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Pancreas Divisum: Patient Presentation and Discussion

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Advanced Radiology Clerkship

Beth Israel Deaconess Medical Center

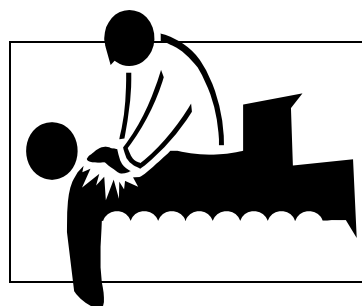
Dr. Gillian Lieberman



Patient JC



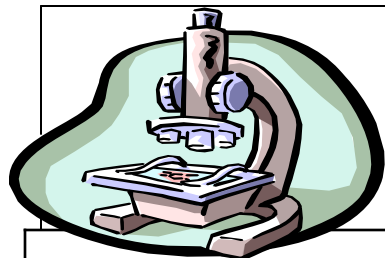
- 44 yo male
- Abdominal pain, epigastric, radiating to back x 1d
- Nausea, vomiting, diaphoresis, low-grade fevers, chills
- PMHx:**
 - 4 m ago, EU abdominal pain → Normal CT



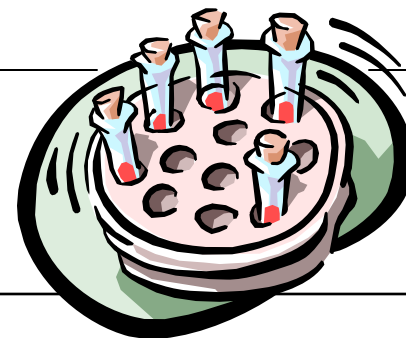
Physical Exam

Vitals: T 100.3 P70 RR20 BP 150/90

- Abd: Distended, tenderness to palpation diffusely, mostly periumbilical
- -Rebound + Voluntary guarding
- BS markedly depressed
- No Cullen/Grey Turner sign



Labs



CBC: WBC 13.4 Hct 42 Plets 257

Amylase 2302 Lipase 1940

LFTs: ALT/AST 47/23 LDH 199
Alk Phos 83 TG 264

E'lytes:

