

ACUTE PANCREATITIS

Classification by severity ie **organ failure and complications** (Atlanta 2012):

Mild: (i)no organ failure (ii)no local/systemic complications

Moderately severe: (i)organ failure resolves <48hrs (ii)local/systemic complications without persistent organ failure

Severe: persistent organ failure >48hrs **most often pancreatic necrosis**

Aetiology (after first three, no fucking attempt at ordering by prevalence):

1. **Gallstones:** block ampulla of Vater → CBD bile reflux into PD under pressure
2. **Alcohol:** SoO hypotonia/acinar cell hypersensitivity to CCK/cytotoxic to acinar cells
3. **Iatrogenic + Drugs:** ERCP/Surgery/DXT/Drugs^{steroids, valproate, thiazides, E2, morphine, cytotoxics, azathioprine}
4. **Idiopathic**
5. **Infection:** coxsackie B, mumps
6. **Autoimmune:** IgG4 autoimmune disease spectrum (periductal lymphoplasmocystic infiltrate)
7. **Trauma:** crush against vertebral column
8. **Obstructive:** tumour of panc head or ampulla/benign PD stricture/sphincter dysmotility
9. **Toxins:** scorpion bite
10. **Vascular**
11. **Hyperlipidaemia:** triglycerides > 1000/dL
12. **Hypercalcaemia:** hyperPTH
13. **Congenital:** cystic fibrosis, haemochromatosis, cysts, pancreas divisum

Pathogenesis:

1. Sphincter damaged/blocked → (i)**duodenopancreatic reflux** (ii)**PD HTN** → enterokinase + pressure activate pro-enzymes (i)**Trypsin** → autodigestion + activates PLA (ii)**Lipase+PLA** → FFA+Ca²⁺ → fat necrosis (insoluble soaps) (iii)**Amylase**
2. **Gland oedema/haemorrhage** → blood-stained/enzyme-rich (retro)peritoneal **effusion** as paracrine enzyme leak
3. **Necrosis:** perilobular: ischaemic necrosis at watershed areas complicated by A+V thromboses and enzymes
periductal: damage to endothelium in duct at centre of lobule -> enzymes escape (esp EtOH/gallstones)
4. **SIRS/MOF**

Progression:

1. Interstitial oedematous pancreatitis
2. Necrotizing pancreatitis

Clinical features

General: Symptoms= **Pain:** epigastric/upper abdo → back; sudden onset/constant; severe; sit forwards/worse if supine
Vomiting (early and profuse ?ileus)

Signs: I= posture/SIRS signs/jaundice/distension from ileus+ascities

Pa= tenderness/rebound/guarding, epigastric mass/pseudocyst_(overlies stomach, can't get above, moves with resp)

Pe=pseudocyst hyperresonant to percuss (stomach), ascities _(shifting dullness), pleural effusion

Ausc= ileus/pleural effusion

Complications: Fluid-related (dehydration/pleural effusion and pulmonary oedema/ascites)

Necrotizing pancreatitis: (i)Cullen's sign_(falciform) (ii)Grey-Turner's sign_(retroperitoneal extravasation)

SIRS features

Other: jaundice due to (i)gallstone (ii)swollen pancreatic head compresses CBD (iii)tumour (iv)PD stricture

Investigations

Diagnosis: 2 of (i)Pain (ii)3x amylase/lipase (iii)CT diagnosis

Blood: (i)Routine FBC/U&E/LFT/CS (ii)CBG (iii)Amylase/lipase (iv)CRP

ABG: (i)severity scoring (ii)lactate in dehydration

Urine: amylase/lipase

CXR: pleural effusion/oedema + rule out PU perf

AXR: ileus (sentinel loop sign, colonic cut-off sign, halo sign)

US: on admission in all! (biliary tree for stones)

EUS: (i)better for stones/microlithiasis in idiopathic pancreatitis (ii)drainage of peripancreatic collections

MRCP: (i)retained stones (ii)distinguishing pseudocyst from WON

CT: can't identify necrotizing pancreatitis first few days (intrapanc fluid → heterogeneous enhancement)

Early: uncertain diagnosis Later: identifying/monitoring complications

Amylase: Normal if very early/delayed presentation + atrophied pancreas

CRP: prognostication/severity

Differential dx:

Severity scoring (Glasgow)

Admission: (i)AGE >55 (ii)WCC >15 (iii)PO₂ <8 (iv)Urea >16 (v)CBG > 10

Within 48 hours: (vi)Ca²⁺ <2 (vii)Albumin <32 (viii)LDH >600 (ix)AST >200

3+ = severe acute pancreatitis (25% mortality)

