Postoperative complications

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Aims & objectives

- To Recognize complications early.
- To Treat them vigorously.

Risk factors

General Factors

1. Old age
2. Neonatal period
3. Obesity
4. Cardiovascular disease
5. Respiratory disease
6. Diabetes mellitus
7. Drug therapy
8. Blood transfusion
9. Neoplastic disease

Risk factors

Specific factors

1. Minimally invasive surgery
2. Orthopaedic surgery
3. Gynaecology
4. Thoracic & upper abdominal procedures
5. Prolonged operations

Cardiovascular disease-

- Angina.
- Dysrhythmia.
- Cardiac valve disease.
- Cardiac pace makers.
- Atherosclerosis.
- Hypertension.

Risk of myocardial infarction following surgery-

Time since infarct	Incidence of further infarction after surgery(%)
0-6 months	55
1-2 years	22
2-3 years	6
>3 years	1
No infarct	0.66

Ischaemic Heart Disease

- Medications should be continued till surgery.
- 20-50% of proven IHD- normal ECG.
- Stop smoking at least 12 hours before surgery to reduce-
  - % of carboxyhaemoglobin in blood.
  - minimize CV S/E of nicotine (tachycardia, HTN).

Ischaemic Heart Disease

- Heavy premedication during induction.
- Adequate postoperative analgesia.
- ECG monitoring during and after operation.
- Avoid atropine.
- Postoperative supplemental oxygen.

Arterial Hypertension

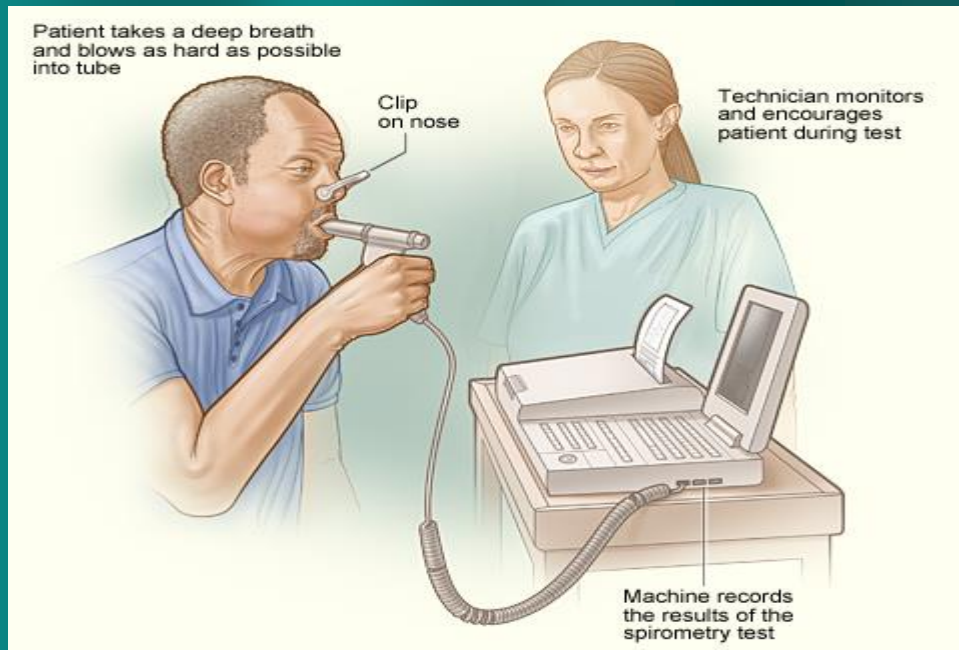
- DBP >110mm Hg is associated with—
  - increased risk of MI.
  - >risk of bleeding.
- DBP <110mm Hg is satisfactory for surgery.

