conditions, cannot be forestalled in them any more than in childhood, but can hardly be put down to any particular procedure or surgical condition.

In Case VII, however, I think, the operation was at fault as far as could be seen at the necropsy. This was a very bad case of strangulation of the caecum, and some 4 ft. of small intestine in an inguinal hernia, the chief strangulation being in a pocket at the upper and outer portion of the sac behind the caecum, where a black knuckle was found tightly shut off from the main sac. When the caecum and intestine were excised, this foul infected pocket ought to have been excised completely with the rest of the sac. But this I could only partially carry out, as the pocket really belonged to the peritoneal cavity. As it was, I partially excised it, and closed the sac, doing a radical cure at once. I think that it was from this pocket, which lay partially within the abdomen, that the fatal peritonitis started. The anastomosis was quite sound on the seventh day, when the patient died, and the bowels had been freely moved as well as flatus passed. I now feel that, if I had excised the whole foul pocket, and stuffed the wound with gauze, instead of doing a radical cure of the hernia, the result might have been recovery. But, at all events, this and Case I are the only cases out of the three fatal ones in which the result could be set down to the procedure itself. As the man, by his own account and that of his wife, was habitually a heavy drinker, and had all the signs of delirium tremens on the third day, it is questionable whether he would have recovered in any case.

All the other cases recovered, and had no trouble afterwards. Those that were treated with gauze drainage did not do better than those in which the abdomen was stitched up without any drainage.

Nevertheless, in the four cases that died, one, I feel sure, would have had a better chance had I stuffed the wound with a gauze apron filled with iodoform gauze instead of closing everything and attempting a radical cure. But, as it stands, I venture to think that this list of cases justifies my belief that I can do more for my patients by a freer use of primary excision for gangrenous gut on the one hand, and on the other by excision of growths of the intestine rather than by artificial anus, and all this with but little more risk than the older methods involved, perhaps with less. In inoperable cases of cancer of the intestine the case before you shows what can be done by anastomosis, and how an artificial anus with all its drawbacks can be avoided.

The details of the various procedures by which all this can be done are a long and interesting study into which I cannot go now. They include the treatment of the patient before, during, and after the operation. You can only realize their meaning and importance by careful study of these cases as we prepare them in the wards beforehand, deal with them on the operating table, and treat them subsequently. And this study I very earnestly commend to you, for a mere textbook knowledge will not help you much.

DUODENO-CHOLEDOCHOTOMY FOR RETAINED GALL STONES AT THE DUODENAL END OF THE COMMON BILE DUCT.

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THE cases, upon which the above operation was performed and which are described in detail below, belong to a group important both from the clinical aspect and from the point of view of treatment.

The association of jaundice with febrile attacks was brought into prominence by the writings of Charcot, but during recent years we are indebted to Osler¹ especially for further elucidation of this most important subject.

When a stone makes its way, usually from the gall bladder, into the common duct, in the ordinary way it passes on into the duodenum. During its passage there may be a typical attack of biliary colic, pain, some fever, vomiting, and jaundice with its usual accompaniments, bile in the urine,

and pale constipated stools; the depth of the jaundice will be dependent on the length of time the stone takes to pass through the duct, and on the associated catarrh of the mucous membrane. With the entry of the stone into the bowel all the above signs disappear and the stone may be sought for and found in the stools. Sometimes the fever instead of being slight and continued may be high and intermittent, accompanied by shivering and sweating.

A stone may remain in the common duct and, if free to move up and down in the duct, may be accompanied by no symptoms if it does not interrupt the normal flow of bile.

At the duodenal end of the common duct, after it has been joined by the pancreatic duct, is a dilatation beneath the mucous membrane of the bowel, the diverticulum of Vater. The opening of this enlargement into the gut is very small, so that there is a tendency for a gall stone to remain lodged in this site, having a certain amount of play, and acting like a "ball valve." Although, as stated above, a gall stone in the common duct, free to move up and down, may have no attendant symptoms, when we have a "ball-valve" stone to deal with, it is always some obstacle to the discharge of bile, and the symptoms presented are rather characteristic.

