Indications and therapeutical options in hepatolithiasis

J. M. Ramia, A. Palomeque, K. Muffak, J. Villar, D. Garrote and J. A. Ferrón

Unit of Hepato-Biliary-Pancreatic Surgery and Liver Transplantation. Service of Gastrointestinal Surgery. Hospital Virgen de las Nieves. Granada, Spain

ABSTRACT

Objective: to present our experience with the treatment of hepatolithiasis.

Patients and methods: experimental design: a retrospective study. Every patient operated on during 2002-2004.

Results: mean age was 68.2 years. All patients were male. Two patients had been operated on before. The other three suffered from: monolobar Caroli's disease (1), cholangiocarcinoma (1), and hepatolithiasis without clear etiologic factors (1). All of them had intrahepatic and extrahepatic lithiasis. Clinical signs included: pain in RUQ, fever, and jaundice. Bilirubin was 3.5 mg/dl (min: 1.7, max: 5.9), GGT: 676.2 IU/l (min: 29, max: 2039), and alkaline phosphatase: 400 IU/l (min: 100, max: 1136). Abdominal ultrasounds always correctly diagnosed HL. CT (3 patients) only diagnosed one case. ERCP (3 patients) and cholangio-MRI (2 patients) always diagnosed HL correctly. Surgical procedures were: hepatojejunostomy with lavage of bile duct (2 cases) and hepatectomy (3 cases) –both right (1) and left (2). We always performed an intraoperative ultrasonography and cholecystoscopy. Morbidity was: biliary fistula (1 case) treated by percutaneous drainage. No mortality occurred. Median stay was 8.8 days. Mean follow-up is 12 months (min: 11, max: 20). No relapse has been observed.

Conclusions: HL is infrequent in Spain. Surgical treatment, usually liver resection, obtains good results with low morbidity and mortality.

Key words: Hepatolithiasis. Surgery. Review. Treatment.

INTRODUCTION

Hepatolithiasis (HL) is defined as the presence of calculi in the intrahepatic bile ducts (1-3). It is a common disease in Southeast Asia and, in that region, is seen in 10-15% of patients with cholelithiasis (2-11); in contrast, it is very uncommon in Spain and other Western countries, where it is only observed in approximately 1% of these patients (8,12). Untreated HL can give rise to cholangitis, hepatic abscesses, biliary cirrhosis, portal hypertension, and cholangiocarcinoma (4,12). HL is associated with high morbidity, around 20-30% (2,13-15), and a mortality oscillating between 1 and 10% (2,13-15). We present a series of five patients treated in our department.

PATIENTS AND METHODS

We performed a retrospective study of all patients undergoing surgery for HL in the Department of Surgery, Hospital Virgen de las Nieves from 2002 through 2004. The following variables were studied –demographic: age, sex and associated risk factors; clinical: signs and symptoms of HL; diagnostic: blood tests, diagnostic methods used and diagnostic sensitivity; surgical: primary surgical technique performed, previous operations, postoperative morbidity and mortality, and length of stay; and rate of recurrence. Patients were seen at the Department's outpatient clinic in August 2004 to update their follow-up data.

RESULTS

The mean age of patients was 68.2 years (range: 31-86 years), and all were male. A history of previous biliary tract surgery was found in two patients. The first patient had undergone cholecystectomy with choledochotomy

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Correspondencia: J. M. Ramia. C/ Buensuceso, 6, 4º D 18002 Granada. e-mail: jose_ramia@hotmail.com

for cholelithiasis and choledocholithiasis, and two years later presented with HL, probably of residual origin, as we were unable to establish whether these calculi could have been present at the time of the first operation. In the second patient, a cholecystectomy with hepatojejunostomy had been performed for cholelithiasis and choledocholithiasis. A stenosis at the hepatojejunostomy was detected during follow-up and was treated on two occasions by means of stents inserted by percutaneous transhepatic cholangiography (PTC); this stenosis was the cause underlying the development of HL. The three patients who had undergone no previous surgery had: right-sided monolobar Caroli's disease (1 patient), cholangiocarcinoma in the left lobe (1 patient), and left hepatolithiasis with no associated etiological factors (1 patient). All patients in this series had both intrahepatic and extrahepatic lithiasis. Clinical presentation was very similar in all patients, with some or all of the typical symptoms in Charcot's triad: right hypochondrial pain, fever, and jaundice. Two patients also had vomiting (Table I).

