Sclerosing cholangitis and biliary tract calculi—primary or secondary?

C S Pokorny, G W McCaughan, N D Gallagher, W S Selby

Abstract

The clinical features of 61 patients with sclerosing cholangitis were reviewed. This group included 23 patients with biliary tract calculi, commonly considered as excluding the diagnosis of primary sclerosing cholangitis. The aim of this study was to compare these 23 patients (group A) with 38 patients with sclerosing cholangitis free of calculi (group B). Both groups had the following features in common: (i) age at presentation, (ii) incidence of inflammatory bowel disease, (iii) extent of radiological disease, (iv) prevalence of HLA-B8 and DR3 haplotype, (v) incidence of cholangiocarcinoma, and (vi) progression to hepatic transplantation (mean follow up 49.9 months). All patients in group A were asymptomatic at diagnosis compared with 23 of the 38 patients (61%) in group B. Recurrent ascending cholangitis occurred in 12 patients in group A (52%) and two patients (5%) in group B. The similarity between the two groups was maintained when the nine patients in group A who developed calculi after sclerosing cholangitis was diagnosed were excluded. It is concluded that choleodocholithiasis is part of the spectrum of primary sclerosing cholangitis and that it is not necessary to invoke choleodocholithiasis as the initial lesion of the bile ducts in such patients.

(Gut 1992; 33: 1376–1380)

Primary sclerosing cholangitis is a chronic inflammatory disorder which results in fibrosis and obliteration of the intrahepatic and/or extrahepatic bile ducts leading to the typical radiological appearance of stricturing and beading of the biliary tree. The aetiology is unknown, although immunological factors have been implicated. Between 50% and 75% of cases are associated with inflammatory bowel disease, mostly ulcerative colitis. Ultimately biliary cirrhosis results and the median survival has been estimated to be 12 years. The diagnosis of primary sclerosing cholangitis is based on typical clinical, histological, and radiological features. By conventional criteria, it is excluded by (a) the presence of biliary tract calculi, (b) a history of previous biliary tract surgery, and (c) the presence of a cholangiocarcinoma. Despite these criteria, patients with biliary tract calculi have been included in several studies of primary sclerosing cholangitis. We have also encountered a number of patients with the radiological features of sclerosing cholangitis but in whom there were also biliary tract calculi. The aim of the present study was to review a group of patients in whom sclerosing cholangitis was present. Twenty three of these patients had, or subsequently developed, intrahepatic and/or extrahepatic bile duct calculi. The features of these patients were compared with those of patients without calculi. The results indicate that both groups of patients can be considered to have primary sclerosing cholangitis.

Methods

PATIENTS

Sixty one patients diagnosed as having sclerosing cholangitis were seen between 1984 and 1991 at the Gastroenterology and Liver Centre of the Royal Prince Alfred Hospital, Sydney. The diagnosis was made in 57 patients by endoscopic retrograde cholangiopancreatography and in three by percutaneous transhepatic cholangiography. In one patient, the diagnosis of sclerosing cholangitis became apparent only after examination of the native liver after hepatic transplantation. All radiological examinations were reviewed by at least two gastroenterologists and two radiologists. The date of diagnosis was defined as the point when radiological evidence of intrahepatic and/or extrahepatic duct strictures were first demonstrated.

The patients were divided into two groups based on whether or not biliary tract calculi were present, either at diagnosis or at any stage during the course of their illness. Their clinical features were compared, as was the extent of disease, the clinical course, and prognosis. The mean period of follow up was 49.9 months (range 1–192 months).

HLA class I and class II alleles were serologically typed at the Tissue Typing Laboratory, NSW Division, Australian Red Cross Society Blood Transfusion Service using the standard National Institutes of Health test for class I and a modified National Institutes of Health test using immunomagnetic beads for class II. Anti-neutrophil cytoplasmic antibody was measured in 31 patients by indirect immunofluorescence. The substrate used was an alcohol fixed neutrophil rich preparation with patient sera screened at a dilution of 1:20.

Comparisons between the two groups were made using Fisher’s exact test.

Results

In 23 patients (group A) biliary tract calculi were present either at the time of diagnosis (14 patients) (Fig I) or subsequently developed some time after the diagnosis of sclerosing cholangitis had been made (nine patients). The calculi in these latter nine patients were found at intervals varying from 18 to 156 months (mean 58.7 months) after sclerosing cholangitis had been...
presented with right upper quadrant pain, 1:

Figure

intrahepatic evident with are and extrahepatic of retrograde cholangiopancreatography ulcerative colitis Sclerosing cholangitis and biliary tract calculi bile ducts present Endoscopic fever, and who the patient in the intrahepatic and with passage progressive liver failure
tomty Thirty eight patients (group B) course was calculi either referred in Table I. Because of the similarities between sclerosing cholangitis the two more ally diagnosis was while was patients (52%) in group A, they had ulcerative colitis, which was primary or secondary? the more ally diagnosis was while was patients (55%) in group A. They had ulcerative colitis, which was

Figure 1: Endoscopic retrograde cholangiopancreatography performed on a patient with ulcerative colitis who presented with right upper quadrant pain, fever, and jaundice. Beading and structuring of the intrahepatic and extrahepatic bile ducts are evident with numerous calculi being present in the intrahepatic ducts (arrowed).

diagnosed (Fig 2). In each case, the calculi were found on repeat endoscopic retrograde cholangiopancreatography, performed because of recurrent ascending cholangitis (six patients) or progressive liver failure (three patients). Five of these nine patients had undergone cholecystectomy from three months to 30 years previously, making passage of a stone from the gall bladder an unlikely cause of the biliary tract calculus. Thirty eight patients (group B) did not have biliary calculi either on diagnosis or during the course of their illness. Biochemical analysis of calculus was not performed.

