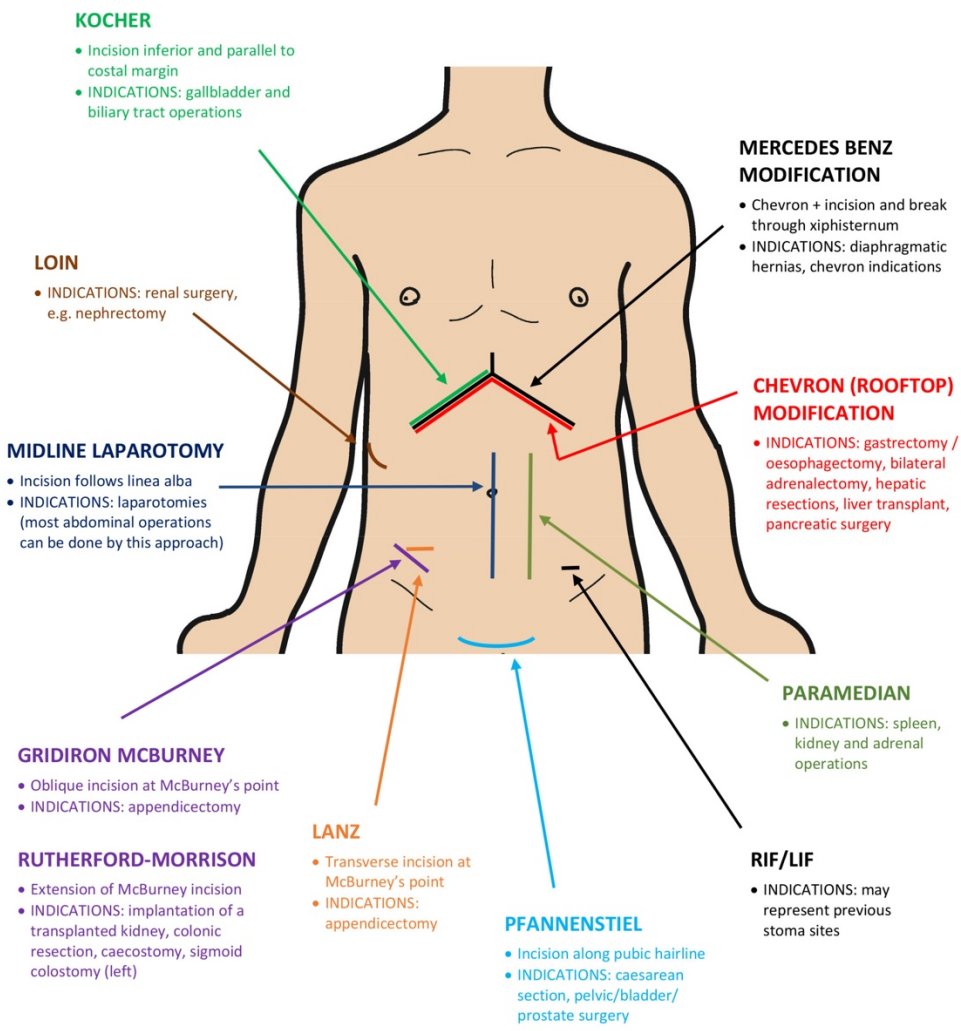
GENERAL SURGERY

GENERAL SURGERY BASICS

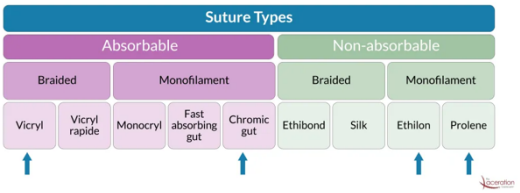


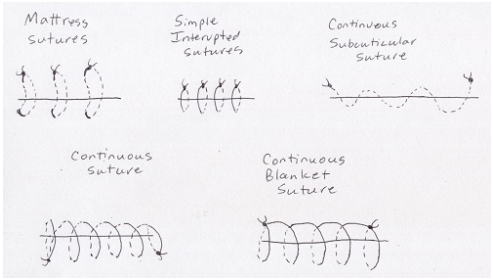
COMMON DEFINITIONS:

- ***Adhesions***: scar-like tissue inside the body that bind surfaces together
- ***Fistula***: an abnormal connection between two epithelial surfaces
- ***Tenesmus***: the sensation of needing to open bowels without being able to produce stools (often accompanied by pain)

SPECIFIC OPERATIONS:

- ***Hemicolectomy*** – removing a portion of the large intestine (colon)
- ***Hartmann's procedure*** (proctosigmoidectomy) – removal of rectosigmoid colon with closure of the anorectal stump and formation of a colostomy
- ***Anterior resection*** – removal of rectum
- ***Whipple procedure*** (pancreaticoduodenectomy) – removal of head of the pancreas, duodenum, gallbladder and bile duct
- **Laparoscopic surgery** = several 5-10mm incisions to ALLOW endoscopes to be inserted





PRE-, INTRA-, POST-OPERATIVE CARE

Pre-operative

Prior to any surgery, need to address the following :

1) **Pre-op assessment**
   a. *PMHx, previous surgery and anaesthestic A/E, meds, smoking, EtOH*
   b. Nutritional asupport for malnourished
   c. Check pregnancy
   d. FHx of sickle cell disease
   e. CV and resp assessment
   f. ASA grade
2) **Consent**
   a. Capacity for **signed** consent – understand, retain, weight up pros/cons and communicate their decision
3) **Investigations**
   a. Bloods (FBC, EUC, HbA1C, COAGs, ABG and esp. Group and Hold)
   b. ECG, ECHO, spirometry
4) **NBM**
   a. 6 hours no food before op
   b. 2 hours no clear fluids before op
5) **Med changes (what to stop)**
   a. DOAC (stopped 24-72 hrs)
   b. OCP (stopped 4 wks before)
   c. OHA (stopped around surgery or adjusted – endocrinologist guided)
6) **VTE assessment**
   a. LMWH or DOAC
   b. Compression calf stockings

Intraoperative

WHO Surgical Safety Checklist

AIM = reduce the risk of human error.

The checklist is completed at 3 stages:

1) Before the induction of anaesthesia
2) Before the first skin incision
3) Before the patient leaves theatre

It involves **multiple members of the team** (e.g., theatre nurse, anaesthetist and surgeon) checking:

- Patient identity
- Allergies
- Operation
- Risk of bleeding
- Introductions of all team members
- Anticipated critical events
- Counting no. of sponges and needles (nothing left inside patient?!)