143 | 104 | 23 / 150

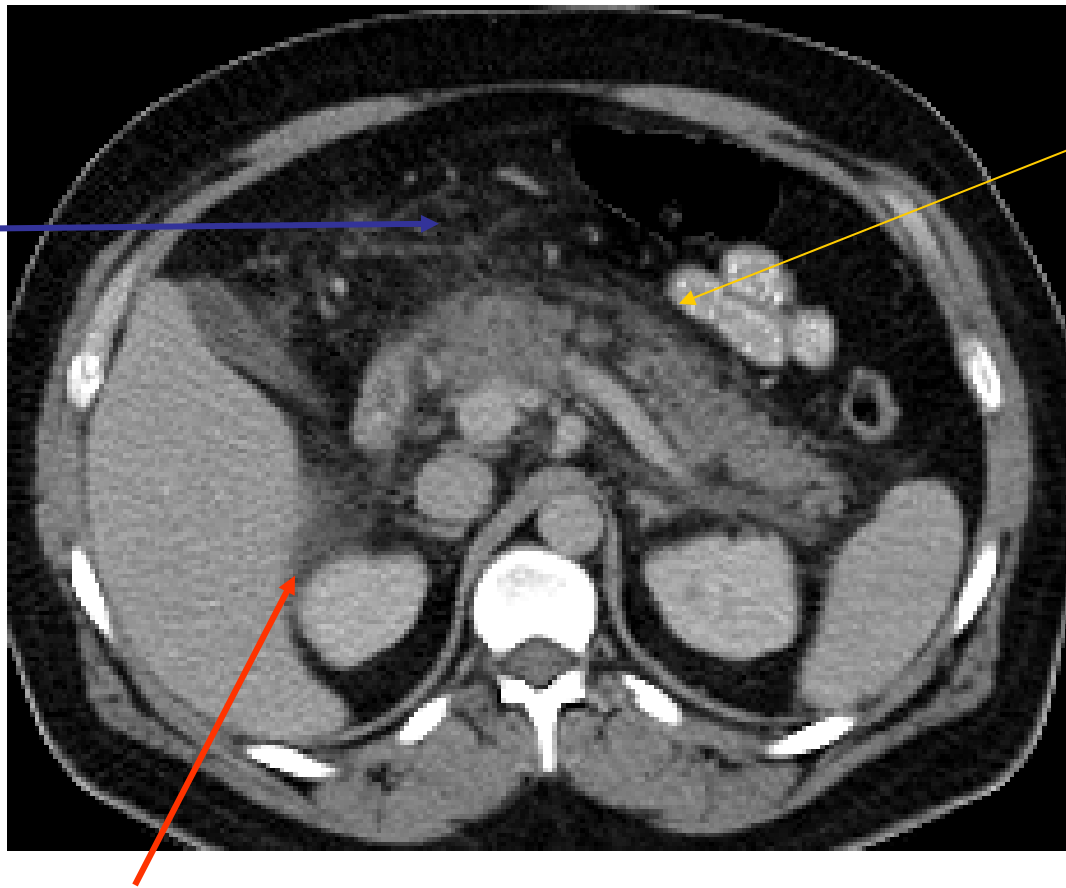
4.3 | 25 | 0.9 \

Ca 9.3 / Ph 4.1/ Mg 2.0



Our Patient JC: Abdominal CT

Fat stranding
(misty
appearance)
of peripancreatic
fat



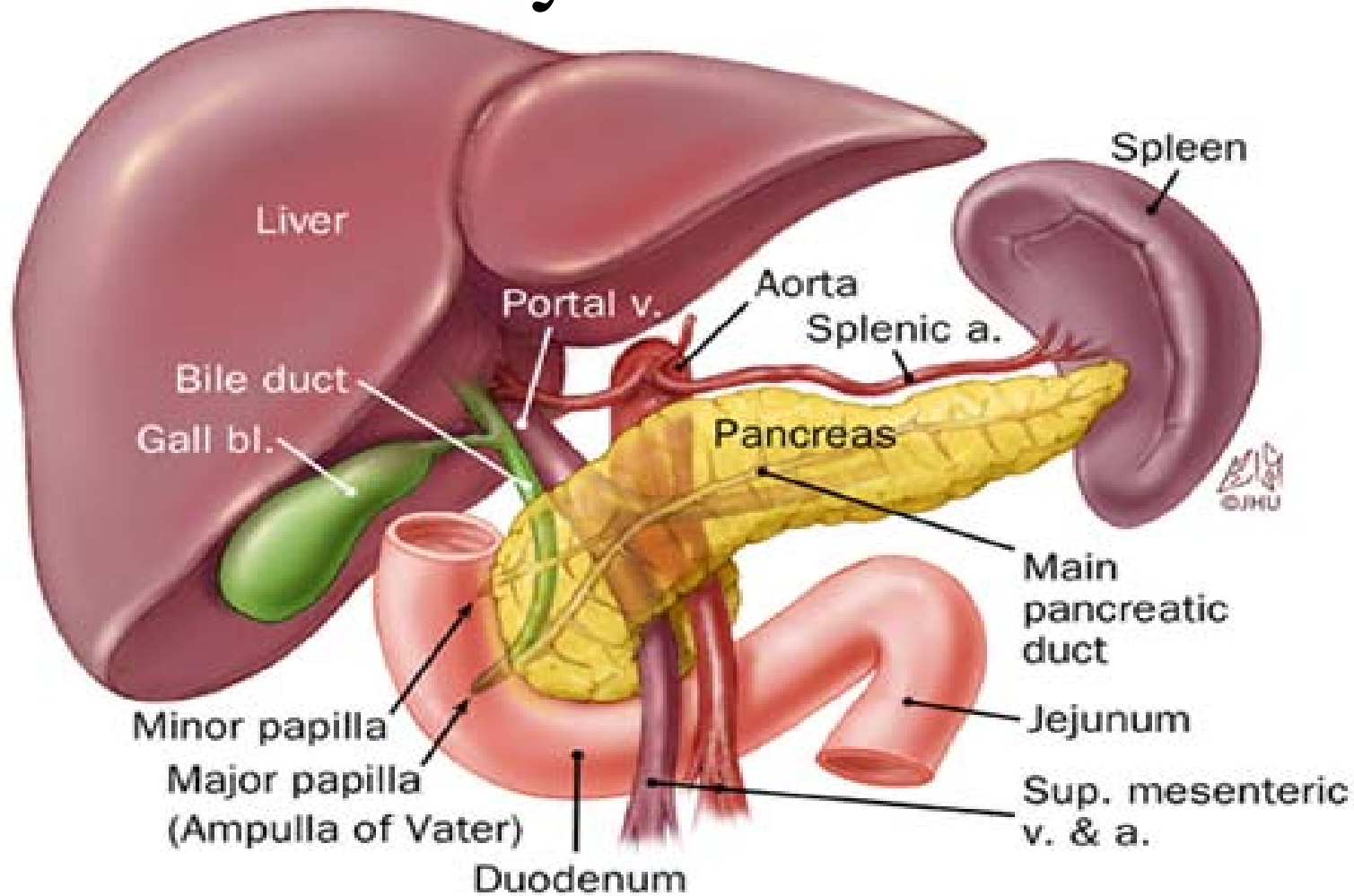
Indistinctive
pancreatic
margins

Thickening of pararenal fascia
and pararenal fluid accumulation

Findings consistent
with pancreatitis



Anatomy of the Pancreas



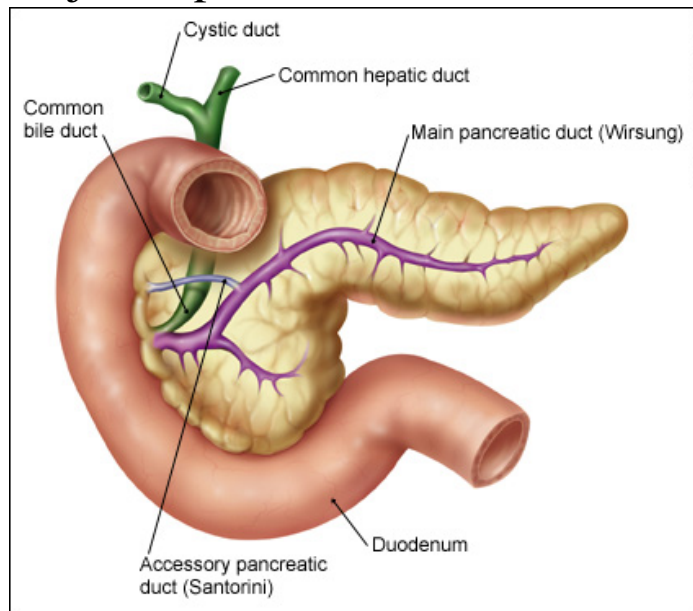


What a mouthful!

