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Managing complications of ERCP: Duodenal Perforations

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ERCP & duodenal perforation: magnitude of the problem

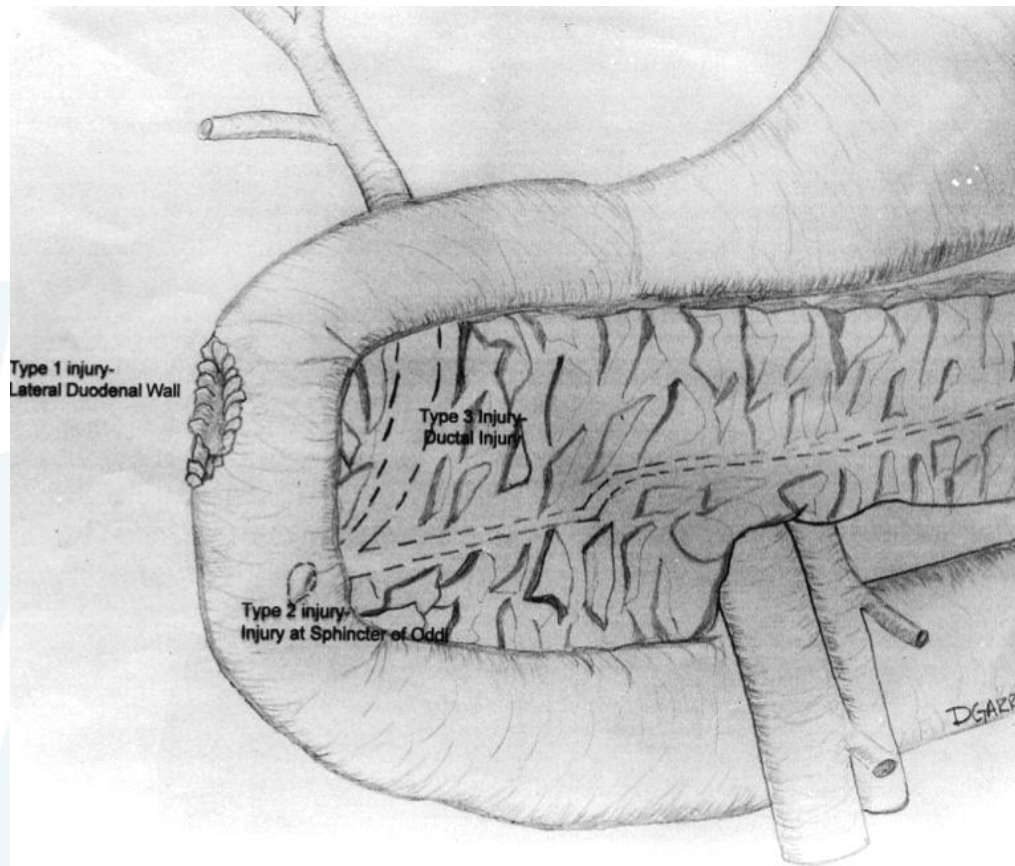
ERCP- related duodenal perforations: 0.3-1.3%

