Acute and Chronic pancreatitis, Splenectomy

M0 teaching slides
2nd August 2016

Acute Pancreatitis

- Diagnosis

- At least **2 out of 3** criteria
  - *Abdominal pain (cardinal symptom)– constant, epigastric, radiating to the back*
  - *Raised serum amylase/lipase levels 3x ULN*
  - *Radiological evidence of pancreatitis on CT scan with contrast / MRI pancreas*
- Etiology
  - *“ I GET SMASHED” , Idiopathic – most common*
  - *Hx of biliary colic, alcohol intake/dependence, trauma, drugs- steroids, ERCP, high TG, Ca, PTH*

To note:

- *If gallstone pancreatitis, pain can be in RUQ. Others- poorly localised*
- *Painless pancreatitis presenting with hypotension e.g critically ill, post-operatively*
- *90% have nausea and vomiting that can last for several hours*
- *Imaging is discouraged esp within initial 48hrs, unless there is clinical doubt of the diagnosis.*
- *US abdomen –often done TRO gallstones*
- *Serum amylase not as sensitive and specific as lipase. Rises early and normalises by 3-5days*
- *MRI pancreas more sensitive than CT scan to characterise solid vs fluid*

Examination

- Vitals: Fever / Tachycardia/ Hypotension
- Dyspnoeic, respiratory distress, jaundice
- Abdominal pain, guarding
- Abdominal distension, diminished bowel sounds from ileus
- Cullen and Grey Turner sign - severe necrotizing pancreatitis

Investigations

- FBC, LFTs, RP, Calcium and Albumin, LDH, Fasting lipids, ABG
- ANA, IgG4 if suspect autoimmune pancreatitis
- Imaging- US abdo, EUS (if cause is unclear- pancreatic ductal abn, small tumors at/near ampulla, microlithiasis in GB/bile duct, early chronic pancreatitis)
- CT/MRCP – if suspect malignancy from hx (>40y, LOW, new onset DM)
- CXR

Predictors of severity

CT Severity Index

Pancreatic inflammation		points
	Normal pancreas	0
	Enlargement of the pancreas	1
	Peripancreatic inflammation	2
	1 acute peripancreatic fluid collection	3
	≥ 2 acute peripancreatic fluid collections	4
Pancreatic necrosis	None	0
	< 30%	2
	30% - 50%	4
	> 50%	6

Maximum 10 points

Scoring systems- none proven to be accurate in predicting severity. However, they are super judgement for triaging pts to ICU and aggressive therapy

- **Ranson's criteria** – done at 0h and 48h
  - *Score 3- mortality 0-3%, score >3 11-15% mortality, score > 6 – 40% mortality*
- **APACHE II score** – 12 measures. APACHE O (inc BMI improves predictability of severe AP)
  - *Score < 8 – mortality < 4%, Score > 8 mortality 11-18%*
- **Glasgow score** – less sensitive than Ranson's (73% vs 91%), similar specificity (71% vs 74%)
- **CT severity Index (Balthazar)**
  - *Based upon the degree of necrosis, inflammation, and the presence of fluid collections*
  - *Detection of pancreatic necrosis does not necessarily predict organ failure but it does alter treatment approach*
  - *Internal validation study showed any degree of pancreatic necrosis was a/w mortality of 23%. Strong association with morbidity/mortality if > 30% necrosis.*
  - *Score > 6 = severe disease*

