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Treatment of non-endemic hepatolithiasis in a Western country. The role of hepatic resection

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ABSTRACT

INTRODUCTION The aim of this study was to assess the safety and the efficacy of hepatic resective surgery in the treatment of single lobe hepatolithiasis.

PATIENTS AND METHODS Retrospective analysis and comparison between hepatic resections in patients with hepatolithiasis (hepatolithiasis group [HG]) and liver masses (control group [CG]). Seventeen consecutive Caucasian patients with single lobe hepatolithiasis (HG) and 30 patients with liver masses without chronic liver disease and previous chemotherapy (CG), were operated during the 5-year period 2000–2005, inclusive. Major hepatic resections including 4 right hepatectomies, 10 left hepatectomies, and 3 left lateral sectionectomy in HG, and 12 right hepatectomies, 3 extended right hepatectomy, 5 left hepatectomies, 4 left lateral sectionectomy, 5 bisegmentectomy, and 1 mesohepatectomy in CG. The main outcome measures were: type and length of surgical procedures, intra- and postoperative blood losses and transfusions (packed red blood cells [PRBC] and fresh frozen plasma [FFP]), intra- and postoperative course and complications (within 30 days of the operation), length of hospitalisation, histopathology, and recurrence of hepatolithiasis.

RESULTS Mean operation time was 6.21 ± 2.38 h in HG versus 7.10 ± 2.21 h in CG ($P = 0.33$). Mean intra-operative blood loss in CG was higher than in HG (1010 ± 550 ml versus 560 ± 459 ml; $P = 0.035$). The other variables considered in the two groups were not statistically different. Intra-operative transfusion were 0.50 ± 0.85 units in HG versus 1.35 ± 2.25 units of PRBC in CG ($P = 0.06$), and 0.66 ± 1.34 units in HG versus 0.68 ± 1.20 units of FFP in CG ($P = 0.44$), respectively. No cases of death were registered. Postoperative complications occurred in 12 patients (25.5%) – 5 cases (10.6%) in HG and 7 cases (14.8%) in CG ($P = 0.18$). Mean postoperative transfusions were 0.47 ± 1.24 units in HG versus 1.10 ± 1.18 units of PRBC in CG ($P = 0.35$), and 0.65 ± 1.40 units in HG versus 0.46 ± 0.82 units of FFP in CG ($P = 0.25$), respectively. Difference in median hospitalisation was not statistically significant (14 ± 10 days versus 12 ± 9 days; $P = 0.28$). Histopathology showed cholangiocarcinoma in 2 cases (11.7%). During the follow-up period (range, 5–127 months; mean, 50.4 ± 41.9 months), 1 patient had lithiasis recurrence and 1 patient died for the co-existing cholangiocarcinoma.

CONCLUSIONS Hepatic resection is the treatment of choice in patients with single lobe hepatolithiasis. An early indication for surgery may reduce the mortality/morbidity rates of hepatic resection for hepatolithiasis.

KEYWORDS

Hepatolithiasis – Resective surgery – Western country

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Hepatolithiasis is a rare disease in Western countries but is common in East Asia where it can be detected in 31–50% of patients undergoing surgery for cholelithiasis.[1,2]

The clinical relevance of this condition lies in its frequent progressive course, which is characterised by recurrent cholangitis, multiple post-phlogistic intrahepatic biliary strictures, parenchymal atrophy and secondary biliary cirrhosis.[3] Its well-known aetiological relationship with cholangiocarcinoma should also be emphasised.[4]

Variation in extent and severity of hepatolithiasis determines significant differences in treatment depending on case series and geographical areas as well as on objective difficulties in establishing a specific treatment programme.

Hepatic resection is advisable for patients with single lobe hepatolithiasis in the presence of multiple post-phlogistic strictures of the biliary ducts, parenchymal atrophy or possible presence of cholangiocarcinoma.[5,6]

On the other hand, current techniques in operative endoscopy and interventional radiology, the introduction in clinical practice of newer instruments (flexible choledocoscope, electro-hydraulic lithotriptors, expanding metallic stents, extracorporeal lithotriptor) may provide effective alternative treatments to radical surgery[7] with regard to the mortality/morbidity rates of hepatic resection and the incidence (15%) of postoperative lithiasis recurrence.

The aim of the present study is to evaluate the current role of radical surgery in a Western institution by means of a retrospective analysis of a case series of hepatic resection for intrahepatic lithiasis.