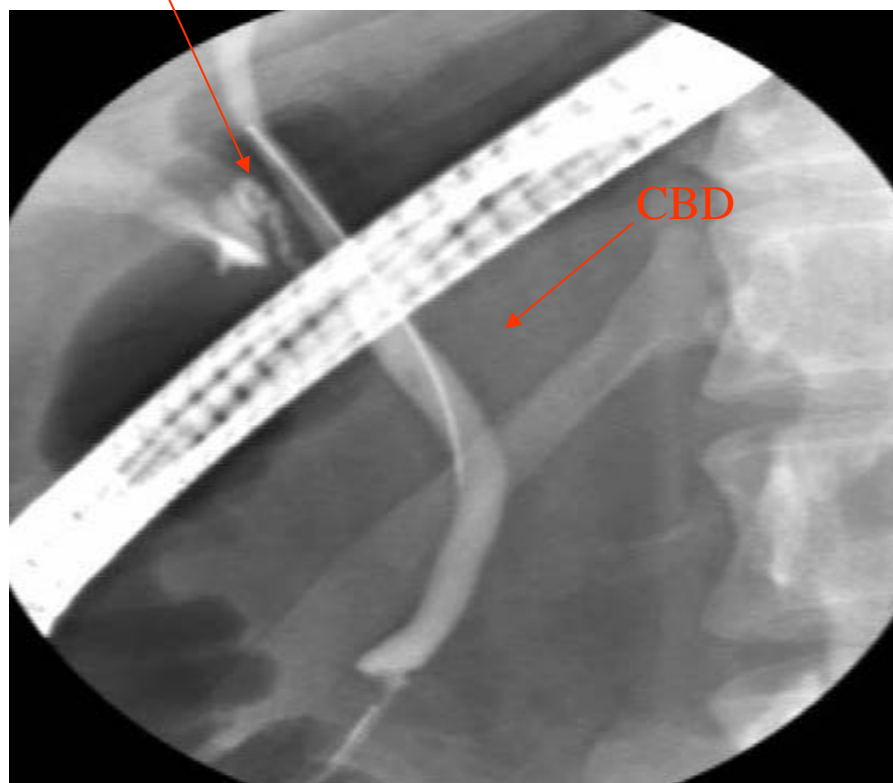
JC: Endoscopic Retrograde Cholangiopancreatography (ERCP)