Mean bilirubin before the operation was 3.5 mg/dl (range: 1.7-5.9 mg/dl), GGT was 676.2 IU/l (range: 29-

2039 IU/l), and alkaline phosphatase was 400 IU/l (range: 100-1136 IU/l). Ultrasounds, performed in all patients, always detected HL, and also detected a dilatation of intrahepatic bile ducts in 4 cases. CT scans were performed in three patients, only detecting the HL in one of them, but enabling an adequate evaluation to be made in the patient with cholangiocarcinoma. In this patient a mass was observed in segments II-III, and vascular relationships were also reported. ERCP (endoscopic retrograde cholangiopancreatography) was performed in three patients and correctly diagnosed HL. Magnetic resonance cholangiography, performed in two patients, was diagnostic in both cases (Table I). A PET scan was performed in the patient with cholangiocarcinoma, and was reported as suggestive of malignancy.

The operation performed was adapted to the individual characteristics of each patient and the etiology of HL. Hepatojejunostomy with lavage of the biliary tract was performed in the two patients who had undergone previous surgery. Hepatectomy was performed in 3 cases: right hepatectomy in the patient with right monolobar Caroli's disease, left hepatectomy with resection of the

Table I. Cases

	1	2	3	4	5
Age	69	31	80	75	86
Previous surgery	Cholecystectomy + choledocotomy (2 years before)	No	No	No	Yes. Cholecystectomy + HY
Clinical aspects	Fever	Pain, fever, jaundice	Pain, fever, vomiting, jaundice	Pain, fever, vomiting, jaundice	Fever, jaundice
Associated factors	Previous choledocolithiasis	Caroli monolobar	Cholangiocarcinoma	No	Prothesis due HY stenosis
BT (mg/dl)	5.9	2.1	2.8	5	1.7
GGT (U/l)	2039	479	29	700	134
FA (U/l)	1036	182	100	370	312
Ultrasound	LIH	Dilatation IHBD R	LIH. stenosis BD. IHBD dilatation	LIH. Cholelithiasis	LIH. IH BD dilatation
CT	No diagnostic	LIH. Dilatation R IHBD	Hypodense tumor SG. II-III	No	No
Cholangio-MRI	No	LIH. IHBD R dilatation	LIH. BD stenosis	No	No
ERCP	No	Yes. LIH y LEH. Dilatation right VB	Yes	Yes	No
Surgery	HY + washing BD	Right hepatectomy	Left hepatectomy + Resection bile duct	Left hepatectomy	New HY
Follow-up (M)	9	18	8	8	9
Morbidity	No	No	No	Biliary fistula	No
Mortality	No	No	No	No	No
EM	6	9	13	8	8
Classification	IE LR	IE R	IE L	IE L	IE LR

HY: hepatojejunostomy; LIH: intrahepatic lithiasis; IHBD: intrahepatic bile duct; BD: bile duct; SG: segment; LEH: extrahepatic lithiasis; EM: mean stay; IE: intrahepatic and extrahepatic; LR: left and right; L: left; R: right.

extrahepatic bile duct in the patient with cholangiocarcinoma, and a left hepatectomy in the patient with left-sided HL. Intraoperative ultrasounds and choledochoscopy were performed in all cases in order to confirm the absence of further calculi. The cholangiocarcinoma was a moderately differentiated tumor, 5 cm in diameter (T3N1M0). Morbidity was observed in a single case, and was due to a low output biliary fistula that was treated by percutaneous drainage. There was no mortality. Mean length of stay was 8.8 days (range: 6-13 days). Mean follow-up was 12 months (range: 11-20 months), and we observed no recurrence of HL.

