who attributes in cases of gout the main production of uric acid to the muscles and bone marrows of the affected extremities, admits however that the kidneys may take a part, not only in the secretion, but also in the manufacture of uric acid. Robin was the first to suggest that uric acid was normally formed in all the tissues, and that the condition in gout was only an exaggeration of the physiological one. Chrzonszczewski, Cantani, and Senator also considered that uric acid is formed in cartilage and fibrous tissue, but most observers agree that it is only deposited, and does not originate in tissues of the connective group. Dr. Haig asserts that in addition to the formation of uric acid in the animal body, the amount present depends greatly on that taken in. He does not, however, produce any proof of the storage of uric acid in the system apart from gout, and it must further be remembered that in diseases such as leucocythæmia, in which large quantities of uric acid are formed, they are not stored but eliminated.

Does Uric Acid occur Normally in the Blood of Man and other Animals?—The solution of this question is of great importance in relation to the problem as to whether uric acid is formed in or carried to the kidneys. I am able to confirm the conclusions of Garrod, von Jaksch, and Klemperer that uric acid is absent from the blood of healthy persons. Of other mammals I have examined the blood of the ox and sheep, and have found no trace of uric acid in them, a result which is again in accordance with those of Sir Alfred Garrod. In the blood of the turkey, goose, duck, and fowl I found, like him, no uric acid, but plenty of urea. Sir John Davy also failed to find uric acid in the blood of snakes.

This mass of experimental evidence, which shows that uric acid is never present in the blood of human beings in health, and also that it is never present in the blood of birds and serpents, although their urinary excretion is almost entirely composed of a compound of uric acid, conclusively supports the view advanced by Sir Alfred Garrod, and held by Dr. Latham, and in a modified sense by Kolisch, that uric acid is normally produced in the kidneys. How is it possible in all these cases that uric acid could be absent from the blood if the view be correct that uric acid is formed in the system generally, and is conveyed in the blood to the kidneys, which play, as it were, merely the part of a filter in the removal of uric acid from the blood? I consider that the evidence brought forward renders such a view impossible.

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LECTURES

ON

DISEASES OF THE GALL BLADDER
AND BILE DUCTS.*Delivered at the Royal College of Surgeons of England.*

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LECTURE III.

GALL STONES OR CHOLELITHIASIS.

THE importance of this subject may be gathered from the facts that *post-mortem* records on persons of all ages and both sexes prove gall stones to be present in from 5 to 10 per cent. of all Europeans, in Strassburg the record being 12 per cent. (Schroeder), in Kiel 5 per cent., and in Manchester 4.4 per cent. (Brockbank).

Surgical Treatment.—After medical treatment has been fairly and fully tried, and failed, I think all are now agreed that surgical measures should be resorted to. While cholecystotomy is generally recognised as the operation to be aimed at in the treatment of affections of the gall bladder or bile ducts, especially in cholelithiasis, it is often impossible

to say what operation will have to be done until the abdomen is opened.

The indications for operating would seem to me to be as follows:

1. In frequently recurring biliary colic without jaundice, with or without enlargement of the gall bladder.
2. In enlargement of the gall bladder without jaundice, even if unaccompanied by great pain.
3. In persistent jaundice ushered in by pain, and where recurring pains, with or without ague-like paroxysms, render it probable that the cause is gall stones in the common duct.
4. In empyema of the gall bladder.
5. In peritonitis, starting in the right hypochondrium.
6. In abscess around the gall bladder or bile ducts, whether in the liver, or under, or over it.
7. In some cases where, although gall stones may have passed, adhesions remain and prove a source of pain and illness.
8. In fistula, mucus, muco-purulent, or biliary.
9. In certain cases of chronic jaundice, with distended gall bladder dependent on some obstruction in the common duct, although the suspicion of malignancy be entertained. In such cases the increased risk must be borne in mind, as malignant disease may be the cause of the obstruction, and operation in such cases is attended with greater danger than ordinary.
10. In phlegmonous cholecystitis and in gangrene, if the case be seen and recognised at a sufficiently early stage of the disease.
11. In gunshot injury, or in stab wounds over the region of the gall bladder.
12. In suspected rupture of the gall bladder without external wound.
13. In some cases of chronic catarrh of the gall bladder or bile ducts.
14. In suppurative cholangitis.