Cannulation of patient JC's major ampulla



Cystic duct (corkscrew) and gall bladder





Our Patient JC: ERCP

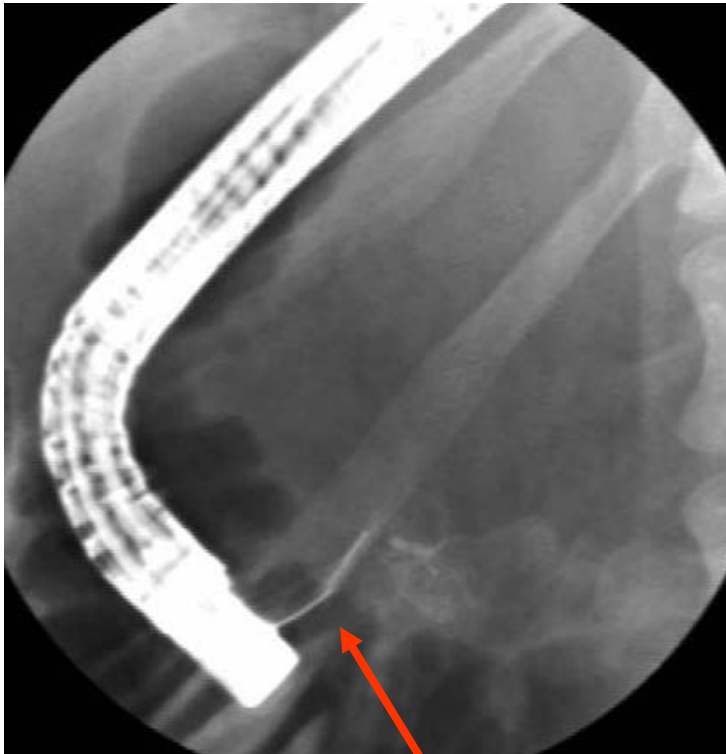


Normal intrahepatic ductal system



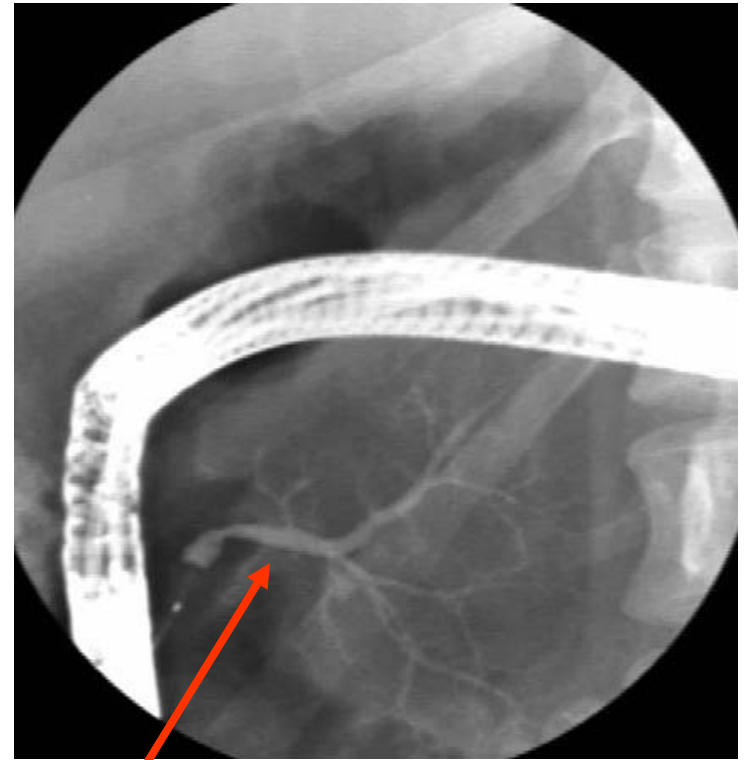
JC: ERCP

Major papilla cannulation

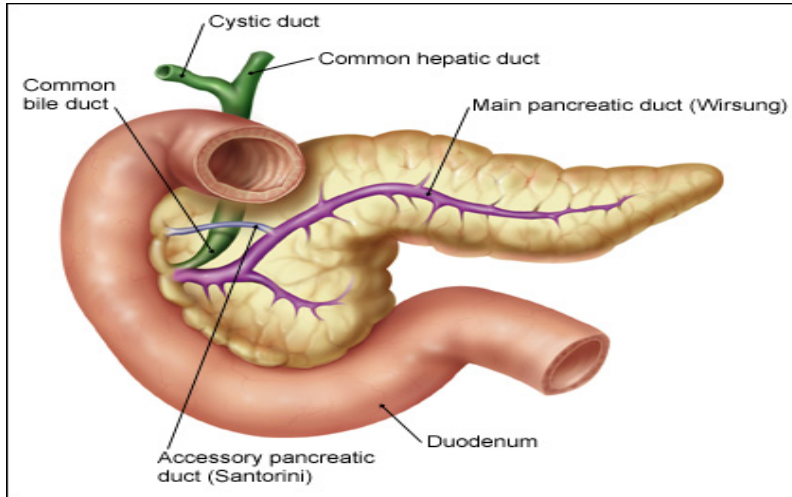


Small ventral duct

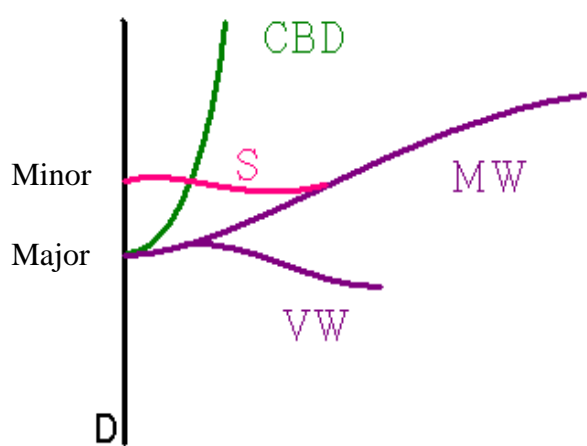
Minor papilla cannulation



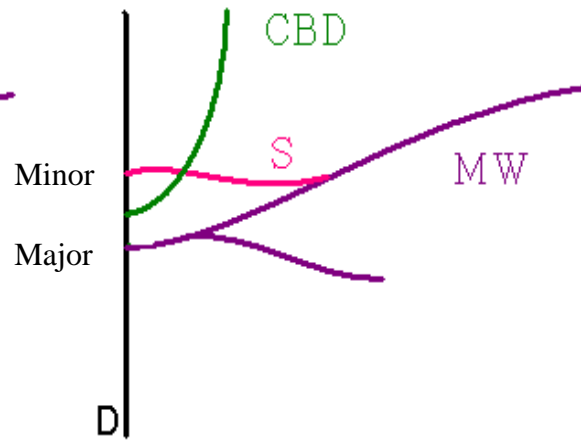
Dominant dorsal duct
connecting to main
pancreatic duct



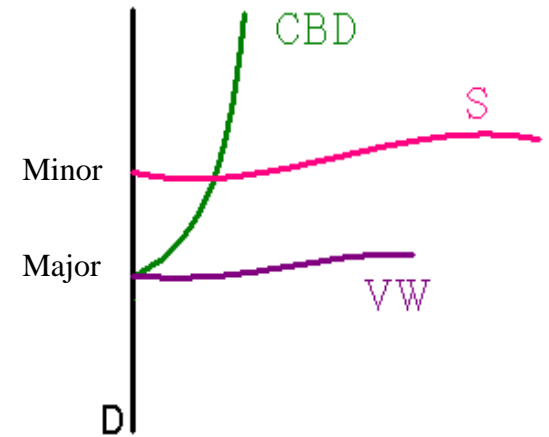
Ductal Variations



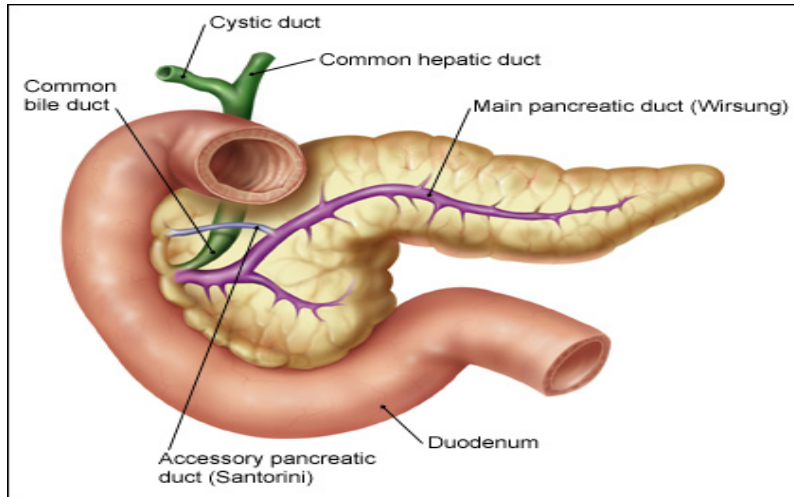
Type 1
Normal Anatomy (85%)



Type 2
Separate duodenal openings (5%)



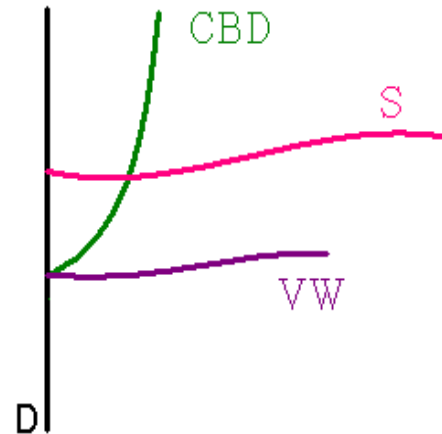
Type 3
Pancreas Divisum (10%)



