination.	Opsonic Indices for <i>Streptococcus faecalis</i> .	The Colon Bacillus.
December 31st, 1907	0.28	—
January 1st, 1908	5.00	—
" 2nd, "	1.08	1.12
" 3rd, "	1.25	1.53
" 4th, "	1.15	1.22
" 5th, "	1.07	1.15
" 6th, "	1.22	1.18
" 7th, "	1.44	1.16
" 8th, "	1.60	1.51
" 9th, "	1.17	6.16
" 10th, "	1.56	7.00
" 11th, "	1.65	1.30
" 13th, "	1.87	2.07
" 16th, "	2.08	1.56
" 18th, "	2.33	1.05
" 21st, "	1.52	0.55
" 28th, "	1.01	1.10
February 4th, "	1.04	1.82
" 12th, "	—	1.43
" 19th, "	1.24	—
" 29th, "	1.71	—

In all were administered three injections of *coli* vaccine amounting to 20 millions, and seven injections of the *Streptococcus faecalis* vaccine amounting to 33 millions.

THE SANITATION OF PANAMA.—In a letter acknowledging the receipt of a report of the Special Commission appointed to investigate the state of things on the isthmus of Panama, the President of the United States expresses his satisfaction at all that has been done there. He makes special reference to the success of Colonel Gorgas's sanitary work. "The treatment of hygienic conditions on the isthmus," Mr. Roosevelt writes, "has been such as to make it literally the model for all work of the kind in tropical countries. Five years ago the Isthmus of Panama was a byword for unhealthiness of the most deadly kind. At present the canal zone is one of the healthiest places on the globe, and the work which is being prosecuted with such tremendous energy is being carried on under conditions so favourable to the health and well-being of the workers that the mortality among them is abnormally small."

AN OPERATION FOR ABSENCE OF THE RECTUM.

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CONGENITAL defects of the rectum and anus, though occurring not infrequently in our large cities, are surgical curiosities in the provinces. As the general practitioner or the surgeon who has never had the opportunity of performing this operation may be called on at any time to interfere, I decided to publish the steps of an operation which proved satisfactory from a surgical standpoint. In Holmes's *System of Surgery*, vol. iii, 1906, the following remarks with reference to prognosis appear:

The lives of the majority of these patients might have been saved and the patients restored to perfect health had the medical attendant been more familiar with the nature and treatment of the deformity. In some cases life can hardly be preserved; in some it can be preserved only at the cost of the infirmity of an artificial anus, but these are the minority.

On March 17th, 1908, a male infant, 27 hours old, was admitted to the Horton Infirmary. It was full term, well nourished, and weighed 7½ lb. On examination it was found to have imperforate anus, there having been no attempt at involution of the epiblast. It had passed uncontaminated urine several times, which partly excluded the possibility of the bowel opening into the bladder or urethra. The infant's condition as revealed by operation was, according to Curling's classification (*Curling's Diseases of the Rectum*, 1876), imperforate anus and partial absence of the rectum, as shown in Fig. 1. As regards the relative frequency of this condition, Curling collected 100 cases of congenital defects of the rectum and anus. Of these, 68 were males.

Fig. 1.

Shortly after admission the infant was placed on the operating table in the genu-pectoral position, the head being easily rotated to one side for receiving the anaesthetic. Pure chloroform was administered from a small inhaler until reflexes were abolished. An incision 1½ in. long was made, starting from just behind the central point of the perineum, extending backwards almost to the tip of the coccyx. A careful dissection was then begun. As it was almost impossible to recognise any of the "landmarks" in this region when the tissues became bathed in blood, and as the size of the wound restricted necessary manipulation, the incision was carried backward for another ½ in. Retractors were inserted laterally; the surgeon continued his dissection, using as his only guide an axis which would have corresponded with the normal rectum had it been present; this axis—the infant being in the genu-pectoral position—being inwards, upwards, and backwards, as shown in Fig. 2. Working along this line brought the operator to the blind end of the bowel. The depth of the wound at this stage of the operation was about 1½ in. The blind end of the bowel was identified by the resonant "ring" which was produced by scraping the tissues in the region with the point of a scalpel. To verify this sign, the chloroform was withdrawn for a little and the child allowed to strain.

Fig. 2.

At the same time the abdomen was pressed firmly with the hand. These two factors were very efficient in rendering the object of search apparent. The areolar tissue surrounding the end of the bowel was seized with a pair of Liston's artery forceps and gentle traction applied. Some surgeons advocate light anaesthesia during these operations, but the operator in this case preferred the infant to be well "under." The spasmodic contractions of the peronei and levatores ani muscles impeded his progress.