Comparison to other ERCP-procedure related complication

- Post-ERCP pancreatitis 5-10%
- Hemorraghe 1-2%
- Infection 1-2%

Mortality: 7-18% vs overall ERCP 0.1%

Types of duodenal perforation



Type 1: Lateral duodenal wall

Type 2: Peri-Vaterian

Type 3: Ductal injuries

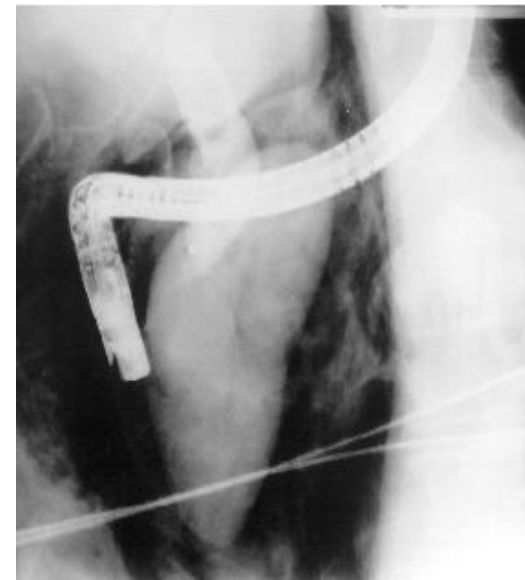
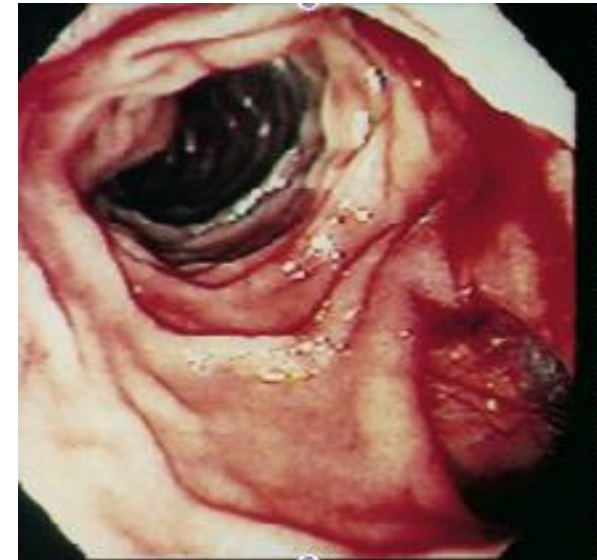
Type 4: Retroperitoneal air alone

Characteristics of the different types of DP

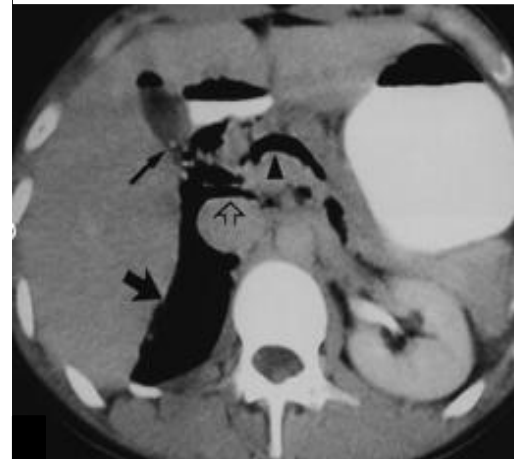
	Type 1	Type 2	Type 3	Type 4
Anatomical location	Lateral duodenal wall	Peri-Vaterian	Ductal injury	Retroperitoneal air alone
Causal mechanism	Endoscope/stent	Sfincterotomy	Wire or basket	Compressed air
Location perforation	Intra- or retroperitoneal	Retroperitoneal	Retroperitoneal	Retroperitoneal
Relative frequency	10-20%	80-90%		
Severity	+++	++	+	-
Radiological features				

Type 1

Anatomical location	Lateral duodenal wall
Causal mechanism	Endoscope
Location perforation	Intraperitoneum
Relative frequency	10-20%
Severity	+++
Radiological features	Remote from papilla Large Persistent



Type 2	
Anatomical location	Peri-Vaterian
Causal mechanism	Sfincterotomy
Location perforation	Retroperitoneum
Relative frequency	
Severity	++
Radiological features	Streaking opacities Retroperitoneal air Amorphous contrast



Type 3	
Anatomical location	Ductal injury
Causal mechanism	Wire or basket
Location perforation	Retroperitoneum
Relative frequency	
Severity	-
Radiological features	Contrast-extravasation



Type 4	
Anatomical location	Retroperitoneal air alone
Causal mechanism	Compressed air
Location perforation	Retroperitoneum
Relative frequency	13-26%
Severity	-
Radiological features	Retroperitoneal air



Risk factors & prevention to duodenal perforation

Type 1: Lateral duodenal wall

Anatomical aberrations (Billroth II configuration, bulbar ulcer, duodenal stenosis, diverticula ...)

