

## Management of HILAR Malignant Biliary Strictures

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### Abstract

**Objective:** To determine the etiology of Hilar malignant biliary strictures and the efficacy of hepaticojejunostomy in its management with or without segmental liver resection.

**Patients and Methods:** A retrospective study of 33 patients was carried out at Civil Hospital & Lyari General Hospital Karachi. They presented with signs and symptoms of mechanical cholestasis. Study was conducted to find the etiology, level of obstruction and the extent of the disease together with approaches to either cure the disease or to relieve the symptoms. Curative resection was attempted where possible in all 33 patients but decision of curative resection or palliative bypass with or without liver resection was made per operatively after accessing the level of obstruction and extent of local, parenchymal or vascular infiltration

**Result:** Of the 33 patients studied, 72.73% (n=24) had cholangiocarcinoma and 27.27% (n=9) had gall bladder Ca with local bile duct extension. Four different sites of biliary tree (i) common hepatic duct [CHD], (ii) confluence of common hepatic duct [CCHD], (iii) right and left hepatic duct [R&LHD] separately, and (iv) left hepatic duct [LHD] were anastomosed with jejunum. Normal liver functions with complete relieve from symptoms was achieved where CHD or CCHD was anastomosed whereas only a significant decrease was observed when R&LHD and only LHD were anastomosed with jejunum.

**Conclusion:** Surgical resection of the tumor together with biliary decompression using different approaches of hepaticojejunostomy is an effective way of managing malignant Hilar bile duct obstruction as well as significantly decreasing the severity of symptoms in irresectable tumours (JPMA;55:339;2005).

### Introduction

Etiology of the proximal bile duct obstruction mainly revolves around the benign or malignant strictures formation. Benign strictures usually result either from trauma, mostly during cholecystectomy whether open or laparoscopic, or from local inflammation, infection, sclerosing cholangitis or other mechanisms.<sup>1</sup> There are 3 general kinds of malignant biliary obstruction. The first category includes primary tumors of the bile duct that involve the bifurcation of the hepatic ducts. The second category involves local extension into the hilum by a tumor arising in an adjacent structure, such as the gallbladder, particularly common in patient with cholelithiasis in women.<sup>2,3</sup> The third category includes metastases from a distant primary site, most often from solid tumors, such as carcinoma of the breast, colon, ovaries or lymphoma.

Cancer of the bile duct, cholangiocarcinoma, is an uncommon malignancy comprising less than 2% of all cancer diagnoses.<sup>4</sup> Extrahepatic cholangiocarcinoma has traditionally been separated into three groups, based on anatomical location. Upper third or hilar tumours up till the confluence, Middle third to upper border of the duodenum, Lower third or distal bile duct tumours arise between the ampulla of Vater and the upper border of the duodenum. Intrahepatic (or peripheral) cholangiocarcinomas are rare neoplasms comprising 6% to 10% of all cholangiocarcino-

mas typically presenting as solitary masses.<sup>5</sup> Hilar or perihilar cholangiocarcinoma are considered together and distal cholangiocarcinoma separately.

Because of the mechanical cholestasis caused by the stricture, mostly of the common bile duct, these patients have severe jaundice and associated symptoms such as pruritis, recurrent cholangitis and malaise.

In malignant cases surgical resection of the tumor or liver transplantation in individual cases should be attempted whenever possible because it represents the only potentially curative approach<sup>1</sup>, and the most effective way to relieve cholestasis. However if removal is impossible, adequate and persistent decompression of the biliary tree is the most important therapeutic aim.

Patients with primary bile duct tumours, selected patients with extension of gallbladder cancer into the hilum or with solitary metastases from tumours such as colon carcinoma, may be candidates for surgical resection.

For this purpose, a retrospective study was carried out to determine the etiology, level of bile duct obstruction and the extent of disease in patients who presented with signs and symptoms of mechanical cholestasis together with surgical approach needed to eradicate the disease or to relieve the symptoms.

## Patients and Methods

Thirty three patients with confirmed malignant bile duct obstruction after investigations, which included LFTs, U/S Abdomen, PTC, CT-Scan, ERCP, or MRCP and histopathological examinations were included in the study. All patients presenting with signs and symptoms of cholestasis due to non malignant causes were excluded. Biliary obstruction was classified according to Bismuth Corlette level of bile duct obstruction:<sup>6</sup>

Level I: below the confluence

Level II: Confined to confluence

Level IIIa: extension into right hepatic duct

Level IIIb: extension into left hepatic duct

Level IV: extension into right and left hepatic duct

### Surgical Procedure

Extensive surgical exploration for resectability was usually performed by a transverse epigastric laprotomy with medical extension to the xiphoid process.

Four different sites of biliary tract were used for anastomosis with jejunum together with or without liver segment resection depending upon the site and extent of disease. Following approaches were used.

