ORIGINAL RESEARCH PAPER

Volume-7 | Issue-4 | April-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

MINIMALLY INVASIVE APPROACH FOR HEPATOLITHIASIS - ENDOSCOPE REPLACING CHOLEDOCHOSCOPE

Hepatobiliary Surgery

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ABSTRACT

Globalization and Intercontinental migration have not just changed the socioeconomic status of regions, but have also altered disease dynamics across the globe. Hepatolithiasis, although still rare, is becoming increasingly evident in the West because of immigration from the Asia-Pacific region, where the disease prevails in endemic proportions. Such rare but emerging diseases pose a therapeutic challenge to doctors. The potential advantages of a laparoscopic approach in the management of hepatolithiasis are minimally invasion, early recovery, shorter hospital stay and better cosmetic outcome. This paper discusses our experience in the innovative approach to deal with the Hepatolithiasis, namely the MINIMALLY INVASIVE APPROACH – ENDOSCOPE REPLACING CHOLEDOCHOSCOPE and also reviews the world literature about the same.

KEYWORDS

Hepatolithiasis, Cholelithiasis, Choledocholithiasis, Choledocho- Duodenostomy, Lapro-Endoscopy

INTRODUCTION:

Hepatolithiasis is defined as the presence of gallstones in the bile ducts proximal to the confluence of the right and left hepatic ducts, irrespective of the co-existence of gallstones in the common bile duct (CBD) and/or gallbladder. The aetiology of hepatolithiasis is not fully understood, but genetic,dietary and environmental factors are thought to be contributory. Malnutrition and low socioeconomic conditions are associated with a high incidence of intrahepatic stones. Hence, economic advancement and the Westernization of lifestyle are associated with an apparent decline in the incidence of the disease in some East Asian countries. Intrahepatic stones occur more commonly in the 5th and 6th decades of life and do not demonstrate a gender preference. However, concomitant intra hepatic and extra hepatic stones occur commonly in older age groups (7th and 8th decades)and are found in approximately 70% of all hepatolithiasis cases.

CASE SERIES

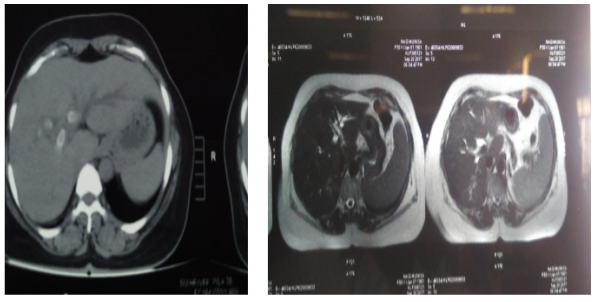
CASE 1

A 26 year old female presented with pain in the Right Hypochondrium for 15 days. She had a previous history of Jaundice and Fever. On Evaluation with Contrast enhanced CT she was diagnosed with Cholelithiasis, Choledocholithiasis and Hepatolithiasis. Routine Blood Investigations viz Complete Blood count, Renal Function Tests ,Liver Function Tests, Coagulation Profile were normal. ERCP was attempted on this patient four times but failed. Injection Vitamin k 10 mg IV given for three days pre operatively and proceeded with Laparo-Endoscopic Approach.

LAPRO ENDOSCOPIC APPROACH : SURGICAL PROCEDURE:

Laparoscopic bile duct exploration :

The site of ports and setup were similar to those in the traditional laparoscopic cholecystectomy. The length and site of the choledochotomy used is governed by the stone size and location of the stone, which should be at least 15 mm. During the procedure, intraoperative flexible Endoscopy was performed through the choledochotomy and stones were visualized. The stones were removed by saline flushing(Infant feeding tube 8 Fr ,10 Fr Foley's catheter) and Dormia basket under Endoscopic guidance. A side-to-side choledochoduodenostomy was performed at the end of procedure in this patient.