The clinical features of the two groups as well as the subgroups in group A – that is, those who had calculi at the time sclerosing cholangitis was diagnosed and those who developed calculi after sclerosing cholangitis was diagnosed, are shown in Table I. Because of the similarities between the two subgroups in group A, they are hereafter referred to as one group. There were proportionally more women in the group with calculi than in the group without (16 of 23 in group A, 17 of 38 in group B; p=0.04). The mean age at diagnosis was similar in both groups. No difference was found in the frequency of associated inflammatory bowel disease: in group A, 12 patients of the 23 (52%) had ulcerative colitis, while in group B, 21 patients (55%) had ulcerative colitis and two (5%) had Crohn’s disease. HLA typing was performed in 13 patients in group A and 14 in group B. HLA-B8 was present in six of 13 patients in group A (46%) and six of 14 (43%) in group B, while HLA-DR3 was found in six patients tested in group A (46%) and five in group B (36%). Antineutrophil cytoplasmic antibody was measured in 31 patients (12 in group A and 19 in group B). Of patients in group A, six (50%) had detectable antibody with a perinuclear pattern on immunofluorescent staining compared with three of 19 (16%) in group B. All patients in group A were symptomatic at initial presentation (11 patients had right upper quadrant pain, eight had cholangitis, two had pruritus, and two had symptoms related to hepatic decompensation). This was the case whether or not calculi were present at the time. In contrast, only 23 of the 38 patients in group B (61%) had clinical manifestations of their disease (cholangitis in eight patients, right upper quadrant pain in six patients, pruritus in three patients, and evidence of hepatic decompensation in six patients; p=0.0002). The remainder were asymptomatic and were being investigated for abnormal liver function tests.

The radiological extent of bile duct disease was similar in the two groups (Table II). Of the patients in group A, the biliary calculi were present in the intrahepatic ducts in six patients, in both intrahepatic and extrahepatic ducts in a further six and in the extrahepatic ducts alone in 11 patients. In only three patients were single stones found. The remaining 20 had multiple biliary calculi of varying size. Thirteen patients in group A (57%) and seven in group B (18%) had associated cholecystolithiasis, diagnosed either before or at the time of diagnosis of sclerosing cholangitis (p=0.002). This excess was largely accounted for by women (10/13 in group A vs two of seven in group B).

Twelve patients (52%) in group A had recurrent episodes of ascending cholangitis during follow up compared with two patients in group B (5%). This difference was highly significant (p=0.0005).

Nineteen patients in group A underwent various therapeutic manoeuvres in an attempt to clear the biliary tree of calculi. Endoscopic sphincterotomy was performed in 16 patients with successful removal of all calculi in seven. In a further five, percutaneous removal of residual intrahepatic stones was possible. Five of these 12 patients had endoscopic insertion of a biliary stent. A further five underwent percutaneous stent insertion in order to achieve biliary decompression. Despite these measures, biliary tract calculi recurred in all 12 patients after removal.

Nine patients in group A (39%) and eight patients in group B (21%) underwent hepatic transplantation because of progressive disease (p=0.07; NS). Uncontrollable intrahepatic sepsis, the result of recurrent calculi, complicated the course of three patients in group A, and was the indication for hepatic transplantation. Cholangiocarcinoma occurred in three patients in group A (13%) and five patients in group B (13%).

Six deaths occurred in group A (26%) and 10 in group B (26%) during the follow up period. Three patients in group A died after liver transplantation (one week to 19 months post transplant), two died from postoperative complications after cholecystectomy and one from massive hepatic necrosis of unknown cause. In group B, four patients died as a result of complications after hepatic transplantation (one week to 18 months post transplantation), four others...
died of progressive hepatic failure while awaiting transplantation and two died from hepatic tumours. On histological review, it was felt that these two tumours were more consistent with hepatocellular carcinoma than cholangiocarcinoma. These two patients have not been included in the analysis of cholangiocarcinomas in the two groups.