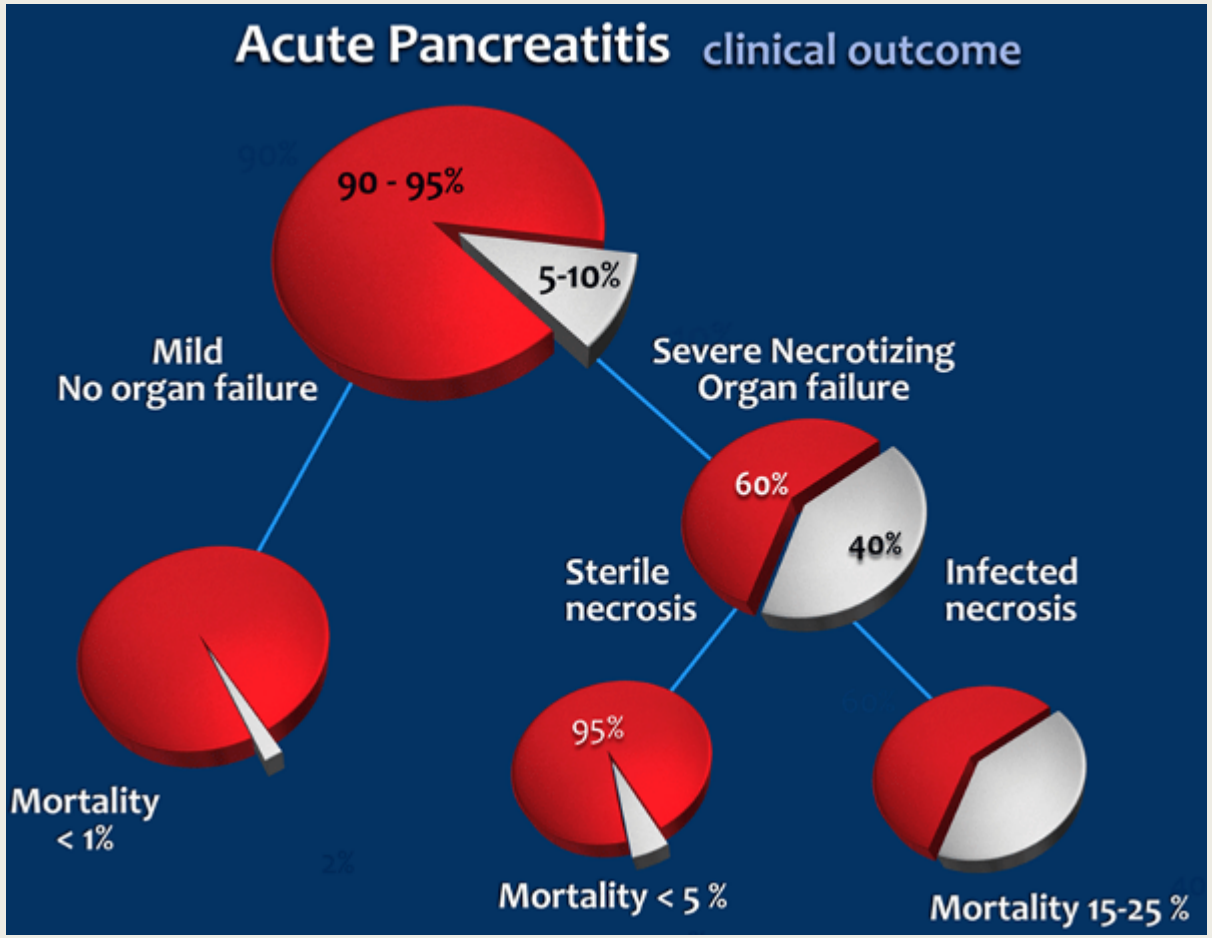
Predicting severity – American College of Gastroenterology guidelines

- Patient characteristics
  - *Age >55 years*
  - *Obesity (body mass index >30 kg/m^2)*
  - *Altered mental status*
  - *Comorbid disease*
- SIRS syndrome (* early / persistent>72h)
  - *Presence of >2 of the following criteria:*
  - *Pulse >90 beats/min*
  - *Respirations >20/min or $PaCO_2$ >32 mm Hg*
  - *Temperature >38 or <36 °C*
  - *White blood cell count >12,000 or <4,000 cells/mm^3 or >10 percent immature neutrophils (bands)*
- Laboratory findings
  - *Blood urea nitrogen (BUN) >20 mg/dl*
  - *Rising BUN*
  - *Haematocrit (HCT) >44 %*
  - *Rising HCT*
  - *Elevated creatinine*
- Radiology findings
  - *Pleural effusions*
  - *Pulmonary infiltrates*
  - *Multiple or extensive extrapancreatic collections*