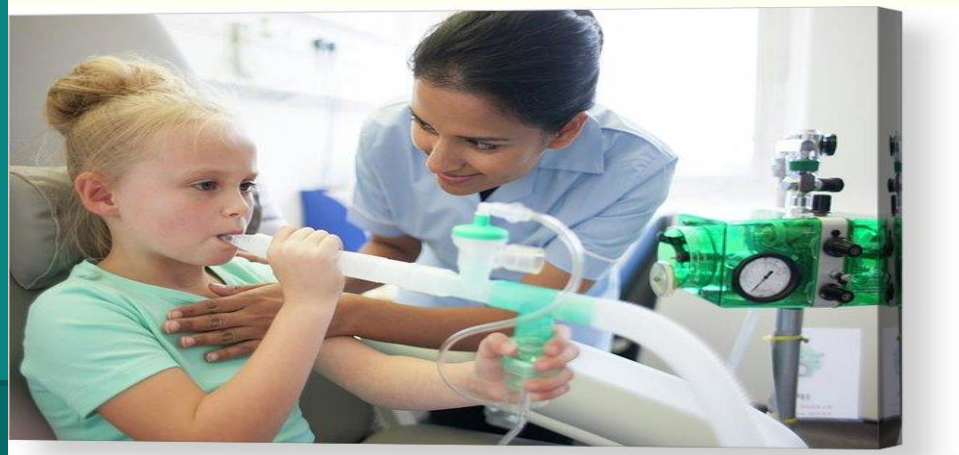
Chronic Respiratory Disease

- Risk of respiratory failure.
- Smokers- 6 times > risk of respiratory complications.
- Stop smoking at least 12-24 hours before surgery.
- Respiratory effect of smoking takes at least 6 weeks to improve after cessation.

Chronic Respiratory Disease *(contd..)*

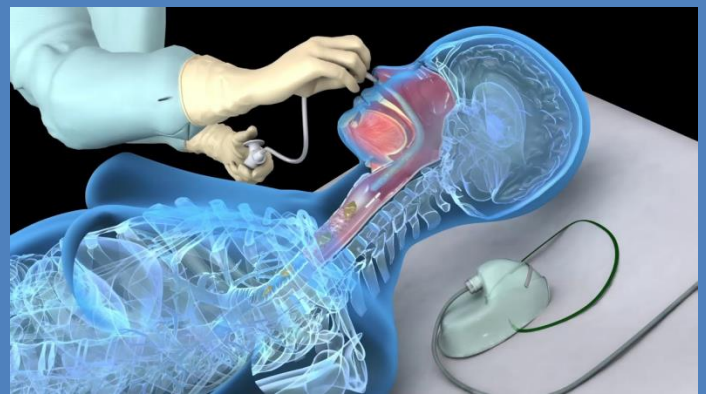
- FEV_1 &
- Spirometry.
- Blood Gas Analysis- if need for IPPV postoperatively.
- Bronchospasm may be aggravated by
  - anxiety,
  - instrumentation of the upper airway,
  - foreign materials or
  - irritants in the upper airway,
  - pain,
  - Drugs.
- Bronchodilator therapy should be continued up until the time of surgery.





Treatment

- Postoperative chest physiotherapy with sputum CS.
  - Sitting up position,
  - Good analgesia,
  - Physiotherapy-
    - » Assisted cough.
    - » Chest percussion.
    - » Naso-tracheal suction.
  - Nebulisation.
  - Thoracic epidural anaesthesia or epidural opiates, or spinal opiate may be useful when the risk of respiratory failure is great.



DIABETES MELLITIS

- Admitted at least 2 days prior to surgery.
- Maintain relative hyperglycemia.
- Desired blood sugar-
  - Around 10 mmol/L.
- OHA should be stopped 48 hours before surgery.
- Replaced by short acting insulin.

Diabetec coma

- Hypoglycemic coma.
- DKA.
- Hyperosmolar coma (usually >60 yrs).

Golden rule

Any diabetec patient with DKA VS hypoglycemia give glucose even before glucose measuring.

Problems due to diabetes

Infection due to-

- Imparied immunity.
- Angiopathy.
- Diabetic neuropathy.
- Hyperglycemia.