CRP >150 also indicates severe pancreatitis

INITIAL MANAGEMENT

1. Aim: supportive

NBM + iv fluids (monitor urine output) + PPI

Analgesia: oral/PCA/block

Nutrition: (i)early feeding (low-fat) (ii)enteral > parenteral (infection/organ failure/mortality; Kalfarentzos et al 1996) but may need to TPN if ileus

Antibiotics: only for **cholangitis**; no supportive evidence in ANC

2. Identify and Treat Cause:

Gallstones → obstructive jaundice → cholangitis → (i)ERCP within 24hrs (ii)lap chole during admission

Hyperlipidaemia: fibrates first line; niacin/omega3 second line

Hypercalcaemia: treat underlying cause

Autoimmune: steroids (pred 40mg/d 4 weeks then taper)

Sphincter dysmotility: sphincterotomy but 30% PEP

Mild: most don't require imaging and resolve by 3-5days

Moderate: require extended hospitalization

Severe: most have pancreatic necrosis → 30% mortality (doubles if infected necrosis)

3. Managing systemic complications

Indications for HDU/ITU: organ dysfunction not responsive to supportive therapy (resp/renal/cardiac)

LOCAL COMPLICATIONS (ATLANTA 2012)

A. INTERSTITIAL PANCREATITIS

1. **Acute peripancreatic fluid collections:** Homogenous without well-defined wall (<4wks)
2. **Pancreatic pseudocyst:** Heterogenous peripanc fluid in well-defined granulation (not epith) tissue-lined sac (>4wks)
(i) Duct disruption (ii) non-disrupted but effusion → MRCP to identify if communicates with PD
If symptomatic (obstruction) → radiological drainage/**EUS-endoscopic** (most effective)/laparoscopic/open cystgastrostomy

B. NECROTIZING PANCREATITIS

1. **Acute necrotic collections:** necrosis of parenchyma/peripancreatic tissues (<4 wks)
2. **Walled-off pancreatic necrosis (WON)** necrotic debris and fluid in well-defined sac (>4wks)
Avoid EUS-endoscopic drainage (infection risk)

Management of fluid/necrotizing collections:

1. **Characterise fluid collection:** CT fails to identify necrotic debris so **MRCP (WON vs PP)**
2. **Step-up approach:** only intervene if clinical course attributable to necrosis (**pain/gastric outlet obstruction/sepsis**)
3. (i) **WON:** radiological drain+ nephrosopic necrosectomy or VARD (ii) **PP:** EUS-endoscopy +/- step-up

C. OTHER LOCAL COMPLICATIONS

Ductal disruption: pleural effusion/ascites/enlarging collection; MRCP → ERCP+stent
Fistula: esp if instrumentation; amylase-rich opalescent fluid; MRCP → ERCP+stent
Vascular: (i) splenic vein thrombosis → GO varices (ii) pseudoaneurysms_(4-10%) → angioembolize
GOO:
PD Stricture

SYSTEMIC COMPLICATIONS (TERTIARY UNIT)

Biochemical derangement: (i) hypoalbuminaemia/hypocalcaemia (ii) **diabetes** (iii) **malabsorption**
SIRS/MOF : **resp/renal/cardiac** failure
Other: peptic **ulcers**

FOLLOW-UP

BILIARY DISEASE: cholecystectomy during same admission/within 4 weeks
NON-BILIARY: autoimmune screen/Ca²⁺/LFTs/lipids; consider CT/MRI/EUS to absolutely rule out stones

CHRONIC PANCREATITIS

Definition: *Progressive, irreversible* destruction of functional pancreas by **inflammation** and **fibrosis**

Consequences: **Exocrine** then **endocrine** insufficiency

Aetiology:

TIGAR-O-HAM = Toxic-Metabolic, Idiopathic, Genetic, Autoimmune, Recurrent pancreatitis, Obstructive

Toxic-Metabolic (70%): alcohol/smoking cause + accelerate chronic pancreatitis and increase cancer risk

Idiopathic (20%)

Genetics (*PRSS1/SPINK1*)

Autoimmune (IgG4)

Obstructive: cholelithiasis/tumour in panc or duo/stricture of PD or SoO/CF

Anatomical: pancreas divisum/annular pancreas

Malnutrition

HyperCa²⁺

PATHOLOGY

Pathogenesis

Protein plugs in finer ductules → **dilatation** of ductules and acini

Acinar epithelium becomes **cuboidal** then **atrophic**; ductile epithelium **necrosis**

Necrosis → perilobular fibrosis → intralobular fibrosis → ductal obstruction/periductal inflammation

Parenchyma replaced by **calcification** + **fibrosis** with **exo/endocrine** resultant (islet tissue usually survives)