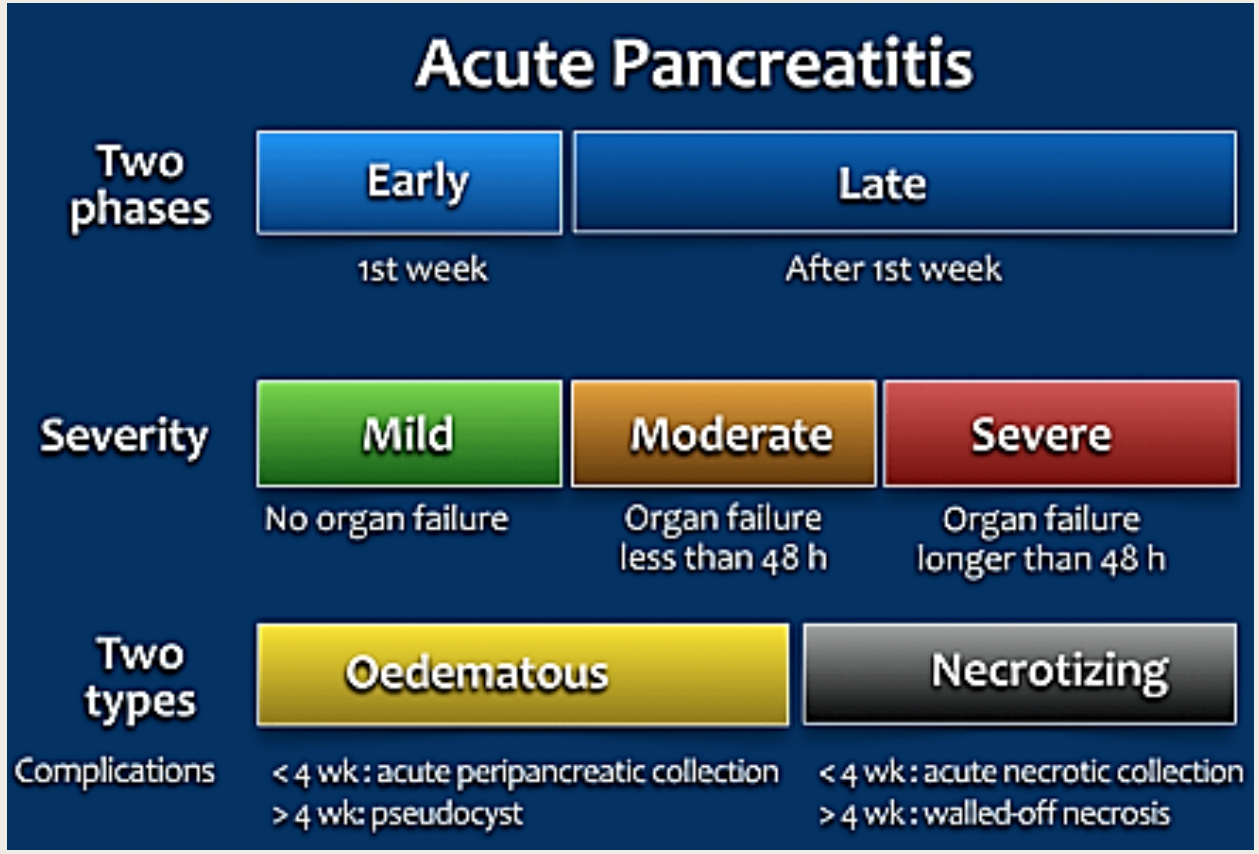
* CRP > 150 at 48hrs is predictive of severe pancreatitis

Clinical outcomes

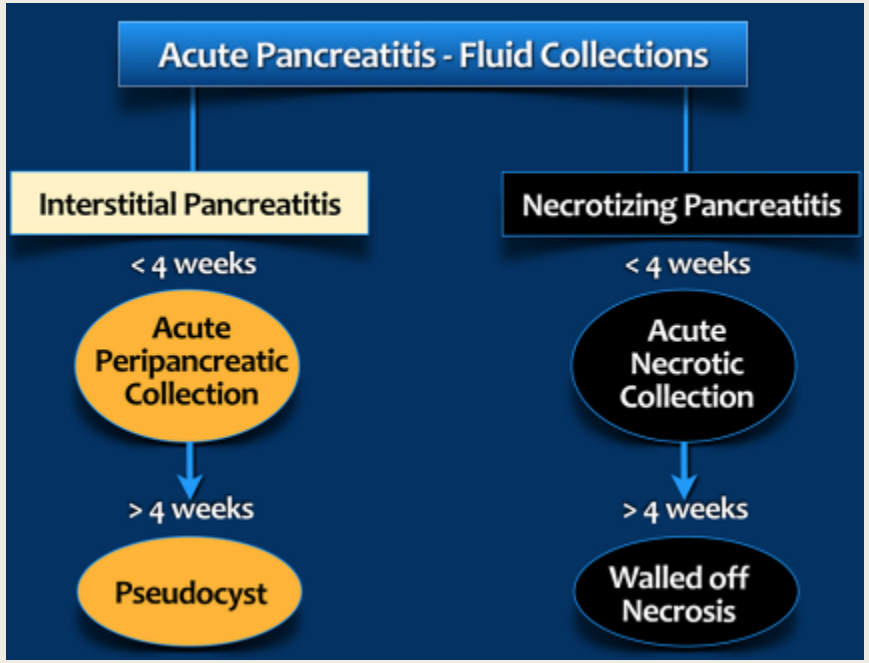
- 85% of patients with acute pancreatitis have mild disease
- 15% have necrotising pancreatitis with necrosis of pancreatic parenchyma or peripancreatic tissue
- Most patients have mild disease and recover over 3-5days
- 20% will develop moderately severe to severe pancreatitis with either local or systemic complications or organ failure
- Overall mortality is 5%. With interstitial pancreatitis (3%) having a lower mortality than necrotising pancreatitis (17%)



