serum CCK, however, is found in patients with chronic alcoholic pancreatitis[6] and regarded as a consequence rather than the cause of the disease.

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Imaging of the common bile duct

EDITOR,—The finding by Hainsworth *et al*, that the combination of clinical history, liver function tests, and ultrasonography generated a negative predictive value of 91% in the age range 21–88 (unit A) (*Gut* 1994; **35:** 991–5), implies that, in subgroups such as the elderly, characterised by a high degree of prior probability of cholelithiasis,[1] and, hence, choledocholithiasis,[2] the negative predictive value of these diagnostic criteria might well be lower, because the negative predictive power is inversely correlated with the prevalence of the condition under diagnostic consideration.[3 4] With increasing age, therefore, there should be greater justification for routine imaging of the common bile duct either by ERCP or by cystic duct cholangiography, in prospective candidates for laparoscopic cholecystectomy.

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EDITOR,—We have read with great interest the study by Hainsworth *et al* (*Gut* 1994; **35:** 991–5) regarding the options for managing the common bile duct in patients undergoing laparoscopic cholecystectomy. However, there are several points that need further discussion.

Firstly, the criteria for selecting patients with high risk of common bile duct stones are vaguely described. There is no precise description of what they have considered a dilated or non-dilated common bile duct on ultrasound scan. Besides, isolated increases in serum alkaline phosphatase or serum bilirubin, or both are poor indicators of common bile duct obstruction (as described by themselves). Liver function tests, however, have a high specificity and negative predictive value, especially if γ glutamyltransferase and aminotransferases are also raised.[1 2]

Secondly, it is surprising that 12 patients were found to have a positive cholangiogram in unit A, but only four patients had common bile duct stones after ERCP. To assume that stones had passed spontaneously is rather speculative. Thus, eight of 12 patients should be considered to have had an unnecessary exploration of the common bile duct. Moreover, we cannot find any explanation why ERCP was delayed up to 96 days after laparoscopic cholecystectomy.

Thirdly, we believe that the risk of a false-positive cholangiogram secondary to air bubbles in the common bile duct during laparoscopic cholecystectomy may be higher because the abdomen is insufflated with carbon dioxide and this gas could pass through the cystic duct during the insertion of the catheter.

Fourthly, Hainsworth *et al* state that 'selective cholangiography misses a proportion of common bile duct stones'. Prospective randomised studies have not proved this, however,[3 4] and suggest that cholangiography can be omitted in patients without indications of common bile duct disease.

Fifthly, no description of the treatment and follow up of patients in whom peroperative cholangiography failed is provided.

Sixthly, assuming that a false-positive result occurs in 0·4–6·5% of the cases when cholangiography is used on routine basis[1 4] common bile duct exploration in patients without choledocholithiasis would be increased. As common bile duct exploration, either supraduodenal or endoscopic, is associated to a higher risk of complications, the unsolved question is 'Does routine cholangiography really reduce morbidity and death rates in laparoscopic cholecystectomy?'

Finally, we believe that preoperative identification of patients with 'no/low' risk of choledocolithiasis in which peroperative cholangiography is not indicated[1 2] should be carried out by means of a clinical history, liver function tests, and ultrasonography. This policy will result in a lower incidence of false-positive cholangiograms without increasing the risk of retained common bile duct stones.

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Reply

EDITOR,—We are glad that our paper has stimulated discussion and debate in this controversial field. Drs Mayol and Alvarez Fernandez-Represa seek clarification of the criteria used for categorising patients into 'low' and 'high' risk groups for bile duct stones. We relied on a combination of history, liver function tests, and bile duct diameter. In our paper, we set out individual features from the history, such as jaundice or pancreatitis, and showed their ability to predict the presence of duct stones.

The working definition of a dilated common bile duct used in the study was a diameter greater than 8 mm. While the probability of finding duct stones rises with increasing bile duct diameter,[1] interpretation of bile duct diameter is not a precise science. Bile duct diameter increases with advancing age, definitions of 'normality' vary between studies, and the overall sensitivity for detecting bile duct stones with ultrasonography ranges from 25–55%.[2 3]

Liver function tests are a very imprecise and non-specific way of detecting bile duct stones, which is the reason why most investigators have used a combination of factors to assign patients to 'high' and 'low' risk groups. We must take issue with our correspondents' interpretation of the large series reported by Voyles *et al.*[4] These authors do not cite any data on the sensitivity, specificity, and positive or negative predictive values of liver function tests in themselves. We await with interest full publication of the results from Mayol *et al.*

We were initially surprised too that, at the time of post-cholecystectomy ERCP, eight of 12 ducts had cleared. One of the eight had a complete block at the lower end of the common bile duct. The stone was sufficiently small to be removed at ERCP but, postoperatively, the patient developed pain and clearly passed the stone before ERCP was done. We believe that the other seven had stones in their bile ducts at the time of surgery for these reasons. Firstly, we used high quality C-arm image intensification, which is associated with a less than one per cent risk of false positivity.[5] This is dynamic and permits further flushing and assessment under vision where doubt exists. Secondly, the 16% detection rate for bile duct stones on unit A coheres with reported rates of 13–20% in patients undergoing open cholecystectomy.[6] Thirdly, spontaneous passage of duct stones is well reported in the context of acute pancreatitis and our paper suggests this is also true of patients undergoing laparoscopic cholecystectomy. Laparoscopic cholecystectomy may differ from conventional cholecystectomy in the degree of manipulation of the gall bladder before the cystic duct is ligated. It is certainly possible that some stones spill over during the procedure, only to subsequently pass spontaneously.

We know of no evidence that low pressure pneumoperitoneum encourages the formation of air bubbles in the biliary tree. First principles suggest that intra-abdominal pressure would equilibriate between the peritoneal cavity and bile duct lumen across the bile duct wall, in much the same way as

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