MALIGNANT BILIARY STRICTURE: SURGICAL MANAGEMENT

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1. Is the stricture benign?
2. Is it resectable?
3. Should the biliary tree be drained prior to surgery?
4. Should I place a stent? Which one?
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Surgical Management of Bile Duct Strictures

Moshim Kukar - Neal Wilkinson

Table 1  Causes of biliary strictures

Biliary stone causes
1. Choledocholithiasis resulting in recurrent cholangitis and stricture
2. Mirzaz’s syndrome of stone impaction at the cystic duct and CBD
3. Stenosis of sphincter of Oddi secondary repeat passage of gallstones

Inflammatory causes
1. Primary sclerosing cholangitis
2. Choledochal cysts resulting in chronic biliary mucosal damage
3. Recurrent or severe pancreatitis
4. Parasitic infection
5. Radiation injury
6. Peptic ulcer diseases and duodenal diverticular diseases

Surgical injury
1. Ischemic biliary strictures from devascularization of CBD during cholecystectomy
2. Biliary reconstruction in setting of small ducts or acute injury/inflammation
3. Gastric, duodenal, pancreatic and hepatic surgery

Malignant causes
1. Cholangiocarcinoma or bile duct adenocarcinoma
2. Gallbladder carcinoma due to extrinsic compression or direct extension
• High-quality helical multi-slice CT scan with IV contrast (before stenting)
• MRI with MRCP (biliary involvement)
• ERCP (low yield, endobiliary cytology, even with FISH)
• EUS-guided FNA of strictures or nodes
• Endobiliary forceps biopsy and cholangioscopy-directed biopsy

**pathological confirmation is not required prior to surgical resection**

*benign causes ruled out (IgG4-related strictures, Mirrizi’s syndrome, primary sclerosing cholangitis, previous biliary surgery)*
Comparative effectiveness of biliary brush cytology and intraductal biopsy for detection of malignant biliary strictures: a systematic review and meta-analysis

Udayakumar Navaneethan, MD¹,², Basile Njei, MD, MPH³, Vennisvasantha Lourdusamy, MD¹, Rajesh Konjeti, MD¹, John J. Vargo, MD, MPH¹, and Mansour A. Parsi, MD, MPH¹

Cleveland, Ohio; Orlando, Florida; New Haven, Connecticut, USA

Results—The pooled sensitivity and specificity of brushings for the diagnosis of malignant biliary strictures was 45% (95% confidence interval [CI], 40%–50%) and 99% (95% CI, 98%–100%), respectively. The pooled diagnostic odds ratio to detect malignant biliary strictures was 33.43 (95% CI, 14.29–78.24). For intraductal biopsies, the pooled sensitivity and specificity were 48.1% (95% CI, 42.8%–53.4%) and 99.2% (95% CI, 97.6%–99.8%), respectively. The pooled diagnostic odds ratio to detect malignant biliary strictures was 43.18 (95% CI, 19.39–95.83). A combination of both modalities only modestly increased the sensitivity (59.4%; 95% CI, 53.7%–64.8%) with a specificity of 100% (95% CI, 98.8%–100.0%). The Begg-Mazumdar and Egger tests indicated a low potential for publication bias.
Modern work-up and extended resection in perihilar cholangiocarcinoma: the AMC experience

F. Rassam 1 · E. Roos 1 · K. P. van Lienden 2 · J. E. van Hooft 3 · H. J. Klümper 4 · G. van Tienhoven 5 · R. J. Bennink 2 · M. R. Engelbrecht 2 · A. Schoorlemmer 1 · U. H. W. Beuers 3 · J. Verheij 6 · M. G. Besselink 1 · O. R. Busch 1 · T. M. van Gulik 1

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Diagram:

- Suspected PHC: n = 606
  - Initially unresectable: n = 228 (37.6%)
  - Potentially resectable: n = 378 (62.4%)
    - Unresectable after diagnostic laparoscopy: n = 57
    - Laparotomy: n = 321
      - Unresectable: n = 120 (37.4%)
      - Resected: n = 201 (62.6%)
    - Benign: n = 31 (15.4%)
    - Confirmed PHC: n = 170 (84.6%)
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Perioperative Management of Hilar Cholangiocarcinoma

Katherine E. Poruk 1, Timothy M. Pawlik 1, and Matthew J. Weiss 1
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Fig. 3 Overall survival in 170 patients undergoing resection of pathology proven PHIC in the AMC. The 5-year survival rate after resection was 44.3%.