The jaundice is essentially chronic, and, although never going away, may for some considerable periods be only slight, and without any other symptoms except a little pain or discomfort. From time to time, however, there will be attacks of colicky pain, with chills or rigors, fever, and sweating, succeeded by a much greater intensity of the jaundice; these symptoms after a while pass off, leaving the patient in his former state to await the repetition of another exacerbation of symptoms, which may occur at very varying intervals, sometimes very shortly after, and in others at intervals of several weeks. The fever in these attacks is intermittent in type, with a similar daily rise for some days together, and it may be accompanied by some enlargement of the spleen. A very pointed fact is that, although the patient during such a chronic illness loses weight, he does not necessarily feel ill, and may in the intervals of the attacks go about doing his work.

The onset of these attacks is caused by some temporary impaction of the stone associated with swelling of the mucous membrane; after a certain degree of distension behind, the stone tends to shift its position, and the bile leaks out by the side into the bowel, with subsidence of the symptoms. The associated fever has been considered due either to nerve irritation from the distension or by the absorption of toxins by the altered mucous membrane.

The liver is not much enlarged, but may be tender, and the gall bladder, as a rule, is not enlarged, or, if so, not much, owing to the intermittent escape of the bile. The pain is usually more referred to the epigastrium than over the right hypochondrium.

In establishing the diagnosis the presence of jaundice for some time, varying in its intensity and never very deep, points to a stone, and especially, when the accompanying signs are taken into consideration, to its probable position at the end of the common duct. As the jaundice will be occurring at the period when cancer is also likely, there may be some difficulty in making a decision. In cancer, which is so common about the head of the pancreas, and thus involves the end of the common duct, there is a steadily progressing obstruction; the jaundice tends to slowly increase, is persistent, and of much greater depth of colour, so that the patient may be deeply bronzed; the gall bladder and the liver slowly enlarge; and when there is pain it is more gnawing and stationary rather than acute and paroxysmal. With the tumour there may be some fever, and in some cases it is of the intermittent paroxysmal type before referred to. It must be borne in mind, however, that the latter symptom, as others, may be due to the additional presence of gall stones which is very frequent. Again, the steady loss of weight and strength with the increasing depth of the jaundice are marked, whereas in the case of the stone, although there is generally loss of weight, yet the general health may be very fair and the jaundice slight, except during the paroxysmal attacks. Lastly, the time element will be an important factor between them. Many of the signs suggesting cancer will be present with any other condition producing a steadily progressing obstruction by blocking of the common bile duct as in a gummatous infil-

tration of the structures in the neighbourhood of the head of the pancreas;² but although the patient may not lose ground as in cancer, yet the symptoms present will be sufficient to diagnose it from the chronic jaundice due to a "ball-valve" stone.

If in a case diagnosed as stone in the diverticulum of Vater the colicky attacks and jaundice entirely disappear, it may be assumed that the stone has passed into the duodenum and perhaps confirmed by finding it in the stools.

There is one other question that has to be considered in the diagnosis. It has been stated that one of the main symptoms is the occurrence of the paroxysmal intermittent fever during the course of a prolonged jaundice varying much in intensity. This has been considered due to the absorption by the altered mucous membrane of bacteria or their toxins. In some cases there may be destructive changes in the mucous membrane leading to septic thrombosis in the radicles of the portal vein. This will result in enlargement of the liver with scattered abscesses in the distribution of the portal vein, and the symptoms will be those of pyæmia, rigors, high temperature, and sweating. Should such a condition have arisen, the frequent repetition of the rigors without increase of the jaundice, the severe illness of the patient, and the rapidity to a fatal termination would denote the serious lesion that had occurred and warrant a practically hopeless prognosis.

CASE I.—DUODENO-CHOLEDOCHOTOMY: RECOVERY.

History.

J. G., aged 46, a gardener, was admitted into St. Thomas's Hospital in March, 1900, under the care of my colleague Dr. Hector Mackenzie, and gave the following history of his illness.