Of the operative measures undertaken for diagnosis, sounding and aspiration of the gall bladder must be referred to. The former is both uncertain and dangerous, and may more safely be replaced by a small exploratory incision, which can be extended for treatment if required. Aspiration of a distended gall bladder through the unopened abdomen, though apparently a simple procedure, is not unattended with danger, death having followed in more than one instance. Murphy says it is fatal in 25 per cent. It is only in very exceptional cases that it can do any good. Here, again, I infinitely prefer to make a small exploratory incision, then to empty the gall bladder by the aspirator, and afterwards to explore the bile passages with the fingers. If, however, aspiration without exploration be decided on, a small needle should be used and the cyst emptied as far as possible, in order that intracystic tension may not lead to extravasation through the needle puncture. With regard to technique, it may be well for us first to consider a simple abdominal section in the gall-bladder region.

Position of Patient.—It has been proposed to suspend the upper part of the trunk when the patient is on the operating table by straps placed under the armpits in order to allow the intestines to fall away from the liver, and thus to afford a better view of the parts to be operated on, just as the Trendelenburg position does in the case of the pelvic organs; but this is inconvenient, and, as a rule, impracticable. I think it will be found that a narrow firm sand bag covered with flannel, placed at the liver level on the operating table under the back, which is thus arched over it, will do all that we require, as it brings the common duct from 2 to 3 inches nearer the surface, opens out the costal angle, and tends to make the intestines slip down from the liver.

Incision.—A vertical incision in the right semilunar line is the one I prefer. If more room be required it can be obtained either by extending the vertical incision or adding a transverse one, either internal or external to the vertical line. It is advisable to avoid as much as possible dividing muscular fibres, as they retract and can only with difficulty be approximated in suturing the wound. The transversalis fascia and peritoneum are best divided together, without separating them, as together they form a strong membrane, whereas singly they are too weak to hold stitches if there be tension. Kocher employs an oblique incision parallel to the right costal margin, which of necessity divides muscle, but which exposes the parts freely, as the wound at once gapes widely. Although for cholecystotomy the transverse incision is quite unnecessary and to my mind usually inadvisable, where it is necessary to expose or manipulate the common duct it presents the advantages of better exposure and more efficient drainage.

Arrest of Hæmorrhage.—As a rule pressure forceps and an occasional ligature effect all that is desirable or necessary, but in cases of long-standing jaundice, especially if accom-

panied by malignant disease, additional precautions are advisable on account of the tendency to hæmorrhage. In such cases I give chloride of calcium in 30-gr. doses every four hours for a few days before operation to make the blood more plastic and to lessen the tendency to bleeding. In jaundiced cases I also prefer to ligature all bleeding points rather than to trust to pressure forceps for hæmostasis.

In order to remove the danger of ventral hernia, I suture the abdominal wall, layer by layer, employing chromic catgut for the deep and silkworm gut for the superficial sutures; but if the operations have been very prolonged and the patient be suffering from shock it may be advisable to suture the parietes *en masse*, using silk of medium thickness, and passing the sutures from within outward at intervals of half an inch. Where it is considered wise to employ gauze packing it is well to apply the sutures and to leave them long, so as to be able to draw the edges of the wound together after the tampon has been removed, without putting the patient to the inconvenience of inserting stitches later. Cholecystotomy or cholecystostomy is unquestionably the operation *par excellence* in the treatment of gall stones.

The indications for the operation are:

1. In all cases where the gall bladder is sufficiently large to permit of drainage after gall stones have been removed from the gall bladder or ducts.
2. In cases where there are gall stones in the ducts but the patient is too ill to bear a prolonged operation, the gall stones being deliberately left for treatment by some solvent solution.
3. In empyema of the gall bladder, where that viscus is not too much disorganised to be permitted to remain.
4. In certain cases of chronic catarrh of the gall bladder or bile ducts.
5. In suppurative cholangitis.
6. In obstruction of the ducts due to hydatid disease.
7. In dropsy of the gall bladder.
8. In idiopathic rupture, or laceration, or gunshot injury of the gall bladder or ducts.
9. In cases of choledochotomy in order to avoid tension in the sutured duct.
10. In certain cases of obstructive jaundice dependent on malignant tumour, which is occluding the ducts; but in these cases the increased danger must be borne in mind.
11. In some case of phlegmonous cholecystitis or gangrene, when the patient is too ill to bear cholecystectomy.

