ER-GS Combined Meeting

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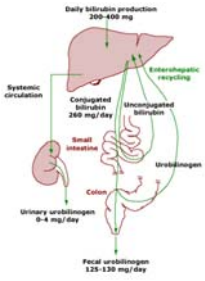
Discussion

Bilirubin Metabolism

- From heme products, primarily senescent RBC (80%)
- Conjugated in hepatocyte
- Heme→biliverdin→ bilirubin→ Urobilinogen
- Enterohepatic recycling

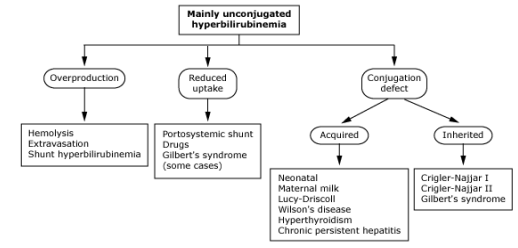


Jaundice

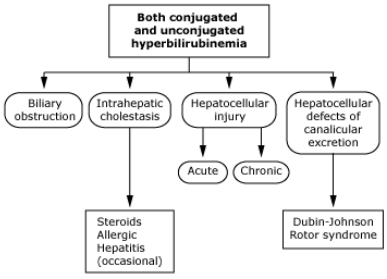
- Predominantly unconjugated bilirubin ↑ due to the **overproduction of bilirubin, impaired bilirubin uptake by the liver, or abnormalities of bilirubin conjugation**
- Both unconjugated and conjugated bilirubin ↑ due to **hepatocellular diseases, impaired canalicular excretion**, and **biliary obstruction**

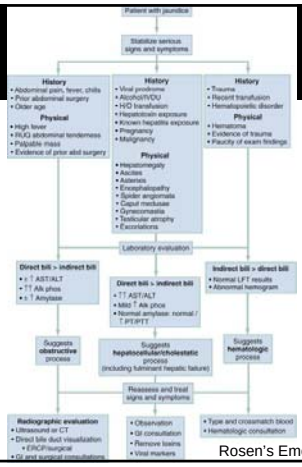
Unconjugated hyperbilirubinemia

Classification of jaundice due to mainly unconjugated hyperbilirubinemia



Both unconjugated and conjugated hyperbilirubinemia





Rosen's Emergency Medicine 7th

Extrahepatic Obstructive Jaundice

- Patients with extrahepatic obstructive jaundice without cholangitis should be admitted for drainage.
- ***ERCP*** is therapeutic for benign obstructions such as gallstones or strictures.

ERCP Indication

- Diagnostic
- Theraputic

ERCP Indication

Diagnostic

- Obstructive jaundice
- Chronic pancreatitis
- GB stones with dilated bile ducts
- Suspected injury to bile ducts
- Sphincter of Oddi dysfunction
- Tumor

ERCP Indication

Theraputic

- Endoscopic sphincterotomy
- Removal of stones
- Insertion of stent(s)
- Dilation of strictures

National Institutes of Health

- "ERCP and EUS have comparable sensitivity and specificity in the diagnosis of choledocholithiasis.
- Patients undergoing cholecystectomy do not require an ERCP preoperatively if there is a low probability of having choledocholithiasis.

National Institutes of Health

- ERCP and sphincterotomy and stone removal is a valuable therapeutic modality in **choledocholithiasis with jaundice, dilated common bile duct, acute pancreatitis, or cholangitis.**
- In patients with pancreatic or biliary cancer, the principal advantage of ERCP is palliation of biliary obstruction when surgery is not elected.

National Institutes of Health

- **Tissue sampling** for patients with pancreatic or biliary cancer not undergoing surgery may be achieved by ERCP
- ERCP is the best means to diagnose ampullary cancers.
- ERCP has no role in the diagnosis of acute pancreatitis except when biliary pancreatitis is suspected.

National Institutes of Health

- ERCP with appropriate therapy is beneficial in selected patients who have either recurrent pancreatitis or pancreatic pseudocysts.
- Patients with type I sphincter of Oddi dysfunction (SOD) respond to sphincterotomy.
- Patients with type II SOD should not undergo diagnostic ERCP alone

National Institutes of Health

- Avoidance of unnecessary ERCP is the best way to reduce the number of complications.
- ERCP should be avoided if there is a low likelihood of biliary stone or stricture, especially in women with recurrent pain, a normal bilirubin, and no other objective sign of biliary disease.
- With newer diagnostic imaging technologies emerging, ERCP is evolving into a predominantly therapeutic procedure."