Type 2: Peri-ampullar

- Sfincterotomy
- Intramural injection of contrast
- Precut-sfincterotomy
- Higher grade of difficulty of ERCP
- Billroth II
- Peripapillar diverticulum
- Sfincter of Oddi dysfunction

Type 3: ductal injury

Strictures

Diagnosis of duodenal perforation

76-80% diagnosed during ERCP

Direct visual inspection and awareness

Conventional abdomen pre- and post-procedure

Distal cholangiography after sphincterotomy



Duodenal perforation: diagnosis

Post-procedural diagnosis

≈ high index of clinical suspicion + low threshold for imaging

Clinical features:

Abdominal /flank pain or discomfort: 44-100%

Peritonitis: 18-29%

Fever: 17-29%

Tachycardia: 74%

Leucocytosis: 35-91%

Hyperamylasemia: 37%

Subcutaneous emphysema: 16%

Imaging: conventional abdominal radiograph →
CT scan with oral contrast



Duodenal perforation: diagnosis

Post-procedural diagnosis

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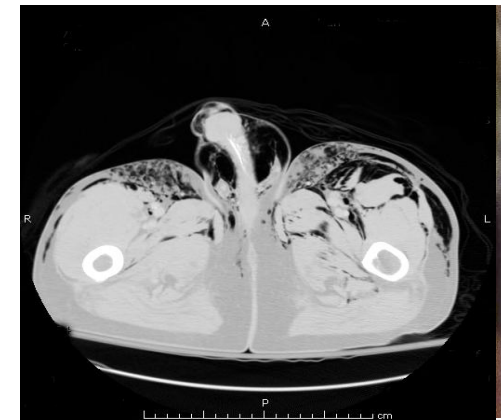
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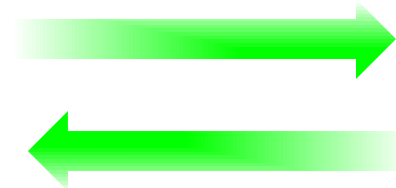
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Imaging: conventional abdominal radiograph →
CT scan with oral contrast



Management: general strategies

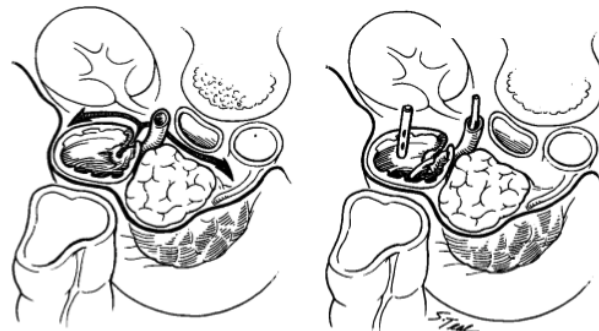


Conservatively



Bowel rest
Nasogastric tube
Antibiotics
Serial clinical and
radiological exam

Endoscopically



Surgically

Repair of the leak with
diversion of gastric content
and/or
Control for the source of the
sepsis by drainage

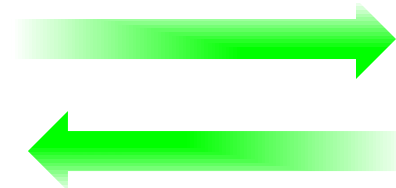
80% of duodenal perforations

20%

Management: general principles



Conservatively



Endoscopically

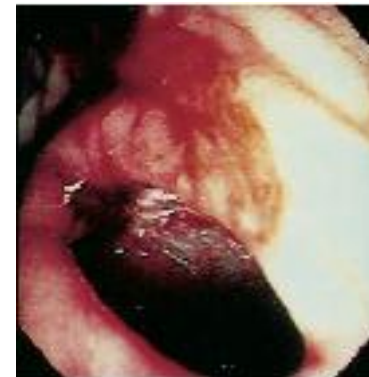
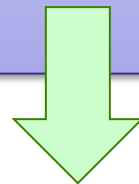