Fig. 3. Kaplan-Meier Survival for hilar cholangiocarcinoma based upon resection margin (Reprinted from Matsuo 44)
Modern work-up and extended resection in perihilar cholangiocarcinoma: the AMC experience

Table 3 Criteria for the assessment of resectability in PHC

- Presence of (extra) hepatic metastases
- Presence of lymph node metastases confined to hepatoduodenal ligament (N1) or lymph node metastases along the common hepatic artery and/or celiac axis (N2)
- Possibility of achieving free ductal margins on the side of the FRL
- Involvement of portal vein bifurcation
- Involvement of hepatic artery branches
- Volume and function of FRL

Table 4 Key elements for staging of PHC

- Location of primary tumor
- Intra- or extrahepatic
- Proximal common hepatic duct
- Confluence of the left and right hepatic duct
- Left or right hepatic duct
- Intraductal growth type
- Local extension
- Segmental duct involvement (including Bismuth-Corlette classification)
- Mentioning biliary variant anatomy
- Vascular involvement (portal vein and/or hepatic arteries, including vascular variations and presence of stenosis of celiac axis or mesenteric artery)
- Lymph nodes
- Regional N1; cystic duct, common bile duct, proper hepatic artery and portal vein nodes
- Metastatic N2; common hepatic artery, periaortic, pericaval, superior mesenteric or celiac artery nodes
- Distant metastasis
- Noncontiguous liver, peritoneum, bone, other
BISMUTH CLASSIFICATION

Bismuth and Corlette, SGO 1975

RESECTION

- Resection of common bile duct and biliary confluence
- Lymphadenectomy
- Liver Resection (Caudate Lobe + Segment IV)
- Biliary-enteric anastomosis
- Portal Vein Resection
- Duodenopancreatectomy

TRANSPLANTATION
High risk of R1-resection

1. Right hepatic artery
2. Portal bifurcation
3. Intrahepatic bile duct margin (left / right)

Courtesy of Peter Neuhaus
Oncological Superiority of Hilar En Bloc Resection for the Treatment of Hilar Cholangiocarcinoma

(a) Overall patient survival

(b) Patient survival of the study cohort (n = 100, perioperative mortality excluded)

Neuhaus P et al., Ann Sur Oncol 2011
Right trisectionectomy

Preoperative portal vein embolization

before PVE

<table>
<thead>
<tr>
<th>Volume (ml)</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>1084</td>
<td>26%</td>
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after 4 wks.

<table>
<thead>
<tr>
<th>Volume (ml)</th>
<th>Percentage</th>
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<tr>
<td>986</td>
<td>32%</td>
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after 6 wks.

<table>
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<th>Volume (ml)</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>930</td>
<td>35%</td>
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</table>
Liver Transplantation with Neoadjuvant Chemoradiation is More Effective than Resection for Hilar Cholangiocarcinoma

David J. Rea, MD,* Julie K. Heimbach, MD,† Charles B. Rosen, MD,† Michael G. Haddock, MD,‡ Steven R. Alberts, MD,§ Walter K. Kremers, PhD,‡ Gregory J. Gores, MD,¶ and David M. Nagorney, MD*

Annals of Surgery • Volume 242, Number 3, September 2005
The Mayo Clinic Protocol

Table 1. Criteria for neoadjuvant therapy and liver transplantation.

<table>
<thead>
<tr>
<th>Diagnosis of cholangiocarcinoma</th>
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<tr>
<td>Transcatheter biopsy or brush cytology</td>
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<tr>
<td>CA-19.9 &gt; 100 mg/ml and/or a mass on cross-sectional imaging</td>
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<tr>
<td>with a malignant appearing stricture on cholangiography</td>
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<tr>
<td>Biliary ploidy by FISH with a malignant appearing stricture on cholangiography</td>
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- Unresectable tumor above cystic duct
  - Pancreatoduodenectomy for microscopic involvement of CBD
  - Resectable CCA arising in PSC
- Radial tumor diameter ≤3 cm
- Absence of intra- and extrahepatic metastases
- Candidate for liver transplantation