In December, 1899, he had his first attack of biliary colic without any jaundice. In February, 1900, he had a second attack, accompanied by jaundice. In March he had two separate attacks, each with jaundice; it was during the latter that he was admitted into hospital. During his stay he had an x-ray photograph taken, but no shadow suggesting a stone was seen. His jaundice gradually disappeared, and he was discharged on May 5th. He was readmitted on the 23rd, having had another attack of colic, with jaundice. It was noted at this time that the liver dullness began at the fifth rib in the nipple line.

First Operation.

On May 30th the following operation was done by the late Mr. William Anderson. An incision was made parallel to the right costal margin, and a cavity was found in the situation of the gall bladder, leading by a ragged aperture into the gall bladder near its fundus. There were many adhesions, during the breaking down of some of which bile escaped. The great omentum was pulled up and sutured to the left margin of the wound, thus shutting off the general peritoneal cavity. A gauze drain was left in the wound down to the gall bladder. No calculus was found in the gall bladder. Mr. Anderson viewed the case as one of cholecystitis.

The subsequent progress was as follows:

Third day. Tube inserted instead of the plug and much bile escaped.

Tenth day. An attack of follicular tonsillitis.

Sixteenth day. Much less bile from the wound and the tube left out.

Eighteenth day. Small swelling behind the sinus, so this was dilated, but no bile escaped.

Twenty-third day. Stools again clay-coloured and bile pigments in urine.

Twenty-fifth day. Stools normal: bile again coming through the fistula.

Forty-first day. Fistula closed and stools normal.

Fifty-fourth day. Another attack of colic with rigidity of muscles on the right side and a swelling to the inner side of the fistula.

Fifty-fifth day. Sudden discharge of a large quantity of bile.

Sixty-first day. Stools again colourless, urine pigmented and bile escaping through the fistula.

Second Operation.

He was at this time—the beginning of August—transferred to my care. On going into the case I was convinced his condition was due to some blockage in his ducts by a stone which acted like a ball valve, causing intermittent jaundice. On the sixty-fourth day (August 3rd) I explored him, making a vertical incision downwards from the sinus in the linea semilunaris. Very great difficulty was now met with on account of the density of the adhesions about the gall bladder, and from the abnormal position of the omentum. At last the gall bladder was clearly defined and the omentum separated and turned downwards; this made it possible to explore the cystic and common ducts. Neither in the former nor in the latter as far as the duodenum could any stone be felt. The operation up to this time had taken one hour and a-half, and as the man's condition did not allow of its further prolongation, exploration of the lower part of the common duct via the duodenum had to be deferred to another occasion. Owing to the rearrangement of parts it was hoped that no such difficulty would be again experienced. A drainage tube was put in the gall bladder, and the rest of the abdominal wound stitched up.

Sixty-eighth day. Much bile coming through the fistula, and the faeces are clay-coloured. The temperature has not risen above 100° F. since the operation.

Eighty-third day. Tenderness round the wound. Since the last note the same intermittent discharge of bile has continued, with varying colour of the stools, constipation, and pigmentation of the urine.

Eighty-fifth day. A rigor, with increase of temperature and sweating. This strengthened one's suspicion of a stone at the end of the common duct.

After a few days, as he had no further shivering and his jaundice was

less and his wound was healed except the fistula, I sent him out of hospital for a short time to recruit for his further operation. He went to the Convalescent Home at Swanley on September 26th, where he remained some weeks, and afterwards to his own home. He put off coming into the hospital until the second week in December.

Third Operation.

On readmission, he stated that while at home he had had occasional rigors and the amount of jaundice had varied; his stools were almost colourless, and he was very constipated unless he took exercise. There was free discharge of bile from the fistula and indications of bile in the urine. His temperature was subnormal, varying one degree between the morning and evening records.

The final operation was performed on December 20th in the late afternoon. His temperature at the time was 98° F., pulse 80. Chloroform was administered, and an attempt was first of all made to wash out the gall bladder through the fistulous opening, but this failed owing to the contraction of the sinus. The opening accordingly was plugged with gauze and the skin cleaned up in the usual way.