Technique.—If the gall bladder be found distended it is aspirated and then opened, the parts being isolated by thin flat sponges. If, as is often the case, the gall bladder be small and atrophied, it will probably be surrounded by adhesions, which require careful separation. If the operation has been undertaken for gall stones they are removed by means of forceps passed through the opening in the gall bladder, or better still by the scoop; if large they may be directly needled or crushed before removal.

Supposing the bile passages to have been cleared, or for some reason further manipulations are considered inadvisable; a non-perforated rubber drainage tube is inserted into the gall bladder, and the edges of the incision in it are brought up and sutured by fine chromic catgut, to the aponeurotic layer of the abdominal wall, not to the skin, thus avoiding the danger of fistula. Where there is time I prefer to suture the peritoneum of the gall bladder to the parietal peritoneum and the mucous margin to the aponeurosis, thus more completely shutting out the peritoneal cavity.

In ordinary simple cases the drainage tube is shortened on the second and third day and removed on the fourth or fifth, but if there have been much cholecystitis or cholangitis it is better to drain for a week, or even longer. Dr. Terrier, in operating for suppurative cholangitis, suggests that the discharge should be bacteriologically tested from time to time, and that the tube should not be removed until the bile is sterile or nearly so, for at first it is loaded with organisms, and if all goes well these diminish, and finally disappear.

In the case of a contracted gall bladder situated deeply, the operation may be both prolonged and difficult. Where I have been unable to bring up the gall bladder, I have at times succeeded in tucking down the parietal peritoneum to the edges of the gall-bladder opening, and so effecting suture of the contiguous margins; but in several cases where I could not effect this, I have with complete success utilised the right border of the omentum by suturing it to the margin of the gall-bladder opening and to the parietal peritoneum, thus forming a tube of peritoneum around the drainage tube and shutting out the general peritoneal cavity. Where occlusion in this way cannot be effected, the insertion of a drainage tube into the gall bladder without suture of the margins to the

parietes seems to be efficient. The method of packing around the tube with iodoform gauze in such cases is one in which I have great faith, as I have found it to be a safe means of occluding the peritoneal cavity.

Dr. Murphy has invented a "button tube" for use in cases where the gall bladder is contracted and cannot be brought to the surface, but the contracted gall bladder is as a rule too small to permit of its employment.

In certain cases, where the gall bladder is contracted, after opening and clearing it and the ducts, the incision may be immediately closed by suture, the line of incision being isolated by a gauze drain; or in other cases cholecystectomy may be performed, and the cystic duct ligatured, the gauze drain being again employed; or, as suggested by Morison, the incision in the gall bladder may be deliberately left patent, and the bile allowed to run into the right kidney pouch, from which it is removed by a drainage tube in the loin. The operation of cholecystotomy has been modified in several ways; for instance, the opening has been closed and then fixed to the abdominal incision, which has been closed over it. This operation is known as cholecystendysis (Courvoisier). It can only be of use where the ducts are known to be thoroughly cleared, where there is no fear of subsequent stricture, and where there is no catarrh or inflammation of the bladder or bile passages.

The so-called "ideal" operation suggested by Langenbuch,¹ in which the opening in the gall bladder is sutured and the viscus returned without fixing it to the surface, has been thought by some to be attended with greater risk than the operation of cholecystostomy. I think the serious objection to it is that the benefits of drainage are not obtained as in the operation of cholecystostomy. A real use for this modification is found in cases where it has been necessary to open a contracted gall bladder, but where, on account of the depth, it is found impracticable to bring it to the surface, as also when, from the contraction of its cavity, it is found impossible to insert a drainage tube.

