test meal revealed no free acid. There were no obvious abnormalities of the stomach and gall-bladder on x-ray examination. Dietetic treatment was given. On Feb. 23, 1946, he reported again at the out-patient department. He had been free from symptoms for seven months, but during the preceding few weeks he had renewed attacks of pain, mostly after milk and porridge. Once more there was no abnormality of the gall-bladder. He was completely free of symptoms after some days of complete rest and frequent small meals with little fat and without milk.

Conclusions

From a total of 220 extirpations of the gall-bladder and 174 resections of the stomach over a period of 3½ years it was observed that gallstones occurred on six occasions shortly after a resection. As a result we believe that it is necessary, when patients complain of pain after resection, to look for the cause in the gall-bladder rather than the anastomosis. Some arguments support the view that the Billroth II type of operation may further the formation of gallstones.

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DIATHERMY DISSECTION OF THE GALL-BLADDER

BY

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Eight years ago I published, jointly, an illustrated article on Thorek's method of electrosurgical obliteration of the gall-bladder without drainage (Bailey and Love, 1939). Briefly, this entailed partial removal of the gall-bladder and coagulation by diathermy of the strip which was left *in situ* attached to the liver. The main advantage of this operation, as compared with the standard cholecystectomy, was that drainage was unnecessary. We reported a series of 129 consecutive and unselected cases with no mortality, and in only seven were there post-operative complications. These included four patients who developed infection of the abdominal wall, one whose wound broke down on the fourth day, and two cases of biliary fistula following drainage of the common bile duct. These fistulae eventually closed spontaneously. We mentioned that in some cases the gall-bladder possessed a more or less complete mesentery, so that it was possible to remove the entire organ without damage to the liver capsule. The gall-bladder bed was then coagulated with a diathermy button and the peritoneal edges were sutured over the exposed area. If the area was too wide to cover with peritoneum a detached piece of falciform ligament or an omental graft was sometimes tacked over the surface.

The very satisfactory results which followed the diathermy dissection of the gall-bladder in cases in which the organ was loosely attached to the liver prompted one to apply it as a routine in all cases suitable for a complete cholecystectomy. Exceptions are patients in whom a cholecystostomy is the more prudent measure, or occasionally the gall-bladder is so embedded in the liver that it is easier and safer to perform Thorek's operation.

Diathermy dissection of the gall-bladder is, as a rule, an easy operation, and differs from the standard cholecystectomy only in that, after identification and ligation

of the cystic duct and artery, a diathermy knife is used to divide the peritoneum on either side of the gall-bladder (Fig. 1). The viscus is then dissected from its bed with the diathermy knife, care being taken that the knife is applied to the gall-bladder rather than to the bed. Thus, Glisson's capsule is unlikely to be damaged, and subsequent seepage of bile and blood is reduced to a minimum. If necessary any raw areas from which bile or blood exudes are coagulated with a diathermy button (Fig. 2). During dissection of the gall-bladder from its bed a constant watch must be kept for the presence of a cholecysto-hepatic duct (Fig. 3). This is an uncommon anomaly—for example, Flint (1923), in his review of 200 cases of the anatomy of the bile ducts and vessels (in which only 69 followed the textbook description), did not record a case. Neuhof and Bloomfield (1945) describe two cases in which the duct measured about 2 mm. in diameter. In one case it was unrecognized, and a fistula resulted which closed in forty-five days, and in the other the duct was recognized at operation and closed with a purse-string suture. When the surgeon is satisfied that the gall-bladder bed is dry the area is covered by approximation of the peritoneal flaps, reinforced, if necessary, with a graft of omentum or falciform ligament. The wound is then closed without drainage.

Excluding cases in which drainage of the common bile duct, or very occasionally the gall-bladder bed, was considered necessary, I have during the past 10 years operated on 332 cases of gallstones. The procedures adopted were: cholecystostomy, 18; Thorek's operation, 81; diathermy dissection, 233.

Cholecystostomy was advisable in some cases of empyema of the gall-bladder, or when the viscus was buried in adhesions so that anatomical dissection was impracticable, especially if the patient was obese. In these cases safe surgery resolved itself into removal of calculi and drainage of the gall-bladder.