OTHER POST-OP comp.:

- Anaemia (<100 = PO Fe tds) (<70 = transfuse)
- Shock – hypvol, sepsis, HF
- Haemorrhage:
  - Reactive (< 24 hrs) – missed BV tear when BP normalises +no vasoconstrict
  - 2nd (7-10 days) – vessel erosion due to infection
- AKI
- Delirium
- Arrythmias, ACS, CVA

Postoperative (ERAS)

1. **Early mobilisation (Physio-assisted)** – DVT prophylaxis
2. **Early nutritional support**
   a. **TPN → PEG → NGT → PO**
   b. Early return to PO diet and fluid intake
3. **Wean pain meds early**
   a. **NSAIDs (***avoid in asthma, AKI, active gastritis and heart disease***)**
   b. **Wean PCAs**
4. **Anti-emetics for post-op nausea**
   a. **Risk factors** = female, non-smoker, young, post-op opiates, Hx of motion sickness
   b. **Prophylactic anti-emetics** at end of operation - metoclopramide, ondansetron
5. **Remove:**
   a. **Drains** (if no blood, fluid or drainage)
   b. **NGT** (no vomiting and tolerates PO feeds)
   c. **IDCs** (if able to mobilise and TWOC)
6. **Monitor for post-op fever**
   a. Pneumonia, Atelectasis,
   b. UTI, IDC infection
   c. DVT/PE
   d. INFECTION = wound, drain, IDC and PIVC sites
   e. Wonder drugs
7. **Long-term steroid usage** → risk of adrenal crisis post-op → may need additional steroids post-op
   a. IV hydrocort in 1st 24 hrs
   b. Double normal dose when eating and drinking for 24-72 hrs

ACUTE ABDOMEN

Definition of acute abdomen

Sudden onset of SEVERE abdominal pain with possible need for surgery

NB: Chronic pain defines pain lasting > 12 weeks

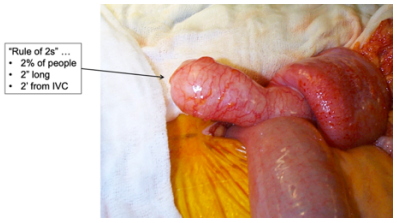
Surgical Causes (BIG 5)

1) Vascular Occlusion	• **Ischeamia colitis vs Mesenteric** "disproportionate pain, lactic acidosis" • **Bleed** = ruptured AAA, splenic, iliac aneurysm, **ectopic**, **viscous**
2) Infection	• *Appendicitis, cholecystitis, diverticulitis, pancreatitis* • ***[localised peritonitis]***
3) Inflammation	• *Abscess, phlegmon*
4) Perforation ***generalised peritonitis***	• Ischaemia – mesenteric, cancer compression • Trauma – post-op, MVA • Colitis -IBD – toxic megacolon, PUD, FB, caustic • Infection – div, cholecystitis, meckel's
5) Obstruction	• **Obstruction** = adhesions / hernia /ISS / volvulus • **Mass** = colorectal, abscesses
GU	• **UTI, renal stone**
Gynae	• ectopic pregnancy, PID, endometriosis • **Ovarian or testicular** torsion → surgery • **Rupture of ovarian cysts**

Pitfall: previous surgery may change neuro-vascular anatomy therefore change pain pattern

Medical Causes

CV/RESP	• Pneumonia • ACS
GI	• Mesenteric Adenitis (young, post-viral) • Meckel's diverticulum → ISS • IBS (Diagnosis of Exclusion!!!)
Haem	• Sickle Cell Crisis • Shingles • Lymphoma
Endo	• DKA
MSK	• Abdominal Wall Muscle Strain/Injury



Primary survey

ABCD – notify seniors

- Airway
- Breathing = RR, sats
- Circulation = HR/BP
- Dysfunction = GCS

Foregut pain	• epigastric → coeliac trunk *left gastric, common hepatic, splenic*
Mid-Gut pain	• peri-umbilical area – SMA (2nd of duodenum up to 2/3 proximal TC) *middle colic, jejunal branches, R colic*
Hind-Gut	• Lower abd. or pelvic area – IMA *L colic, sigmoid, sup. rectal*
Migratory RIF	**appendicitis**
Colic pain	• **Biliary, Small bowel(A)** • **Large bowel (A) = longer intervals** • **Renal (B) –** *diaphoretic!*
Colicky central pain	**SBO – previous bowel surgery (?Adhesions)**

Acute Mx

- **IV line** = IVF, IV ABx,
- **NGT** – aspirate for SBO/LBO
- **Fluid balance chart**
- **Analgesia & Anti-emetic**
- **VTE prophylaxis**

Regular review

- **Vitals** + symptoms changes
- Vomit, bowel movements, UO (?IDC)
- **Guarding** (vol. vs invol – rigidity)
- **Percussion vs Rebound tenderness**
- **Coughing test**
- **Peritonitis signs:**
  - Murphy
  - McBurney's point

Further steps

- Take consent –
- anaesthetics review
- Put on surgical list

Initial Bloods

- **FBC** – anaemia, left-shift
- **EUC** - ureamia
- **LFT** = cholestatic vs hepatic
  - Albumin = long-term nutrition
- **CRP** = inflammation (CRP > 100 (CONCERN) , CRP > 200 (ED))
- **Lipase / amylase**
- **ABG/VBG** – serum lactate [**ischemia**]
- **B-HCG** = pregnancy / ectopic
- **troponin** + ECG [**STEMI**]
- **Group and hold**
- **COAGs**
- **BSL** = DKA
- **Blood culture (M/C/S)** - ?septic screen

Additional Imaging

Bedside

- **Urine dipstick** = DKA (ketones) vs UTI (pyuria)
- **ECG** = STEMI
- **Mobile CXR (AP + lateral) =LL pneumonia (air under diaphragm?)**

Imaging - which to use?