DISCUSSION

Hepatolithiasis is defined as the presence of calculi in the intrahepatic bile ducts (1-3). This disease is more common in Asia and is rare in Spain (2,3,8,12). Complications can occur if HL remains untreated (4,12), and their associated morbidity and mortality is high, oscillating between 1 and 10% (2,13-15).

The etiology of HL is not fully understood (4). Biliary stasis, biliary infection, and biliary mucin production are the most important factors in the formation of HL (1,10). There is no difference in prevalence between sexes as occurs in cholelithiasis, and it is more common in the third and fourth decades of life (3). Genetic and environmental factors are thought to be involved as HL is more common in rural areas and in patients with a low socio-economic level, probably in association with the diet (3,11).

HL has a double pathogenesis: calculi that form within the liver (primary HL) and calculi that form in the gallbladder and migrate to the common bile duct and, thence, to the intrahepatic bile ducts (secondary HL) (2,3). In HL, calculi are most frequently located in the left lobe (4). The majority of calculi are brown pigment stones, and they have been shown to have a higher concentration of cholesterol and lower concentration of calcium bilirubinate and bile acids when compared to those found in the gallbladder (1,3,12). A higher proportion of unconjugated bile acids is found in the hepatocytes of patients with HL (12). In Asia, HL is usually associated with previous biliary tract stenosis caused by a series of disorders (bacterial or parasitic infection, Caroli's disease, post-traumatic or postsurgical biliary stenosis, cholangiocarcinoma, primary sclerosing cholangitis, etc.) that cause biliary stasis, leading to the formation of primary calculi (2,13-16). In Europe, secondary calculi are more common. Our series was very heterogeneous, with cases related to all the above-mentioned etiological factors.

HL is considered to be a risk factor for the development of cholangiocarcinoma (17). The co-existence of HL and cholangiocarcinoma varies between 0.36 and 13% of patients (1,5,17). It has been suggested that the mechanical irritation caused by hepatolithiasis, as well as chronic biliary infection and cholestasis, damages the bil-

iary epithelium to the point of causing a tumor (5,8,10,18). Doubt always exists regarding the order in which these two diseases appear, whether the stenosis caused by the tumor induces HL or viceversa. Patients with HL and cholangiocarcinoma are usually women with small tumors located in the left lobe and who present a higher frequency of episodes of cholangitis (17). Concomitant HL makes a correct preoperative diagnosis difficult (5,8,10,18). Postoperative morbidity in patients with cholangiocarcinoma is higher when a concomitant HL is present (8). The 5-year survival of patients with HL and cholangiocarcinoma varies between 3 and 23%, and the presence of HL does not appear to alter survival (5,17).

Abdominal ultrasounds is the most economic, accessible and useful method for detecting dilatation at the intrahepatic biliary tree, and HL of down to 1-2 mm (1,2). This investigation is impeded by the presence of aerobilia (1). Conventional CT has a diagnostic sensitivity 63 to 81%, although these results have improved with helical CT (9). Its advantage is that it provides additional information (hepatic topography, atrophy of the affected lobe, etc.) (1,11). Magnetic resonance cholangiography is currently the non-invasive investigation of choice for studying the biliary tree, and has substituted ERCP and PTC, which have changed from being diagnostic methods to being used in the therapeutic setting (1). Intraoperative ultrasounds, cholangiography and choledochoscopy are very important to confirm the diagnosis, to plan the surgical intervention, and to reduce residual lithiasis (2,9,10). At the present time, a correct pre-operative study should include ultrasounds, abdominal CT and MR cholangiography, as was performed in our later cases (8). Liver function tests show a rise in bilirubin, GGT, transaminases, and alkaline phosphatase levels in 80% of cases (3).