Revised Atlanta Classification (2012)



Revised Atlanta Classification (2012)



Acute Peripancreatic Collection

- < 4 weeks
- In interstitial pancreatitis
- Homogeneous - fluid density
- *No fully definable wall*
- Adjacent to pancreas
- Confined by normal fascial planes

Acute Necrotic Collection

- < 4 weeks
- In necrotizing pancreatitis
- Heterogeneous collection
- *No fully definable wall*
- Intra- or extrapancreatic

Pseudocyst

- > 4 weeks
- In interstitial pancreatitis
- Homogeneous - fluid density
- *Well defined wall*
- Adjacent to pancreas
- No non-liquid component

Walled-off Necrosis

- > 4 weeks
- In necrotizing pancreatitis
- Heterogeneous collection
- *Well-defined wall*
- Intra- or extrapancreatic

Management

- **Supportive treatment**
- Fluid resuscitation
  - *Critical for aggressive fluid replacement in initial 48hrs*
  - *Adjust according to Clinical assessment, BUN, Creatinine*
  - *Lactated Ringer's solution reduces SIRS / CRP cpd to Normal saline*
- Pain control
  - *Opioids*
  - *Fluid resuscitation (ischaemia)*
- Active monitoring – vitals, urine output, electrolytes, hypocount – if raised, increases risk of infection
- Nutrition
  - *Mild pancreatitis – IV hydration, resume oral diet (low fat) within 1 week if pain improving, no ileus, N/V*
  - *Moderate-severe – initiate within 48hrs*
    - Enteral feeding preferred to parenteral :maintain the intestinal barrier and prevents bacterial translocation from the gut
    - High protein, low fat, semi-elemental feeding formulas (eg, Peptamen AF) because of a reduction in pancreatic digestive enzymes
- Prophylactic antibiotics are not recommended regardless of type or disease severity
- If clinical deterioration noted after 72hrs – CT with IV contrast indicated to assess for local complications and pancreatic necrosis

