Management of biliary leaks

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Postoperative biliary leak happens after:

- Cholecystectomy
- Liver resection
- Liver transplantation
Carl Langenbuch
(1882 cholecystectomy)

Erich Mühe (1985 LCC)
Amsterdam – injury classification

<table>
<thead>
<tr>
<th>Type</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Cystic duct leaks or leakage from aberrant or peripheral hepatic radicles</td>
</tr>
<tr>
<td>B</td>
<td>Major bile duct leaks with or without concomitant biliary strictures</td>
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<tr>
<td>C</td>
<td>Bile duct strictures without bile leakage</td>
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<tr>
<td>D</td>
<td>Complete transection of the duct with or without excision of some portion of the biliary tree</td>
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</tbody>
</table>
Amsterdam – injury classification

• The leak is graded as
  • “Low grade” (LG) if the leak is visible in cholangiography from the distal part of the common bile duct only after opacification of the intrahepatic biliary radicals.
  • “High-grade” (HG) leak is defined if the leak was seen before intrahepatic opacification
Strasberg-Bismuth classification

A

B

C

D

E1

E2

E3

E4

E5

>2 cm

<2 cm
Risk factors for biliary injury

- Acute cholecystitis
- Acute pancreatitis
- Cholangitis
- Calot’n triangle fibrosis
- Bleeding
- Adhesions
- Difficult anatomy
- Stone in d. cysticus/ Mirizzi syndrome

- Unexperienced surgeon
- Bad controlled clipping of the bile duct
- Coagulation used too near biliary duct

- Obesity
- Elderly patient
Critical view of safety

The hepatocystic triangle is cleared of fat and fibrous tissue. The lower one third of the gallbladder is separated from the liver to expose the cystic plate. Two and only two structures should be seen entering the gallbladder.
Recognizing the biliary injury

• Intraoperative (10-30%)
  • Conversion / ask for help
  • Avoid additional injury
  • Do cholangiography if possible
  • Place drain / T-tube
  • Send patient to hepatic surgeon

• Postoperative
  • Biliary leakage symptoms
    • Leakage: Abdominal swelling, nausea, fever, pain, peritonitis, drain/wound leakage of bile
    • Symptoms of biliary obstruction
      • High liver enzymes, jaundice, cholangitis, secondary chirrosis
Biliary injury diagnosis

- **US/ CT**
  - Diagnosis of biloma and drainage
- **MRCP (primovist)**
  - Diagnosis of biloma and disruption of duct
- **PTC**
  - Examine proximal duct anatomy
- **T-tube cholangiography**
  - Examine duct anatomy
- **ERCP**
  - Clarify anatomy
  - Treatment
Biloma found: Let’s drain!

- Biloma: risk of infection
- Bile destroys tissue

US + DRAIN + ERCP

- If peritonitis, laparoscopy, lavation and drainage + ERCP next day
Endoscopic treatment

- **D. cysticus and periferial leakage:**
  - Sphincterotomy
  - Plastic stent / biodegradable stent

- **Choledochal leak and stricture:**
  - Plastic stent or fcSEMS

- **Removal of choledochal stones**

- **PTC assisted Rendez vous technique**

- **Nasobiliary drainage**
Amsterdam A- injury treatments

Sphincterotomy worse than stenting in all kind of leaks


Sphincterotomy as good as stenting in moderate leaks

Sandha et al Gastrointest Endosc. 2004;60:567-575
Aksoz et al Dig Endosc. 2009;21:158-161

Sphincterotomy and stent vs only stent – no difference

Mavrogianni et al European journal of gastenterology et hepatology 2006

Sphincterotomy as good as sphincterotomy + stent in all Amsterdam A leaks

Rainio et al Dig Dis Sci 2017; published online
Amsterdam B leak

• Plastic stent
  • 7F vs 10F no difference
  • Stent duration 3 months

• Metal vs plastic
  • Minor leaks plastic
  • In large defects, fully covered metal stent
    • Kahaleh et al Gastrointest Endosc 2007
    • Baron et al Clin Gastroentrol Hepatol 2006
    • Luigiano et al Surg Laparosc Endosc Percutan Tech 2013
  • Stent duration 3-6 months
Amsterdam C stricture treatments