Impaired wound healing due to-

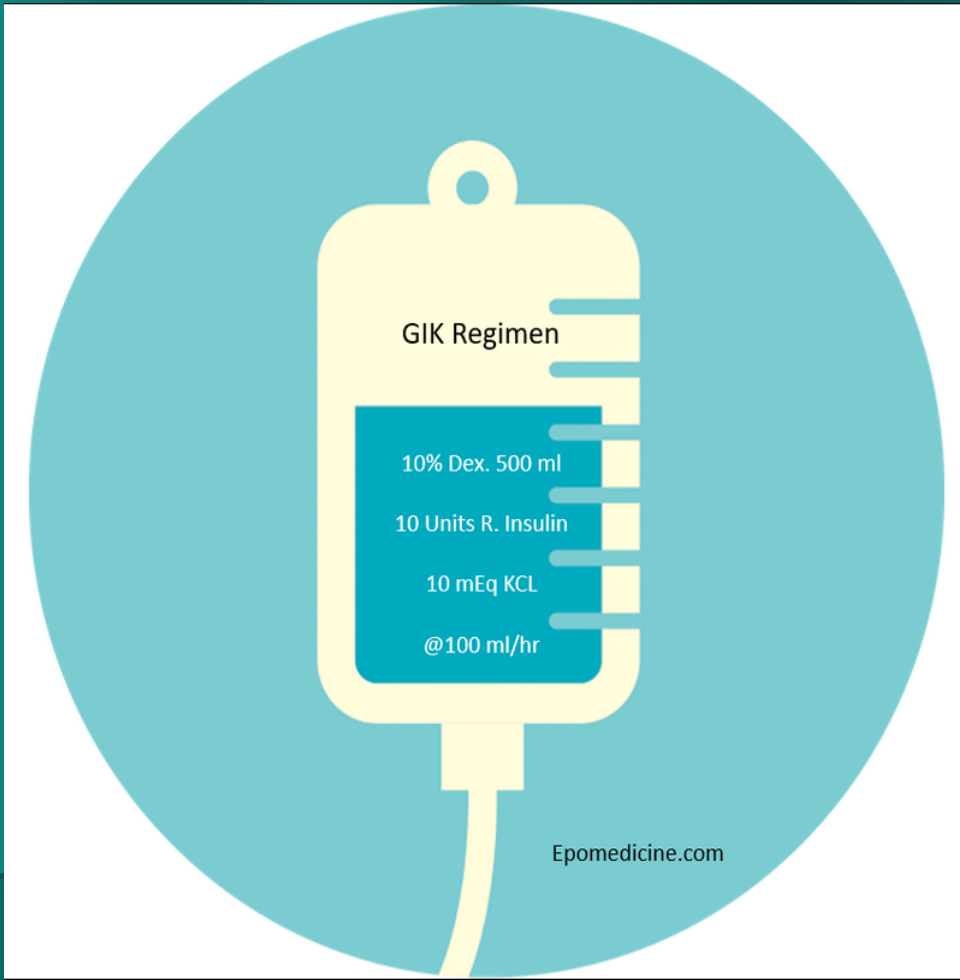
- Reduced blood supply.
- Interference with acute inflammatory reaction.

- Increased risk of atheroma.
- Neuropathic ulcers.
- Wet gangrene.
- Renal disease-
  - DM >20 years 15% incidence of glomerulosclerosis making fluid and electrolyte imbalance.

Diabetes Mellitus *(contd..)*

The GKI Sliding scale regimen-

- Infuse 10% glucose 500ml + 10 mmol potassium chloride (KCl) at 100ml/hour
- Prepare a 50 ml syringe containing 50 units of Actrapid insulin in 50ml normal saline (= 1 unit/ml) and connect to glucose infusion.
- Adjust the rate of the syringe driver according to the following sliding scale-



Diabetes Mellitus *(contd..)*

Blood glucose (mmol/L)	Regime 1	Regime 2
<4	Off	Off
4-8	1u/hr	2u/hr
8-11	2u/hr	3u/hr
11-16	3u/hr	4u/hr
16-20	4u/hr	6u/hr
>20	5u/hr	8u/hr

Regime 1- suitable for most patients

Regime 2- if ill, shocked or on steroids

- Operations- best done early on morning list
- Continue i.v. regimen until 1 hour before 1st postoperative meal.
- Restart s.c. insulin with this meal

Diabetes Mellitus *(contd..)*

- Desired range of 6-12 mmol/L.
- At least 2 hourly during surgery
- At least 4 hourly following surgery including plasma potassium levels.
- If 2 successive blood glucose values are >20 mmol/L leave instructions to consult the duty doctor.
- In the perioperative period lactate containing fluids (e.g. Hartmann's solution) should be avoided in diabetics
- If oral feeding is not started within 72 hours consider parenteral nutrition.