The clinical presentation of HL ranges from mild cases of acute cholangitis, which usually resolve with antibiotic treatment, to severe forms that require emergency surgery for suppurative cholangitis, hemobilia, multiple hepatic abscesses, etc. (2,3,6,7,11). Most frequent signs and symptoms include: pain in the right hypochondrium, fever and jaundice (3,12). A history of cholecystectomy or surgery for HL is common; two of the five patients in our series had been cholecystectomized (1). Asymptomatic patients exist in whom the diagnosis is incidental and who do not usually present with liver atrophy (4,11).

The main objective of treatment is to extract all calculi that are present, to resolve bile stasis, and to prevent HL recurrence (8,10,12). Therapeutic options include the non-surgical approach, surgical treatment, and a combination of the two (2,4). The treatment of asymptomatic HL has not been fully established (4).

The non-surgical approach to HL consists of the extraction of calculi under radiological (percutaneous transhepatic cholangiography with/without lithotripsy or access through a T-tube) or endoscopic (transduodenal

papillotomy with or without lithotripsy) control (2). These techniques are very useful in patients with recurrent HL, bilobar disease, or high surgical risk; additionally, they enable biopsies to be taken from stenoses with a neoplastic appearance (9). Lithotripsy is particularly useful for cholesterol stones (9). Of these techniques, percutaneous cholangiography entails the highest risk, but also has the lowest rate of recurrence (4).

Potential surgical operations for HL include: a) hepatectomy; b) extraction of calculi via a choledochotomy, with placement of a T-tube or creation of a hepatojejunostomy, particularly if the sphincter of Oddi does not function correctly; and c) in exceptional cases, liver transplant (1,2,10,19). The primary problem of techniques involving biliary diversion is HL recurrence (10). Two typical clinical situations can be distinguished: the patient with choledocholithiasis and HL (secondary calculi) with no stenoses of the intrahepatic biliary tree, in whom hepatectomy is not usually required (T-tube or diversion) (2,9,12); and patients with primary calculi and stenoses of the biliary tree with underlying liver disease, in whom the rate of residual lithiasis is very high if hepatectomy is not performed (9). Intraoperative choledochoscopy is essential to confirm that a good clearance of the bile tree has been achieved in order to avoid further surgery (2,9).

Hepatectomy of the affected segment, including intrahepatic calculi and potential biliary stenoses, is probably the best therapeutic option, as it achieves the best long-term results (85-95% therapeutic success) (4,8,10); this eliminates bile stasis and avoids the risk of malignant change (4). It is particularly indicated for: a) monolobar HL, especially if this is located in the left lobe; b) a lobe that is atrophic or presents multiple abscesses secondary to cholangitis (12); c) cholangiocarcinoma; and d) patients with multiple intrahepatic stenoses that cannot be treated endoscopically (4,9). Between 4 and 16% of patients undergoing hepatectomy will develop HL in the liver remnant (2,9), much lower than the rate achieved with any of the diversion techniques (10). Left hepatectomy with percutaneous treatment of the right lobe is recommended in patients with bilobar disease (2). When hepatectomy is not feasible, the surgical technique of choice is hepatojejunostomy, which is useful in cases of bilobar HL, recurrent HL, or when the extrahepatic biliary tree is damaged. However, this technique does not work when intrahepatic stenoses are present (9).

In Asia, up to 35% of operations for HL are performed as urgent procedures. We believe that, if possible, a programmed surgery is preferable. Emergency surgery should only be performed in patients with severe cholangitis, hemobilia or hepatic abscesses, and only after failure of the attempted endoscopic or interventionist techniques.

Recurrence of HL continues to be the most serious problem after HL treatment, although this has decreased from 60 to 15% at the present time, possibly due to the increase in the number of hepatectomies, and improved

non-surgical techniques (9). Recurrence can cause suppurative cholangitis, hepatic abscesses, sepsis and multiple organ failure (20). Its treatment is complex (20). Re-operation is difficult due to the adhesions of previous surgery, the distortion of the biliary anatomy, and the scarring of the common bile duct; as well as the patient's general condition and changes in hepatic function (20). For all these reasons, the use of minimally invasive techniques has increased in the past decade (20). If prostheses are used, it appears that metallic prostheses obtain better results than internal-external drainages (18).

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