Another modification suggested by Bloch is that in two stages: The operation consists in incising the parietes until the peritoneum is reached, the cavity of which, however, is not opened; the wound is then packed with gauze and left for several days, when adhesions will have formed between the gall bladder and the parietal peritoneum. The gall bladder can then be safely opened. Or if the peritoneum be opened the gall bladder is fixed, but not opened until adhesions have formed. As the method is only available for the simplest cases—namely, where the gall bladder is distended, as it does away with all chance of exploring the ducts by the hand within the abdomen, and as it is frequently followed by fistula, I would only mention it to condemn it as clumsy and uncertain, and no safer than the ordinary operation of cholecystotomy. I think, however, this operation presents considerable advantages when undertaken in the presence of chronic jaundice associated with distended gall bladder, as in such cases there is usually malignant disease either of the head of the pancreas or of the bile ducts, and when the peritoneum is exposed but not opened pressure can be applied to arrest the oozing of blood, which cannot always be stopped by ligatures or forceps.

CALCULI IN THE COMMON BILE DUCT.

After cholecystotomy has been performed and the gall bladder cleared of its contents, it may be found impracticable to remove other gall stones impacted in the cystic or common ducts, either by means of forceps or scoop introduced through the gall-bladder incision, or by digital manipulation from without. Under such circumstances the gall stones may be crushed or removed by "choledochotomy," or under certain circumstances "cholecystenterostomy" may be performed.

Before proceeding to a description of cholelithotomy or choledochotomy it may be advisable to refer to the special condition of cholelithiasis, where the gall stones are in the common duct, which, according to Courvoisier, occurs in about 4 per cent. of all cases; in my own cases I found the percentage to be no less than 20.

Fenger has dwelt on the great importance of the ball-valve action of floating stones in the common bile duct as explaining the remittences of jaundice in many cases where it might have been supposed that the jaundice would be per-

sistent. The gall bladder is frequently atrophied, so that jaundice with distended gall bladder is presumptive evidence in favour of malignant disease, but that jaundice without distended gall bladder favours the diagnosis of cholelithiasis.

I think the condition is due to a combination of causes:

1. All cases of cholelithiasis are accompanied by inflammation of the walls of the biliary passages, as shown by the almost universal presence of adhesions round the gall bladder.
2. Gall stones in the common duct seldom cause complete obstruction, either because they are floating in the duct or because they only partially fill it; there is, therefore, no sufficient backward pressure to cause dilatation of the gall bladder.
3. The muscular coat of the gall bladder, though feeble, is sufficient to enable it to contract, which it doubtless does in efforts of expulsion when there is any obstruction in the common duct.
4. The contraction from being at first intermittent becomes in the long run constant, and the accompanying inflammation fixing the contracted gall bladder, it atrophies.

The special symptoms pointing to stone in the common duct are absence of enlargement of the gall bladder, with frequent mild attacks of pain followed by an intensification of the jaundice, which in many cases never quite disappears. The pain is in the epigastric rather than in the right hypochondriac region, and passes through to the right dorsal or lumbar rather than to the right infrascapular region. Where jaundice is continuous and intense without much variation, especially if the gall bladder be enlarged, there is usually malignant disease, or some other cause than gall stones.

1. In a few cases a concretion of moderate size may be manipulated backwards into the cystic duct, and thence extracted by scoop or forceps; but it is seldom practicable, on account of the contraction of the gall bladder and cystic duct.
2. Occasionally a small stone may be pressed into the duodenum, but this is rare, and not infrequently it may be pushed into a dilated diverticulum of Vater, and so be missed, and the whole operation rendered futile.
3. Cholecystostomy with subsequent treatment by solvent injections is well worth bearing in mind, on account of its simplicity and safety, together with the certainty of giving immediate relief with a modicum of risk, and putting the patient in better condition for subsequent treatment, should such be necessary.
4. Cholelithotripsy, or crushing the stones *in situ*.
5. Needling concretions through the duct walls.
6. Choledochotomy, or incising the duct and removing the calculi.
7. Choledochoduodenostomy, or reaching the duct through the opened duodenum, for stones impacted in the duodenal end of the duct.
8. Cholecystenterostomy, or short-circuiting the obstruction.
9. Choledochenterostomy, or uniting the duct to the gut in case of largely dilated ducts; and
10. Choledochostomy, or attaching the dilated duct to the surface and draining it.