Thorek's operation was performed when the biliary tract could be exposed, so that the cystic duct and artery could be ligated with safety. When a fibrotic and contracted gall-bladder is partially buried in the liver removal of part of the viscus, with coagulation of the embedded portion, entails less risk than a complete cholecystectomy. It should be mentioned, however, that many of the early

FIG. 1.—Division of the peritoneum with a diathermy knife in dissection of the gall-bladder.

FIG. 2.—Coagulation of raw area with a diathermy button.

FIG. 3

cases in which Thorek's procedure was adopted would now, with increased experience, be dealt with by diathermy dissection.

Diathermy dissection was performed in 233 cases and two deaths occurred. The first fatality involved a somewhat feeble elderly male, who faded away a few days after the operation in what was apparently a combination of cholaemia, uraemia, and myocardial failure. The second fatality was due to failure to recognize the presence of a cholecysto-hepatic duct, and the history was as follows:

A woman aged 43 had a pre-operative diagnosis of gall-stones confirmed by a cholecystogram. The patient was somewhat obese, and the operation was rendered more difficult than usual, as adhesions between the diaphragm and upper surface of the liver prevented more than a moderate degree of rotation of that organ. However, there was not much difficulty in clearly exposing the junction of the cystic and common hepatic ducts, and the cystic duct and cystic artery were ligated in the usual manner. During diathermy dissection of the gall-bladder from its bed some discharge of bile was noticed, but this ceased when the raw area was coagulated with a diathermy button. Owing to the limited rotation inspection of the gall-bladder bed was somewhat restricted, but as it appeared to be dry the peritoneum was sutured over it and the wound was closed.

On the following day the patient complained of epigastric distress, and a tense swelling was obvious in this region. Some of the sutures were removed and sinus forceps introduced. About 15 oz. (425 ml.) of bile escaped, and a rubber drainage-tube was introduced. A biliary fistula developed, but there was no evidence of obstruction of the biliary ducts, and the faeces were well coloured. It was hoped that the fistula would close spontaneously, but after three months hope began to fade. It was proposed to temporize for another three months, and then, if necessary, dissect out the fistula and implant it into the jejunum. However, the patient developed menopausal melancholia, which was doubtless aggravated by her unfortunate condition. She became uncontrollable, constantly removing her dressings and making determined efforts to return to her home. Surgical intervention was obviously imperative, so the wound was reopened and the track of the fistula dissected from the abdominal wall and traced towards the under surface of the liver. The fistula was implanted in a loop of the upper jejunum. Three days later the wound broke down and the biliary discharge reappeared. The mental condition of the patient deteriorated and she died about one month later.

I was not at that time aware of the existence of the cholecysto-hepatic duct, and attributed the fistula to "slipping" of the ligature which was applied to the cystic duct. This was not very convincing, as the duct was easily identified and secured with No. 60 thread, which has a better frictional grip than catgut. On reviewing the case I now believe that the fistula was caused by division of an unrecognized cholecysto-hepatic duct.

Advantages of Diathermy Dissection

The average mortality of standard cholecystectomy in skilled hands is about 2%. Lung complications, including pulmonary embolus, account for the majority of fatalities. Both these conditions are predisposed to by restricted respiratory excursions. In the standard cholecystectomy a puddle of bile and blood collects beneath the diaphragm and the necessary drainage-tube causes further subphrenic irritation. Diaphragmatic spasm results, and inefficient aeration of the lungs predisposes to basal atelectasis. Also, as the piston-like action of the diaphragm is an important factor in maintaining an efficient venous circulation, impaired movements encourage venous stagnation, and associated risk of thrombosis and possible embolus accrues.

If Thorek's (1938) operation or diathermy dissection is employed, subphrenic irritation is reduced to a minimum. The risk of the above-mentioned complications is proportionately reduced, and the mortality is in the region

of 0.5%. In addition, convalescence proceeds more smoothly, tedious but non-lethal chest complications are uncommon, and thrombosis of the iliac or femoral veins is almost unknown. Also, the necessity for frequent removal of bile-soaked dressings is obviated, with the advantage that the patient is spared routine disturbances, and the time of the nursing staff is not occupied with the continual preparation of dressing trolleys. Finally, it is exceptional for the wound to heal other than by first intention.