- Plastic stents, change every 3 months (1-6 stents)
- Fully covered metallic stent 3-6 months

Kahaleh et al Gastrointest Endoscopy 2005, 2008
Donatelli et al Combined endoscopic and radiologic approach for complex bile duct injuries: Gastrointest Endosc. 2014;79:855-864
Amsterdam D – Operative treatment
Operative treatment

- Immediately during the initial operation
- Primary repair during the 1. week
  - Hepaticojejunostomy
  - Biliobiliary anastomosis
  - Suturing (+ T-drain)
- Late repair after 2-3 months
  - Treatment of sepsis
  - Drains
  - Hepaticojejunostomy
Send to a specialist because:

Liver surgeon vs GI surgeon:
Treatment successful >90% vs 17-30%


- Stricture 75% vs 18% (Early non-specialist vs Specialist)
- Recurrent cholangitis 50% vs 11%
- Morbidity 75% vs 21%
Biliary injury in HYKS (2004-2014) 102 patients

- Incidence 1.1%
- B, C ja D injuries 0.28%
- Specializing vs senior surgeon: 22% vs 78% (52% GI surgeon)
- 16 hospitals / 60 surgeons
- 1 case / surgeon (1-7)
Operations n=102

Problems in operation 62%

- Acute cholecystitis 32%
- Chronic cholecystitis 17%
- Bleeding 5%
- Stones in d.cysticus 3%
- Wide d.cysticus 3%
- Bile leak 3%
- Choledochal injury 3%
- No problems 38%
Drain – time delay to ERCP

• 47% got drain in primary operation
• Time delay from operation to ERCP
  ▪ Median 7 days
  ▪ Median 4 days if drain in the operation
Biliary injury finding in ERCP

- Leak in d. cysticus or Luschkan 59% + 21%
- Leak in choledochus / hepaticus communis 17%
- Biliary stricture 14%
- Choledochus totally cut 4%
- Bile duct stone 17%
Treatment

- 100% succeeded if endoscopic treatment initiated
- 7 ERCPs remained diagnostic
- ERC treatment
  - Sphincterotomy 56%
  - Sphincterotomy and stenting 37%
- 5 patients had hepaticojejunostomy

- In Amsterdam A leaks: sphincterotomy vs sphincterotomy and stenting
  - equally good results
Interesting Case

- Open cholecystectomy 1.10.2017
  - Perforated gallbladder and biliary peritonitis
  - Drain placed
- Bile leak to the drain, abdominal pain
- 6.10.2017 ERC, sphincterotomy and stent
Interesting Case

- Bile leak continues
- 20.10.2017 ERC, cholangioscopy

6.10.2017 ERCP

Gap, segment 5-7?

Wire does not enter

Leak stops
Interesting Case

- Follow-up ERCP 1/2018, 4/2018, 8/2018 and 11/2018

- Big branches, not going to atrophy easily
- Dilatation until 6mm – 2-wire catheter – 2 wires
- 2 stents 7fr (12 and 15 cm) exchange every 3 months
- No leak 26.11.2018
- Liver enzymes normal
Liver transplantation, anastomotic stricture and leakage

- Many times strange curve in extrahepatic duct

Kaffes
3-4 cm
8/10 mm wide
Liver transplantation, Patient case

- Liver transplantation, liver enzymes high after 2 weeks

Stricture and small leak | Dilatation and plastic stent | 3 months later 2 plastic stents | 3 months later Kaffes 8mm for 6 months
Take Home message:

• Operate systematically
• Conversion if there is any doubt of the anatomy
• Place a drain if you think about it
• Contact liver surgeon early if there is damage
• Most of the injuries can be treated endoscopically
• GI-surgeons, liver surgeons, endoscopists and radiologists should work closely together
Lähteet:

- Bergman JJ, van den Brink GR, Rauws EA, de Wit L, Obertop H, Huijbregts E, Tytgat GN, Gouma DJ (1996) Treatment of bile duct lesions after laparoscopic cholecystectomy. Gut 38:141-147, DOI:10.1136/gut.38.1.141