



Prevention and Treatment of Post ERCP Complications. An Update

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COI

- Boston Scientific: Consultant; Research and Development pancreatic stents
- Abbvie: Consultant; Lectures (pancreatic enzymes)
- UpToDate: Author Royalties (pancreatitis related topics)
- Parexel: Physician adjudicator pancreatic events
- Pancreas Journal: Associate Editor
- Ariel Precision Medicine: Medical Board of Directors (pancreas genetics)
- National Pancreas Foundation: Medical Board of Directors

Biliary Pancreatitis

- Diagnosis of acute pancreatitis, elevated transaminases and elevated Tbili
- Approx 80% of the stones will pass spontaneously
- Plan:
 - Follow LFTs / Total bili
 - MRCP
 - EUS

Biliary Pancreatitis

Outline

- Complications (rare & not so rare)
- Prevention
- Management
- Summary

Indications for ERCP

Endoscopic Retrograde Cholangiopancreatography (ERCP) for Diagnosis and Therapy

National Institutes of Health
State-of-the-Science Conference Statement
January 14-16, 2002



Complications (specific)

- Pancreatitis
- Bleeding
- Perforation
- Infection
 - Patient related
 - Endoscope related
- Rare complications...

Complications (specific)

- Pancreatitis
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- Perforation
- Infection
 - Patient related
 - **Endoscope related**
- Rare complications...

Complications (Nonspecific)

- Sedation related
- Complications related to biliary and pancreatic stents
- Impaction of retrieval baskets
- Very rare: Contrast allergy; Electrosurgical hazards; Gallstone ileus; Liver abscess, gas embolism

Overall Complications of ERCP with Sphincterotomy and Related Mortality

Author	Cotton et al 1991	Freeman et al 1996	Rabenstein et al 1998
Study	Retrospective multicenter review	Prospective multicenter study	Prospective monocenter study
Patients number	7729	2347	746
Pancreatitis number percent	148 1.9	127 5.4	35 4.7
Bleeding number percent	234 3.0	48 2.0	16 2.1
Sepsis number percent	129 1.7	35 1.5	10 1.4
Perforation number percent	76 1.0	8 0.3	1 0.1
Other number percent	49 0.6	24 1.1	3 0.3
Totals number percent	636 8.2	229 9.8	63 8.4
Deaths number percent	103 1.3	10 0.4	5 0.7

General Complications

- Pancreatitis
- Bleeding
- Perforation
- Infection

Post ERCP Pancreatitis

Patient

- Female
- Younger age
- Suspected SOD
- Prior post ERCP pancreatitis
- Normal bilirubin

NOTE: Chronic pancreatitis; smoking; liver dz / PREVENTIVE

Procedure

- Pancreatic injection (extent)
- Pancreatic wire placement
- Difficult or failed cannulation
- Precut Sphx
- Panc Sphx; Minor Sphx
- Ampullectomy

Risk Reduction

- Pre-Procedure
 - Indications
 - Patient selection
 - MD selection
 - Diagnostic w/u
 - IV hydration with LR (1lt)
- Intra-Procedure
 - Technical maneuvers
 - MPD stent
- Post-Procedure
 - Recognition
 - Drug (Indom. PR)
 - Treatment

