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Per-operative cholangiography and post-cholecystectomy biliary strictures

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Summary

A series of 78 patients with post-cholecystectomy biliary strictures have been examined. The majority (71%) did not have per-operative cholangiography at the time of initial cholecystectomy. Of the remainder, inadequate views were obtained in two patients and incomplete information was associated with subsequent common bile duct damage. In addition the study was performed after the common bile duct had been transected in a further two cases. The use of per-operative cholangiography in patients undergoing cholecystectomy is advocated, and the advantages and disadvantages of such an approach examined.

Introduction

Iatrogenic damage represents the most frequent cause of benign bile duct stricture and over 90% of such injuries follow cholecystectomy *(1,2,3)*. The precise reason for operative injury may not be evident in an individual case but, undoubtedly, a number of such strictures follow damage inflicted during 'uneventful, routine' cholecystectomy *(4)*. Some are associated with careless dissection and some are inflicted during attempts to control haemorrhage. The anatomical arrangement of the biliary structures, particularly in the region of Calot's Triangle, varies widely *(5)*. The cystic duct may be short, may join the common hepatic duct high, close to the hilus, or very low at the ampulla and in some instances may drain into a right hepatic sectoral duct joining the main biliary channel well below the hilus of the liver (Fig. 1). Such variation in anatomy may not be easily revealed during dissection but is usually displayed by per-operative cholangiography. While currently used principally to detect the presence or absence of stones in the common bile duct, routine use of per-operative cholangiography for this purpose remains the subject of some controversy *(6,7)*. However, the use of the technique early in the operation provides precise anatomical information, and may lower the incidence of accidental injury to major structures.

Patients and methods

Seventy-eight patients with stricture of the external biliary tree following cholecystectomy have been referred over an 8 year period. There were 34 men and 44 women (age range 27–76, mean 49.9, years). Sixty-seven patients (86%) had had a simple cholecystectomy, and 11 cholecystectomy with exploration of the common bile duct and T-tube drainage. Precise information was not obtainable in 6 patients, but of the remaining 72, 51 (71%) did not have per-operative cholangiography at the time of cholecystectomy. Per-operative cholangiography was performed in the remaining 21 patients and led to exploration of the common bile duct in only six. In two patients poor quality pictures were obtained with inadequate and incomplete views of the proximal and distal duct. In both these cases the cannula had been introduced into a very short cystic duct and had been advanced into a narrow common bile duct which was interpreted as a long cystic duct. In both cases the surgeon had divided the common bile duct on the basis of this

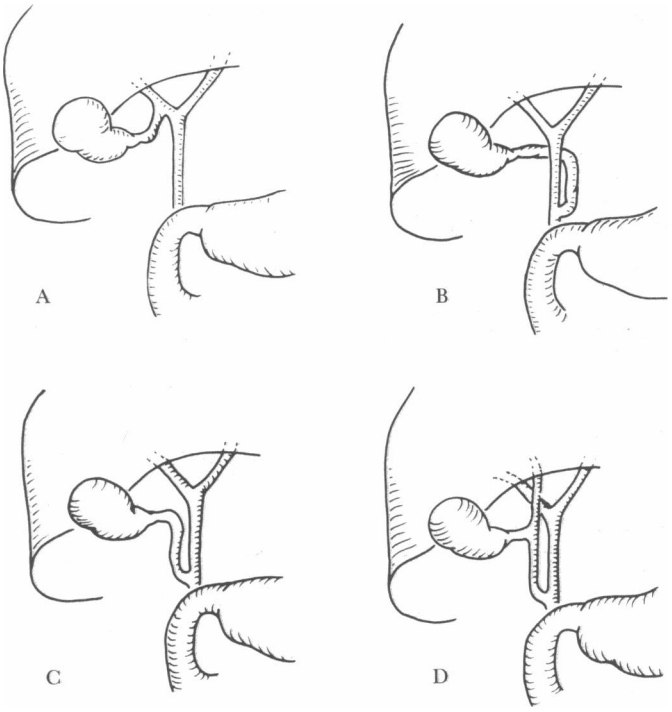

FIG. 1 The cystic duct joins the common hepatic duct at an angle and on its right side in approximately 65% of cases. In the remainder it can enter the main right hepatic duct (A) or take a variable course around the common hepatic duct before joining it (B, C). The cystic duct may join a right hepatic sectoral duct which itself may join the common biliary channel at a variable level and site (D). (See Fig. 3.)