CT & MRI image of hepatolithiasis

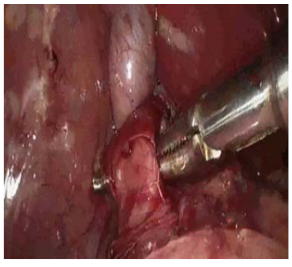


Fig 1.1 : Mobilization of CBDFig

Fig 1.2 : Choledochotomy done using hook

Fig 1.3 : Stone visualized via Choledochotomy

Fig 1.4 : Retrieval of 2 CBD stones

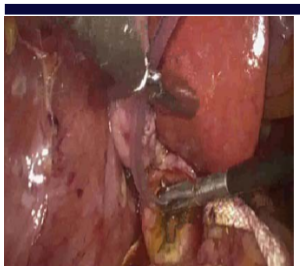


Fig 1.5 : CBD probed with infant feeding tube & flushed

Fig 1.6 : CBD probe with 10fr Foleys Catheter

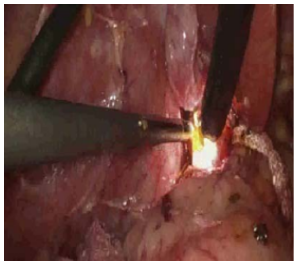


Fig1.7: Endoscopy introduced choledochotomy

Fig 1.8 : Laparo Endoscopic view into

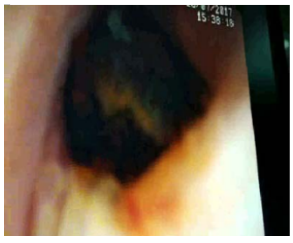


Fig1.9: Hepatic Duct Stone

Fig1.10: Duodenal Incision

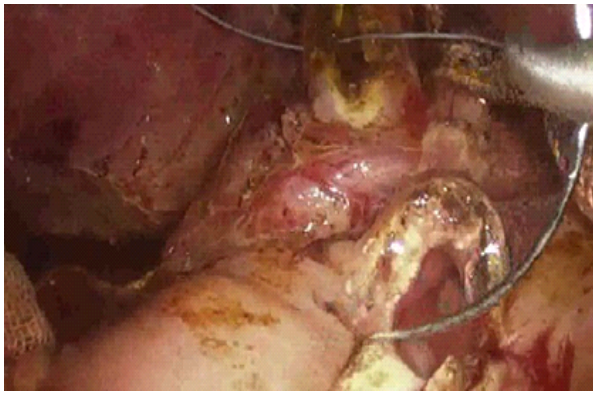


Fig 1.11 : Choledocho Duodenostomy done

CASE 2

A 39 year old Female with no comorbidities presented with fever and pain in the Right Hypochondrium. Routine Blood Investigations viz Complete Blood count, Renal Function Tests, Liver Function Tests, Coagulation Profile were normal. CECT Abdomen revealed hepatolithiasis in the Right and Left Hepatic ducts with Cholelithiasis and Choledocholithiasis . Injection Vitamin k 10 mg IV given for three days pre operatively .

Post-operatively the patient was started on clear liquids from day 2 and discharged on day 7.

DISCUSSION :

Stones in hepatolithiasis are typically of two types,namely calcium bilirubinate stones (brown pigment stones), and cholesterol stones. Cholesterol stones comprise only 5.8–13.1% of all intrahepatic stones; the majority are calcium bilirubinate stones, which contain more cholesterol than similar stones in the extrahepatic ducts. This suggests that the pathogenesis of intrahepatic stones involves not only the precipitation of calcium bilirubinate, but also an altered cholesterol metabolism. Bile duct stricture and infection with β-glucuronidase-producing bacteria are speculated to play a key role in bilirubin precipitation and formation of calcium bilirubinate stones,which are primary intrahepatic stones and are seen mostly in East Asian countries. By contrast, hepatolithiasis in Western societies occurs from secondary stones that are predominantly composed of cholesterol and have little association with biliary strictures, stasis and bacterial infection. Metabolic factors, acquired and/or congenital, act synergistically in the development of cholesterol hepatolithiasis. Notably, hepatolithiasis is more frequent in the left lobe because the left hepatic duct coalesces with the CBD at an acute angle which tends to induce bile stasis when associated with biliary strictures

Fig 2.1 : Infant feeding tube probed into CBD

Fig 2.2 : Endoscopy introduced into choledochotomy

Fig 2.3 : Laparoendoscopic view

Fig 2.4 : Second order duct stone retrieval

MANAGEMENT OF HEPATOLITHIASIS :

The basic principle of management of primary hepatolithiasis is to control infection during an acute attack of cholangitis and to remove all stones, strictures and destroyed liver segments by elective definitive surgery when the disease is quiescent. The initial conservative measures for acute cholangitis consist of administering broad-spectrum antibiotics, Intravenous fluids, adequate analgesics and careful monitoring of abdominal and vital signs. The definitive procedure is planned according to the results of all imaging studies. Preoperative evaluation of the hepatobiliary system includes use of ultrasonography (USG), computed tomography (CT) scan, magnetic resonance cholangiopancreatography (MRCP), endoscopic retrograde cholangiopancreatography (ERCP). These investigations provide information about the location of stones and any biliary stricture or liver atrophy, which in turn provide guidance on the type of operation.

The classification of Hepatolithiasis according to the location of stones and its complication is given by Dong et al , which also guides in the treatment plan.

Dong's classification of hepatolithiasis	
Type	Definition or content
Type I	Localized stones: unilobar or bilobar
Type II	Diffusely distributed stones
Type IIa	Without hepatic atrophy; no stricture of the intrahepatic bile ducts
IIb	Atrophy limited in segment or / and stricture of the intrahepatic bile ducts
IIc	With biliary cirrhosis and portal hypertension
Additional Type E Extrahepatic stones	
Ea	Normal sphincter of Oddi
Eb	Relaxation of the sphincter of Oddi
Ec	Stricture of the sphincter of Oddi

Indications for hepatectomy in hepatolithiasis are: (i) unilobar hepatolithiasis, particularly left-sided; (ii) atrophy, fibrosis and multiple abscesses secondary to cholangitis; (iii) suspicion of concomitant intrahepatic cholangiocarcinoma, and (iv) multiple

intrahepatic stones with biliary strictures that cannot be treated percutaneously or endoscopically.

Bilobar & Right Lobe Hepatectomy have more morbid outcomes.In bilobar hepatolithiasis with choledocholithiasis , laparo-endoscopic approach has given better results in terms of stone clearance and low recurrence rate, when compared to the Endoscopic and Percutaneous procedures.The addition of Choledocho-duodenostomy, as a drainage procedure gives an endoscopic access for removal of any retained /recurrent stones in future.

CONCLUSION:

The surgical resection remains the definitive treatment of hepatolithiasis because it includes the complete removal of intrahepatic stones and the simultaneous resolution of accompanying stricture in the bile ducts. Surgery may also reduce the risk of recurrent stone formation, cholangitis and the development of cholangiocarcinoma. The presence of distributed stones in the hepatic duct without hepatic atrophy and without stricture in the intra hepatic bile ducts have made stone removal by Minimally Invasive approach with bilio enteric drainage with the usage of endoscope replacing choledochoscope. However in cases of bilobar hepatolithiasis with choledocholithiasis, Minimallly Invasive approach is promising in terms of complete removal of stones with direct visualization of the diseased ducts. A Multidisciplinary Algorithmic Approach integrating interventional endoscopy and surgery is vital for the success rate in the Minimally Invasive approach. Further studies are required to accept Endo Laparoscopic approach as a standard procedure for hepatolithiasis.

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