Post-ERCP Pancreatitis

Pancreatic Stents for Prevention of Post-ERCP Pancreatitis

First author/y	Study design	Patients	n	Pancreatitis rate without and with pancreatic stent		p
Smithline 1993 ³⁰	RCT	Pre-cut biliary ES, SOD, small ducts	93	18%	14%	0.299
Sherman 1996 ³⁹	RCT (abstract)	Pre-cut biliary ES	93	21%*	2%	0.036
Tarnasky 1998 ²⁹	RCT	Biliary ES for SOD	80	26%	7%	0.03
Elton 1998 ³⁴	Retrospective, case control	Pancreatic ES for all indications	194	12.5%	0.7%	<0.003
Patel 1999 ³⁵	RCT (abstract)	Pancreatic ES for SOD	36	33%	11%	>0.05
Vandervoort 1999 ⁹¹	Prospective, case control	Pancreatic brush cytology for suspected malignancy	42	28.1%	0%	0.08
Aizawa 2001 ⁸⁶	Retrospective, case control	Biliary balloon dilation for stone	40	6%	0%	0.11
Fogel 2002 ²⁸	Retrospective, case control	Biliary +/- pancreatic ES for SOD	436	28.2%	13.5%	<0.05
Norton 2002 ⁷⁷	Retrospective, case control	Endoscopic ampullectomy	28	11.1%	20%	>0.05
Fazel 2003 ⁸⁷	RCT	Difficult cannulation, biliary ES, SOD	76	28%	5%	<0.05
Freeman 2004 ⁸⁸	Prospective, case control	All attempted major papilla PD stents in high-risk therapeutic ERCP	225	66.7%	14.4%	0.06
Catalano 2004 ⁸⁰	Retrospective, case control	Endoscopic ampullectomy	103	16.7%	3.3%	0.10

Prophylactic pancreatic stent placement and post-ERCP pancreatitis: an updated meta-analysis

RCTs comparing panc stent placement and subsequent incidence of PEP

14 studies included

1,541 patients (760 got PS / 781 control)

Conclusion:

“PS placement prevented PEP after ERCP as compared with no PS placement”

Prevention

Prophylaxis of post-ERCP pancreatitis: European Society of Gastrointestinal Endoscopy (ESGE) Guideline – Updated June 2014

Authors: Jean-Marc Dumonceau, Angelo Andriulli, B. Joseph Elmunzer, Alberto Mariani, Tobias Meister, Jacques Deviere, Tomasz Marek, Todd H. Baron, Cesare Hassan, Pier A. Testoni, Christine Kapral

Technical maneuvers:

Minimize pancreatic injection, placement of PD stent in high risk cases, wire guided cannulation

7.1.5. Cannulation techniques

► Statement 2010:

For deep biliary cannulation, the wire-guided technique reduces the risk of PEP and increases the success rate of primary cannulation when compared with the standard contrast-assisted method

New information since 2009:

Five comparative studies and a meta-analysis comparing the wire-guided vs. the standard contrast-assisted method for selective biliary cannulation were published between 2009 and 2013 [127–132]. Four studies [128–131], two of which were RCTs [128, 131], did not confirm the results of previous meta-analyses that showed a lower risk of PEP with the wire-guided method. In most studies, the wire-guided method shortened cannulation and fluoroscopy times. However, in a recent meta-analysis that extended the analysis to 12 RCTs (3450 patients), the wire-guided method significantly lowered the incidence of PEP compared with the contrast-assisted method (RR 0.51; 95%CI, 0.32–0.82) [132]. In addition, the wire-guided cannulation technique was associated with greater primary cannulation success (RR 1.07; 95%CI 1.00–1.15), fewer precut sphincterotomies (RR 0.75; 95% CI 0.60–0.95), and no increase in other ERCP-related complications.


Wire Guided Cannulation

Prevention



Pharmacology:

Administration of prophylactic drug before or after high-risk cases, possible, pre-procedure hydration with Lactated Ringer



A Randomized Controlled Trial of Rectal Indomethacin for the Prevention of Post-ERCP Pancreatitis

**AU: B.Elmunzer, J.Scheiman, G.Lehman, A.Chak, P.Mosler, P.Higgins,
R.Hayward, J.Romagnuolo, G.Elta, S.Sherman, E.Fogel
Michigan; Indianapolis, Cleveland, Kentucky, Med Univ. South Carolina**

New England J Med 2012;366:1414-22

General Complications

- Pancreatitis
- Bleeding
- Perforation
- Infection (including SCOPE infection)

Complications from ERCP Prospective Series

Author	Year	N	Panc	Bleed	Perf	Infect	CP	Death
Cotton	2009	11,497	2.6%	0.3%	0.13%	0.3%	0.2%	0.06%
Williams	2007	5,264	1.6%	0.9%	0.4%	1.0%		
Cheng	2006	1,115	15.1%					0.1%
Christensen	2004	1,117	3.8%	0.9%	1.1%	5.0%	2.3%	1.0%
Masci	2001	2,462	1.8%	1.2%	0.7%	0.6%		0.1%
Freeman	2001	1,963	6.7%					
Loperfido	1998	2,769	1.3%	0.8%	1.0%	0.9%		0.4%
Freeman	1996	2,347	5.4%	2.0%	0.5%	1.0%		0.3%