Postoperative pain

Results in-

- Reduced respiratory movement--atelectasis & pneumonia.
- Increased sympathetic output leads to increased myocardial oxygen demand increasing the risk of MI.
- Increased secretion of catecholamines and catabolic hormones leading to increased oxygen consumption and sodium and water retention.
- Delayed mobilization of the patient.

Management

- Assurance.
- Parenteral analgesics.
- Opioids incase of severe pain.
- NSAIDs incase of mild to moderate pain.
- However, in combination with opioids, they may decrease the amount of opioid necessary.
- PCA.
- Epidural analgesia.

Any postoperative elevation of body temperature more then 1°C above normal should be considered significant and the cause should be investigated.

Fever – Basic mechanism

Endotoxin , Inflammation

|

Monocyte, Macrophage

| IL-1,IL-6,IFN,TNF

Preoptic area of Hypothalamus

| PGs

Raise temperature set point

|

Fever

Incidence

- 40% major surgery -suffer pyrexia.
- 80% of which have no specific aetiology.
- Rest 20% - Infectious cause.
- Infection is the only headache of post operative pyrexia.

SUGGESTIONS OF INFECTION

- Preoperative trauma.
- ASA class – above 2.
- Fever after 2nd P.O.D.
- Initial temperature above 38.6 degree Celsius.
- T.C. >10000/µl.
- B.U.N.>15mg/dl. (normal up to 7mg/dl).

Causes :

During operation-

- Preoperative sepsis or hyperthermia.

Immediate postoperative period (first 6 hours)

- Metabolic or endocrine abnormality (thyroid crisis, adrenocortical insufficiency),
- Prolonged hypotension with inadequate tissue perfusion

Mnemonic of Causes-

5 W's.

- Wind, POD1-2: the lungs, i.e.
  - pneumonia,
  - aspiration, and
  - pulmonary embolism.
  - Once attributed to atelectasis, but this has been shown to be inaccurate.
- Water, POD3-5:
  - urinary tract infection, related to indwelling catheter (during surgery or currently i.e. Foley catheter)
  - Thrombophlebitis.
  - Drain tube infection.
- Walking (or VEINS, which then sounds like "Weins"), POD4-6:
  - deep vein thrombosis or
  - pulmonary embolism
- Wound, POD5-7:
  - surgical site infection.
- Wonder drugs or “What did we do?”, POD7+:
  - drug fever,
  - infections related to intravenous lines

Investigations

Depends upon individual pathology behind it.

- Chest X ray , sputum for culture ,ECG (pulmonary embolism).
- Wound swab.
- Urine R/M/E.
- Signs of DVT (Homan's , Moses test) .
- Examine catheter , cannula sites .
- Examine pressure areas .
- T.C. , D.C. , Blood Culture.
- C.T.scan , Tumor marker -Consider hidden malignancy.
- Ultrasonography, C.T scan -Consider hidden infection (Sub-phrenic , Pelvic abscess)

General Management

- Most patients require no specific treatment.
- Subsides spontaneously.
- Infection requires treatment.

General Management

- Fever increases fluid losses and energy requirements as below-
  - Sensible loss increases by approx. 250ml/day/°C
  - Insensible loss increases by approx. 250ml/day/°C
  - Calorie requirement increases by 5%/°C rise in temperature.

  Therefore these should be replenished.
- Primary treatment consists of treating its cause and not the fever itself. i.e.
  - Changing or removing the cannula or catheter,
  - Early mobilization to prevent respiratory infection or DVT,
  - Broad spectrum antibiotic.
  - Antipyretics, tepid sponging etc.

Specific Causes And Management

They are first diagnosed and then managed.