A vertical incision, 4 in. long, was made internal to the situation of the fundus of the gall bladder through the rectus muscle, splitting its fibres. It was started an inch and a-half below but was subsequently prolonged up to the costal margin. On opening the peritoneal cavity the adhesions, which caused so much delay at the former operation, were found to have considerably cleared up. The neck of the gall bladder, the cystic duct, the common duct, the duodenum, and the colon were without difficulty defined. The ducts seemed thickened but no stone could be felt; palpation through the duodenum gave some fullness about the end of the common duct suggesting a stone. The colon was packed out of the way with gauze, and the duodenum was also wrapped round and shut off from surrounding structures. A vertical incision was made in the duodenum opposite the common duct opening, and plugs of gauze were placed in its upper and lower ends to prevent leakage. A rounded body could then be felt on the inner wall at the end of the duct, which was cut down upon and a stone was extracted. No stitches were placed in the duct. The plugs were removed from the duodenum, and it was sewn up by a continuous gut suture for the mucous membrane and silk Lembert stitches for the sero-muscular coat. After thoroughly wiping the parts over with normal saline, the abdominal wound was stitched up in layers except at one spot, where a gauze drain came through, the other end of which was placed about the situation of the duodenal wound. A second piece of gauze was pushed along the sinus into the gall bladder. The stone was almost circular, like a marble, ½ in. in diameter. It was firm, composed of cholesterine, and of a light yellow colour. Its surface was nearly smooth without any faceting.

December 21st. Feels very comfortable. Temperature 100.2° F. and pulse 92. Small quantities of water given by mouth and rectal feeding. At 8 p.m. his temperature went up to 101.4, but his pulse was 92, he did not feel sick, and he seemed very well.

December 22nd. Very comfortable: pulse 76 and temperature 99.4°. At 8 p.m. temperature 100.8°.

December 23rd. The wound was dressed and the drains were changed. Some clear serum came out from the abdominal wound without any trace of extravasated products. Drains again replaced. Temperature 98.6°. Bovril and milk in teaspoonfuls allowed by mouth. Evening temperature normal.

December 24th. Everything satisfactory.

December 25th. Wound dressed again and very little bile has drained away from the gall bladder. The drains were removed and not replaced: no discharge from the abdominal wound. Enema given and some tinge of bile in the stools. Urine not so dark. Temperature normal.

December 26th. Rise of temperature at night to 99.8° (probably due to Christmas festivities).

December 27th. Temperature normal and afterwards remained so. Bowels opened naturally, and some bile in stools. Jaundice has sensibly diminished and the urine is much lighter. Dressed again and all stitches removed: a little suppuration—about one or two—so a hot boracic fomentation applied. Very slight quantity of bile now coming from the sinus into the gall bladder. Fish given.

January 10th, 1901. Simply a few granulations now from the gall-bladder sinus. The jaundice has almost entirely disappeared and plenty of colour in the stools.

January 16th. Left the hospital quite well.

Since this time I have often seen him. He remains quite well, has no pain and has never had any jaundice or shivering attacks since the operation.

CASE II.—DUODENO-CHOLEDOCHOTOMY: RECOVERY.

Mrs. J. F., aged 43, came to see me in September, 1901, having been sent to me from Durban, Natal, by my friend Dr. J. Rouillard.

History.

She gave the following history of her illness. In January, 1900, she had her first attack of jaundice, with vomiting, great pain in the stomach, pale motions, and dark urine. These symptoms lasted for about four months, and then gradually subsided. She remained well for some months, but in January, 1901, she had a similar attack, with the addition of frequently repeated rigors; the latter lasted for only a few weeks, but all her other symptoms continued. She lost flesh at first, but not recently.