©1999 Christy Krames

Ductal Variation

Type 3 Pancreas Divisum

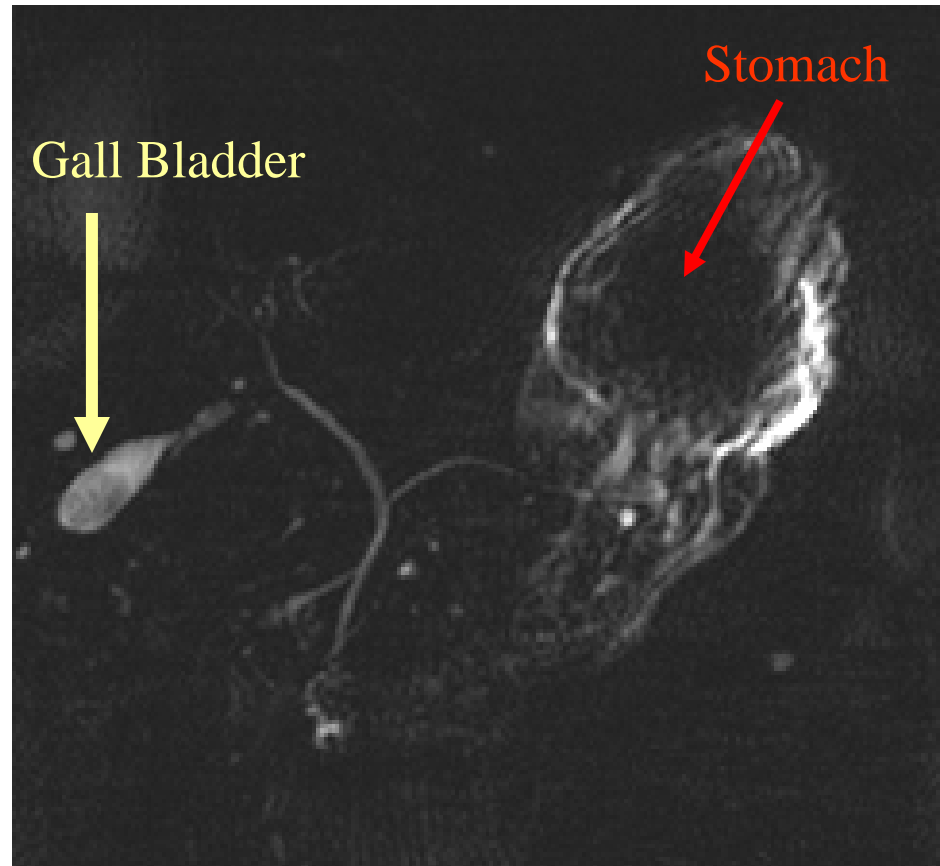


The most common congenital variant of pancreatic anatomy.



Magnetic Resonance Cholangiopancreatography

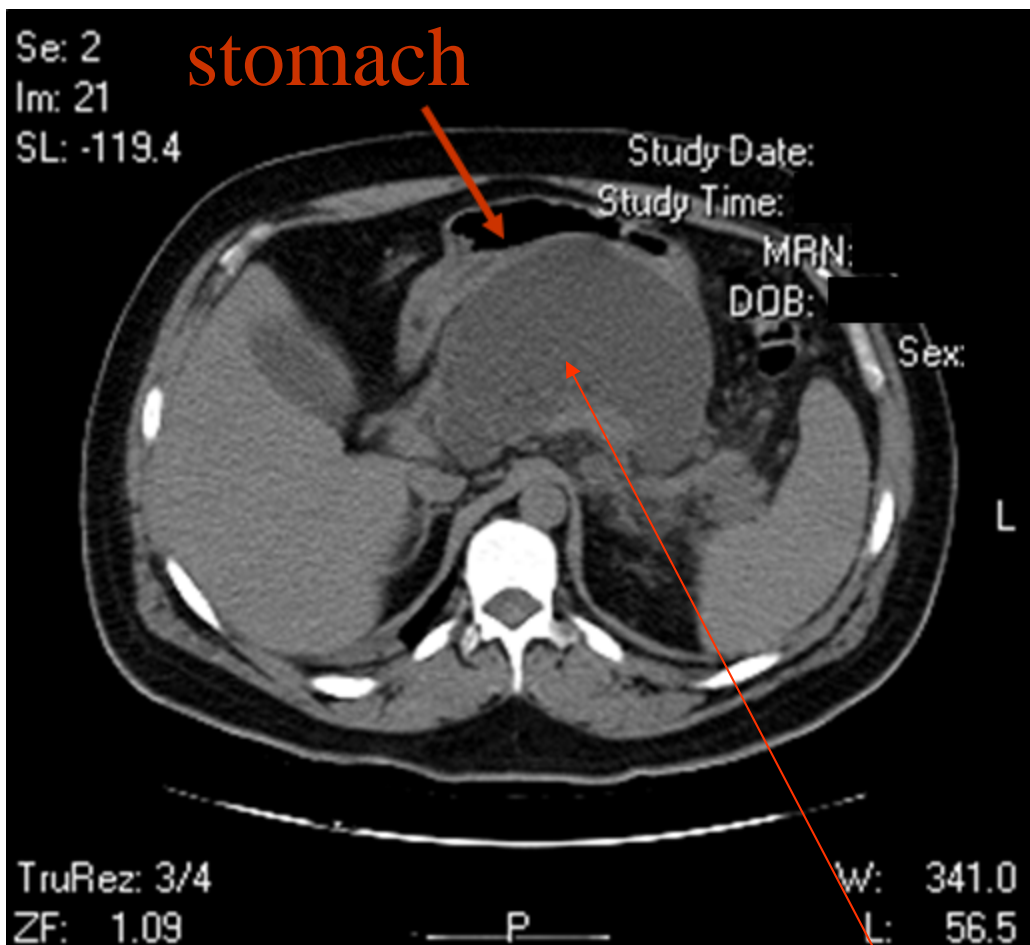
- Fluid filled bile and pancreatic ducts are very bright on T2 images
- Accessory duct drains majority of pancreas



Pancreas Divisum Anomaly



Our Patient JC: 2 Weeks later



J.C. clinically improved, and he was discharged home.

2 weeks later:

He returned to EU with nausea, vomiting, and periumbilical pain, similar to prior admission.