Patients and Methods

Patients

Between October 2000 and March 2005, 17 patients underwent hepatic resection for hepatolithiasis. In all patients, the extent and severity of the disease were evaluated by biochemical tests (indices of cholestasis, hepatic necrosis and synthesis), instrumental examination including hepatic ultrasonography, abdominal spiral CT-scan, magnetic resonance cholangiopancreatography (MRCP), and, in some cases, endoscopic retrograde cholangiopancreatography (ERCP) and percutaneous transhepatic cholangiography (PTC).

Pre-operative tumour markers (α-fetoprotein, carcinoembryonic antigen, Ca19-9) were measured in all cases.

Indication for surgical treatment was the presence of single lobe hepatolithiasis with radiological signs of multiple postphlogistic strictures of biliary ducts and parenchymal hypoatrophy, and the possible presence of cholangiocarcinoma.

During the same period, 189 patients underwent hepatic resection in our institution and, among them, 30 hepatic resections were performed for liver masses in patients without chronic liver diseases and previous chemotherapy. These patients (control group [CG]) were chosen to be compared to the hepatolithiasis group (HG) in order to evaluate the safety of surgical treatment for intrahepatic lithiasis. All patients underwent a major hepatic resection (removal of 2 segments or more was considered as a major resection). Surgical procedures were compared with reference to operation time, blood losses and intra-operative transfusion (packed red blood cells [PRBC] and fresh frozen plasma [FFP]). The evaluation of the outcome of liver resection included the comparative analysis of postoperative complications and mortality (within 30 days of the operation), the need of postoperative transfusions (PRBC and FFP), and the length of postoperative hospitalisation.

Surgical technique

The surgical procedure was performed by right subcostal incision along the midline up to the xiphoid apophysis. Hepatic resection was carried out by intermittent portal triad clamping (with 20 min of ischaemia and 10 min of reperfusion), with ischaemic periods shorter than 50 min. Both portal and arterial branches to the diseased lobe were isolated and divided using primary hilar approach for right/left hepatectomies and the transparenchymal approach for left lobectomy. No attempts were made to identify and ligate the biliary ducts at the hepatic hilum. Ligation of the hepatic veins was performed, if possible, by the extraparenchymal route. Parenchymal transection was carried out by harmonic scalpel (Ultracision; Ethicon) and ultrasonic dissector (Soring; Sonoca). Treatment of hepatic resection surface was completed with tiny stitches on biliary and vascular branches. Minor bleeding sources were treated with an argon photocoagulator. At the end of the procedure, a Jackson-Pratt type aspiration drain was placed alongside the row surface of the liver.

Postoperative treatment

The postoperative treatment included the return to oral feeding after 48 h of nasogastric aspiration, inhibitors of gastric acid secretion and broad-spectrum antibiotics, daily biochemical monitoring of blood crasis, and of hepatic and renal function for the first 4 postoperative days.

Follow-up

After discharge, the clinical conditions as well as the hepatic function of HG patients were monitored according to a planned follow up programme (at 1, 3, 6, and 12 months from the operation). Liver morphological findings were obtained by ultrasonography and MRCP.

Data collection

All clinical files were retrospectively analysed with regard to presentation of symptoms/signs, previous surgical treatment, pre-operative diagnostic, histological findings, recorded complications and hepatolithiasis recurrence (in patients operated more than 6 months previously).

Statistical analysis

The immediate outcomes, including operative morbidity and mortality were evaluated. Continuous variables were expressed as mean ± SD and compared using the unpaired *t*-test. Statistical analysis was performed with χ^2 test. A *P*-value lower than 0.05 was considered statistically significant.

Results

Hepatolithiasis group

The HG included 17 patients, 14 males (82%) and 3 females (18%). Mean age was 66.4 ± 9.3 years (range, 45–83 years).