Cholelithotripsy was first suggested and put in practice by Mr. Lawson Tait. The ordinary incision for cholecystostomy may be large enough; but if the patient be stout, or the ducts cannot easily be reached, it may have to be increased so as to allow the hand to pass into the peritoneal cavity, in order that the fingers may locate and grasp the stone *in situ*. If the right hand be used, the thumb will enter the foramen of Winslow, and the index finger will pass in front of the common duct, or, in case of the left hand being used, these digits will be reversed, when the whole force of the opposing finger and thumb can be brought to bear on the concretion.

Usually the gall stone flattens out into a wafer shape, and in altering the position of the digits, the edges of the wafer are compressed, and the concretion is either converted into pulp or breaks into innumerable fragments, which can be passed on towards the duodenum or subsequently washed through.

The disadvantages of cholelithotripsy are, first, the fear of seriously damaging the ducts by the manipulation; and, secondly, the danger of leaving fragments permanently in the passages, which may then grow by further deposit of cholesterine. The first danger need not be feared, if the finger and thumb only be used as the compressing force.

The question of needling impacted concretions by the passage of a needle through the walls of the duct was raised by my colleague Mr. Teale in 1895. The operation is generally regarded as inadvisable on account of the almost unavoidable damage to the ducts and the fear of infection. The latter danger of leaving fragments in the ducts may be overcome by at the same time performing cholecystostomy and later syringing the ducts with sterilised water until they are clear of debris, or if any fragments should be unavoidably left, by applying through the fistula some solvent solution, such as olive oil or 5 per cent. *sapo animalis*.

Choledochotomy is the name given to the operation of in-

cising the bile ducts for the extraction of gall stones, in cases where the concretions cannot otherwise be removed. Courvoisier performed the first successful operation on January 22nd, 1890, and two others, both successful, in February and March of the same year.

The cholecystostomy incision must be extended to 4 or 5 inches, and after the separation of adhesions the wound must be held open by a retractor on the right and preferably by an assistant's finger on the left, as the fingers can at the same time retract the pylorus and stomach on the left, and the colon and omentum below without inflicting injury, as retractors are apt to do. A sandbag placed under the lower dorsal spine makes the region of the common duct more accessible.

The operator should now, after having separated adhesions, have a good view of the common duct within a free border of the lesser omentum, and on inserting his left index finger into the foramen of Winslow, or on grasping the duct between the index finger and thumb, he can, without difficulty, bring the duct well within reach, the concretion making a distinct projection.

Over the prominent stone, a vertical incision as low down and as far forward as possible should be made, sufficiently large to allow the concretion to pass. Through this opening a probe can be passed or even a finger, in order to explore the ducts thoroughly, so as to remove other stones if present. The incision in the duct may now be closed by interrupted sutures in two layers, first the muscular and fibrous coats being approximated, and secondly the serous margins; but if this be impracticable, the muscular and serous coats may be sutured together and additional Lembert's sutures may be applied over all.

If a gall stone be felt in the hepatic duct, it may be reached by opening the common duct and passing a scoop or forceps through this opening. Fenger has in this way explored the ducts and removed stones quite in the liver substance.

A large drainage tube should be left in the abdomen, and it may be wise to gently pack iodoform gauze over the duct, and to bring the end out by the side of the drainage tube, if there be any doubt about the closure of the wound in the duct. The tube may be removed in twenty-four or forty-eight hours if there be only a little discharge, and the gauze should be gradually removed day by day until it is all away.

Mr. Knowsley Thornton has recommended drainage by a glass tube above the pubes, and Mr. Morison by a stab wound in the right loin. Mr. Frederick Page considers all drainage unnecessary, but Mr. Greig Smith opposes this view, and I have lost a case of cholecystectomy through neglecting to drain.