CBD, common bile duct; CCA, cholangiocarcinoma; PSC, primary sclerosing cholangitis.
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Common controversies in management of biliary strictures

Mansour A Parsi

Core tip: Based on available evidence preoperative biliary drainage is not routinely indicated in resectable malignant strictures. However, it is appropriate in acute cholangitis, in severely symptomatic patients and in those with delayed surgery. In patients with...
Efficacy of preoperative biliary drainage in malignant obstructive jaundice: a meta-analysis and systematic review

Hanifa Moole1,2†, Matthew Bechtold3 and Srinivas R. Pulli3

Fig. 6 Forest plot: individual study proportions and the pooled estimate of odds ratio for major adverse events in the internal PBD group versus the DS group. (Fixed effects)

Fig. 7 Forest plot: individual study proportions and the pooled estimate of odds ratio for mortality in the external PBD group versus the DS group. (Fixed effects)
Cholangiocarcinoma: preoperative biliary drainage (Con)

A. LAURENT, C. TAYAR & D. CHERQUI

Department of Digestive and Hepatobiliary Surgery, Hôpital Henri Mondor, Créteil, France

left-sided resections, whatever the level of bilirubin. Conclusions. PBD can be omitted in the following situations: recent onset jaundice (<2–3 weeks), total bilirubin <200 μmol/l, no previous endoscopic or transhepatic cholangiography, absence of sepsis, future liver remnant >40%. These criteria include most patients requiring left-sided resections and selected patients requiring right-sided resections. In other cases, PBD is required, associated with portal vein embolization in the event of a small future liver remnant.
Review Article
Malignant Biliary Obstruction: Evidence for Best Practice

Leonardo Zorrón Cheng Tao Pu,¹ Rajvinder Singh,² Cheong Kuan Loong,² and Eduardo Guimarães Hourneaux de Moura¹

¹Setor de Endoscopia Gastrointestinal, Departamento de Gastroenterologia, Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo, 05403-000 São Paulo, SP, Brazil
²Gastroenterology Department, Lyell McEwen Hospital, Adelaide, Haydown Road, Elizabeth Vale, SA 5112, Australia

1. Is the stricture benign?
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Best option for preoperative biliary drainage in Klatskin tumor
A systematic review and meta-analysis
Zengwei Tang, MD*, Yuan Yang, MD, Wenbo Meng, MD, PhD, Xun Li, MD, PhD

PTBD was associated with lower risk of cholangitis (risk ratio [RR] = 0.49, 95% confidence interval [CI]: 0.36–0.67; P < .00001), particularly in patients with Bismuth-Corlette type II, III, IV KT (RR = 0.50, 95% CI: 0.33–0.77; P = .05). Compared with EBD, PTBD was also associated with a lower risk of pancreatitis (RR = 0.35, 95% CI: 0.17–0.69; P = 0.003) and with higher successful rates of palliative relief of cholestasis (RR = 1.20, 95% CI: 1.10–1.31; P < .0001). The incidence of hemorrhage was similar in these 2 groups.
Percutaneous transhepatic biliary drainage catheter tract recurrence in cholangiocarcinoma

British Journal of Surgery 2010; 97: 1860–1866

Y. Takahashi¹, M. Nagino¹, H. Nishio¹, T. Ebata¹, T. Igami¹ and Y. Nimura²

445 patients with extrahepatic cholangiocarcinoma and PTBD

Tract recurrence: 23 = 5.2%

Median survival 22 vs 27 months

**Conclusion:** PTBD catheter tract recurrence is not unusual. The prognosis for these patients is generally poor, even after resection. To prevent this troublesome complication, endoscopic biliary drainage is first recommended when drainage is indicated.
TAKE HOME MESSAGES

- Rule out benign stricture
- Assess resectability
- 5 years Survival after R0 resections ~50%
- Preoperative drainage:
  - Very High bilirubin, Cholangitis
  - Delayed surgery (PVE)
  - Endoscopic
TAKE HOME MESSAGES

- Extended hepatectomies according to Bismuth classification:
  - Caudate lobe
  - Bile duct
  - Lymph node dissection
  - En bloc portal vein resection

- Preoperative portal vein embolization

- Liver transplantation