Exploration of the Common Bile Duct

This procedure considerably increases the risk of the operation, and some authorities quote a mortality figure of 10% when drainage of the common duct is performed. The increased mortality is partly due to the fact that in many cases drainage is required when obstruction is present, as a result of which cholangitis and cholaemia are often associated complications. In addition, the insertion of a T-shaped tube into the common bile duct is time-consuming and necessitates intricate manoeuvres under deep anaesthesia. However, palpation of the duct may reveal an obvious calculus which demands removal, and in other cases it is usually wise to explore the common duct if there have been attacks of colic or recurrent jaundice, or if obvious dilatation of the duct is discovered at operation. If exploration is necessary the cystic duct is usually slit up and the incision carried into the common duct as far as required. Through the aperture the duct can be explored with a malleable probe, which, in the absence of obstruction, should readily pass into the duodenum. Desjardin's forceps are useful for withdrawing calculi or debris from the duct.

At the operation doubt not infrequently arises as to whether the common bile duct should be explored or not. The surgeon is naturally averse to adding unnecessarily to the length and difficulty of the operation, but, on the other hand, it is even less desirable to overlook such a condition as a calculus impacted in the duct.

Choledochography

This is a simple procedure which provides valuable information concerning the condition of the common bile duct. Information regarding the calibre of the duct, the discovery of a filling defect due to a calculus, and the presence of obstruction from other causes such as pancreatic compression are of value to the surgeon who is pondering on the necessity for exploring the common duct.

Technique.—It is preferable that the choledochogram is taken before cholecystectomy is performed, as an intact cystic duct is more readily manipulated than a blind stump. Traction on the gall-bladder renders the cystic duct taut, and the wall is nicked with sharp-pointed scissors at a point about half an inch (1.25 cm.) from its fusion with the hepatic duct. A malleable cannula is the most suitable instrument for the introduction of the opaque medium, but an ordinary cannula or a short length of suitable rubber tubing may be used. The cannula, attached to a suitable syringe, is introduced through the cystic duct, and about 5 ml. of lipiodol is injected during a period of five seconds. As the last of the fluid is introduced the exposure is made and should be as short as possible. The film is ready for inspection within five minutes. It is important to remove metal retractors and unnecessary instruments from the field of operation immediately before the film is taken, otherwise opaque shadows may obscure the duct. During the interval of waiting the surgeon can perform appendicectomy if advisable, or else proceed with the gall-bladder dissection. In order to facilitate manipulation of the ducts the gall-bladder should be retained until a decision has

been reached as to the necessity for exploring the common duct. If exploration is deemed necessary the slit in the cystic duct is extended to permit the introduction of suitable instruments. In cases of infection or back pressure, drainage of the duct can be obtained, if necessary, by a T-shaped tube introduced through the opening. If exploration of the common duct is not required, then the cystic duct is divided and the distal end is ligated with silk or thread. Cholecystectomy is then performed.

By revealing a filling defect a choledochogram may prevent the surgeon from overlooking some condition which demands exploration of the duct. Thus a calculus may be more or less embedded in the wall of the duct and cause no appreciable obstruction to the passage of an instrument.

FIG. 4.—Choledochogram showing distended duct and patent lumen.

On the other hand, the choledochogram may indicate that although the duct is distended the lumen is patent, and consequently exploration is not necessary. Fig. 4 illustrates such a case: the duct was about three times the normal size, but lipiodol flowed freely into the duodenum. An unnecessary exploration was therefore avoided. The condition was due to subacute pancreatitis and consequent compression of the duct. Simple diathermy cholecystectomy was per-

formed; the patient made a good recovery and has remained in good health.