Abdo USS	• *Gallstones* • *Free fluid* • *GU issues*
AXR erect + supine	• Intra-luminal gas • perforation • LBO/SBO • Pneumoperitoneum
CT scan	• **Intra-luminal gas** = ***ileus*** • *Free fluid* • *Fat stranding* • *Phlegmon / abcess* • *Closed loops* • *Intestinal infarction (contrast)*

COMPLICATIONS OF ABDO POST-OP ISSUES

DDX

- **Hypovol. Shock** (internal GI bleed, anastomotic leak)
- **UTI**
- **Septic shock** (SSI, port site infection)
- **VTE**
- **Atelectasis** (poor pain control)
- **Pneumonia**
- **Neurovascular damage**
- **Paralytic Ileus**

Anastomotic leak

- *Long-term steroids*
- *Lower bowel anastomosis*

Early SBO (within 30 days)

- *Early adhesions OR constant in inflammation*
- *Rx: NGT decompression + supportive care*

PP of sepsis

(1) Precipitant ↑↑↑ local pro-inflammatory mediatory release (esp. macrophages → TNFa, Il-1, IL-6)

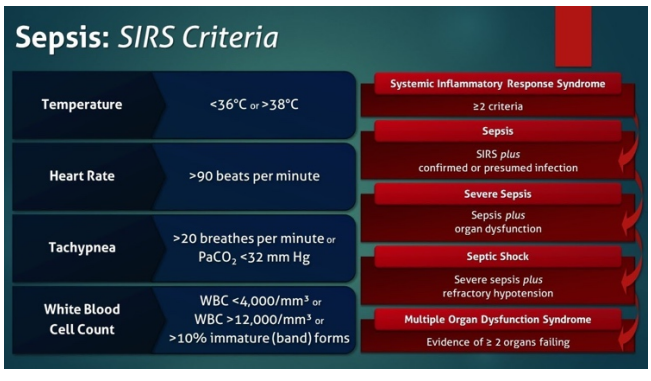
(2) Liver releases acute phase proteins (CRP) → counter and contain inflammation

(3) Failed counter attack → uninhibited cycle of pro-inflammatory mediate amplification

Complications

(1) **DIC** (IL-1 and TNFa → stimulate endothelial surface causes uncontrolled activation of coagulation cascade causing microvascular thrombosis and fibrinolysis)

(2) **HypoTN, hypoperfusion, hypoxia** → organ dysfunction



Mx of sepsis

(1) Call for help + send to ICU

(2) DR ABCD

(3) Airway = patent (I+V?) → mech. ventilatory support

(4) Breathing = FiO2

(5) CPR?

(6) IV access +/- NGT/IDC
  a. IVF (bolus) = 14L of crystalloids (Hartmann's)
  b. IV antibiotics = tacozin
  c. Take blood cultures (M/C/S)
  d. IV adrenaline (raise BP via systemic vasoconstriction)

(7) GCS + BSL

Only IF HAEM STABLE:

(1) Check UO improves from 5-10mL/hr to 35ml/hr

(2) CT-guided + contrast (to confirm leak)

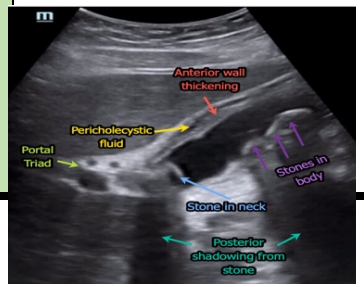
(3) CT-guided drainage of pelvic abscess

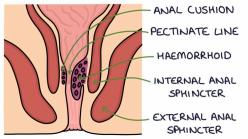
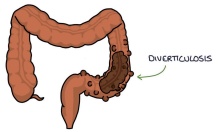
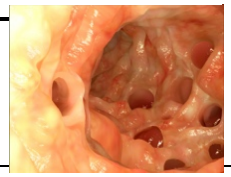
(4) DVT prophylaxis (chemical > mech)

(5) Nutrition / hydration

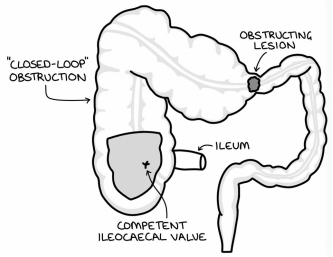
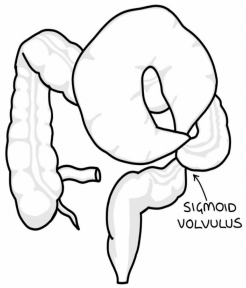
(6) Aim switch IV → oral