The clinical symptoms were recurrent fever (12 cases, 70.5%), biochemical signs of cholangitis (12 cases, 70.5%), abdominal pain (6 cases, 35.2%), jaundice (6 cases, 35.2%), anorexia and weight loss (3 cases, 17.6%); 3 patients (17.6%)

Table 1 **Hepatolithiasis group, surgical procedure, and outcome**

Case	Age (yrs)	Presentation	Previous surgery	Surgical procedure	Histology	Follow-up
1	48	Fever, jaundice, epigastric pain	None	Left hepatectomy	Chronic cholangitis	No recurrence
2	54	Epigastric pain	None	Right hepatectomy, cholecystectomy	Chronic cholangitis, parenchymal hypotrophy	No recurrence
3	60	Fever, jaundice, epigastric pain	Cholecystectomy	Left hepatectomy	Chronic cholangitis, parenchymal hypotrophy	No recurrence
4	82	Fever, epigastric pain, weight loss	Cholecystectomy, choledocholithotomy, choledochoduodenostomy	Left hepatectomy, hepaticojejunostomy	Cholangiocarcinoma (pT3 pN1)	Exitus 18 months after resection
5	60	Fever	None	Left lateral sectionectomy, cholecystectomy	Chronic cholangitis, parenchymal hypotrophy	Relapse within the right lobe
6	68	Asymptomatic	Nephrectomy	Left lateral sectionectomy, cholecystectomy	Chronic cholangitis	No recurrence
7	62	Fever, jaundice	None	Left hepatectomy	Cholangiocarcinoma (pT1 pN0)	No recurrence
8	63	Fever, jaundice	None	Left hepatectomy	Chronic cholangitis, parenchymal hypotrophy	No recurrence
9	71	Fever, epigastric pain, weight loss	Rectal resection	Left hepatectomy	Chronic cholangitis	No recurrence
10	47	Fever	Cholecystectomy	Right hepatectomy	Chronic cholangitis, parenchymal hypotrophy	No recurrence
11	69	Fever, jaundice, epigastric pain	Choledocholithotomy, choledochoduodenostomy	Left hepatectomy, hepaticojejunostomy	Chronic cholangitis	Relapse within the right lobe
12	73	Fever, jaundice	Whipple procedure	Right hepatectomy parenchymal hypotrophy	Chronic cholangitis,	No recurrence
13	79	Asymptomatic	None	Right hepatectomy, cholecystectomy	Chronic cholangitis	No recurrence
14	66	Fever, jaundice	Cholecystectomy	Left hepatectomy, hepaticojejunostomy	Chronic cholangitis, parenchymal hypotrophy	No recurrence
15	59	Fever, jaundice	Cholecystectomy	Left hepatectomy	Chronic cholangitis, hypotrophy	No recurrence
16	65	Asymptomatic	None	Left lateral sectionectomy	Chronic cholangitis, parenchymal hypotrophy	No recurrence
17	71	Fever	None	Left lateral sectionectomy	Chronic cholangitis	No recurrence

were asymptomatic and hepatolithiasis was incidentally discovered during follow-up for known cholelithiasis (Table 1).

Medical histories revealed previous cholecystectomy in 6 cases (35.2%); three had subsequently been subjected to choledocholithotomy and latero-lateral choledochoduodenostomy. One patient had undergone a Whipple procedure for chronic pancreatitis and developed hepatolithiasis due to hepaticojejunostomy stenosis. In only 3 cases (17.6%) was a conservative treatment attempted. These patients underwent repeated PTC and balloon dilation of biliary strictures; surgical option was chosen upon the evidence of parenchymal atrophy.

Diagnostic evaluation included spiral CT-scan and MRCP in all cases, ultrasonography in 14 cases (82.2%), ERCP in 9 cases (52.9%), and PTC in 3 cases (17.6%). In all cases, spiral CT-scan and MRCP revealed dilations and strictures of intrahepatic biliary ducts, limited to the left hepatic lobe in 13 patients (76.4%), and to the right hepatic lobe in 4 patients (23.5%). There was definite radiological evidence of parenchymal hypo-atrophy in 8 cases (47%). CT-scan and ERCP revealed the possible presence of cholangiocarcinoma (intraparenchymal mass or strictures with retrodilation of the biliary ducts) in 3 (17.6%) and 2 (11.7%) cases, respectively,.

The surgical procedures included 4 right hepatectomies (23.5%), 10 left hepatectomies (59%), and 3 left lateral sectionectomy (17.5%). Additional surgical procedures were cholecystectomy in 6 cases (35.2%), hepaticojejunostomy in 1 case (5.8%), and conversion of the choledochoduodenostomy in hepaticojejunostomy in 2 cases (11.7%). A biliary drain was placed in 6 patients (35.2%) (3 transcystic drains, 2 T-tubes, and 1 biliary drain through main left hepatic duct after left hepatectomy).