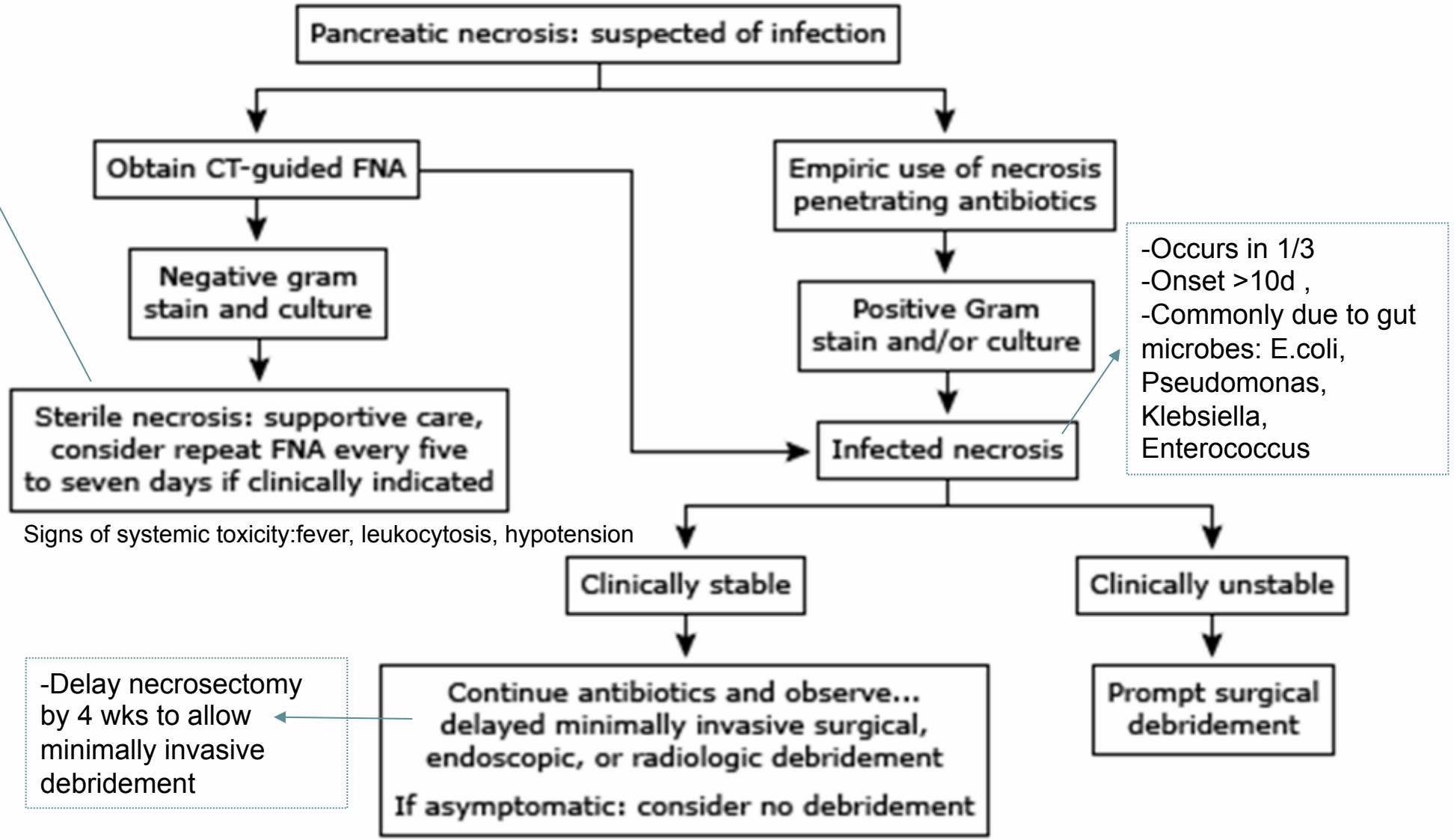
Management of complications

- **Acute pancreatic fluid collection** – early phase. Usually asymptomatic, resolves spontaneously w/i 7-10days without need for drainage
- **Walled-off pancreatic necrosis/ Pancreatic pseudocyst** (after 4wks)
  - Mnx depends on sx, characteristics and location of fluid collection
  - Expectant management for those w/o cystic neoplasm, pseudoaneurysm or minimal symptoms
    - Repeat CT scan every 3-6mths until cyst resolves/stabilizes at a small size
    - If pseudoaneurysm present but asymptomatic – embolization of aneurysm followed by expectant management
  - IF drainage required, 3 main options:
    - **Endoscopic drainage**
      - *Contraindicated if pseudoaneurysm present*
      - *Good for relatively small pseudocysts in communication with the main pancreatic duct for transpapillary stent placement*
      - For larger symptomatic cysts abutting the stomach, duodenum, transmural puncture to relieve symptoms possible
      - *10 to 15%morbidity, 70 to 80% fluid collection resolution, 10-15% recurrence rate.*
    - **Surgical drainage**
      - Can be open or lap. Mainly used in cases of endoscopic failures, recurrence of collection
      - Cystogastrostomy or a cystojejunostomy depending on location
      - Open approach a/w substantial morbidity and morality (25%, 5% respectively)
    - **Percutaneous drainage**
      - As effective as surgery in draining and resolving sterile and infected walled-off pancreatic fluid collections
      - Stent diameter may need to be increased with time for necrotic debris to drain. Frequent irrigation required to maintain patency
      - Risk of infection, pancreaticocutaneous fistula formation

Management of pancreatic necrosis

Indications for intervention in absence of signs of infection

- Ongoing GOO, biliary obstruction due to mass effect 4-8 wks after onset
- Persistent symptoms of abdo pain, N/V/anorexia/ LOW >8 wks afer onset
- Disconnected duct syndrome with persistent sx of pain and obstruction >8 wks after onset



Management of Gallstone pancreatitis

- Gallstone pancreatitis
  - *ERCP*
    - ERCP shld be performed early (w/i 24hrs) for patients with gallstone pancreatitis and cholangitis
    - ERCP also indicated if imaging shows CBD obstruction with visible stone, dilated CBD or increasing LFTs in absence of cholangitis.
    - Evidence for URGENT ERCP is controversial- *early ERCP reduced pancreatitis-related complications but not mortality in patients predicted to have severe pancreatitis*
    - ERCP NOT indicated even in severe gallstone pancreatitis WITHOUT cholangitis
  - *Cholecystectomy*
    - Can be done within 7 days of index hospitalization in mild pancreatitis
    - In severe necrotizing pancreatitis, cholecystectomy shld be delayed
    - Risk of recurrence acute pancreatitis \
    - Cholecystectomy shld also be offered to patients with acute pancreatitis and biliary sludge