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information. In 2 further patients per-operative cholangiography was only performed after considerable dissection, the injury to the common bile duct then being displayed (Fig. 2). Thus, of the 21 patients submitted to per-operative cholangiography only 17 (24% overall) had adequate views.

In 15 of the 78 patients ductal damage had been noted at the time of cholecystectomy. This included both patients who had had cholangiography after ductal damage. None of the remaining 13 in whom injury was recognised at the time of operation had had cholangiography.

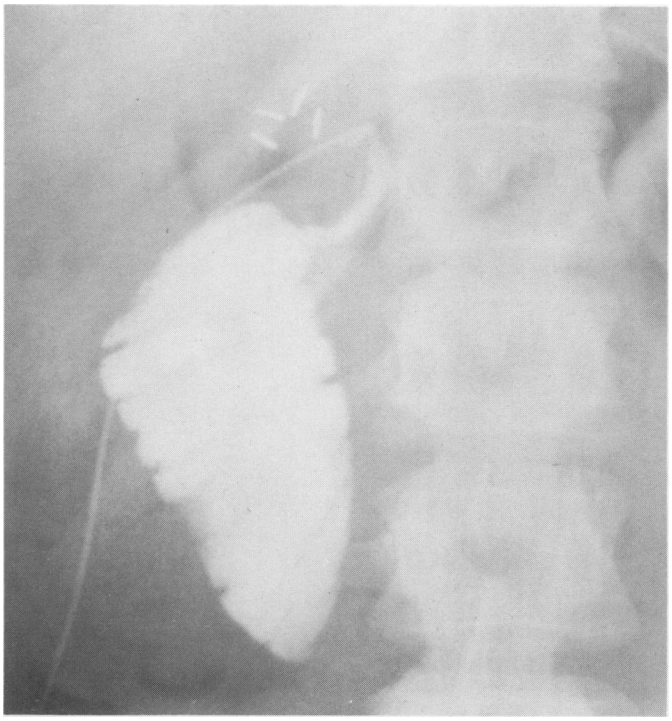

FIG. 2 Operative cholangiogram performed after extensive dissection in Calot's triangle, showing complete absence of filling of the proximal ducts. Subsequently it was found that the duct had been transected.

Discussion

The causes of biliary tract damage during cholecystectomy have been described in detail and include a 'lack of anatomical knowledge and of appreciation of anomalies' *(8)*. The presence of anomalous biliary and vascular anatomy is in fact the rule rather than the exception, with less than 50% of individuals exhibiting a commonly described pattern *(9)*. A method to display the anatomy before excessive dissection of Calot's triangle is commenced, is clearly desirable. Per-operative cholangiography was first used in 1932 *(10)* and with the improvement of imaging systems, has become easier and less time-consuming *(11)*.

The value of routine cholangiography, principally to detect the presence of ductal stones, is well-established *(12,13)*. Although most authors mention its use to demonstrate the anatomy, the same importance does not seem to have been attached to this aspect of the investigation. Indeed, the use of the technique remains a subject of controversy with some surgeons critical of the cost, the additional time required, the irradiation risk, and the incidence of false-positive and negative results. This has led to the advocacy of selective cholangiography using precise criteria *(14,15)*.

The technique of the procedure of operative cholangiography is important but not all authors emphasise that cannulation of the cystic duct early in the procedure will enable precise information to be obtained without recourse to extensive dissection along the length of the cystic duct, to display its junction with the common hepatic duct. Such early cannulation can usually be obtained without difficulty and we have found that the cholangiography catheters described by Berci *(16)* of value in this regard. Initial injection of a small amount of constrast to detect stones can be followed, if necessary, by a larger quantity when the surgeon is satisfied either that there are no stones present or indeed if the duct requires formal exploration. Following exploration stones may be left in the common duct in approx 5% of cases *(12,17)*. This incidence of retained stones may be reduced to 1% or less by carrying out post-exploratory cholangiography *(18)* or choledochoscopy *(19)*. While these techniques are usually recognised as of value principally in the detection of a residual stone they may also demonstrate unsuspected ductal damage, as in 2 patients in this series.