(7) Wean pain meds

	Acute Cholecystitis	Acute cholangitis	Gallstones	Pancreatitis	Pancreatic cancer	Cholangiosarcoma
PP / comp.	1. Gallstone stuck in GB neck → cystic duct obstruction 2. GB distension and stagnant bile → activates mucosal phospholipase (Lecithin → lysolecithin = toxic) 3. 2nd bacterial infection → Abscess → perforation → peritonitis *__Gallstone ileus__ = air in biliary tree due to cholecysto-entereic fistula + ectopic gallstone blocking ileocecal valve	Infection and inflamed bile ducts due to: 1. Gallstone obstruction in bile duct 2. Infection secondary to ERCP *Common organisms* ➢ E. coli ➢ Klebsiella ➢ Enterococcus	1) Small stones formed within gallbladder	**Inflammation of pancreas** 1) Acute (rapid onset inflammation and Sx) 2) Chronic (progressive and permanent deterioration of pancreatic function) ***Pathophysiology – gallstone pancreatitis*** 1) obstruct pancreatic duct 2) Bile reflux into pancreatic duct → proteolytic enzymes autodigest ***Pathophysiology – alcohol-pancreatitis*** ➢ EtOH directly toxic to pancrease	Cancer of the pancreas ➢ Most are adenocarcinomas (usually in head of pancreas) ➢ Average survival 6/12 (for advanced disease) ➢ Low 5-year survival of < 25%	Cancer of the biliary duct system ➢ Most are **adenocarcinomas** ➢ Usu. in **perihilar region**
RF	• 40 yo fat female of fertile age • Pregnancy = 10x risk of gallstones	➢ Females	• Forty (40 yo) • Fat • female • fertile age	• Idiopathic • Alcoholic • Hx of gallstones (ONLY cause of acute pancreatitis) • Post-ERCP • **GET SMASHED**	➢ **Courvoisier's sign → non-tender palpable RUQ mass** *(head of pancreas tumour or cholangiosarcoma)* ➢ **Trousseau's sign of malignancy** – migratory thrombophlebitis i.e. thrombophlebitis in different locations (pancreatic adrenocarcinoma) *Specific signs* ➢ Obstructive jaundice (pale stools, dark urine, itchy)+ palpable mass *General signs* ➢ UWL, LoA, altered bowel habit	• Primary sclerosing cholangitis (P-ANCA) • Liver flukes (parasites) • Ulcerative colitis (P-ANCA)
Clinical Sx	➢ **RUQ/epigastric pain** rad *AROUND* to back after meal ➢ Anorexia → N/V ➢ **R shoulder tip pain** – referred pain (sub-phrenic abscess) ➢ **WAKING NOCTURNAL PAIN** ➢ Steatorrhea ➢ **Murphy's sign** → deep palpation of R costal margin on inspiration	**Charcot's triad:** ➢ RUQ pain ➢ Fever ➢ Jaundice (raised bilirubin)	May present asymptomatically ➢ Severe colicky epigastric or RUQ pain ➢ Triggered by meals (Raised CCK – stimulates contraction of sphincter of ODDI) ➢ 30 mins -8 hours ➢ N/V	**ACUTE PANCREATITIS** ➢ Severe epigastric pain radiating straight into the back ➢ Steatorrhoea ➢ Cullen and grey-turner's sign **CHRONIC PANCREATITIS**: ➢ Chronic epigastric pain ➢ Loss of exocrine and endocrine fn ➢ Pseudocysts and abscesses		➢ **Courvoisier's sign → non-tender palpable RUQ mass** *(head of pancreas tumour or cholangiosarcoma)* ➢ Obstructive jaundice (pale stools, dark urine, itchy) ➢ Non-specific = UWL, RUQ pain, HM, palpable GB
Comp.	➢ **Sepsis** ➢ **Gallbladder empyema** ➢ **Gangrenous gallbladder** ➢ **Perforation**	**Surgical emergency** ➢ **High mortality rate due to sepsis**	➢ **Acute cholecystitis** ➢ **Acute cholangitis** ➢ **Pancreatitis**	➢ Pancreatic necrosis → infection → abscess ➢ Pseudocysts (4 weeks after) ➢ T1DM type C	**Death**	
Ix	➢ Fever (left-shift WCC) ➢ **LFT = +++ ALP /GGT** ➢ **USS** = thickened GB wall > 4mm, pericholecystic fluid, hypereamic wall ➢ **Cholecystography (HIDA) scan (if USS inconclusive)** ➢ **CT abdo-pelvis (DDx:** *Gallstone ileus, emphysematous or gangrenous cholecystitis)* **RIGLER'S SIGN = perforation, sbo** ➢ Sign of pneumoperitoneum when gas is outlining both sides of bowel	➢ **FBC** ➢ **LFT = +++ ALP /GGT** *Imaging (least → most sensitive)* ➢ **Abdo USS** – gallstones ➢ **CT abdo** ➢ MRCP ➢ Endoscopic USS	➢ **FBC** ➢ **LFT = +++ ALP /GGT** ↓ ➢ **1st line = Abdo USS** ○ gallstones, bile duct dilatation (>6 cm) ○ **Signs of acute cholecystitis** ➢ 2nd line =MRCP ○ Highly sensitive and specific for biliary tree disease	**+++ LIPASE / AMYLASE** ➢ (FBC, EUC, LFT, CRP, B-HCG, BSL) ➢ Raised CRP ➢ **Abdo USS** = thickened pancreas ➢ **CT abdo-pelvis (**fat stranding around pancreas) ***Glasgow score*** ➢ **P** – Pa_{O_2} < 8 KPa ➢ **A** – **A**ge > 55 ➢ **N** – **N**eutrophils (WBC > 15) ➢ **C** – **C**alcium < 2 ➢ **R** – u**R**ea >16 ➢ **E** – **E**nzyme (LDH > 600 or AST/ALT >200) ➢ **A** – **A**lbumin < 32 ➢ **S** – **S**ugar (Glucose >10) **0-1 (MILD,), 2 (MOD), 3 or more (severe)**	***Bloods (suggestive)*** ➢ *CA 19.9* ***Imaging + histology (gold standard)*** ➢ *Staging CTAP* ➢ *MRCP – visualise biliary system* ➢ *ERCP – biopsy* ***Referral indications: (e.g. for CT or gastro)*** ➢ *Over 40yo + jaundice* ➢ *Over 60 +UWL + non-specific Sx (back pain, altered bowel habit, new diabetes)*	*Same for pancreatic cancer*
Mx	1) **Admit → ABCD** 2) **NBM** → ERCP to remove gallstones 3) **Analgesia** (Panadol) 4) **Anti-emetic** (ondans) 5) **NGT aspirate** – if vomit 6) **IVF** 7) **IV ABx** – local guidelines 8) **Drain any pus BEFORE** → laparoscopic cholecystectomy (within 72hrs) → can *convert to open*  	**Surgical emergency → Admit** (contact seniors – ICU/HDU) 1) **Analgesia** (Panadol) 2) **Anti-emetic** (ondans) 3) **NBM** → ERCP to remove gallstones 4) **IV ABx** – local guidelines 5) **Blood cultures** ***Benefits of ERCP:*** 1) **Cholangio-pancreatography** (visualises biliary duct system) 2) **Sphincterotomy** = allow stone removal **3) Stone removal** 4) **Biliary stenting** – relieve strictures **5) Biopsy** (percutaneous transhepatic cholangiogram – if ERCP fails)	***Asymptomatic*** 1) conservative Rx ***Symptomatic*** **1) NBM** **2) IV analgesia + anti-emetics** **3) IVF (maintenance)** **4) Surgery** (via ERCP or laparoscopic Cholecystectomy) ***Risks of cholecystectomy*** ➢ Infection, Bleed, damage to surrounding structures ➢ Scar (Kocher insicional scar) – hernia ➢ Anaesthetic + VTE risks ➢ **Post-cholecystectomy syndrome (***indigestion, RUQ discomfort, intolerance to fatty foods- diarrhoea, flatulence)*	**ACUTE PANCREATITIS** **1) Admit → Haem stable – FiO2 + IVF** **2) IV analgesia + anti-emetics** **3) IVF (**maintenance**)** **4) NGT aspirate** (for pancreas rest) **5) Nutritional support** (NJT or TPN) **6) NBM** → endoscopically excise necrotic tissue **7) IV ABx – evidence of specific infection (e.g. abscesss, infected necrotic area)** **8)** If gallstone pancreatitis → endoscopic sphincterotomy **CHRONIC PANCREATITIS:** ➢ Abstain from smoking and alcohol ➢ CREON enzymes ➢ SC insulin regimes ➢ ERCP to treat strictures ➢ **Surgery (last resort)**	*MDT meeting* ➢ *Curative vs palliative intent* *Surgery* ➢ *Total pancreatectomy* ➢ *Distal pancreatectomy* ➢ *Whipple's procedure* ➢ *Modified whipple's (pylorus preserved)* *Palliative intent:* ➢ Insert stent to relieve obstruction ➢ Palliative chemo ➢ Palliative RT ➢ End-of-life care - Sx control	*MDT meeting* ➢ *Curative (If early)* ➢ *palliative intent* *Curative intent* ➢ *chemo + RT (combined)* *Palliative intent:* ➢ Insert stent to relieve obstruction ➢ Palliative chemo ➢ Palliative RT ➢ End-of-life care - Sx control