Risk Factors

- **Patient Factors**

- coagulopathy
- anticoagulation (hold prior to procedure)
- renal failure on hemodialysis
- cholangitis

- **Anatomical Factors**

- periampullary diverticulum
- Billroth II gastrectomy
- ampullary stenosis
- stone impaction

Risk Factors

- **Technical Factors**
 - sphincterotomy length
 - extension of previous sphincterotomy
 - needle-knife
 - low case volume

Post Sphincterotomy Bleed

Prevent & Treatment

- Prevention:

- Identify high risk patients
 - INR \leq 1.5
 - Platelets 50-80k
 - DDAVP for pts with platelet dysfunction

- Management:

Endoscopic Injection, electrocautery, heater probe, APC, balloon tamponade, fully cover metal stents, hemoclips, Angiography, Surgery

General Complications

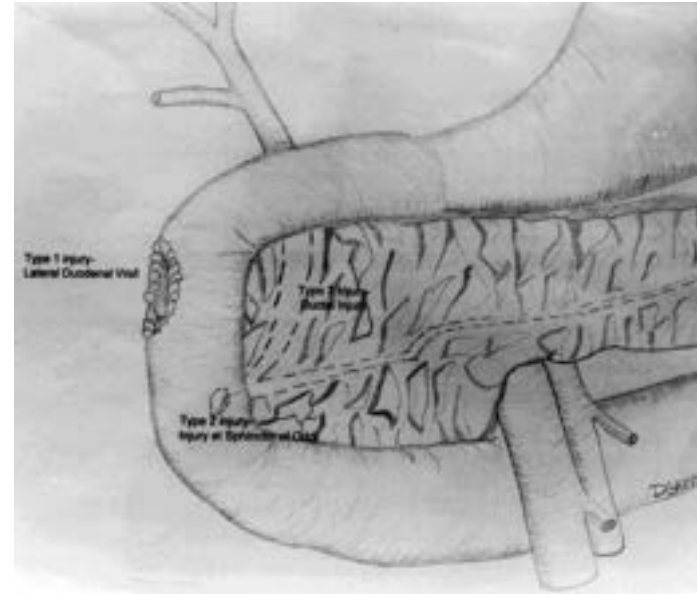
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Complications from ERCP Prospective Studies

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Perforation Classification

- Type 1: Duodenal Wall
- Type 2: Ampullary
- Type 3: Ductal Injury
- Type 4: Retroperitoneal Air Alone



Stapfer M, et al. Management of duodenal perforation after ERCP and sphincterotomy. *Annals of Surgery* 2000;232:195

Case



Clips Large Capacity Over The Scope Clip



Padlock Clip



Treatment - Perforation

- Start conservatively treatment with observation, IV antibiotics, NG suction, bowel rest and early surgical consultation

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Infection

- Incidence: < 1%
- Hepatic abscess
- Acute cholecystitis
- Cholangitis (most frequent infectious complication)
 - commonly results from incomplete biliary drainage
 - highest rates observed in malignant hilar strictures and patients with PSC

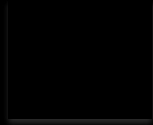
Prevention

- Antibiotic prophylaxis for patients with:
 - Biliary tract obstruction
 - Features of biliary sepsis
 - Pancreatic pseudocyst or WON
- Minimize volume of contrast injection
- Selective drainage in patients with hilar strictures (preferably after MRCP) to avoid contamination

Rare Complications

- Impaction of retrieval baskets
- Gallstone ileus
- Contrast allergy
- Portal Vein Gas
- Cardiac Air Embolism
- Arterial air embolism with cerebral ischemia
- Intraoperative hemorrhage
- Pneumothorax, pneumomediastinum
- Electrosurgical Hazards

Rare Complications



Rare Complications

- Impaction of retrieval baskets



Keep the plastic cover to
Prevent OP trauma &
Duodenal / biliary trauma
New devices are compatible
With the ERCP scope working
channel