Control group

The CG included 30 patients, 17 males (56%) and 13 females (44%). Mean age was 58.9 ± 11.8 years (range, 35–82 years).

The surgical procedures in CG included 12 right hepatectomies (40%), 3 extended right hepatectomy (10%), 4 left lateral sectionectomy (13.3%), 5 left hepatectomy (16.6%), 5 bisegmentectomy (16.6%), and 1 mesohepatectomy (3.3%) for benign neoplasm (14 cases, 46.6%), cholangiocarcinoma (6 cases, 20%), hepatocellular carcinoma (2 cases, 6.6%), haemangioendothelioma (2 cases, 6.6%) colorectal metastases (4 cases, 13.3%), and cystic echinococcosis (2 cases, 6.6%). Additional surgical procedures were cholecystectomy in 18 cases (60%), biliary carrefour resection (4 cases, 13.3%) and subsequent double biliodigestive anastomosis (3 cases 10%), and multiple biliodigestive anastomosis (1 case, 3.3%).

Comparison between groups

Mean intra-operative blood losses were higher in CG patients than in HG patients (1010 ± 550 ml versus 560 ± 459 ml; P = 0.04). The other variables considered were not statistically different between the two groups. Mean operation time was 6.21 ± 2.38 h versus 7.10 ± 2.21 h (P = 0.35). Intra-operative transfusions were 0.50 ± 0.85 units versus 1.35 ± 2.25 units of PRBC (P = 0.06), and 0.66 ± 1.34 units versus 0.68 ± 1.20 units of FFP (P = 0.44), respectively. No cases of death were registered.

Postoperative complications occurred in 12 patients (25.5%) – 5 cases (10.6%) in HG and 7 cases (14.8%) in CG (P = 0.18).

In HG, postoperative course of 9 cases (52.9%) was uneventful. There was one case of pancreatitis treated conservatively (total parenteral nutrition, inhibitors of gastric and pancreatic secretion, antiproteases) until complete remission and discharge on the 23rd day. Three patients (17.6%) developed a low-output postoperative biliary fistula (100–200 ml/die). In two patients, the fistula resolved spontaneously, with a prolonged hospitalisation up to the 28th and 33rd day; in the other case, an ERCP with papillosphincterotomy (18 days after intervention) was necessary to solve biliary tree hypertension; the biliary fistula resolved completely on the 33rd postoperative day. One patient had fever and abdominal pain after discharge due to perihepatic fluid collection. New hospitalisation with an ultrasound-guided drainage was required until complete relief of symptoms.

In CG, postoperative course was uneventful in 23 cases (76.6%). Two patients (6.6%) developed pneumonia. Two patients (6.6%) developed low postoperative output biliary fistula (50–100 ml/die) with spontaneous resolution.

Two patients developed transitory hepatic failure and one patient (5.5%) developed perihepatic blood collection and subsequent mild anaemia which required blood transfusion. No re-operation was required. Thus, biliary fistula incidence was 17.6% in HG and 6.6% in CG (P = 0.22).

Mean postoperative transfusions were 0.47 ± 1.24 units in HG versus 1.10 ± 1.18 units of PRBC in CG (P = 0.35), and 0.65 ± 1.40 units in HG versus 0.46 ± 0.82 units of FFP in CG (P = 0.25), respectively.

Difference in mean hospitalisation length was not statistically significant (14 ± 10 days in HG versus 12 ± 9 days in CG; P = 0.28). These results are summarised in Table 2.

Histopathological examination revealed the presence of cholangiocarcinoma in 2 patients (11.7%); stage pT3, pN0, M0 and pT3, pN1, M0. As for all other cases, the histopathological findings included fibrosis and hepatic hypotrophy, chronic cholangitis, dilation of the biliary ducts and ductal lithiasis.