When she came to me there was distinct colouring of the conjunctivæ; as she was naturally of colour, the depth of the skin change could not be estimated. The liver was enlarged and tender, but tenderness was particularly marked over the prominent enlarged gall bladder. She had not recently had any pain except on some sudden movement, but there was a general feeling of soreness in the epigastrium and across the back. She had never had malaria. On October 3rd she was admitted into St. Thomas's Hospital under my care. Her temperature that afternoon was 99.8° F., and normal the next morning, but at 4 o'clock it ran up to 103° F. without any rigor, but with sharp pain. The normal was reached in twelve hours, and it remained so for six days, when it suddenly rose again to 103° F. at 4 o'clock on the 11th. Again it dropped below normal by 8 a.m. on the 12th, but rose at 4 p.m. to 103° F., and then, as before, went to normal in the morning. On the 13th and 14th the daily rise was only to

100° F., and on the next two it remained normal. This being the case, I now, on the afternoon of the 16th, operated.

Operation.

An incision was made in the right linea semilunaris, the outer margin of the sheath of the rectus was opened, and the muscle displaced inwards, and then the posterior layer of the sheath with the peritoneum were cut through together. The distended gall bladder immediately came forwards into the wound. Exploration with the finger showed the cystic and common ducts to be distended, and in the latter, just as it was passing behind the first part of the duodenum, was felt a stone.

Diagram giving exact size and shape of stones, showing the facets; A, junction of first and second parts of duodenum; B, common duct; C, length $\frac{5}{8}$ in., diameter, $\frac{1}{16}$ in.; D, length, 1 in., diameter, $\frac{3}{16}$ in.; E, opening of duct.

As the size of the gall bladder completely prevented convenient access to the deeper-lying structures it was brought up into the wound, packed round with gauze, and tapped, a rubber tube attached to the cannula draining off the bile and preventing any contamination of the peritoneum. The gall bladder in this manner was practically emptied, and proved to contain no stone. The bile was dark-coloured, thick, and mixed with a considerable quantity of mucus. The cannula was now withdrawn, and the small hole in the fundus was stitched over by a couple of Lembert's sutures. Careful exploration could now be made, and the following state of things was revealed. The stone in the common duct which was originally felt was situated just above where the duct passed behind the duodenum; its size distinctly stretched the duct, and the stone itself had very limited play upwards, not moving above the duodenum more than half an inch—that is, not its whole length. On palpating the second part of the duodenum another stone could be felt at the level of the termination of the duct; it seemed fixed so far that its range of movement upwards was practically nil. It was evident that the only satisfactory way of removing the lower stone was by opening the duodenum, and this I proceeded to do. Gauze was now packed around the duodenum, and below over the colon, and a vertical incision was made at the level of the common duct opening and at the junction of its anterior and right surfaces. A little mucus flowed out, but any further trouble from this was avoided by inserting gauze tampons above and below in the bowel. The lips of the wound were now held aside by small retractors, and a marked elevation was seen on the inner wall, just above the position of the papilla. On palpation this proved to be a stone, very fixed as far as its upward movement was concerned. Steadying the stone between the thumb and finger, an incision was made over its lower end, cutting through the walls of the gut and duct. Some bile escaped, and the stone presented. The latter was easily drawn out with a pair of forceps. The second stone was then pushed along the duct, seized with forceps, and withdrawn. The duodenum was closed with fine silk, a continuous suture being

used for the mucous membrane, and interrupted (Lembert) sutures for the sero-muscular coat; no stitches were put in the duct. The abdominal wall was sewn up in layers, fine silk being used for the peritoneum, fine silkworm gut for the fascia, and horsehair for the skin. A gauze drain, which had been placed on the outer side of the duodenum, was brought out at the upper angle of the wound.

The patient stood the operation very well up to the last ten minutes, when her pulse became very weak, so that it was necessary to infuse her with 2 pints of saline with 1 oz. of brandy. With this there was rapid improvement, especially when she was back in bed with hot bottles and after a hypodermic injection of strychnine.