**Discussion**

The findings of this study show that a number of patients with sclerosing cholangitis also have biliary tract calculi. The similarity of the clinical features, the frequency of associated inflammatory bowel disease, age at diagnosis, and radiological extent of disease all indicate that these patients can be considered to have primary sclerosing cholangitis rather than sclerosing cholangitis secondary to calculi damaging the biliary tree and resulting in stricture formation. The clinical and radiological features are similar to those reported in other studies of primary sclerosing cholangitis. In addition, the prevalence of HLA-B8 and DR3 was similar in the two groups although not as high as reported in previous studies of primary sclerosing cholangitis. The prevalence of HLA-B8, however, was similar to that found in an earlier study of primary sclerosing cholangitis in an Australian population. Antineutrophil cytoplasmic antibody, with a perinuclear pattern on immunofluorescent staining has been reported to have a sensitivity of 65% and specificity of 100% in primary sclerosing cholangitis. In the present study, such antibody was detectable in six of 12 patients (50%) examined in group A and three of 19 in group B (16%). Finally, nine patients with typical primary sclerosing cholangitis subsequently developed biliary tract stones after a mean interval of 58.7 months from diagnosis.

The pathogenesis of the calculi found in patients with primary sclerosing cholangitis may depend on several factors. Increased bile lithogenicity is suggested by the significantly higher frequency of choledocholithiasis in the patients with bile duct stones (57%), which contrasts with the reported prevalence of 10–20% in developed countries. This would also account for the significantly greater proportion of women in group A, as the incidence of gall stones is higher in women than men and in this study the excess of patients with gall bladder calculi was made up by women. Biliary stasis would further predispose to the development of stones in the presence of lithogenic bile. The same is true of recurrent ascending cholangitis. It could be argued that in the patients with choledocholithiasis the calculi had passed from the gall bladder into the bile ducts. Cholecystectomy had been performed for suspected biliary colic three months to 30 years previously, however, in five of nine patients who went on to develop biliary tract calculi, discounting this theory. Further evidence against this is the finding that the occurrence of choledocholithiasis was much higher in patients in group A who underwent cholecystectomy (16/23; 70%) than is generally seen in association with cholecystolithiasis. Finally, the presence of multiple intrahepatic calculi is not typical of the pattern of
Sclerosing cholangitis and biliary tract calculi – primary or secondary?

### TABLE I  Clinical features of 61 patients with sclerosing cholangitis

<table>
<thead>
<tr>
<th>Group A</th>
<th>Subgroup 1 (n=14)</th>
<th>Subgroup 2 (n=9)</th>
<th>Total (n=23)</th>
<th>Group B (n=38)</th>
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<tbody>
<tr>
<td>Sex</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>6 (43%)</td>
<td>1 (11%)</td>
<td>7 (30%)</td>
<td>21 (55%)</td>
</tr>
<tr>
<td>Female</td>
<td>8 (57%)</td>
<td>7 (99%)</td>
<td>15 (67%)</td>
<td>17 (45%)</td>
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<tr>
<td>Mean age at diagnosis (yr)</td>
<td>48 (36-78)</td>
<td>46 (33-60)</td>
<td>47 (33-78)</td>
<td>43 (18-74)</td>
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<tr>
<td>EHD only</td>
<td>3 (21%)</td>
<td>1 (11%)</td>
<td>4 (17%)</td>
<td>15 (39%)</td>
</tr>
<tr>
<td>EHD and IHD</td>
<td>2 (14%)</td>
<td>2 (22%)</td>
<td>4 (17%)</td>
<td>11 (29%)</td>
</tr>
<tr>
<td>Calcification</td>
<td>2 (14%)</td>
<td>2 (22%)</td>
<td>4 (17%)</td>
<td>11 (29%)</td>
</tr>
</tbody>
</table>

### TABLE II  Radiological involvement and biliary tract calculi

<table>
<thead>
<tr>
<th>Group A (n=23)</th>
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<th>Subgroup 2 (n=9)</th>
<th>Total (n=23)</th>
<th>Group B (n=38)</th>
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</thead>
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<tr>
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</tr>
<tr>
<td>IHD only</td>
<td>6 (43%)</td>
<td>3 (33%)</td>
<td>9 (39%)</td>
<td>15 (40%)</td>
</tr>
<tr>
<td>IHD and EHD</td>
<td>5 (36%)</td>
<td>2 (22%)</td>
<td>7 (30%)</td>
<td>14 (37%)</td>
</tr>
<tr>
<td>EHD only</td>
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<td>6 (67%)</td>
<td>14 (61%)</td>
<td>21 (55%)</td>
</tr>
<tr>
<td>EHD and IHD</td>
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<td>6 (67%)</td>
<td>9 (39%)</td>
<td>15 (40%)</td>
</tr>
<tr>
<td>IHD only</td>
<td>4 (29%)</td>
<td>2 (22%)</td>
<td>6 (26%)</td>
<td>10 (26%)</td>
</tr>
<tr>
<td>IHD and EHD</td>
<td>2 (14%)</td>
<td>2 (22%)</td>
<td>4 (17%)</td>
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</tr>
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<td>Calcification</td>
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</table>

The authors express their thanks to Mrs Jan Austin for typing the manuscript. This paper was presented in part, in abstract form to the Combined Quadrennial Scientific Meeting of the New Zealand Society of Gastroenterology and the Gastroenterological Society of Australia in September, 1991.