Complication

- Specific complication
  - Pancreatitis, Bleeding, Infection, Perforation
- Non specific complication:
  - Medication-related complications
  - Cardiopulmonary complications

Complication

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Incidence Rates of Post-ERCP Complications: A Systematic Survey of Prospective Studies

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- In the 16,855 patients enrolled in 21 prospective surveys between 1987 and 2003

Complication

- Specific complications :6.85 %
  - Pancreatitis: 3.47%; infections: 1.44%; bleeding: 1.34%; perforations:0.60%
  - Mild-to-moderate events occurred in 872 patients (5.17 %), and severe events in 282 (1.67 %).
  - Death rate was 0.33%
- Nonspecific complications
  - mainly cardiovascular or analgesia-related effects
  - totaled 173 (1.33 %), with 9 deaths (0.07 %)

Complicatioin

Table 3. Details Concerning Each Subgroup of Complications, Including Severity

		Pancreatitis				Bleeding			Perforation		Infection		
Authors	No. of Pts	Mild	Moderate	Severe	Death	Moderate	Severe	Death	All	Death	Mild	Severe	Death
Barthet	1,159	5	7	9	3	7	1	0	12	2	6	2	1
Boender	242	0	3	1	1	13	2	0	4	0	9	2	0
Chen	210	4	5	2	0	1	1	0	2	0	1	1	1
Choudari	562	35	8	6	1	1	1	0	4	0	4	0	0
Christensen	1,177	30	10	5	3	7	4	1	13	1	52	7	3
Christoforidis	516	12	3	2	0	3	0	0	0	0	2	0	0
Deans	958	0	8	2	2	2	2	0	3	0	0	7	0
Dickinson	328	0	11	1	1	1	0	0	1	0	0	0	0
Freeman	2,347	53	65	9	1	36	12	2	8	1	30	5	2
Koklu	299	7	0	0	0	8	4	0	4	0	2	2	0
Leese	394	6	0	2	1	12	7	1	3	1	4	3	0
Loperfido	2,769	0	33	3	1	17	4	2	16	4	20	4	4
Lal	210	0	10	0	0	5	0	0	0	0	1	0	0
Masci	2,103	0	41	3	1	19	11	0	16	0	17	2	2
Ong	336	15	2	1	0	3	0	0	1	0	4	4	1
Rabenstein	438	0	16	3	0	3	7	2	0	0	4	0	0
Sherman	423	11	4	2	0	4	2	0	2	0	3	1	1
Suissa	534	20	8	2	1	8	2	0	9	1	20	6	3
Tanner	255	0	0	7	0	0	5	0	0	0	0	1	0
Tzovaras	372	4	0	1	0	1	0	0	2	0	6	1	1
Vandervoolt	1,223	60	22	6	2	9	1	0	1	0	9	0	0
Total	16,855	262	256	67	18	160	66	8	101	10	194	48	19
%		1.55	1.52	0.40	0.11	0.95	0.39	0.05	0.60	0.06	1.15	0.28	0.11

Risk factors for complications after ERCP: a multivariate analysis of 11,497 procedures over 12 years (CME)

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Background: Complications of ERCP are an important concern. We sought to determine predictors of post-ERCP complications at our institution.

Methods: GI TRAC is a comprehensive data set of patients who underwent ERCP at our institution from 1994 through 2006. Logistic regression models were used to evaluate 4 categories of complications: (1) overall complications, (2) pancreatitis, (3) bleeding, and (4) severe or fatal complications. Independent predictors of complications were determined with multivariable logistic regression.

Results: A total of 11,497 ERCP procedures were analyzed. There were 462 complications (4.0%), 42 of which were severe (0.36%) and 7 were fatal (0.06%). Specific complications of pancreatitis (2.6%) and bleeding (0.3%) were identified. Overall complications were statistically more likely among individuals with suspected sphincter of Oddi dysfunction (SOD) (odds ratio [OR] 1.91) and after a biliary sphincterotomy (OR 1.32). Subjects with a history of acute or chronic pancreatitis (OR 0.78) or who received a temporary small-caliber pancreatic stent (OR 0.69) had fewer complications. Post-ERCP pancreatitis was more likely to occur after a pancreatogram via the major papilla (OR 1.70) or minor papilla (OR 1.54) and among subjects with suspected SOD with stent placement (OR 1.45) or without stent placement (OR 1.84). Individuals undergoing biliary-stent exchange had less-frequent pancreatitis (OR 0.38). Biliary sphincterotomy was associated with bleeding (OR 4.71). Severe or fatal complications were associated with severe (OR 2.38) and incapacitating (OR 7.65) systemic disease, obesity (OR 5.18), known or suspected bile-duct stones (OR 4.08), pancreatic manometry (OR 3.57), and complex (grade 3) procedures (OR 2.86).