The follow-up period ranged from 5 to 127 months (mean, 50.4 ± 41.9 months). During the follow-up period, 1 case (left hepatectomy) developed recurrent cholangitis due to a relapse of the hepatic lithiasis within the right lobe, which was treated with high-dose biliary acids and antibiotics. One of the two patients with cholangiocarcinoma died

Table 2 Comparison of the two groups

Variable	Hepatolithiasis group (*n* = 17)	Control group (n = 23)	*P*-value
Operation time (h) [median ± SD]	6.21 ± 2.38	7.10 ± 2.21	NS
Intra-operative blood losses (ml) [median ± SD] 560 ± 459	1010 ± 550	0.035	
Intra-operative PRBC transfusion (units) [median ± SD]	0.50 ± 0.85	1.35 ± 2.25	NS
Intra-operative FFP transfusion (units) [median ± SD]	0.66 ± 1.34	0.68 ± 1.20	NS
Postoperative mortality (*n*)	0	0	–
Postoperative morbidity *n* (%)	5 (29.4)	7 (23.3)	NS
Postoperative PRBC transfusion (units) [median ± SD]	0.47 ± 1.24	1.10 ± 1.18	NS
Postoperative FFP transfusion (units) [median ± SD]	0.65 ± 1.40	0.46 ± 0.82	NS
Postoperative hospitalisation (days) [median ± SD]	14 ± 10	12 ± 9	NS

NS, not significant.

18 months after the hepatic resection; the second patient is at present disease-free.

Discussion

Hepatolithiasis is more common among East Asian countries than in the Western world. The relative incidence of hepatolithiasis against all cases with gallstone disease in the West is about 1% whereas in Asia it has been reported between 18% and 50%.

To our knowledge, no series of hepatic resection for hepatolithiasis in Western countries has been reported in the English literature.

Studies from East Asia, where the incidence of intrahepatic lithiasis is higher, report on larger series (26 cases in 26 years,[8] 43 cases in 20 years,[5] 103 cases in 12 years,[9] and 101 cases in 14 years[10]). In terms of demographic characteristics and clinical presentation, as well as type and distribution of type of the hepatic resections performed (left lateral sectionectomy, left hepatectomy, and right hepatectomy), our series (17 cases over a 5-year period) seems to be similar to those described in other studies[3,11] where most patients had intrahepatic lithiasis of the left hepatic lobe, thus allowing a reliable comparative evaluation of results.

Hepatolithiasis-related complications include recurrent cholangitis, hepatic abscesses, multiple post-phlogistic strictures of intrahepatic biliary ducts, hepatic parenchymal atrophy, secondary biliary cirrhosis, and neoplastic degeneration with onset of cholangiocarcinoma. Therefore, the goals of any treatment for intrahepatic lithiasis are stone removal and cholestasis elimination. Hepatic surgery allows the achievement of these goals by means of radical resection of the affected lobe and stenotic biliary segments with infected bile. Nevertheless, hepatic resection for hepatolithiasis is burdened by rates of mortality (up to 2.3%[5]) and morbidity (up to 32%[12]) that are unacceptable if compared with the benign nature of the disease. These high mortality/morbidity rates can be ascribed to different intraoperative and postoperative factors. The dissection of the diseased hepatic lobe, requiring the division of hepatic ligaments, may be a technical challenge, because of the numerous and tenacious adhesions due to repeated infectious episodes, which lead to sclerosis, atrophy, and to the development of hepatic and perihepatic abscesses resulting in blood losses. Furthermore, surgical manoeuvres may cause bacteraemia with postoperative septic complications. Finally, the diseased structure of intrahepatic biliary ducts can affect negatively an effective biliostasis of the resection surface thus exposing to the risk of postoperative biliary fistulas. Nevertheless, in our series, the overall morbidity and mortality in HG were not statistically higher than in CG. Postoperative morbidity (29.4%) was mainly due to low-output biliary fistulas (3 cases) and acute pancreatitis (1 case). Comparing the type of complications, the biliary fistula was more frequent in HG than in CG (17.6% versus 6.6%; $P = 0.22$), resulting in a longer hospitalisation (until the 33rd day). Intra-operative blood losses were moderate (560 ± 459 ml) and only one patient required intra/postoperative blood transfusions. No peri-operative death was observed. Comparison of the two groups demonstrates the safety of the surgical choice in the management of hepatolithiasis, in spite of a higher risk of biliary fistula (21.4%). In our series, this could have been favoured by the use of an harmonic scalpel during hepatic transection.[13] These results are consistent with existing data from the literature and could be related to an early indication for hepatic resection, which