- CT: Pancreatitis and large **pancreatic pseudocyst** extending into lesser sac and compressing stomach



Hilary Hochberg
Gillian Lieberman, MD

So...

What happened?

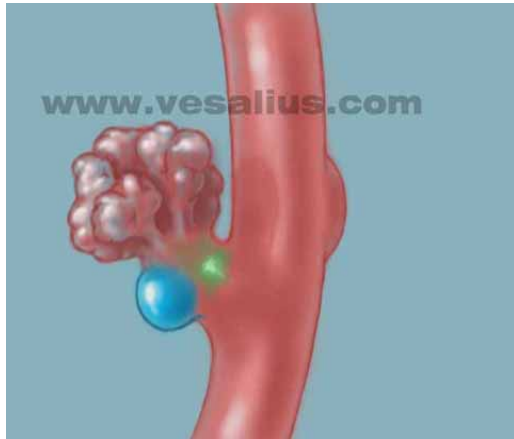


Pancreas Divisum: Embryology

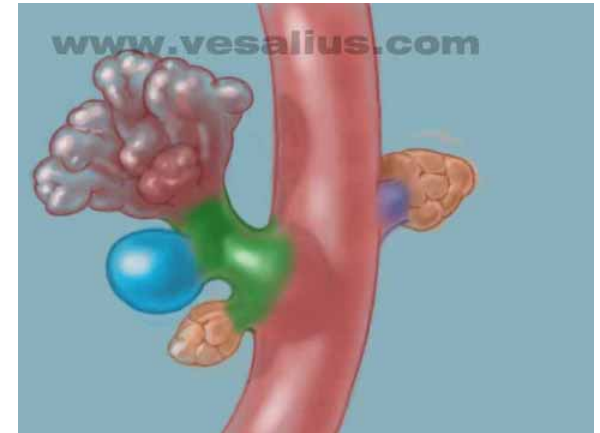




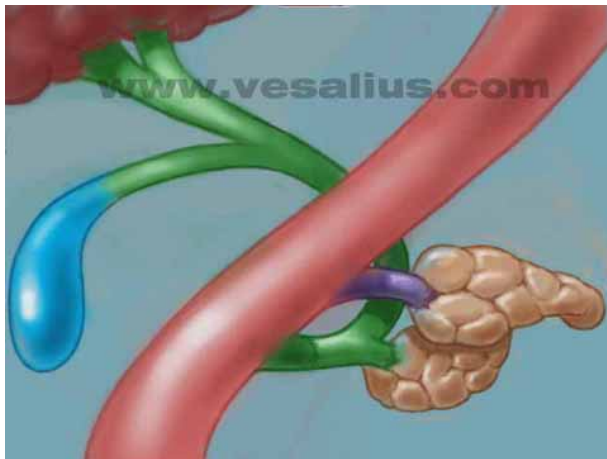
Normal Embryological Development of Pancreas



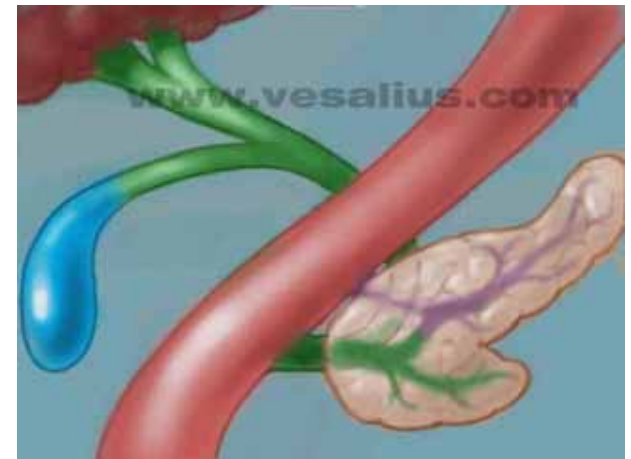
Week 4: Dorsal pancreatic bud



Week 5: Ventral bud appears between GB and duodenum.



Bile duct moves to right, apposing the pancreatic buds as duodenal wall differentially grows.

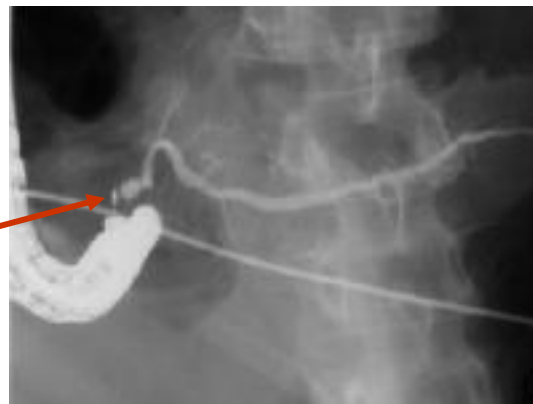


Dorsal duct (Santorini) and ventral duct (Wirsung) FUSE. The ventral duct is the main duct for pancreatic secretions into the duodenum. If the dorsal duct persists, it is called the minor papilla.



Pancreas Divisum

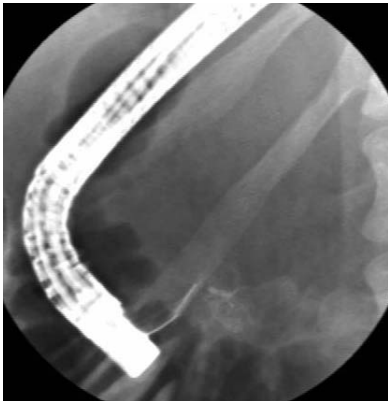
- NO FUSION of ventral and dorsal pancreatic buds
- Ventral bud only drains ventral pancreas
- Dorsal bud (through minor papilla) must drain majority of pancreas.
- Minor papilla is often stenotic and inhibits flow of pancreatic juice → **Pancreatitis**
- Other features:
 - Stenosis of minor papilla
 - Signs of chronic pancreatitis
 - Dilated dorsal duct
 - Santorinicele





Diagnosis of Pancreas Divisum: ERCP

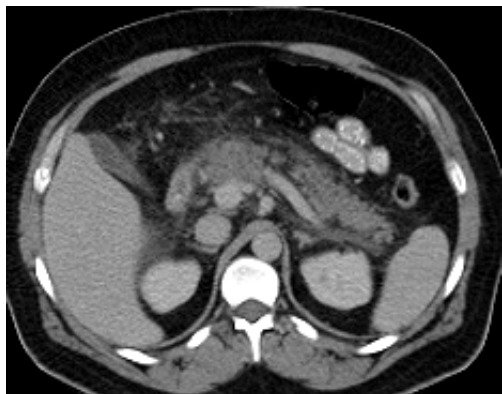
- Absent or small ventral duct
- Confirm by cannulation of minor duct → lack of communication between dorsal and ventral and dorsal ducts.