Conclusions: This study characterizes a large series of ERCP procedures from a single institution and outlines the incidence and predictors of complications. (Gastrointest Endosc 2009;70:80-8.)

GASTROINTESTINAL ENDOSCOPY Volume 70, No. 1 : 2009

Result

- Overall complications: suspected sphincter of Oddi dysfunction (SOD) and after a biliary sphincterotomy
- Post-ERCP pancreatitis: after a pancreatogram via the major papilla or minor papilla and among subjects with suspected SOD

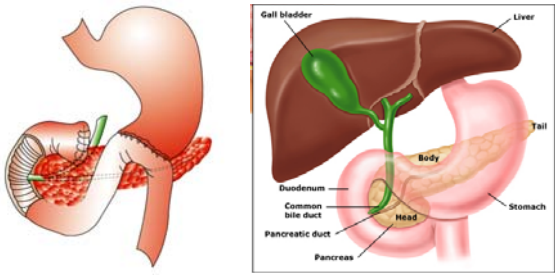
Result

- Biliary sphincterotomy was associated with bleeding.
- Severe or fatal complications were associated **with severe and incapacitating systemic disease, obesity, known or suspected bile-duct stones, pancreatic manometry, and complex procedures**

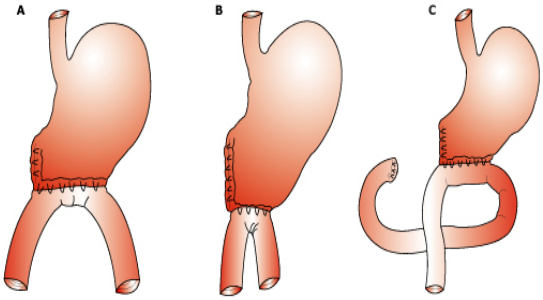
ERCP in Billroth II

- The Billroth II operation entails partial gastrectomy with end-to-side gastrojejunostomy
- The landmarks of the ampulla are inverted by 180º compared to their location in native anatomy.

Anatomy



Billroth II reconstruction



ERCP in Billroth II

- Faylona JM et al. Endoscopy. 1999 Sep; 31(7): 546-9.
  - 110 patients January 1993 and December 1997
  - Total ERCP: 185 times; 66% success
  - Perforation, which occurred in 11 examinations (6%).
  - 9 case in small bowel while the endoscope was being manipulated through the afferent loop
  - 2 patient died (1%)
  - 2 patients had retroduodenal perforations

HPB, 2006; 8: 393–399

Taylor & Francis

Management of perforation after endoscopic retrograde cholangiopancreatography (ERCP): a population-based review

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Abstract

Background. Perforation related to endoscopic retrograde cholangiopancreatography (ERCP) is a rare complication associated with significant morbidity and mortality. This study evaluated the management and outcomes of these perforations. *Patients and methods*. Between July 1996 and December 2002, a total of 6620 ERCPs were performed at our regional endoscopy unit serving the 1.5 million population of Southern Alberta. Thirty perforations (0.45%) were identified and retrospectively reviewed. *Results*. Seven of these 30 patients were found to have guidewire perforations of the bile duct, 11 perforations were peri-ampullary, 3 duodenal, 1 esophageal, and 1 patient had a perforation of an afferent limb of a Billroth II anastomosis. In seven patients the location of the perforation could not be determined (unknown). All patients with guidewire perforations were recognized during ERCP, and all were managed medically. Of the 11 peri-ampullary perforations, 7 of these patients had a pre-cut sphincterotomy, 5 underwent surgery and 4 patients died. Delay in diagnosis occurred in all patients that died. Of the three duodenal perforations, all required operation and one patient died. Of the seven 'unknown' retroperitoneal perforations, two patients required surgery and there was no mortality. The patients with esophageal and afferent limb perforations both recovered uneventfully after surgery. Most patients who required surgery had retroperitoneal fluid seen on CT scanning. *Conclusions*. We found that most guidewire perforations can be managed medically with little morbidity. Pre-cut sphincterotomy is a risk factor for perforation. Peri-ampullary and duodenal perforations have a high morbidity and mortality rate. In particular, retroperitoneal fluid collections on CT scans, delay in diagnosis and failure of medical therapy requiring salvage surgery are associated with poor outcomes. Early aggressive surgery may improve patient care.