It is important to emphasise that the use of per-operative cholangiography on its own is not enough and there must be adequate full visualisation of the entire ductal system as it must not be forgotton that stricture may already exist. Awareness of this fact may help obviate subsequent legal implications. Misinterpretation can easily occur if there is a short cystic duct, the cannula having been advanced so far that it passes into the common bile duct, as occurred in 2 patients in this series, or if the cystic duct enters an anomalous right hepatic duct. In both instances if there is no distal obstruction contrast passes rapidly down the common duct and into the duodenum there being no display of the proximal ducts. The surgeon can then easily mistake the common biliary channel for a long cystic duct, ligate it and remove it along with the attached gallbladder as occurred in 2 patients in this series.

The authors perform per-operative cholangiography as a routine during cholecystectomy both to detect ductal stones and to display anatomy. The procedure is valuable in both respects but care must be taken to perform the examination early during the operation, to ensure suitable positioning of the cannula and to obtain adequate filling of both proximal and distal ducts (Fig. 3). Failure to fulfill these criteria may leave the surgeon in ignorance of anatomical variations or may actually mislead him. Adequately performed operative cholangiography although unlikely to prevent biliary ductal damage in all cases, may help to reduce its incidence.

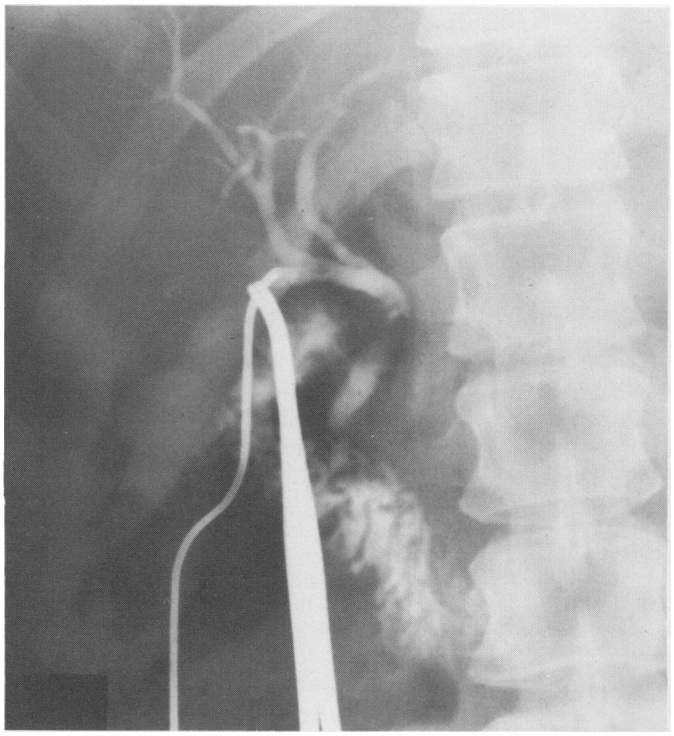

FIG. 3 Cannula inserted into the cystic duct early in the procedure. The operative cholangiogram showed the cystic duct entering the right main hepatic duct. There is a low junction of the right and left hepatic ducts, and several filling defects in the common bile duct.

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Notes on books

Current Surgical Therapy 1984–1985 by J L Cameron. 613 pages, illustrated. Decker/Blackwell, Oxford. £53.50.

There are 135 chapters written by acknowledged experts on gastrointestinal surgery, the spleen, hernia, endocrine, breast and chest wall therapy followed by respiratory and vascular treatment. The final chapters deal with trauma and emergency care, soft tissue and skin injuries and pre- and postoperative care. Practical advice is given but there are no references to the literature.

Standards for Intensive Care Units. 20 pages. Paperback. Intensive Care Society. £3.00.

This booklet brings together information on the design and operation of intensive care units. It discusses the structure and the services followed by staffing, administration, operational policies and management of equipment.

Microbes and Infections of the Gut edited by C S Goodwin. 377 pages, illustrated. Blackwell, Oxford. £27.50.

This comprehensively reviews all aspects of gut infections including infantile and childhood diseases, tropical disease, public health aspects and surgically important infections. The last chapter reviews the gut bacteria in relationship to carcinoma of the colon.

A Colour Atlas of Cardiac Surgery. Congenital Heart Disease by J L Monro and Gerald Shore. 192 pages, illustrated. Wolfe Medical, London. £55.

The book starts with various approaches to the heart followed by illustrated accounts of each of the commonly performed operations for congenital heart disease. As always, the illustrations are of great clarity and the colour reproduction is superb.

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