	Appendicitis	Mesenteric Ischemia	Diverticular disease (Acute diverticulitis)	Haemorrhoids
PP	1. **Obstructed appendiceal lumen** (faecal and mucus accumulation = bacterial overgrowth) 2. **Intraluminal pressure > appendix venous pressure** 3. **Venous ischemia** ➔ appendiceal wall ischemia 4. **Abscess → gangrene → perforation → peritonitis** (sepsis)	Reduced blood flow through mesenteric vessels supplying intestines ➢ **Acute =** high mortality rate (50%) – thrombus from LA blocks SMA ➢ **Chronic (intestinal angin***a) – narrowing of mesenteric blood vessels due to atherosclerosis*	1. **Diverticula** = Pouch or pocket in bowel wall (0.5-1cm) a. NOT found in rectum (no teniae coli) b. **Areas not covered by longitudinal muscle** teniae coli (weakness in vasa recta) 2. **Diverticulosis** = presence of diverticular without inflammation or infection 3. **Diverticulitis** = infection or inflammation of diverticular → *Erosion of outpouching of abdominal wall due to ↑intra-luminal pressure*	**Enlarged anal vascular cushions** (connect arteries & veins) ➢ **Mainly located in 3, 7 and 11 o'clock** positions (with 12 o'clock = genitals, and 6 o'clock = anus) ➢ **1st degree** = no prolapse ➢ **2nd degree** = prolapse when straining (returns on relaxing) ➢ **3rd degree** = prolapse when straining (does not return on relaxing BUT can be pushed back) ➢ **4th degree** = prolapse permanently
RF	Young (5-35 yo) DDx: ➢ Mesenteric adenitis ➢ Meckel's diverticulitis → volvulus, ISS ➢ Ectopic pregnancy • Ovarian/testicular torsion • **Valentino syndrome** = duodenal perforation causing R paracolic pain • **Appendiceal mass** -*when appendiceal omentum sticks to inflamed appendix →conservatively managed prior to removal*	• Advanced age • FHx • Smoking • DM • HTN • HC • History of AF	• Low fibre diet • Constipation • Alcohol, smoking • Obese • Ageing • NSAID usage (↑risk of diverticular haemorrhage) • Hx of diverticulosis *Monitor for complications* ➢ **Fistulas (2nd to abscess) -** (between colon-bladder or colon-vagina) **[MOST COMMON]** ➢ **Ileus/obstruction** (2nd to hypertrophy and inflammation) ➢ Perforation ➢ Peritonitis ➢ **Peri-diverticular abscess** (contained by peripheral granulation tissue) ➢ **Peri-diverticular *Phlegmon* =** unbound soft-tissue inflammation ➢ **Large haemorrhage** needing transfusions	• Constipation / straining • Increased intra-abdo pressure (cough, sneeze, weightlifting) • Pregnancy 
Clinical Sx	*ALVARADO SCORE > 8 = appendicitis* ➢ Migratory RIF pain ➢ Anorexia ➢ N/V ➢ Low grade Fever, left-shift WCC ➢ **Percussion & Rebound tenderness + rigidity** (*ruptured appendix*) ➢ **McBurney's point tenderness** (1/3rd from ASIS to umbilicus) = *inferior appendix* ➢ **Rovsing's sign** = palpate LIF → painful RIF= *inferior appendix* ➢ **Obturator's sign** = IR/ER of flexed hip (*pelvic*) ➢ **Psoas' sign** = Lie on side and R hip extension → iliopsoas (*retroceacal*)	**Classic triad of:** ➢ Central abdominal colicky pain (30 mins after eating and lasting 1-2 hrs) ➢ UWL (due to anorexia) ➢ Abdominal bruit (auscultation) **Non-specific signs** ➢ Acute pain disproportionate to exam findings ➢ Signs of early shock, peritonitis and sepsis	➢ LLQ pain (95% = western) ➢ RLQ pain = (75% = Asian) ➢ Constipation = last bowel motion? ➢ Diarrhoea ➢ PR bleeding ➢ Palpable abdominal mass (if abscess formed)  *Peritonitic signs* ➢ Fever, ➢ Leucocytosis = left-shift WCC – signs of shock ➢ **Rebound tenderness + rigidity** (perforated) ➢ 	➢ Sorre itchy anus ➢ Streaked painless bright PR bleed on toilet paper ➢ Lump around or inside anus ***External haemorrhoids*** ➢ Visible on inspection ➢ Very tender ***Internal haemorrhoids*** (visualies with proctoscope) ➢ Felt during PR exam ➢ No pain ***Thrombosed haemorrhoids*** ➢ Clot in haemorrhoid ➢ Purple very tender swollen lumps around anus ➢ Cannot do DRE exams
Ix	Clinical diagnosis ➢ **FBC (left-shift = neutrophils >70%)** ➢ EUC, LFT, CRP, B-HCG, Lipase ➢ **UA (exc. UTI)** ➢ **Abdo USS** – children + young women (exclude O+G pathology – ectopic, torsion, cyst rupture) ➢ **CT abdo + contrast** (most accurate) → thick wall, enlarged (>6mm)	Clinical diagnosis ➢ **FBC, EUC, LFT, CRP, B-HCG** ➢ **VBG –** metabolic acidosis, raised lactate ➢ **CT angiography (gold-standard)** Contrast CT – acute mesenteric ischaemia	• **+++ WBC** • **+++ CRP** • (FBC, EUC, LFT, CRP, B-HCG, Lipase) • *C. difficile stool toxin* • **CT AP (oral vs IV contrast)** - ++ *soft tissue density within pericolic fat 2nd to inflammation = confirm dx and severity (e.g. complicated w/ abscess, fistula)* • ***AXR + upright CXR*** → *localised diverticulitis (ileus, SBO, thickened wall)*	• ***(1) Clinical exam (DRE)*** o Examined with proctoscope • Investigations to exclude other causes o IBD – faecal calprotectin o Diverticulosis - o Colorectal cancer o Anal fissures
Mx	➢ **Admit → Haem stable – FiO2 + IVF** ➢ **Analgesia** (Panadol) + **anti-emetic** (ondans) ➢ **NBM** ➢ **Perioperative** IV ABx – cefazolin + metronidazole o *Clindamycin (if penicillin allergy)* ➢ **Appendicectomy** (laparoscopic vs open) (lower risk for laparoscopy) o **Usu. retro-caecal appendix is most affected** ➢ *colonoscopy to rule out malignancy if elderly *Complications:* ➢ *Bleed, infection, scars, pain* ➢ *Damage to adjacent organs (bowel, bladder)* ➢ Anaesthetic and VTE risk	***Mx of acute mesenteric ischaemia*** ➢ Remove necrotic bowel ➢ Remove or bypass thrombus (open vs endovascular surgery) ***Mx of chronic mesenteric ischaemia*** ***Conservative Mx*** ➢ Stop smoking and EtOH ➢ Reduce weight (diet, exercise) **Medical mx:** ➢ Anti-HTN ➢ Statins **Surgical mx: (revascularisation)** ➢ Endovascular procedures (e.g. percutaneous mesenteric artery stenting) ➢ Open endarterectomy or bypass grafting	***Diverticulosis OR Uncomplicated Diverticulitis (90% managed in outpatients)*** • Bowel rest (NBM) • **High-fibre diet** (to ↓straining, intra-luminal pressure) + **bulk-forming laxatives** • ABx = cipro + metronidazole (cover Gram -ve rods – *B. fragilis*) ***Admit (IF UNWELL and cannot tolerate PO feeds)*** • NBM, fail to improve with outpatient management • **IVF + IV Abx** = IV cef + metro • **Urgent CT + surgery (if complications present)** ***Complicated →*** *Mx depends on Hinchey stage* ***Follow-up*** : **1)** Follow up in 1 mth time → for colonoscopy (rule out possible cancers) **2)** **Oral Abx for 5 days + high fibre diet**	**Conservative** / *Lifestyle* • *↓strain, ↑fibre, (hydrateion)* • *exercise,* • *sitz bath,* • *squatty potty* **Medications** • *stool softeners / laxatives (Dulcolax)* • *topical astringents (e.g. anusol – contains hydrocortisone to help chemically shrink haemorrhoids)* **Non- Surgery** • ***rubber band ligation (****around base of haemrrohoid****)*** • **injection sclerotherapy** • **bipolar diathermy –** destroy haemorroid with electric current **Surgery** • **indication =** thrombosed haemorrhoids (within 72 hrs) • **haemorrhoidal artery ligation –** *suture blood vessels to cut off blood supply* • **Haemorrhoidectomy →** may cause faecal incontinence