Choledochoduodenostomy is a term applied to the modification of the operation of choledochotomy, where a gall stone is impacted in and removed from the diverticulum of Vater, through an incision in the duodenum.

McBurney,² Pozzi, and Kocher have performed this operation with success. The operation is difficult, and should only be done where the gall stone cannot be brought into the more accessible part of the common duct.

Cholecystectomy, or excision of the gall bladder, indications:

1. Bullet wound or other wound of the gall bladder where suture is impracticable.
2. In phlegmonous cholecystitis.
3. In gangrene of the gall bladder.
4. In multiple or in perforating ulcers.
5. In chronic cholecystitis from gall stones where the gall bladder is shrunken and too small to drain safely, and where the common duct is free from obstruction.
6. In mucous fistula due to stricture of the cystic duct.
7. In hydrops of the gall bladder due to stricture of the cystic duct, as also in certain cases where the gall bladder is very much dilated.
8. In certain cases of empyema where the walls of the gall bladder are very seriously damaged, and in
9. Cancer of the gall bladder.

It is contra-indicated in all cases of non-patency of the common duct, and it should not be resorted to under the idea that it will prevent the formation of gall stones, as calculi may form in the bile ducts within the liver or below it.

The operation is performed through the usual incision for reaching the gall bladder.

The peritoneum covering the gall bladder just below the liver is incised parallel to the hepatic margin, and the gall bladder is freed by means of a finger or a blunt dissector as far back as the cystic duct, the latter part of the dissection

being done subperitoneally as much as possible. The duct is ligatured and divided, the stump being aseptically either by the cautery or by the application of a 1 in 500 solution of perchloride of mercury. The peritoneum is now sutured over the top of the duct. There is usually little bleeding, and that is easily arrested by sponge pressure or by one or two ligatures.

Unless there be oozing, or unless the wound has been infected by pus or gall-bladder secretion, drainage may perhaps be thought unnecessary, but the adage, "When in doubt drain," is a good one, and it can do no harm to leave an efficient drainage tube in the right kidney pouch for twenty-four or forty-eight hours after extirpation of the gall bladder. Packing with iodoform gauze in these cases is better than using a tube, as it serves the double purpose of arresting oozing from the lacerated liver and acting as a drain.

Cholecystenterostomy consists in establishing an artificial opening between the gall bladder and intestine, preferably the duodenum. The first operation was performed by Winiwarter, in 1880. In its place it is an extremely useful operation, but as it leaves the cause of the obstruction unremedied, it ought not to be resorted to, except occasionally, where a more radical operation is impracticable or inadvisable. Dr. Murphy, of Chicago, favours the procedure before other methods.

My own conclusions are that the operation is indicated :

1. In biliary fistulæ, depending on stricture or other permanent occlusion of the common duct.
 2. Very occasionally in cancer of the head of the pancreas or malignant tumour of the common duct, leading to chronic jaundice and distended gall bladder; but in such cases the mortality will necessarily be so high that the justifiability of the operation is questionable.
 3. Occasionally in impaction of gall stones in the ducts, where the patient is not in a fit condition to bear the more prolonged operation of separating adhesions, and crushing or removing the concretion by choledochotomy.
 4. In certain cases of obstruction of the cystic duct where cholecystectomy is impracticable.
- Contra-indications.*—1. In any obstruction of the bile ducts which can be cleared away with reasonable probability of success.
2. In malignant disease of the head of the pancreas or common bile duct, leading to distension of the gall bladder, the mortality is so great (8 operations with 7 deaths) that it is hardly worth doing.
 3. In contracted gall bladder, where it is impracticable to insert the button.
 4. Where there are extensive adhesions which would lead to kinking of bowel.
 5. In very large gall bladder with obstruction of the cystic duct, where cholecystectomy should be done.

The operation may be performed (a) by means of simple suture, (b) by means of my decalcified bone bobbin, (c) by means of Murphy's button. I decidedly prefer to make the union by means of the Murphy button, both on account of its efficiency and the expedition with which it can be used.