enables the surgical procedure to be performed before damage from cholestasis and recurrent infections are established. In addition, in the absence of adhesions, hepatic resection may be carried out with low blood losses and relatively easy haemostasis of the resection surface due to the well-known reduced vascular supply to the atrophic segments affected by lithiasis.[10] Accordingly, in this series, the dissection of the hepatic hilum had actually showed thrombosis of the right hepatic artery in one case of hepatectomy. Moreover, excellent general and local conditions in our patients may be related to differences in aetiology and severity of lithiasis with respect to Asian reports. Finally, it is worth pointing out that our series included only patients with hepatolithiasis affecting a single hepatic lobe (10 cases to the left, 4 cases to the right) and that only in 3 cases was the resection accompanied by major additional surgical procedures (hepaticojejunostomy or conversion of the previous choledochoduodenostomy in hepaticojejunostomy). These elements may have contributed to the positive postoperative course observed in these patients as compared to the other series, where the percentage of patients with diffuse hepatolithiasis and previous operations and/or concomitant major surgical procedures other than hepatic resection is higher (35%[3] and 63%[11], respectively).

The high complication rate of hepatic resection for hepatolithiasis has led some authors[7,14,15] to adopt conservative treatments, with different combinations of endoscopic and/or radiological procedures, which include perendoscopic papillosphincterotomy, perendoscopic or percutaneous biliary dilation and stenting, percutaneous electrohydraulic choledochoscopy and lithotripsy, and extracorporeal lithotripsy. These conservative approaches may prove to be effective in temporarily solving cholestasis and stone clearance, but they do not allow the definitive removal of the sclerotic damage of intrahepatic biliary ducts, thus predisposing to both the subsequent recurrence of septic complications and the need for repeated treatments. Futhermore, all conservative treatments for hepatolithiasis do not allow the compromised function of the hepatic parenchyma, that is generally hypo-atrophic due to the chronic cholestasis, the septic complications and the impaired hepatic vascularisation, to be restored. In our series, the only two patients initially treated by a conservative approach underwent a radical operation following the demonstration of irreversible parenchymal damages. Finally, the risk that any conservative treatment for hepatolithiasis could allow an unrecognised cholangiocarcinoma to progress or phlogistic conditions predisposing to subsequent neoplastic degeneration to persist, should be noted.

The correlation between hepatolithiasis and cholangiocarcinoma may be underestimated[5,16] because of its development within the biliary duct wall without any radiological evidence of an intrahepatic mass, the difficult differential diagnosis between benign and neoplastic strictures, the likelihood of false negatives in biliary brushing. Moreover, the likelihood of onset of cholangiocarcinoma during the course of conservatively treated cases of hepatolithiasis has been reported.[17] In our series, two cases (11.7%) of hepatolithiasis complicated by recurrent cholangitis were found to be affected by cholangiocarcinoma only at the final pathology of the resected left hepatic lobe, without any clinical, biochemical or radiological evidence of tumour rising being observed at pre-operative work-up. When compared to the literature, the rate of pre-operative, unrecognised cholangiocarcinoma in our series is high; even though related to the small number of cases, this high rate is still indicative of the risk of cholangiocarcinoma complicating the natural history of intrahepatic lithiasis and suggests the need for carefully consideration of such occurrences when planning the diagnostic/therapeutic strategy for hepatolithiasis.

With respect to long-term results, a rate of intrahepatic relapse of lithiasis up to 16% of resected cases has been reported.[18] In our series, 1 patient (5.8%) reported recurrent cholangitis with stones into the right biliary tree 6 months after left hepatectomy. One patient with diagnosis of cholangiocarcinoma at the time of the resection died 18 months after the operation whereas no patient developed cholangiocarcinoma during the follow-up period.

Conclusions

The results of the present series suggest that hepatic resection has to be considered the treatment of choice in patients with single-lobe hepatolithiasis, parenchymal hypo-atrophy, and irreversible biliary strictures or possible presence of cholangiocarcinoma. An early indication for surgery may reduce the mortality/morbidity rates of hepatic resection for hepatolithiasis. Alternative conservative treatments, possibly associated with resective surgery (left hepatectomy and dilation-stenting of the right biliary duct, represent effective therapeutic options for diffuse hepatolithiasis and for those cases who are excluded from surgical treatment (age, hepatic failure, concomitant pathologies, *etc.*) regardless of the extent and the severity of lithiasis. An accurate diagnostic evaluation to screen for a possible cholangiocarcinoma is mandatory before outlining any treatment programme. Specific care has to be taken to avoid a biliary fistula which seems to be the most important complication during the postoperative course.

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