Hinchey stage	*Description*	*Acute Rx*
Stage 0	*Mild Sx (LLQ pain + fever)*	*Oral Abx*
Stage 1	*Phlegmon*	*Abx +/- CT drain*
Stage 2	*Pericolic or distant Abscess /fistula*	*Abx + Abscess drain*
Stage 3	*Purulent peritonitis (ruptured abscess)*	Resection + primary anastomoses = lower mortality but anastomotic leak
Stage 4	*Faeculent peritonitis*	*Hartmann (*higher mortality risk (but no leak))

	BOWEL OBSTRUCTION	ILEUS	VOLVULUS	HERNIA
PP	Blocked passage of food, fluids and gas through intestines → deemed a surgical emergency	➢ Paralytic/adynamic ileus where small bowel becomes inactive ➢ **Pseudo-obstruction** = *functional obstruction of large bowel*	When bowel twists around itself and the mesentery it attaches to ➢ Causes **closed loop bowel obstruction** ➢ 2 main types (sigmoid vs caecal volvulus)	➢ Abnormal protrusion through muscle, fascia ➢ Many types (abdominal, tentorial, diaphgramatic)
RF	90% of bowel obstruction causes are: • ***Adhesions*** *(small bowel) – secondary to:* o Previous abdo surgery o Peritonitis o Endometriosis o PID or pelvic infections • ***Hernias*** *(small bowel)* • **Malignancy** (large bowel) *Other causes:* ➢ Volvulus, Diverticular disease, Strictures (e.g. Crohn's), ISS  *__Closed loop obstructions__ = have competent ileocaecal valves with LBO → progressive dilated bowel → ischaemia	• Bowel trauma • Handling of bowel (post-op abdominal surgery) • Inflammation or infection (e.g. peritonitis, appendicitis, pancreatitis, or pneumoina0 • Electrolyte imbalance (e.g. hypoK, hypoNa)	➢ **Chronic constipation** ➢ Neuropsychiatric disorders (e.g., Parkinson's) ➢ Nursing home residents ➢ High fibre diet ➢ Pregnancy ➢ Adhesions  **__CAECAL VOLVULUS.__**: • Younger patients **__SIGMOID VOLVULUS.__**: • More common • Older patients • XS laxatives + high fibre diet	***__Increased intra-abdo pressure__*** ➢ Chronic constipation ➢ Weight lifting (repetitive) ***__Weakened abdo wall__*** ➢ Multiple pregnancies (lSCS) ➢ Previous abdominal surgery **__Hernia Types__** **Inguinal**: Indirect, direct **Femoral**: • **F** – **F**emoral vein laterally • **L** – **L**acunar ligament medially • **I** – **I**nguinal ligament anteriorly • **P** – **P**ectineal ligament posteriorly **Incisional**: Post-op **Umbilical**: Common in neonates **Epigastric**: Post-op **Spigelian**: Lateral border of RA along semilunaris **Diastasis recti**: Widening of linea alba **Obturator**: Howship-Romberg sign – pain extending from inner thigh to knee when hip IR **Hiatus**: 4 types – sliding, rolling, combined or large opening
Clinical Sx	➢ **Green-bilous vomiting** ➢ Abdo distension ➢ Diffuse non-specific abdominal pain ➢ Obstipation ➢ High-pitched tinkling bowel sounds ➢ ALTERED bowel habit ➢ UWL ➢ PR bleed (bowel cancer)	➢ **Green-bilous vomiting** ➢ Abdo distension ➢ Diffuse non-specific abdominal pain ➢ Obstipation ➢ High-pitched tinkling bowel sounds	➢ **Green-bilous vomiting** ➢ Abdo distension ➢ Diffuse non-specific abdominal pain ➢ Obstipation ➢ High-pitched tinkling bowel sounds	**__Asymptomatic__** ➢ Soft lump protruding from abdominal wall ➢ Reducible vs irreducible (incarcerated → strangulated or obstruction) ➢ Aching, pulling or dragging sensation
COMP.	➢ **Hypovol. Shock =** Fluid loss from intravascular space into GIT → (3rd spacing) ➢ Higher up obstruction = greater fluid loss ➢ **Bowel ischaemia → perforation → Sepsis**		• **Bowel ischaemia → perforation → Sepsis**	• **Incarceration** = irreducible hernia leading to: o **Obstruction (** block passage of faeces - obstipation) o **Strangulation** (hernia cuts off blood supply = ischaemia)
Ix	➢ FBC, EUC, LFT, CRP, Lipase, B-HCG ➢ VBG – metabolic acidosis and raised lactate ➢ CXR - *pneumoperitoneum* ➢ Abdo XR ➢ > 3cm (small bowel – mucosal folds – valvulae conniventes) ➢ > 6cm (colon – haustra) ➢ > 9cm (caecum) ➢ CTAP -contrast ➢ Check for abdominal perforation		➢ Abdo XR ➢ "coffee-bean" sign for sigmoid volvulus ➢ CTAP -contrast ➢ Check for abdominal perforation	**__Clinical assessment__** ➢ Abdominal wall USS ➢ Hernias with narrower base → higher risk of incarcerations (e.gg spigelian **__DDx: umbilical lump__** ➢ Benign – sebaceous cyst, lipoma, granuloma, abscess, ➢ Malignant – sister mary joseph, melanoma, lymphoma, AC
Mx	***__Unstable__***: ➢ ABCDE – call general surgery ➢ NBM ➢ IVF ➢ NGT – decompress stomach contents (reduce risk of aspiration) ***__STABLE__*** ➢ Conservative Mx ➢ Exploratory surgery (laparoscopic vs open) ➢ Adhesiolysis ➢ Hernia repair ➢ Resection of obstructing tumour	➢ 1st line = treat underlying reversible cause (e.g. electrolytes, inflammation) Provide supportive care: ➢ NBM ➢ IVF ➢ NGT – decompress stomach contents (reduce risk of aspiration) ➢ Early mobilisation – help stimulate peristalsis ➢ TPN – may be needed while waiting for bowel to regain function	***__Provide supportive care:__*** 1) NBM 2) IVF **3)** NGT – decompress stomach contents (reduce risk of aspiration **4) Endoscopic decompression (e.g. using flexible sigmoidoscopy) to help correct volvulus** a. Flatus tube left temporarily to decompress bowel b. High risk of recurrence (60%) ***__Surgical Mx__*** • Laparotomy (open abdominal surgery) • **Hartmann's procedure ➔ sigmoid volvulus** (removal of the rectosigmoid colon and formation of a colostomy) • **Ileocaecal resection or R) hemicolectomy ➔ caecal volvulus**	**Conservative Mx** ➢ Leave hernia alone ➢ Indications = wide neck hernias (have low comp. risk) **Surgical Mx** ➢ Tension free repair – place mesh over defect in abdominal wall allowing tissues to grow into mesh to provide support o Lower risk of recurrence