Surgically

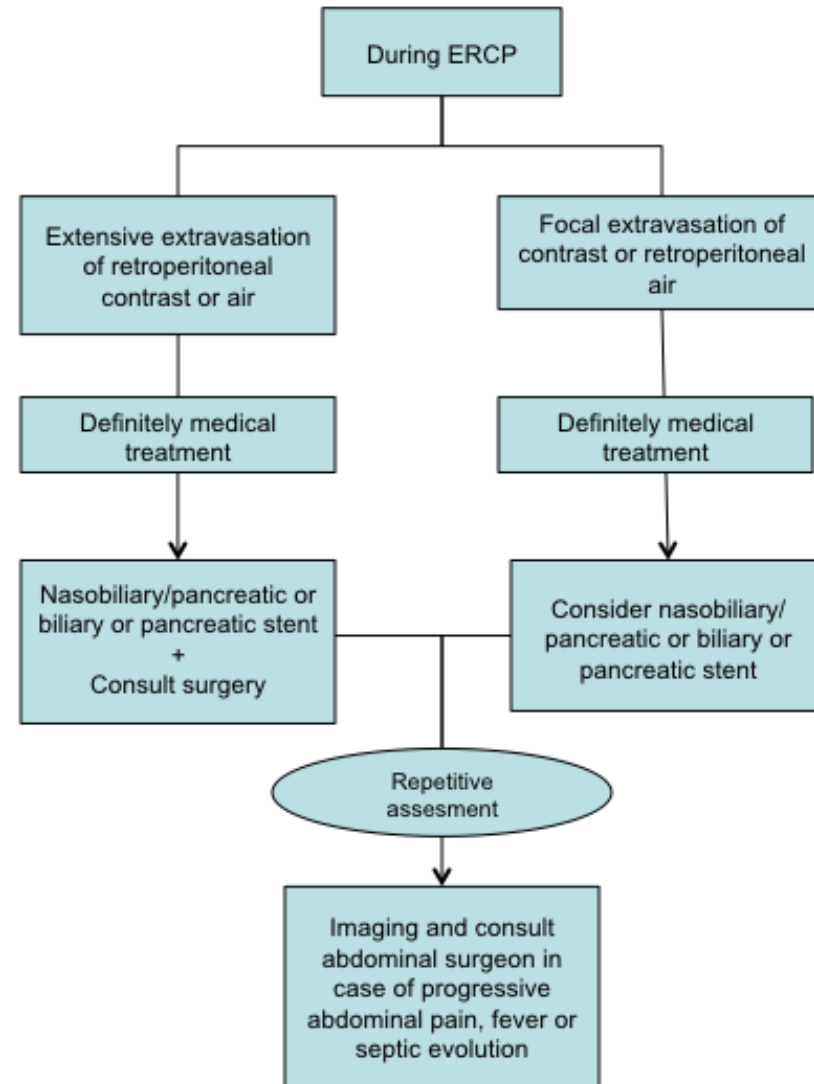
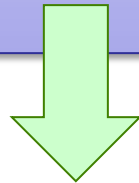
Classification of DP-types = general predictor

Individual clinical assesment + radiological
assesment should guide eventual decision