Chronic Pancreatitis

- **Definition:**
  - *Syndrome involving progressive inflammatory changes in the pancreas that result in permanent structural damage which can lead to impairment of exocrine or endocrine function*
- **Distinguishing features:**
  - *Asymptomatic over long period of time*
  - *Present with a fibrotic mass with symptoms of pancreatitic insufficiency without pain.*
  - *Normal levels of amylase and lipase*
- **Morphologically-**:
  - *Patchy focal disease characterised by mononuclear infiltrate and fibrosis vs diffusely large portion of pancreas involved with a neutrophilic inflammatory response in acute pancreatitis*
- **Pancreatic insufficiency** (>90% of pancreatic function is lost)
  - *Fat malabsorption – steatorrhoea prior to protein deficiency.Malabsorption of fat soluble vitamins*
  - *Glucose intolerance occurs in chronic pancreatitis, overt diabetes mellitus occurs late in disease*
- **Classic triad**: steatorrhoea, diabetes mellitus, pancreatic calcifications – late advance stage disease
- Can develop acute pancreatitis with sudden worsening or change in pattern of symptoms
- Watch for possibility of a pancreatic carcinoma. Increased risk in pts with chronic pancreatitis
- **Investigations**
  - *72hr faecal fat test (>7g/day fat diagnostic of malabsorption)*
  - *Plain XR – showing calcium deposition – common in alcoholic pancreatitis*
  - *US low sensitivity (70%), specificity (90%) vs CT 80% spec 85%*
  - *MRCP becoming diagnostic test of choice in view of demonstrating calcifications and pancreatic duct obstruction consistent with chronic pancreatitis*
  - *ERCP –now limited for therapeutic. Characteristic beading of main pancreatic duct and ectatic side branches is diagnostic of chronic pancreatitis*

Chronic Pancreatitis

- After establishing a secure diagnosis of pancreatitis (i.e ruling out other causes of symptoms e.g PUD, biliary obstruction, pseudocysts, pancreatic carcinoma)
- Management
  - *Treat underlying cause e.g cessation of alcohol intake*
  - *Small portion, low fat meals (anecdotal evidence)*
  - *Smoking cessation to reduce risk of Pancreatic CA*
  - *Pain management – some may need chronic Opioids*
  - *Pancreatic enzyme (Creons, Vitamin ABDEK)*
- Surgical options:
  - *A meta-analysis of four trials concluded that **duodenum-preserving pancreatic head resection** was as effective as pancreatoduodenectomy for relief of pain, overall morbidity and postoperative endocrine insufficiency and was superior in some postoperative outcomes and quality of life*
  - *Total pancreatectomy is a treatment option in **carefully selected** patients with chronic pancreatitis in whom substance abuse is not a confounding factor*

Complications of acute pancreatitis

- Splanchnic venous thrombosis
  - *Involves splenic, portal, SMV*
  - *Effective treatment of underlying pancreatitis usually leads to spontaneous resolution*
  - *Anti-coagulation shld be initiated if there is extension of clot into portal or SMV causing hepatic decompensation or reduced bowel perfusion*

- Pseudo aneurysms
  - *Rare but serious complication of acute pancreatitis*
  - *High index of suspicion for those with acute pancreatitis and unexplained GI bleeding*

- Abdominal compartment syndrome
  - *Increased risk due to aggressive fluid resuscitation, peripancreatic inflammation, ascites and ileus*