BOWEL CANCER

Details

- **3rd most common cancer in the world**
  - **Good prognosis AC = mucinous and medullary**
  - **Bad prognosis AC = signet ring cell, small cell, mixed adenocarcinoma and neurodendocrine carcinoma (MANEC)**

Risk factors

- *Advanced age*
- *Western Diet (high in red and processed meats)*
- *Obesity + sedentary lifestyle*
- *Smoking + EtOH*
- *Previous irradiation (rectal cancer)*

SPECIFIC HIGH RISK FACTORS:

- Fhx of bowel cancer
- FAP – autosomal dominant
- HNPCC (Lynch syndrome)
- IBD (Crohn's or UC)

Assoc. Sx

- altered bowel habits (more loose and/or more frequent stools)
- UWL
- PR bleed +/- melaena
- Unexplained abdominal pain +**TENESMUS**
- Fatigue → Fe deficiency anaemia
- Abdominal or recta mass on examination

Differentiating location of bowel cancer based on PR bleed

- Midgut = melaena + non-tender palpable RIF mass
- L) CRC = melaena or mixed in PR bleed + alted bowel habit,
- Rectal ca = tenesmus, PR bleed, perianal pain (with some sciatica)

Types

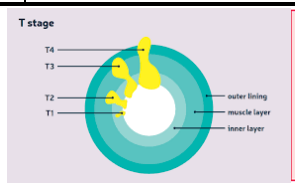
	Inheritance	Gene/MoA	Significance

FAP	Autosomal dominant	• APC tumour suppressor gene
		• Chromosomal instability pathway
			• Large number of polyps (adenomas) along large intestine
			• These polyps are pre-cancerous (usually before the age of 40)
			• Variants include:
			  ○ **Gardener syndrome** (osteomas of mandible, desmoid tumour, thyroid tumours)
			  ○ **Turcot syndrome** (rare – polyps +CNS tumours e.g. medulloblastomas)

HNPCC	Autosomal dominant (more aggressive)	• DNA mismatch repair gene
		• Microsatellite instability pathway
			• **Higher risk of cancers** (esp. CRC)
			• Tumours develop in isolation (does not produce adenomas)
			• Criteria for Lynch syndrome
			  ○ < 50yo + less polyps than FAP patient
			  ○ 1st degree relative < 50yo w/ CRC, endometrial ureter, pelvic tumour

Ix (triple test)

- **Bowel cancer screening program ➔ FOBT test (every 2 years over the age of 50)**
- **FBC + Fe studies – Fe deficiency anaemia**
- **EUC, LFT, CRP**
- **CEA**
- **Staging CT + PET-CT**
  - **Main met sites = liver, bone, lung**
- **Colonoscopy / sigmoidoscopy (gold-standard) → biopsy**
  - **MUST provide ≥12 negative LN to be negative (minimise false positives)**
  - **Low grade** = tubular architecture BUT atypical cytology
  - **High grade** = < 50% tubules + solid + abnormal cytology
- **Genetic counselling and testing**
  - 1st degree relatives, siblings and offspring



Stage	Features	5-year survival
A	Tumor confined to the mucosa	90–95%
B1	Tumor growth into muscularis propria	75–80%
B2	Tumor growth through muscularis propria and serosa (full thickness)	60%
C1	Tumor spread to 1–4 regional lymph nodes	25–30%
C2	Tumor spread to more than 4 regional lymph nodes	
D	Distant metastases (liver, lung, bones)	<1%

DUKE'S CLASSIFICATION OF TUMOUR STAGING (TNM)
T = based on depth (NOT size)
N – LN involvement = worse prognosis

Mx

MDT approach – depends on multiple factors including:

- Clinical condition and general health
- Stage and grade
- Histology
- Patient wishes

Management (curative vs palliative intent)

1) Surgical resection
   a. Identify tumour (tattoed during endoscopy)
   b. Remove section of bowel with tumour + **apical nodes**
   c. Create end-to-end anastomosis OR stoma
2) Chemotherapy (adjuvant – if stage III)
3) Radiotherapy
   a. **Rectum ONLY applicable for neo-adjuvant RT (as retroperitoneal, hence fixed)**
4) **Immunotherapy (OFTEN combined with chemo)**
   a. Anti-VEGF (bevacizumab)
   b. Anti – EGFR (cetuximab) → only if WT RAF and mutant KRAS
5) Palliative care

Removal of:

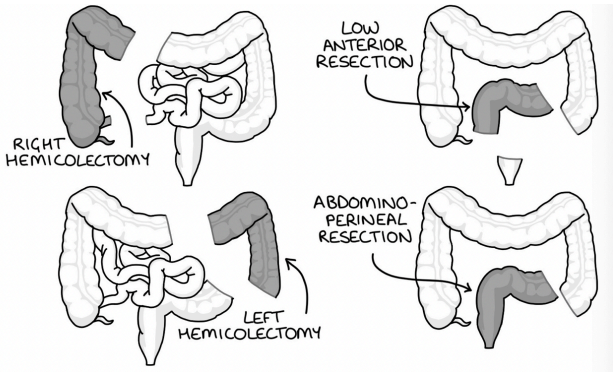
- Caecum
- Ascending colon
- Proximal transverse colon

HIGH anterior resection

- Removal of sigmoid colon

Low anterior resection

- Removal of sigmoid colon and upper rectum (spared lower rectum and anus)



Removal of:

- Distal transverse colon
- Descending colon

Removal of:

- Rectum
- Anus

Surgical complications

General	Specific
• Infection, • bleeding, • damage to adjacent organs, • surgical scars • Anaesthetic and VTE risks	• Post-op ileus • Faecal incontinence, urgency and frequency of bowel movements (**especially for low anterior resection**) • Failure of anastomosis • Stroma requirement • Incisional and inguinal hernias • Intra-abdominal adhesion → SBO/LBP

Hartmann's procedure

- (ED procedure for obstruction secondar t o tumour or sig. diverticular disease)
- removal of rectosigmoid colon and creation of colostomy

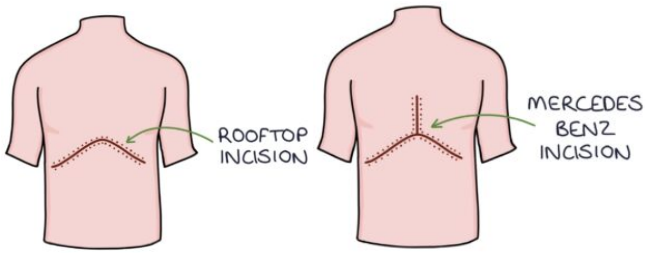
TOTAL proctocolectomy

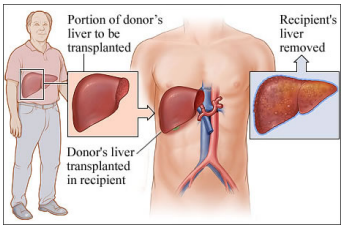
- Advanced high grade dysplasia
- UC

Follow-up period – every 3 years after curative surgery

- CEA tacking
- CT thorax and CTAP

LIVER TRANSPLANT





INDICATION	Contraindications	Procedure	Post-transplant care
Acute liver failure (immediate transplant) ➢ Paracetamol OD ➢ Acute viral hepatitis **Chronic liver failure** (can wait 5 months) ➢ HCC (case-by case basis)	➢ Significant co-morbidities (e.g., severe CKD, lung or heart disease) ➢ Current illicit drug use ➢ Continuing EtOH misuse (6 months of abstinence is required) ➢ Untreated HIV ➢ Current or previous cancer (except certain liver cancers)	1) ***rooftop*** " or "***Mercedes Benz***" 2) Remove old and replace with new liver, biliary system and blood supply is then implanted and connected	Lifelong ***immunosuppression*** **(**e.g., steroids, azathioprine and tacrolimus) • **Avoid alcohol and smoking** • Treating **opportunistic infections** • Monitoring for **disease recurrence** (i.e. of hepatitis or primary biliary cirrhosis) • **Monitoring for cancer** as there is a significantly higher risk in immunosuppressed patients

STOMAS

➢ artificial openings of a hollow organ (for example the bowel).

➢ specially adapted bag (***stoma bag***) is fitted around the stoma to collect the waste products and is emptied as required

	Urostomy	*Gastrostomy*	*End-Ileostomy*	*End-Colostomy*
DESCRIPTION	from the urinary system onto the skin via an ileal conduit (created from ileum) to urostomy bag (tightly fitted to avoid urine contact with skin)	Connection between stomach and abdominal wall	ileum) is brought onto the skin (SPOUT present – allows direct drainage to tightly fitting stoma bag without the contents	large intestine (colon) is brought onto the skin (NO SPOUT)
SPOUT	***Yes***	*Percutaneous endoscopic gastrostomy* (*PEG*)	***Yes***	***No***
Indication	*Post-cystectomy*		*panproctocolectomy* (*total colectomy*) *for IBD, FAP*	*abdomino-perineal resection* (*APR*)
LOCATION	*right iliac fossa* (*RIF*).		*right iliac fossa* (*RIF*).	*left iliac fossa* (LIF).
OUTPUT	**Urine**	**Direct feeds into stomach**	**liquid** stools	**solid** stools

* All patients with stomas should have training on how to manage the stoma and have regular follow-up with a specialist ***stoma nurse***.

Alternatives	General stoma complications
➢ **Alternative end-ileostomy = *ileo-anal anastomosis* (*J-pouch*) →** o leum folded back on itself and fashioned into a larger pouch that links small bowel with anus → functions a bit like a rectum (storage space) ➢ **Loop colostomy/ileostomy** → when proximal and distal end of small bowel brought out of skin → forms a temporary stoma to allow distal bowel to heal after surgery (since no faeces in distal bowel) o reversed after 6-8 weeks later	➢ psychosocial impact: ➢ obstruction OR stenosis ➢ bleeding, infection ➢ granulomas (raised lumps around stoma) ➢ prolapse of bowel through hernia site ➢ parastomal hernia ➢ short gut syndrome – high output diarrhoea, dehydration and malnutrition