The accompanying diagram shows the shape of the two stones and their exact size. The adjacent poles were faceted. In structure they were composed of a blackened cortex which very easily split off, while the interior consisted mainly of orange-stained cholesterine. In removing the second stone it was definitely drawn through a narrowed part of the duct situated above the upper end of the lower stone.

After-History.

Three hours after the operation (11 p.m.) the pulse was 108 and stronger. She was allowed to moisten her mouth with warm water, and on account of pain she was given morphine hypodermically.

October 17th. At 8 a.m. her temperature was 97.8°, pulse 96. She was given a teaspoonful of milk and water, but it made her sick; she said, though, she never could take milk. Brand's essence in warm water in teaspoonfuls was substituted, with rectal feeding, both nutrient enemata and suppositories alternately. At 11 p.m. she was not so comfortable owing to slight abdominal distension. As there had been some more vomiting, the Brand's essence was stopped and only warm water given. Pulse 116, temperature 99.2°.

October 18th. No sickness during the night, and slept for about four hours. Pulse 128, temperature 100°. She complained of fullness on the left side over the colon, so at 7 a.m. an enema was given, after which a considerable quantity of flatus was passed, giving great relief and removing the distension. In the evening the wound was dressed, the gauze drain removed, and another put in. There was some tenderness around the umbilicus and over the gall bladder, but there was nothing to suggest any leakage from the intestine. Pulse 124, temperature 101°.

The urine now contains no bile. October 19th. The feeling of sickness, which was constant before the operation, is now lost, and she is able to take barley water and lemon by mouth. Pulse 120, temperature 100°. Plasmogen given and drachm doses of sulphate of magnesia three times in the day. At 10 p.m. pulse 124, temperature 100.2°. The bowels have acted three times, giving great relief. The wound was dressed again and quite clean. The abdomen was less tender except over the duodenum, and there was no distension; no vomiting during the past twelve hours.

October 20th. Pulse 120, temperature 99.6°; one action of the bowels during the night, and bile was present. Calves-foot jelly ordered but all food by mouth is distasteful; no vomiting or nausea. At 10 p.m. pulse 122, temperature 100°; one action of the bowels during the day.

October 21st. Pulse 118, temperature 98°. Wound dressed, and on removing the drain a quantity of thin, blood stained pus came away which was rather offensive; there was no trace of food in this nor any gas with it. More inclined to take food. At 11 p.m. pulse 120, temperature 99.6°. Bowels acted once during the past twenty-four hours. Soup and calves-foot jelly taken with relish.

October 22nd. Temperature 99°, pulse 100. Thin purulent discharge from the wound, but no gas. Urine is much lighter in colour and has only a slight trace of bile in it. At 8 p.m. pulse 112, temperature 100°. Rectal feeding stopped.

October 23rd. 8 a.m. temperature 98.4°. Taking plenty of food. 3 p.m. temperature 100°.

October 26th. Progress most satisfactory. Wound still discharging with slight night rises of temperature.

October 30th. Temperature normal since the 26th. November 1st. She feels very well and has a good appetite: put upon fish diet. There is very little discharge from the wound and it is quite sweet. No tenderness over abdomen.

November 15th. Wound healed. The urine and faeces are quite natural. The patient after leaving the hospital gained flesh rapidly: she felt in perfect health and had a good appetite, having entirely lost her old sensations of nausea and shivering attacks: she has now returned home to South Africa.

On perusing the descriptions of the above two cases, it will be seen that the symptoms correspond closely with the statements made in the opening remarks. The treatment adopted in both of them—removing the stone through the duodenum—was the only one possible, and the cases add two more recorded successes to the few already reported by McBurney, Mayo Robson, Page and others, of this variety of choledochotomy.

REFERENCES.

- 1 Osler, *Johns Hopkins Hospital Reports*, vol. ii, 1890; *Lancet*, May 15th, 1897.
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A CASE OF REMOVAL OF THE GALL BLADDER.

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CHOLECYSTECTOMY, or removal of the gall bladder, is rarely performed as a primary operation, and it is only in exceptional cases that it is required as a secondary measure, the condition most commonly calling for it being the persistence