Pulmonary problem

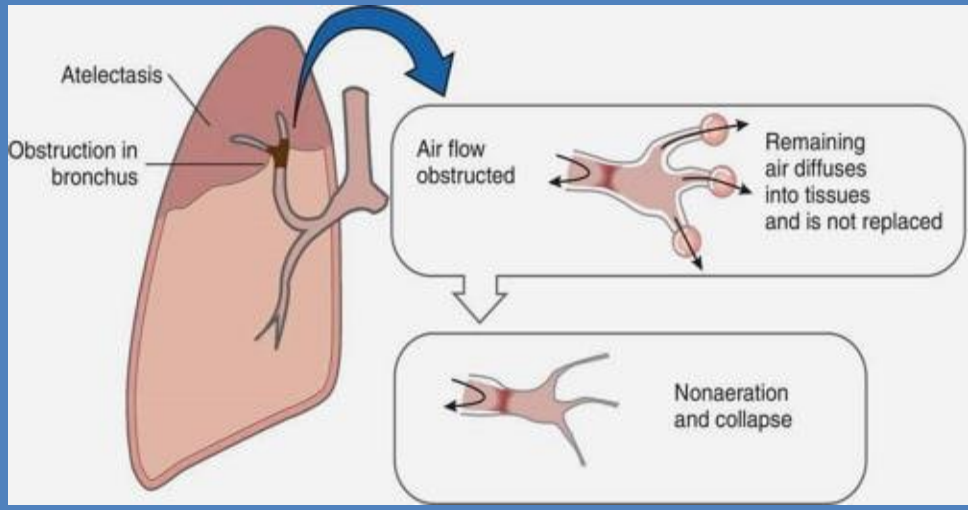
- 1st & 2nd POD.
- Atelectasis & pneumonia.
- Early mobilization.
- Respiratory physiotherapy.
- Adequate fluid management.
- 3 A
    - Antibiotics.
    - Analgesics.
    - Areation.

Pulmonary care

- FRC & VC reduces upto 40% pre-op level.
- Go up slowly upto 60-70% by 6^{th} -7^{th} POD.
- Aggravated by-
    - Obesity.
    - Smoking.
    - Pre- existing lung diseases.
    - Elderly.
    - Pain.
    - Abdominal distension.