Complications of Pancreatitis

Acute

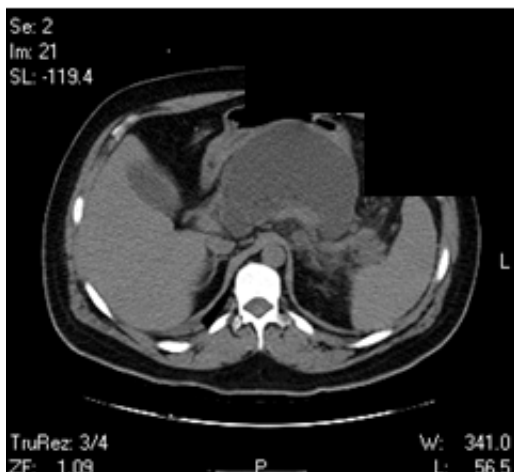


Loculated fluid collection

Pancreatic necrosis

Pancreatic hemorrhage

Subacute



Phlegmon

Pseudocyst

Pancreatic ascites

Abscess

Pseudoaneurysm



Treatment of Pancreas Divisum

Standard Medical Therapy:

Low fat diet
Analgesics
Pancreatic enzymes
Anticholinergics

Minor Papilla Treatment:


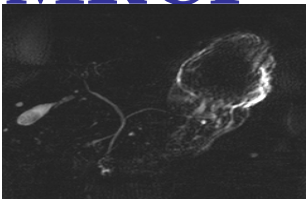
Endoscopic

- Dilatation
- Stenting
- Papillotomy

Open surgical

- Minor sphincteroplasty
- Pancreatico-jejunostomy with Roux-en-Y limb



	Pros	Cons
<p>ERCP</p> 	<ul style="list-style-type: none"> •Best visualization of ductal anatomy •Access for biopsy or therapeutic intervention (sphincterotomy) 	<ul style="list-style-type: none"> •Technically difficult. •Radiation •Expensive •Invasive: Complications (4% ERCP→pancreatitis)
<p>MRCP</p> 	<ul style="list-style-type: none"> •Noninvasive •Better imaging of parenchyma 	<ul style="list-style-type: none"> •Worse resolution than fluoroscopy so less sensitive than ERCP

•Screening Examination In Patients With Low or Intermediate Probability Of choledocholithiasis

- Failed or Incomplete ERCP
- Post-operative Anatomy
- Primary Sclerosing Cholangitis (PSC)
- Complications of Chronic Pancreatitis
- Variant Ductal Anatomy!

MRCP growing in use....