The operation of cholecystenterostomy is performed through the same incision as is made for cholecystotomy, and after the gall bladder has been aspirated and the intestine clamped either by an india-rubber tourniquet or by intestinal clamps the junction is effected. If sutures be employed a semicircle of interrupted silk sutures is inserted to unite the contiguous serous surfaces of the gall bladder and gut, the viscera are then opened, and the mucous margins of the two openings are united by interrupted catgut stitches, after which the circle of catgut stitches and then the circle of serous sutures is completed. If the bone bobbin be used two continuous sutures only are employed, a silk stitch to unite the serous surface one-third or half an inch from the visceral openings, and a catgut suture to join the mucous margins of the visceral openings.

The whole process occupies a very short time, and is really very simple; it is, however, necessary to bear in mind that the button has to separate by causing the approximated margins of the openings to slough, and that the true bond of union is only slight at first, so that it is well to keep the patient absolutely quiet for at least a fortnight, lest the new bond of union should give way and permit of extravasation of the visceral contents.

In considering the question of cholecystenterostomy it has to be borne in mind that the operation can only be done when the gall bladder is of moderate size or dilated, and that it is inapplicable to the difficult class of cases where a gall stone is impacted in the common duct and the gall bladder is atrophied. When it can be done the anastomosis should be

made to the duodenum, but if preferred a free loop of jejunum may be selected and brought over the hepatic flexure of the colon. In only exceptional cases should the anastomosis be made between the gall bladder and colon.

From a report up to date which Dr. Murphy has been so kind as to furnish me, cholecystduodenostomy has been performed with the aid of the anastomosis button in sixty-seven non-malignant cases, with only three deaths. My own cases are eleven in number, with one death.

Choledochostomy is the term applied to the direct surface drainage of a dilated bile duct, of which Iverson and I have each had a successful case. The operation was first performed by Terrier.

Where it is impossible to clear the ducts, instead of performing choledochostomy, the operation of choledochenterostomy may be done, the union of the dilated duct to the duodenum being made by means of a Murphy's button. The operation was first performed by Sprengel.

In concluding my lectures I must thank you, Mr. President, and my audience, for the kind forbearance which you have shown in listening to details which I fear may at times have been somewhat wearisome. My wish has been to show the importance of the subject I have taken up, and some of the results which may be looked for by appropriate surgical treatment, and if I have succeeded in exciting your interest and in making it evident that in the greater number of diseases of the gall bladder and bile ducts surgical treatment is well worth considering, after a fair, though not too prolonged, trial of medical means, my aim will have been accomplished.

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REMARKS ON THE MORPHOLOGY AND CHEMICAL PRODUCTS OF THE DIPLOCOCCUS PNEUMONIÆ, AND SOME RESULTS OF VACCINATION.

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In these remarks it is merely intended to give a brief summary of some of the results obtained, reserving the discussion of these and the mass of details to a subsequent communication.

Sputa were obtained from cases of pneumonia in various hospitals, at all stages of the disease. In every case the capsulated diplococcus was found. It always existed as a paired body, and it was invariably found in association with numerous other bacteria. An attempt was made to isolate these organisms by means of plate cultivations. The pyogenic cocci were nearly always found, especially the staphylococcus aureus. Various bacilli also were cultivated, some decolorising with Gram's solution. Inoculation of many of these bacilli was attended with negative results, but one of them induced an illness characterised by wasting and chronic diarrhoea. Further cultivations of this bacillus proved it to be the bacillus coli communis.

Special mention must be made of the circumstance that the bacillus septicæmiæ of rabbits is frequently found in human saliva. It looks like a diplococcus, but can easily be known by its characters and growth in gelatine and agar. If this organism gains admission to the culture, its intense septicæmic effect will be found in all sub-cultures. Its effects have frequently been mistaken for those of the diplococcus.

The diplococcus is a very difficult organism to work with. In the first place, it is by no means so easy to get a pure growth as might be supposed, it varies often in virulence, and the broth cultures must be quickly utilised (within two or three days), as the virulence quickly dies out. This refers chiefly to broth cultivations; if kept on blood the organism will always retain its virulence for a considerable period.

The rabbit is well known to be highly susceptible to this coccus, and this was the animal selected for the investigation, a few side experiments were also made on guinea-pigs.