Result

- Most guidewire perforations can be managed medically with little morbidity.
- Pre-cut sphincterotomy is a risk factor for perforation.
- Peri-ampullary and duodenal perforations have a high morbidity and mortality rate.
- In particular, retroperitoneal fluid collections on CT scans, delay in diagnosis and failure of medical therapy requiring salvage surgery are associated with poor outcomes.

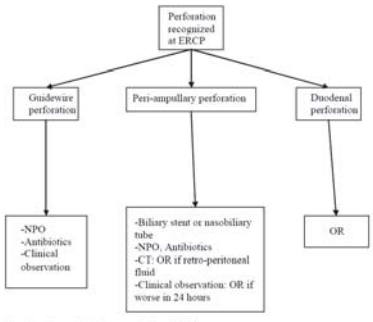

Figure 1. Management algorithm for perforation recognized at ERCP.

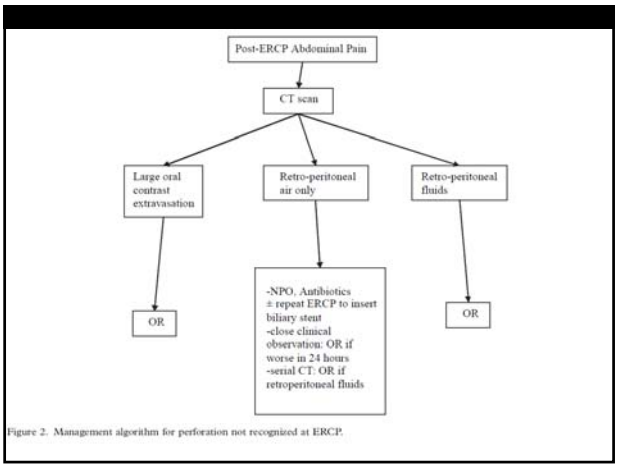

Figure 2. Management algorithm for perforation not recognized at ERCP.

Thank You for Your Attention!!

American Society of Gastrointestinal Endoscopy

- ERCP is primarily a therapeutic procedure for the management of pancreaticobiliary disorders (C).
- Diagnostic ERCP should not be undertaken in the evaluation of pancreaticobiliary pain in the absence of objective findings on other imaging studies (B).
- Routine ERCP before laparoscopic cholecystectomy should not be performed (B).
- Endoscopic therapy of postoperative biliary leaks and strictures should be undertaken as first-line therapy (B).

- ERCP has an important role in patients with recurrent acute pancreatitis and can identify and, in some cases, treat the underlying cause (B).
- ERCP is effective in treating symptomatic strictures in chronic pancreatitis (B).
- ERCP is effective for the palliation of malignant biliary obstruction (B), for which self-expanding metallic stents have longer patency than plastic stents (A).
- ERCP can be used to diagnose and to treat symptomatic pancreatic-duct stones (B).

- Pancreatic-duct disruptions or leaks can be effectively treated via the placement of bridging or transpapillary pancreatic stents (B).
- ERCP is a highly effective tool to drain symptomatic pancreatic pseudocysts and, in selected patients, more complicated benign pancreatic-fluid collections arising in patients with a history of pancreatitis (B).
- Intraductal ultrasound and pancreatoscopy are useful adjunctive techniques for the diagnosis of pancreatic malignancies (B).
- ERCP can be performed safely in both children and pregnant adults by experienced endoscopists. In both situations, radiation exposure should be minimized as much as possible (B).

Grading system for the major complications of ERCP and endoscopic sphincterotomy

	Mild	Moderate	Severe
Pancreatitis	Amylase at least three times normal at more than 24 hours after the procedure, requiring admission or prolongation of planned admission to two to three days	Hospitalization of 4 to 10 days	Hospitalization of more than ten days, hemorrhagic pancreatitis, phlegmon or pseudocyst, or intervention (percutaneous drainage or surgery)
Bleeding	Clinical, not just endoscopic evidence of bleeding, hemoglobin drop <3 g, and no need for transfusion	Transfusion (four units or less), no angiographic intervention or surgery	Transfusion (five units or more), or intervention (angiographic or surgical)
Cholangitis	>38ºC for 24 to 48 hours	Febrile or septic illness requiring more than three days of hospital treatment or endoscopic or percutaneous intervention	Septic shock or surgery
Perforation	Possible, or only very slight eak of fluid or contrast, treatable by fluids and suction for three days or less	Any definite perforation treated medically for 4 to 10 days	Medical treatment for more than 10 days, or intervention (percutaneous or surgical)

Adapted with permission from Cotton, PB, et al. Endoscopic sphincterotomy complications and their management: An attempt at consensus. Gastrointest Endosc 1991; 37:383.