- 1- Common Hepatic Duct anastomosis with jejunum (CHD)
- 2- Confluence of Common Hepatic Duct anastomosis with jejunum (CCHD)
- 3- Right and Left Hepatic Duct anastomosis with jejunum (R&LHD)
- 4- Left Hepatic Duct anastomosis with jejunum (LHD)

Curative resection was attempted where possible. Resectability in patients was ascertained preoperatively by bilateral parenchymal extension, vascular infiltration of liver, diffuse intra hepatic metastasis or peritoneal dissemination of the tumour. The stricture was resected back to a normal duct with healthy mucosa, where confluence was the site; hilum was exposed together with lowering of the hilar plate and stricture resection up to the healthy mucosa and anastomosed with jejunum. Liver slices measuring approximately 2.5 X 4.25 cm of the lower edges of segment V/IV to gain access of R&L HO, both ducts separately were anastomosed to the jejunum.

Surgical bypass of 1 or more obstructed intrahepatic segmental ducts via a Roux-en-Y hepaticojejunostomy was done in selected patients undergoing laparotomy who were found to have unresectable disease and favorable anatomy and expected to have a reasonably long survival. Segment III resection was contemplated with exposure of the left hepatic duct end to side anastomosis. 3/0 Chromic Catgut (CCG)

was used for anastomosis with Jejunum at all four sites.

## Results

### Pre operative findings and previous interventions

All the patients in the study group had severe mechanical stasis, reflected by grossly deranged LFTs with jaundice, pruritis and malaise (Table 1).

Table 1. Symptoms and laboratory results.

| LFTs and assoc. symptoms | Values             |
|--------------------------|--------------------|
| Total Bilirubin          | 15.7 (11.3 - 24.1) |
| SGPT                     | 92 (61 - 141)      |
| GGT                      | 421 (366 - 503)    |
| Alk Phos.                | 1104 (849 - 1873)  |
| Pruritis                 | ++++               |
| malaise                  | +++                |

**Foot note:** all the values are predicting sever mechanical stasis of biliary drainage.

In 8 of the 33 patients a previous attempt had been made for decompression. This included endoscopic stent placement in 4 patients. Percutaneous Trans hepatic cholangio drainage (PTCD) in two patients, operative insertion of T-tube in one, and hepaticojejunostomy in the other. Only 2 out of the 8 had effective drainage of the biliary tree with bilirubin level dropping from 15 mg/dl to 7.4 mg/dl (mean).

### Etiology, management and complications

Most of the bile duct obstructions were due to cholangiocarcinoma (n=24) and remaining because of local biliary extension of gall bladder carcinoma (n=9).

Out of the 24 cholangiocarcinoma, 11 had obstruction at bismuth level I, 6 patients level II, 3 level IIIa, 2 level IIIb and 2 had bismuth level IV. Gall bladder carcinoma has 4 patients with level I obstruction, 3 level II, 1 level IIIa, no patients with level IIIb and 1 with level IV.

All patients were operated in an attempt for curative resection but palliative bypass was done after considering the tumor irresectable because of bilateral parenchymal infiltration, peritoneal metastasis and vascular infiltration of liver. Level of obstruction according to Bismuth Classification decided the approach needed as shown in table 2.

Four of the 33 patients died within a month after hepaticojejunostomy. Death resulted from heart failure in 1 patient on day 19. One died due to pulmonary embolism, as a complication of DVT on day 21 one from septicemia as a result of bile leak on day 14 who previously had a hepaticojejunostomy attempt failed and one from severe post duodenal ulcer bleeding on day 16.

**Table 2. Site of bile duct anastomosis with respect to Bismuth classification.**

| Bismuth level | Approaches | No. of Patient |
|---------------|------------|----------------|
| Level I       | CHD        | 15             |
| Level II      | CCHD       | 9              |
| Level III     | R&LHD      | 6              |
| Level IV      | LHD        | 3              |

**Foot note:** table shows level of obstruction with corresponding no of patients and approaches used for each level.

CHD: Common hepatic duct; CCHD: Confluence of common hepatic duct; R&LHD: Right and Left hepatic duct; LHD: Left hepatic duct.

The other complications occurring in 6 patients were minor bile leak in 3 patients, 1 with segment III approach, 1 with R&L HD anastomosis and the other confluence of CHD anastomosis. In all three bile leakage stopped in 7-10 days. Two patients developed anastomotic stricture and were reopened and re-anastomosed with access loop formation. One had jejuno-jejunal leak, and were reopened and re-anastomosed using healthy gut.

### Follow up and outcome

Of the 33 patients who received hepaticojejunostomy with or with out liver segment resection, the efficacy of the procedure could be evaluated in only 27 patients. Four died within 30 days whereas no adequate follow up data was obtained in the remaining 2 patients. In patients undergoing CHD, 6 months survival was 100%, 1 year 92.85% and 3 years 64.28%. Follow up of one patient was lost and one died in less than a month. Those who underwent CCHD the 6 months survival was 100%, 1 year 57.14% and 3 years survival 28.57%. One patient was lost to follow up and 1 died within 30 days of the procedure. Those being subjected to R&LHD had a 6 months survival of 50%, 1 year survival 25% and 3 years survival nil. Two patients died within 30 days of the procedure. Of those undergoing LHD 3 months survival was 66.66%, 6 months survival 33.33% and 1 year nil. Histological examination of all those patients who survived for 3 year or more revealed negative free margins irrespective of the level of obstruction together with clinically living a disease free life whereas all the others had positive margins suggesting that complete removal of the pathology had not been achieved.