Stone Entrapment

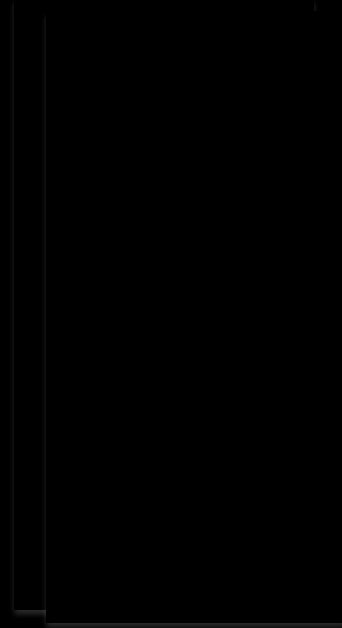
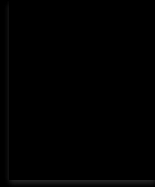
Treatment options:

- Mechanical lithotripsy / salvage device
- ESWL
- Cholangioscopy
- Naso biliary catheter w drainage and then bring back in 1 wk and re treat
- Surgery

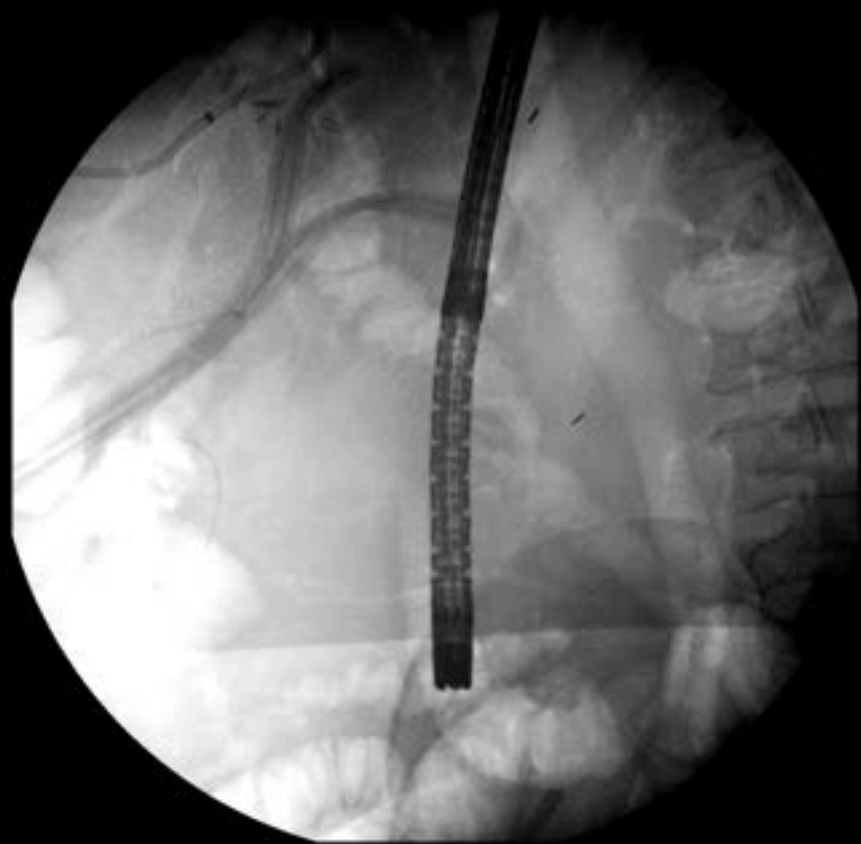
64 yo M s/p liver transplantation c/b anasto. stricture



Rare Complications – Stent Migration



73 yo F s/p Whipple for pancreatic head cancer, now presents with a third episode of acute pancreatitis



Conclusions

- Make sure you are fit for the job !
- Know your equipment
- There are clear indications - NIH consensus & ASGE & European SGE
- Don't take unnecessary risks
- Pre-procedure hydration
- Pancreatic duct stenting !
- Indomethacin for high risk patients
- Recognize and treat complications

A horizontal banner at the top of the slide features a blurred city skyline at dusk or dawn. Several skyscrapers are visible, with some windows illuminated. A solid blue horizontal line runs across the slide just below the banner.

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