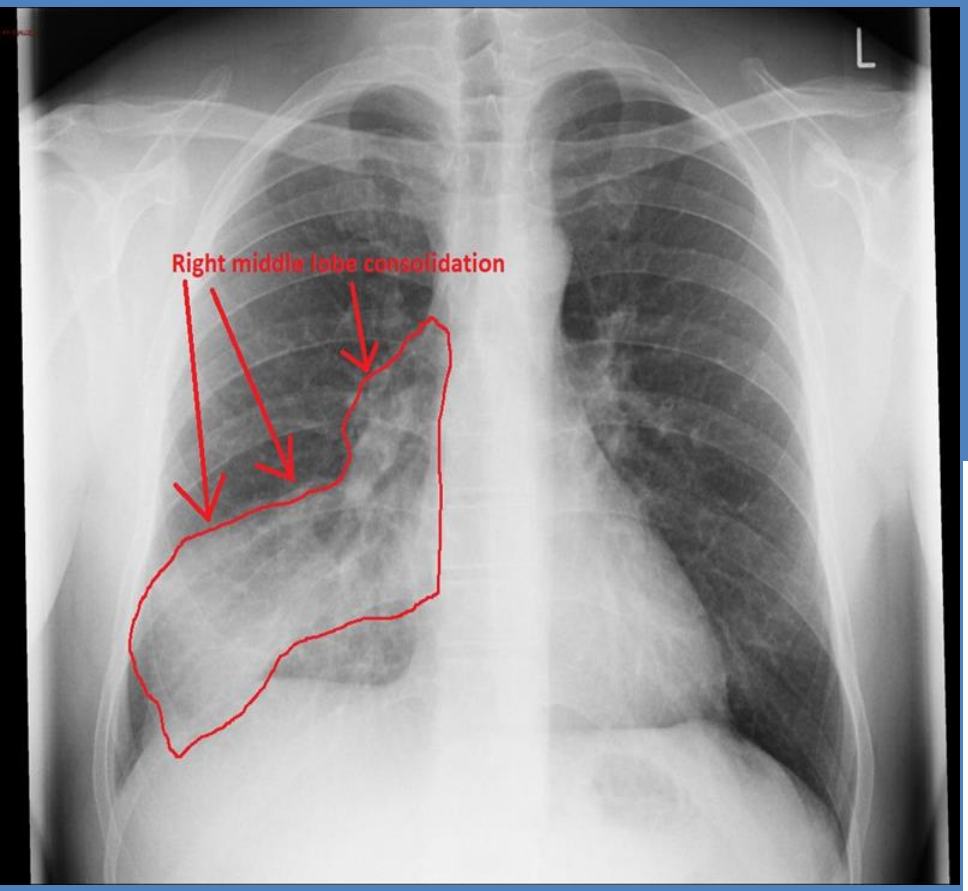
Atelectasis

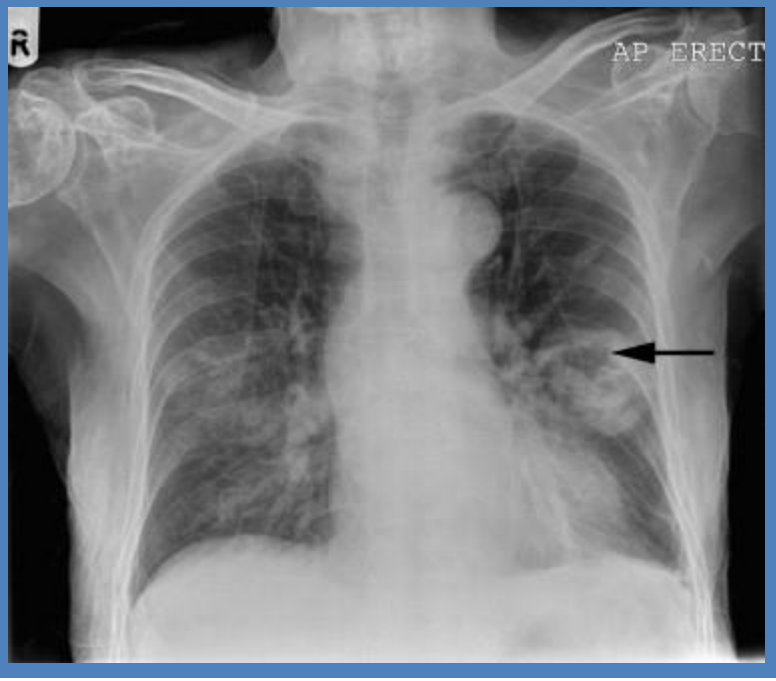
- Complete or partial collapse of the entire lung or area (lobe) of the lung.
- Alveoli within the lung become deflated or possibly filled with alveolar fluid.
- Fever during first 48 hours usually is due to atelectasis. (90%)



25% of GI surgery is associated with it.

Segmental
Focal patchy





Old age
Smoking
Obesity
Previous respiratory disease

Segmental (or subsegmental) consolidation

Clinical Feature

Symptoms-

- Fever (Unknown etiology)
- Tachypnea
- Tachycardia.

Signs-

- Elevated diaphragm.
- Rales.
- Decreased breath sound.

Pathology

- Ventilation perfusion mismatch.
- Infection.

Obstuctive-

- Secretion from COPD,
- Intubation.
- Anesthetic agent ,
- Blood clot.
- Malposition of endotracheal tube.

Non-Obstructive-

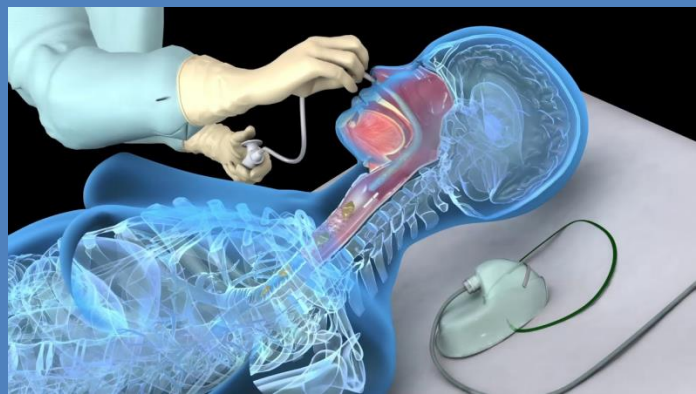
- Bronchiole closure at closing volume of lung
- Less surfactant.
- Low FRC.