Post-cholecystectomy Syndromes

After removal of the gall-bladder, and possibly a handful of stones, the patient naturally hopes to be rid of symptoms. But disappointments following cholecystectomy are not uncommon, though most of them are preventable or curable. Briefly, some of the more important causes of post-cholecystectomy syndrome are as follows:

1. A calculus, or calculi, may remain undetected in the hepatic or common duct and give rise to further attacks of biliary colic or obstruction. The hepatic duct should be explored if a stone is removed from the common duct, as retrograde migration of small calculi occasionally occurs. In some conditions, such as acholuric jaundice, small cinder-like stones are found in all the ducts, and irrigation of the hepatic duct is advisable in order to dislodge calculi which might not otherwise be detected. A choledochogram is a valuable precaution against overlooking a calculus in the common duct.

2. Chronic parenchymatous pancreatitis is often associated with infection of the biliary tract. Symptoms, including epigastric discomfort and flatulent dyspepsia, persist owing to deficiency of the external secretion, but they are relieved by the administration of a pancreatic preparation, such as "liquor pancreaticus," "panteric," or "pancrobilin." I referred to this syndrome many years ago (Love, 1933).

3. Spasm of the muscle of Oddi is alleged to be the cause of colicky pain which occasionally occurs after chole-

cystectomy. Cases apparently of this nature have been described by Maurice Lee (1946). Antispasmodics certainly relieve the symptoms, and pethidine, 25–50 mg., should be prescribed thrice daily, combined with an early morning saline aperient.

4. Dilatation of the stump of the cystic duct is apt to occur after cholecystectomy unless the duct is ligated within a quarter of an inch (0.6 cm.) of the common duct. Petersen (1946) records 42 cases, and states that the "re-formed gall-bladder" may be as large as a normal organ. I have on two occasions removed a single calculus from the stump of the cystic duct. In both cases intermittent jaundice was the predominant symptom, presumably due to exacerbations of infection around the stone and consequent pressure on the converging hepatic duct. A dilated cystic duct is usually buried in adhesions, and may be recognized only after probing through an incision in the common duct.

5. Conditions unrelated to the biliary apparatus may account for symptoms which persist after cholecystectomy. The appendix should always be removed during the operation of cholecystectomy, unless local conditions or the general condition of the patient preclude further operative intervention. The retention of a pathological appendix sometimes accounts for post-cholecystectomy symptoms. Presumably, when the gall-bladder is removed adjacent organs are scrutinized, in which case a peptic ulcer is recognized and receives appropriate treatment. Occasionally adhesions develop between the pylorus or duodenum and the gall-bladder bed. These are apt to cause angulation or even obstruction, but are unlikely to occur if the gall-bladder is removed by diathermy dissection.

Summary

When cholecystectomy is performed diathermy dissection of the gall-bladder is the method of choice. In the large majority of cases this is a simple and safe procedure, and the dry abdomen can be closed without drainage, with the great advantage that subphrenic irritation and consequent spasm of the diaphragm are reduced to a minimum. As compared with the standard operation chest complications and pulmonary embolism are much less common—a fact which is reflected in the lower mortality and reduced morbidity.

The technique and value of choledochography are discussed, and a summary is presented of some of the causes of post-operative persistence or recurrence of symptoms.

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A report of the Joint Tuberculosis Council (copies may be obtained from the Hon. Sec., 1, Becket Street, Oxford) sets out its views on the organization of the tuberculosis service under the National Health Service Act. The Council advocates that the Minister of Health should appoint a Central Advisory Committee for Tuberculosis and that there should be at least one member on the Central Health Services Council with a special interest in tuberculosis. It suggests that the Minister should create a direct link between the Regional Hospital Authority and the Tuberculosis Dispensaries, and that the tuberculosis service should be co-ordinated on a Regional level, each Regional Board appointing a tuberculosis committee for that purpose. The board should also appoint a Regional tuberculosis physician. The Council emphasizes that the health visitors provided by local authorities should hold either the Certificate of the Tuberculosis Association or the Health Visitors' Certificate, or preferably both. Local health authorities should establish tuberculosis subcommittees empowered to delegate to local voluntary care committees some functions relating to prevention, care, and after-care. The Council regards such voluntary agencies as important in tuberculosis work.