Splenectomy – Indications

- Traumatic Splenic injury

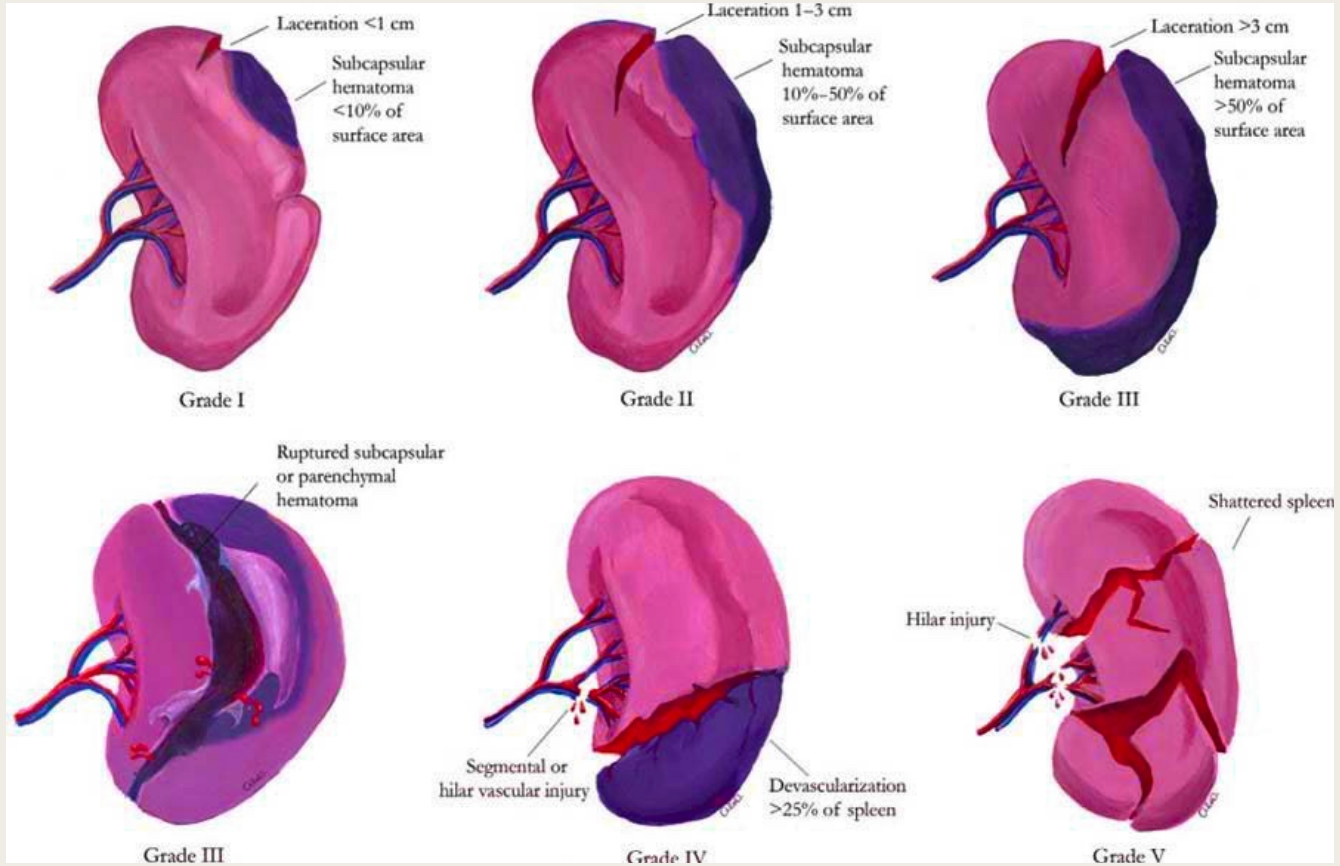
- Non-traumatic / Medical
  - *Indications for splenectomy:*
    - ITP (most common)
    - Hereditary spherocytosis
    - Thalssaemia
    - Sickle Cell anaemia
    - Hodgkin disease
    - Felty syndrome (RA, splenomegaly, neutropaenia)

Splenic injury

- Often occurs in blunt trauma due to MVA, falls
- Patient presents with trauma and is assess with ATLS protocols
- FAST scan – hypoechoic rim of subcapsular fluid or intraperitoneal fluid around the spleen or in Morrison’s pouch (hepatorenal space)
- CT scan with IV contrast – arterial phase will show a blush / extravasation, hypodensity can represents hematoma, hemoperitoneum by comparing Hounsfield units to differentiate from ascites

Grading of splenic injury – AAST

Splenic CT Injury Grading Scale	
Grade I	Laceration(s) < 1 cm deep Subcapsular hematoma < 1cm diameter
Grade II	Laceration(s) 1-3 cm deep Subcapsular or central hematoma 1-3cm diam
Grade III	Laceration(s) 3-10 cm deep Subcapsular or central hematoma 3-10 cm diam
Grade IV	Laceration(s) > 10 cm deep Subcapsular or central hematoma > 10cm diam
Grade V	Splenic tissue maceration or devascularization



The shortcommings of this grading scale are:

- Underestimation of injury extent
- Significant inter-observer variability.
- Does not include:
  - Active bleeding
  - Contusion
  - Post-traumatic infarcts
- Most importantly: **no predictive value** for non-operative management (NOM).

.

Management of traumatic splenic injuries

- **Non-operative management**
  - *Hemodynamically stable*
  - *Low grade splenic injury (I-III)*
  - *Without evidence of intra-abdominal injury*
- No evidence of active contrast extravasation/ blush on CT
  - *Even those who require extra-abdominal injuries e.g fracture stabilization*
  - *Contraindications: hemodynamic instability, generalized peritonitis, other intra-abd injuries requiring surgical exploration. Portal hypertension –relative contraindication*
- **Angio-embolisation**
- Indications: Active contrast extravasation on CT, intra-parenchymal pseudoaneurysm formation
- Variable success rates – institution depedent
- Relative contraindication: Grade IV/V injuries due to vascular disruption, age>55yrs due to splenic capsule thinning out and associated with higher failure rates
- If contrast extravasation is from splenic parenchyma supplied by short gastric vessels – then operative intervention prompted as they are less amenable to embolization