Bilirubin level dropped considerably coming down to normal in 20 patients within 6-8 weeks. Seven patients did show significant improvement. In most cases bilirubin dropped significantly within the first week and returned to normal range in 6-8 weeks. It took 8-14 weeks for the bilirubin level to drop significantly in patients subjected to palliative by pass procedure due to an irresectable tumour. In these

patients bilirubin was reduced enough to relieve the symptoms of severe cholestasis only. It did not reach the normal level. Comparison of bilirubin levels is shown figure.

Figure. Pre and post operative bilirubin level for different approaches used.

Foot note: Post operative bilirubin values for CHD & CCHD approaches are after 6-8 wks and 8-14 wks for R&LHD and LHD

CHD: Common hepatic duct; CCHD: Confluence of common hepatic duct; R&LHD: Right and Left hepatic duct; LHD: Left hepatic duct.

### Discussion

Malignant hilar biliary obstruction should be suspected in patients with cholestasis or jaundice in whom non-invasive imaging studies show dilated intrahepatic ducts and a relatively non dilated distal common bile duct, often with a decompressed gallbladder and sometimes without a demonstrable hilar mass. Alkaline phosphatase level will be abnormal in virtually all patients, with variable increases in serum bilirubin and transaminase levels.

Most common presenting clinical feature of perihilar or extra hepatic tumours is of biliary obstruction: jaundice, pale stools, dark urine and pruritis. Right upper quadrant pain, fever, and rigors suggest cholangitis (this is unusual without drainage attempts), More proximal tumours obstructing one duct, often present with systemic manifestation of malignancy, such as malaise, fatigue, and weight loss.<sup>2,7</sup> Hilar tumors classified according to modified Bismuth have important prognostic significance both for surgical resectability and for palliative drainage.

In patients for whom surgical resection is not obviously contraindicated by medical factors, the goal of evaluation must be minimally invasive detection of the extent of the primary tumour and the presence of any metastatic disease (liver metastases, carcinomatosis, or lymphadenopathy outside the field of resection). Ultrasound should always be the first choice due to its high sensitivity, specificity and accuracy for the proximal tumors despite its low accuracy for distal localization.<sup>8</sup> In the setting of a hilar lesion, it is uncommon that the distal extent is not

resectable. The critical issue is the proximal extent of the tumor. In order to understand this, the entire intrahepatic biliary tract must be visualized. Though MRCP in now getting popular together with CT scan, PTC may be good at demonstrating the intrahepatic anatomy<sup>9-16</sup> and was used in all our patients to delineate the extent of dilation.

Locoregional extent of disease is the greatest problem in cases of proximal bile duct cancers. Surgical resection remains the only curative treatment for Hilar cholangiocarcinoma. A study of 102 patients carried out by Liu YB et al<sup>17</sup> suggested, resection to be the primary choice for treatment of hilar cholangiocarcinoma, and radical resection may prolong the patients' survival time and achieve better effect than simple drainage. A similar study of 113 patients receiving surgical resection for Hilar cholangiocarcinoma was reviewed by Neuhaus P et al.<sup>18</sup> Analysis showed, Hilar resections as least radical resective procedure will generate rates of formally curative resections of less than 50%. Even after these formally curative resections, long-term survival cannot be achieved. Only additional liver resections will increase the number of long-term survivors to significant figures. Typically in patients with stage IV disease, radical extended hepatectomy should be performed after excluding patients who have extensive invasion of the hepatic artery or portal vein.<sup>19</sup> The aim of resection should always be to achieve negative free margins. Survival is most favorable when resection of hilar cholangiocarcinoma was accomplished with margin-negative resections.

Partial hepatectomy together with caudate lobe resection is routinely performed to achieve negative margin when fifteen different series were assessed.<sup>20</sup> Even with liver resection, the positive margin rate was around 50%, but this is an improvement over radical bile duct resection alone, still being significantly high.<sup>5</sup>

Extended Liver resection increased the operative time and added more complexity to the procedure so it was not routinely performed in our series. Segment III, IV & V were either partially or completely resected to remove tumor and to gain access to the biliary system for biliary enteric anastomosis. A study of 109 resections by Lillemoe KD<sup>21</sup>, suggested addition of hepatic lobectomy did not alter the survival rate. Negative margins and negative lymph node status were only associated with improved survival. Another study carried out by Johnson SR<sup>22</sup> revealed average 5 year survival for all patients was 44.4%, achieved after curative resection without radical liver resection.

Locally advanced gall bladder cancers (T4, N0, and M0) were treated with combined liver and radical bile duct resection with hepaticojejunostomy because a survival benefit is seen with this aggressive approach.

In conclusion, treatment of malignant hilar biliary obstruction is challenging for all specialists involved,

including endoscopists, interventional radiologists, surgeons, and oncologists. Management strategies vary widely among different centers and are the subject of substantial controversy, but the aim should always be to achieve clinically disease free patients and histologically negative free margins as far as possible.

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