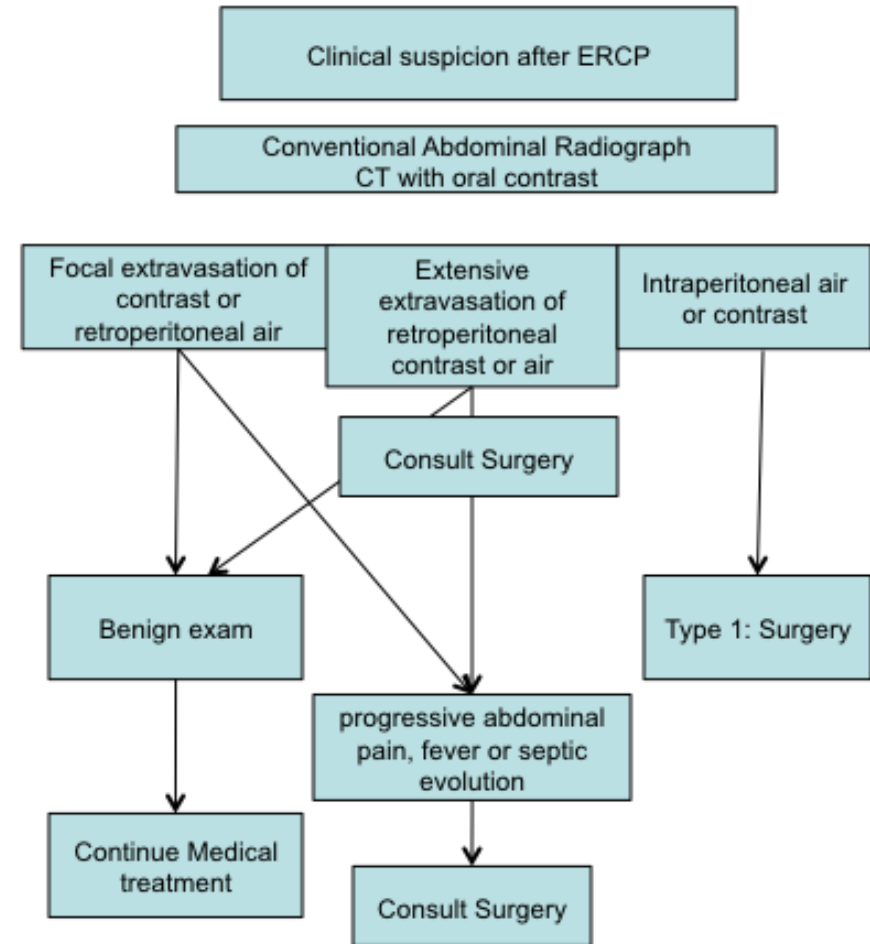
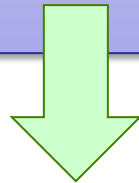
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Causal mechanism	Endoscope/stent
Location perforation	Intra- or retroperitoneal
Relative frequency	10-20%
Severity	+++



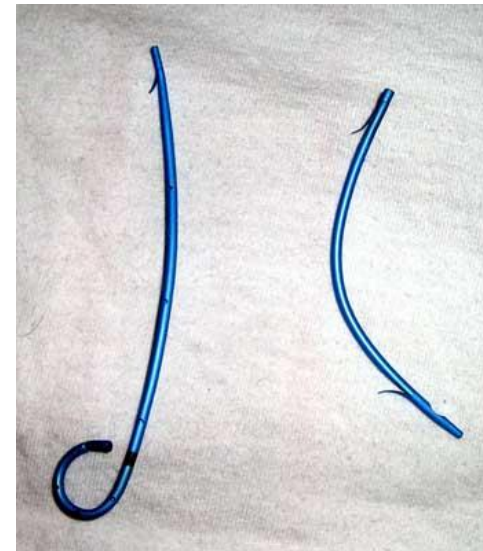
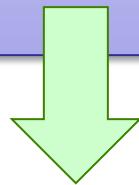
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Anatomical location	Peri-Vaterian
Causal mechanism	Sfincterotomy
Location perforation	Retroperitoneal
Relative frequency	
Severity	++