- **Surgical intervention**
- Indication: hemodynamically unstable, unable to tolerate significant hypotension, failure of non-surgical management
- Splenic salvage:
  - *Splenorrhaphy refers to the suture repair of the spleen with or without splenic wrapping, and is generally supplemented by electrocautery techniques for control of parenchymal haemorrhage*
  - *Partial splenectomy is a form of splenic salvage and refers to the removal of a portion of the spleen based upon its segmental blood supply.*
- Total splenectomy is the safest option and is often done in emergency setting where the risk of blood loss outweighs the risk of OPSI
- Replantation of splenic tissue — If splenectomy for injury is deemed necessary, heterotopic autotransplantation of splenic tissue into omental pockets may provide some splenic function, although this has not been proven conclusively

Post-splenectomy related issues

- Activities
  - *Restricted activities and avoidance of high risk activities for up to 3 months*
  - *No clinical studies to support duration*
- Vaccinations
  - *Shld be given 14 days before elective surgery*
  - *Given on POD 14 for emergency surgeries*
  - *Inactivated Influenza vaccines– NOT live attenuated vaccines*
- Antibiotics
  - *In Children, daily penicillin (amoxicillin) up to 5yrs and 1 yr after splenectomy*
  - *In Adults – no indication for daily antibiotics unless in hypogammaglobulinemia, HIV infection, solid organ transplant recipients, and patients with advanced liver disease*
  - *However, if febrile, early administration of antibiotics reduces risk of severe infection*

Vaccination of persons with asplenia or sickle cell disease

Vaccine	Asplenia or sickle cell disease	
	Recommendation	Strength, evidence quality
Haemophilus influenzae b conjugate	U: age <5 years	Strong, moderate
	R: age ≥5 years	Weak, low
Hepatitis A	U	Strong, moderate
Hepatitis B	U	Strong, moderate
Diphtheria toxoid, tetanus toxoid, acellular pertussis; tetanus toxoid, reduced diphtheria toxoid; tetanus toxoid, reduced diphtheria toxoid, and reduced acellular pertussis	U	Strong, moderate
Human papillomavirus	U	Strong, moderate
Influenza-inactivated (inactivated influenza vaccine)	U	Strong, moderate
Influenza-live attenuated (live attenuated influenza vaccine)	X	Weak, very low
Measles, mumps, and rubella-live	U	Strong, moderate
Measles, mumps, and rubella-varicella-live	U	Strong, moderate
Meningococcal conjugate**	R¶	Strong, low
Pneumococcal conjugate (PCV13)	U: age <6 years△	Strong, moderate
	R: age ≥6 years○	Strong, very low
Pneumococcal polysaccharide (PPSV23)	R: age ≥2 years§	Strong, low
Polio-inactivated (inactivated poliovirus vaccine)	U	Strong, moderate
Rotavirus-live	U	Strong, moderate
Varicella-live	U	Strong, moderate
Zoster-live	U	Strong, moderate

R: recommended—administer if not previously administered or not current; such patients may be at increased risk for this vaccine-preventable infection; U: usual—administer if patient not current with recommendations for dose(s) of vaccine for immunocompetent persons in risk and age categories; X: contraindicated.

Thank you!

Ranson criteria to predict severity of acute pancreatitis

0 hours	
Age	>55
White blood cell count	>16,000/mm3
Blood glucose	>200 mg/dL (11.1 mmol/L)
Lactate dehydrogenase	>350 U/L
Aspartate aminotransferase (AST)	>250 U/L
48 hours	
Hematocrit	Fall by ≥10 percent
Blood urea nitrogen	Increase by ≥5 mg/dL (1.8 mmol/L) despite fluids
Serum calcium	<8 mg/dL (2 mmol/L)
pO2	<60 mmHg
Base deficit	>4 MEq/L
Fluid sequestation	>6000 mL

The presence of 1 to 3 criteria represents mild pancreatitis; the mortality rate rises significantly with four or more criteria.

A score >= 3 indicates Acute Severe Pancreatitis
A score = 2 indicates Acute Moderate Pancreatitis
A score < 2 indicates Acute Mild Pancreatitis

Assessing the severity of acute pancreatitis

Glasgow prognostic score: (NOTE PANCREAS ACRONYM)

- **P**aO2 < 8kPa (60mmhg)
- **A**ge > 55 years
- **N**eutrophils: (WBC >15 x109/l
- **C**alcium < 2mmol/l
- **R**enal function: (Urea > 16mmol/l)
- **E**nzymes: (AST/ALT > 200 iu/L or LDH > 600 iu/L)
- **A**lbumin < 32g/l
- **S**ugar: (Glucose >10mmol/L)

Any 3 factors means acute severe pancreatitis