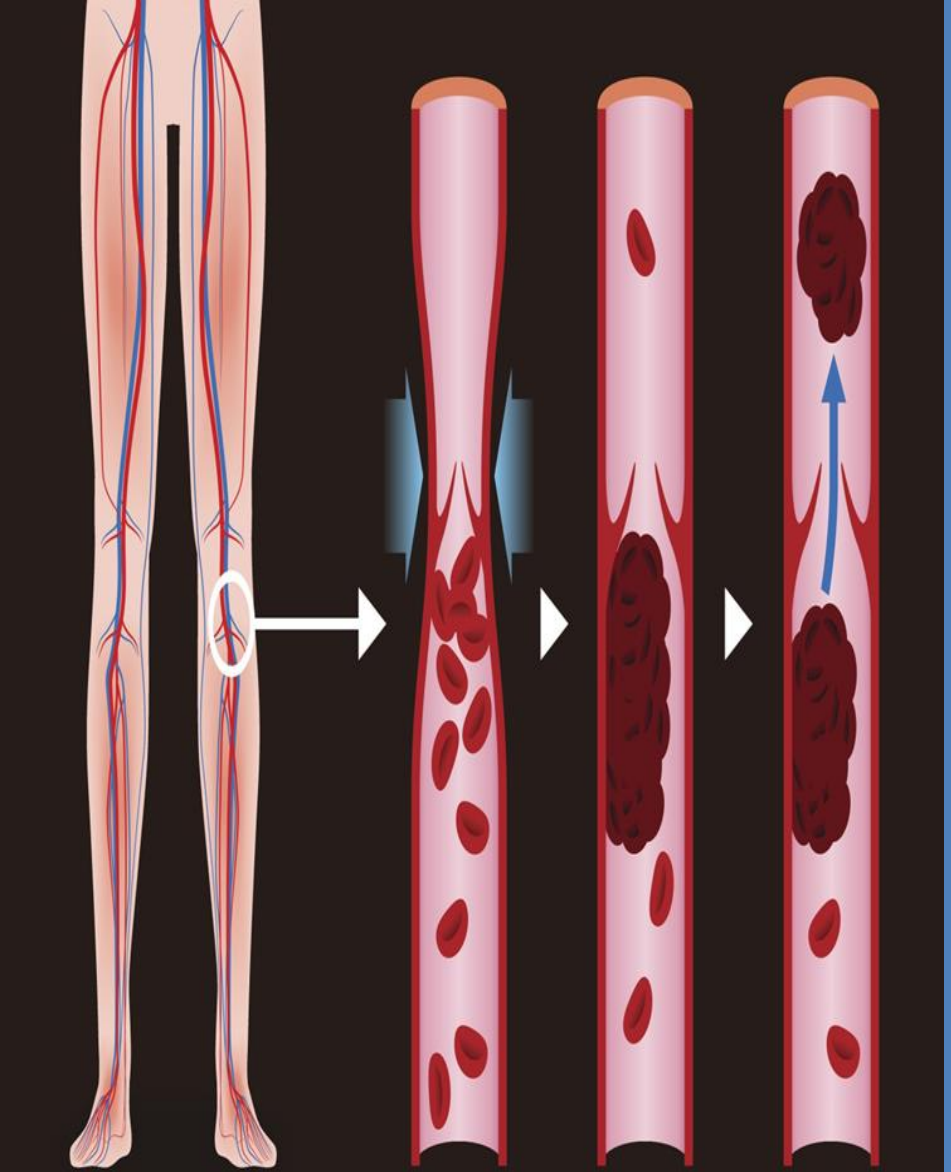
Prevention

- Early mobilization
- Freq. change of posture
- Encourage coughing
- Breathing exercise.

Treatment

- Assisted cough.
- Chest percussion.
- Naso-tracheal suction.
- Rx of COPD if present





Every 1000 operations there will be –

100 DVTs,
10 pulmonary emboli and
1 death.

Complication-

- Pulmonary embolism.
- Varicosities.
- Non healing ulcers.
- Permanent edema of limb.