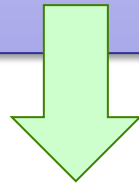
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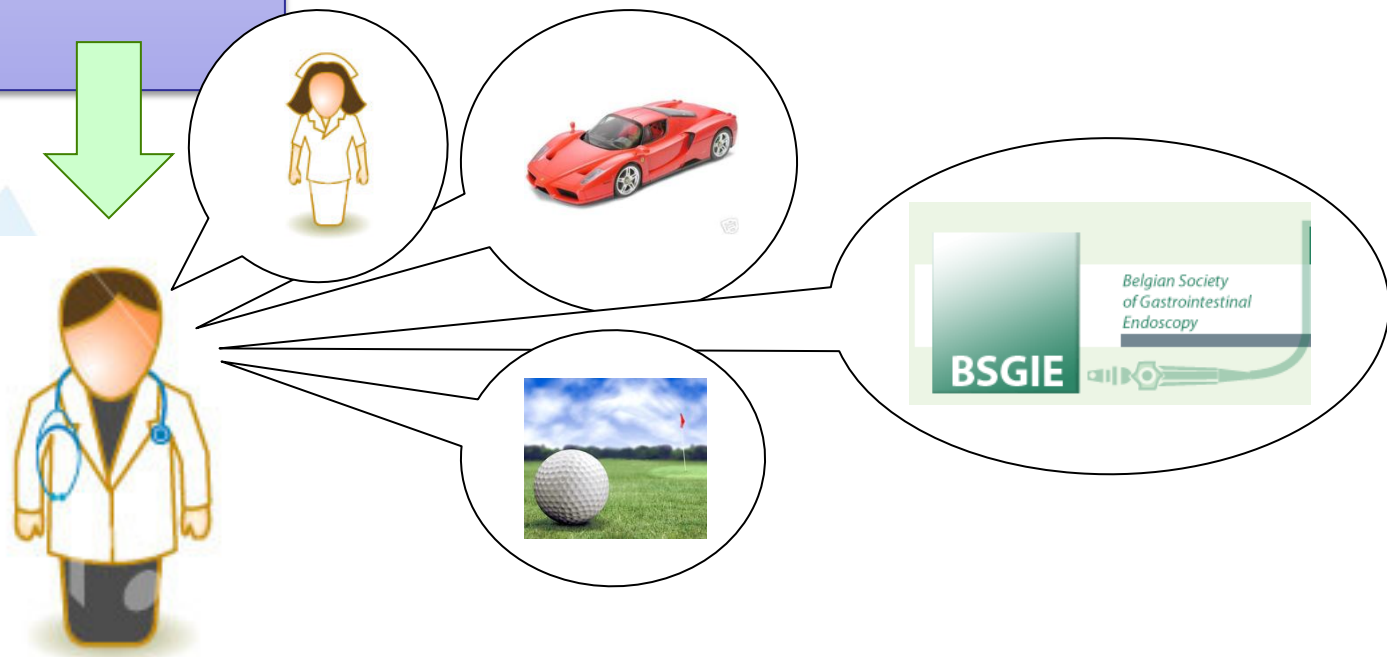
Type 3	
Anatomical location	Ductal injury
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Relative frequency	
Severity	+



Type 4	
Anatomical location	Retroperitoneal air alone
Causal mechanism	Compressed air
Location perforation	Retroperitoneal
Relative frequency	
Severity	-



Type 4	
Anatomical location	Retroperitoneal air alone
Causal mechanism	Compressed air
Location perforation	Retroperitoneal
Relative frequency	
Severity	-



Conclusion: Duodenal perforations

- Rare but potentially severe and fatal complication
- High index of suspicion in patients after ERCP-procedure with abdominal pain
- Early diagnosis is of the essence and warrants low threshold for imaging
- Treatment modalities involve conservative, endoscopical and surgical approach
- Treatment strategy determined mainly by clinical picture supported by imaging