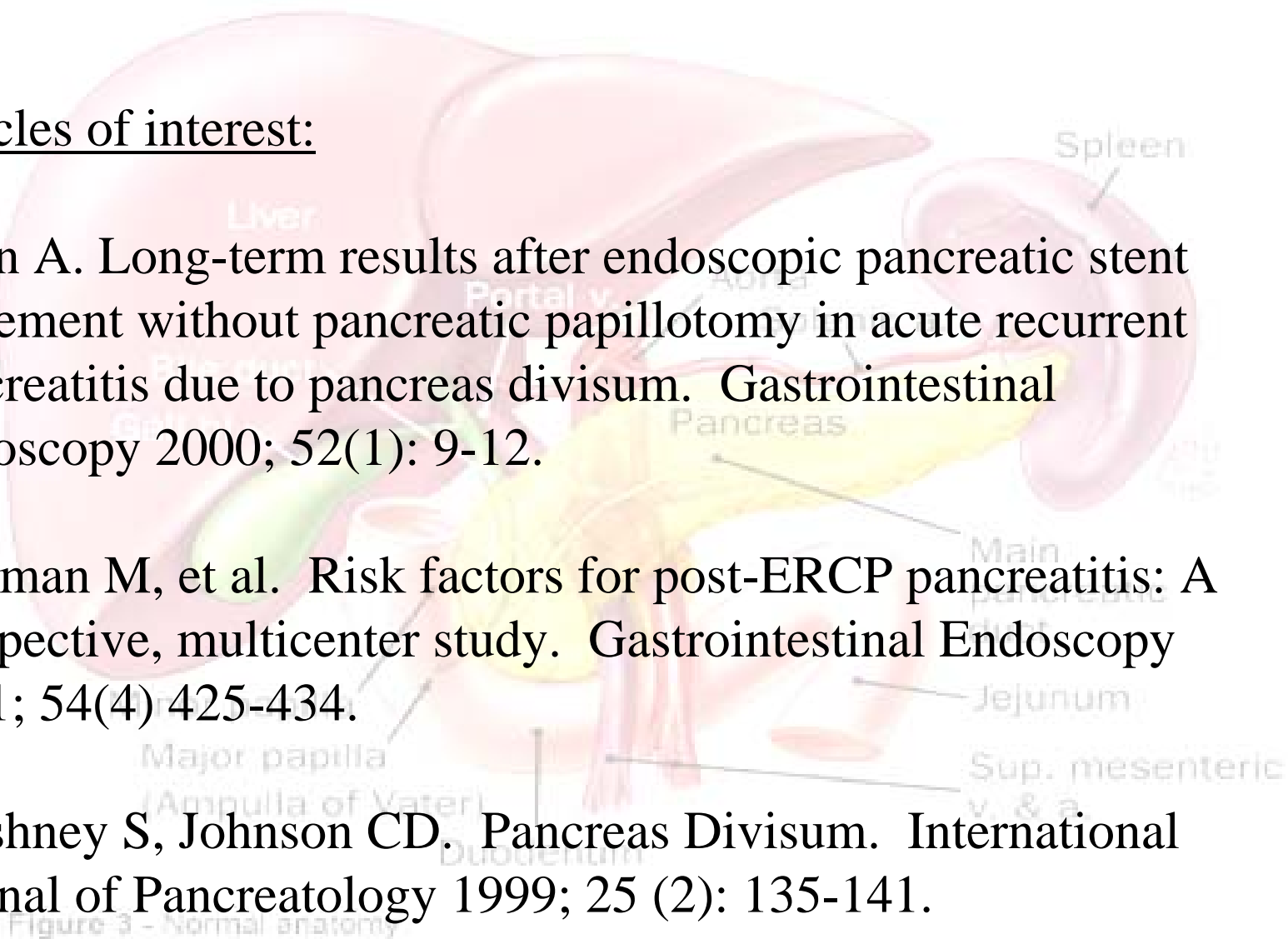


Articles of interest:

Ertan A. Long-term results after endoscopic pancreatic stent placement without pancreatic papillotomy in acute recurrent pancreatitis due to pancreas divisum. *Gastrointestinal Endoscopy* 2000; 52(1): 9-12.

Freeman M, et al. Risk factors for post-ERCP pancreatitis: A prospective, multicenter study. *Gastrointestinal Endoscopy* 2001; 54(4) 425-434.

Varshney S, Johnson CD. Pancreas Divisum. *International Journal of Pancreatology* 1999; 25 (2): 135-141.





Acknowledgments

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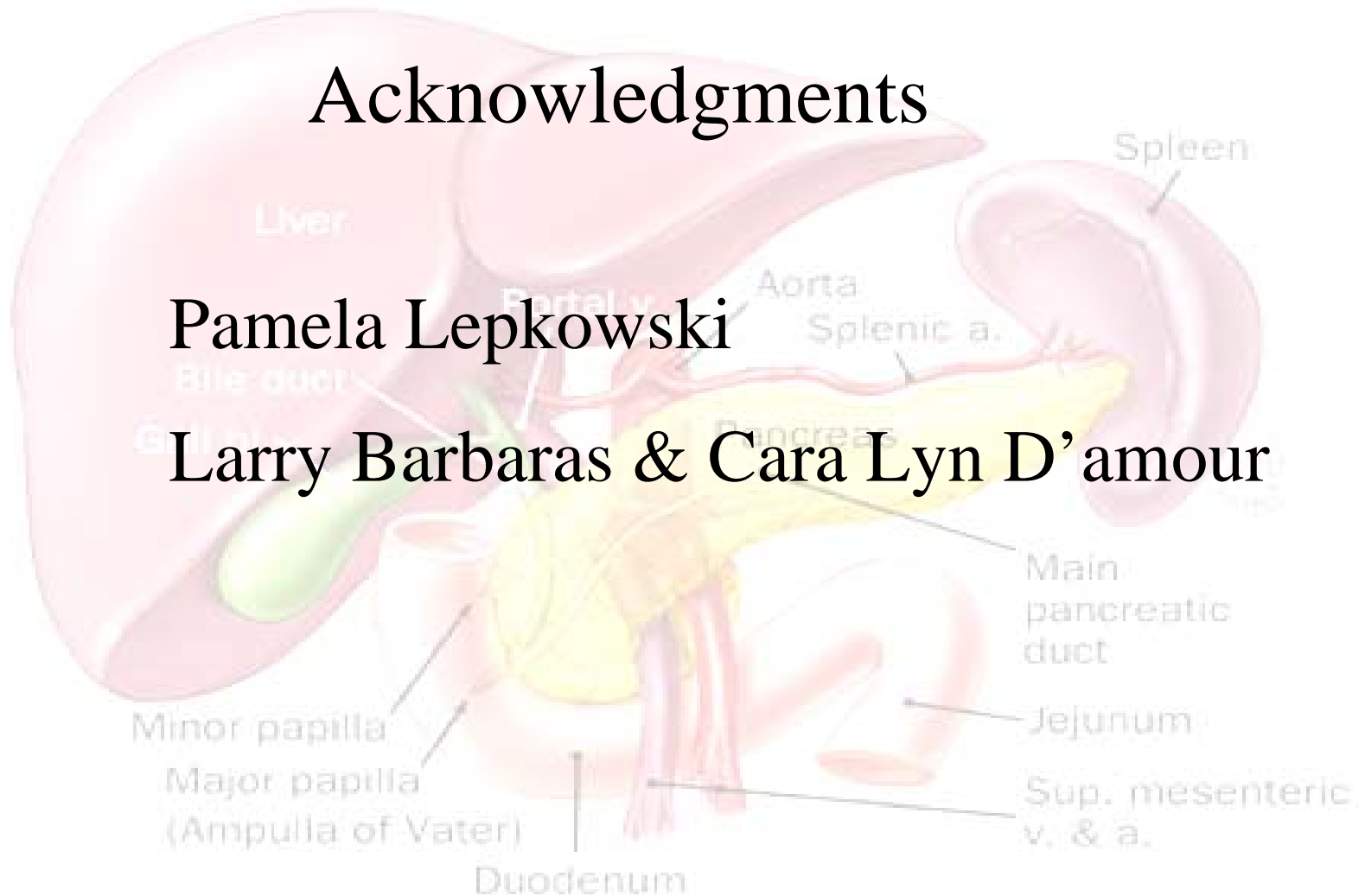


Figure 3 - Normal anatomy