Duct ectasia + strictures → **chain of lakes** (sacculations with intervening strictures) → **occlude** (debris/stones)

Differential: acinar atrophy/interlobular fibrosis/ductal hyperplasia/metaplasia → mimics cancer

Histomorphological variants:

(i)**CALCIFYING CP:** intraductal/parenchymal Ca²⁺ → PD stenosis with periduct inflamm/parenchymal atrophy/necrosis/fibrosis

(ii)**OBSTRUCTIVE CP:** painless **blockage of PD** by tumour/post-pancreatitis/CF → **atrophy/fibrosis without epith changes**

(ii)**AI CP:** lymphoplasmacytic infiltration **IgG4**/macrophages/eosinophils/neutrophils (assoc'd w/ UC/CD/PSC/Sj/thyroiditis/PBC)

(iii)**HEREDITARY CP:** irregular **sclerosis** with parenchymal destruction (*PRSS1* gene)

DIAGNOSIS

Clinical features

1. **PAIN:** (i)PD obstructn_(stricture/stone) (ii)inflamm infiltr.(iii)enlarged nociceptors (iv)spinal neurons: hyperalgesia/allodynia (v) trypsin

2. **VOMITING:** pseudocyst → gastric outlet obstruction

3. **EXOCRINE FAILURE:** *Malabsorption/steatorrhea/malnutrition* (i)PD obstn (ii)gland destruction → Enzymes/ADEK

4. **ENDOCRINE FAILURE:** diabetes in 50%; increases risk of cancer

Other: peptic erosions/ulcers

EVENTUAL BURN-OUT → (i)RESOLUTION OF PAIN (ii)ONGOING EXO/ENDOCRINE DYSFUNCTION

Investigations

(a)**Bloods:** (i)Cause: IgG4 and autoimmune screen (ii)Effects: malabsorption/malnutrition

(b)**Pancreatic function**^(advanced): (i)faecal elastase: <200ug/g (ii)secretin stim: analyse juice for HCO₃⁻ | (iii)serum trypsin: <20mg/dL

(c)**Imaging:** (i)**differentials** of severe epigastric pain (ii)exclude **other pancreatic pathology:** cancer/cysts/IPMN

****Characteristic features:** (i)parenchymal: *atrophy/fibrosis/calcification* (ii)duct: *strictured/dilated/stone* **

1. CT: parenchyma and calcifications; less ductal detail than MRI

2. MRCP-secretin: ductal details; cannot visualise calcification

3. EUS: duct and parenchyma

4. ERCP: most detailed ductal imaging

MANAGEMENT

(a) Treat cause:

Autoimmune: corticosteroids

Alcohol: abstinence

(b) Symptomatic

Pain: medical therapy/endoscopic therapy/nerve block or neurolysis/surgery

Erosions/ulcers: PPI

Exocrine enzymes/ADEK vitamins

Endocrine: diabetes

Vomiting: ESU cysto-gastrostomy for pseudocysts

(c) Ductal obstruction

(a) Endoscopic: ERCP + stone trawl/lithotripsy/sphincterotomy_(SoOD or stenosis)/stenting PD (>50% pain relief)

(b) Surgery if (i) pain not responsive to other modalities (ii) obstruction (iii) cannot rule out cancer

Drainage: relieves pressure in pancreatic duct

Puestow: lateral pancreaticojejunostomy

Partington-Rochelle: longitudinal pancreaticojejunostomy

Resection: inflammatory mass > 4cm

(a) Duodenum-preserving pancreatic head resection (DPPHR)

(i) Frey (distal pancreas + head resection not in front of PV)

(ii) Beger (subtotal head resection above PV + roux pancreas)

(iii) Berne (larger head resection not in front of PV; no drainage)

(iv) Hamburg: (subtotal head resection not in front of PV; lat drainage)

(b) Whipple's: pylorus-preserving pancreaticoduodenectomy

(c) Total pancreatectomy: after multiple other radical procedures failed as → brittle diabetes BUT 66% pain relief

Islet cell transplant into portal vein → implant in liver and lessen diabetes

OTHER COMPLICATIONS

Fluid: (i) pancreatic ascites: ERCP and stent (ii) Pseudocyst: leave for 6 wks; transgastric/percutaneous drainage/surgery

Biliary: CBD stricture

Vascular: (i) Splenic vein thrombosis → variceal UGIB (ii) Pseudoaneurysm → UGIB

Pancreatic cancer: 4% (increased by smoking and diabetes)

Fistula (pancreatico-pleural/bronchial or mediastinal pseudocyst) → conservative first and if fails, ERCP and stent