DVT Cuses

- Trauma to vessels.
- Hormones –Pregnancy,OCP.
- RTA
- Operations req. long time.,Oldage, Obesity.
- Malignancy.
- Blood disorder – Polycythemia
- Orthopedic surgery-Pelvic and Hip surgery.
- Serious Illness – MI , Stroke
- Immobilisation
- Splenectomy

Clinical Feature

Symptoms-

- Pain in calf,
- bleb in skin ,
- low grade fever

Sign-

- Homan,
- Moses

Investigation

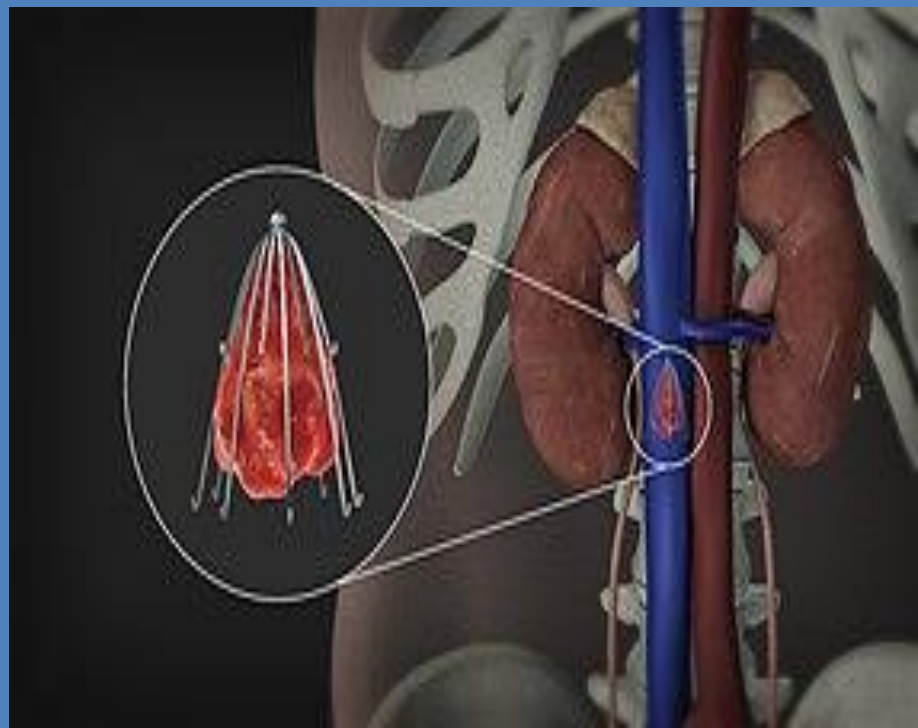
- Doppler study
- Contrast Venography

Prophylaxis

- Early mobilisation
- Hydration
- Heparin -5000 unit s/c 2hr. Before and 24 hr. after surgery and 12hrly for 5 days.
- Pneumatic compression.

Treatment

- Bed rest
- Elevation of limb
- Heparin -10000 unit I/V bolus with 30000 to 45000 unit /day. (INR 2-3) for 7-10 days
- Warfarin – 10mg 12 hrly for 6-12 months starting 2-3 days before heparin withdrawl.
- IVC filter
- Palma and May- Husni operations.



UTI

Nosocomial usually.

- Catheter,
- previous urinary contamination ,
- retention contribute to UTI.

Symptoms-

- Fever,
- dysuria,
- tenderness in flank.

Investigation-

- Urine R/M/E.

Treatment.

- Hydration,
- Antibiotic ,
- Drainage.

Thrombophlebitis

Factors-

- Cannula size,
- solution infused,
- bacterial presence,
- venous thrombosis .

Triad of phlebitis-

- Tenderness,
- Edema ,
- Induration.

Prevention

- Aseptic technique.
- Change tube every 2 days.
- Insertion site change every 3 days.
- Hypertonic solution to be given in larger veins.
- Use superior extremity veins .

Treatment

- Removal of cannula.
- Moist heat to improve circulation.
- Elevation of limb to improve venous return.
- Analgesics.

Wound infection

- Superficial surgical site infection.
- Deep surgical site infection.
- Organ space infection.

Wound infection

Major surgical infections-

- Significant quantity of pus.
- Delayed return to home.
- Systemically ill.

Minor surgical infections-

- Discharge of small amount of pus or serous fluid only.

Types of wound

Clean- such as-

- thyroid or hernia surgery

Potetially contaminated- such as-

- elective gastrointestinal surgery.

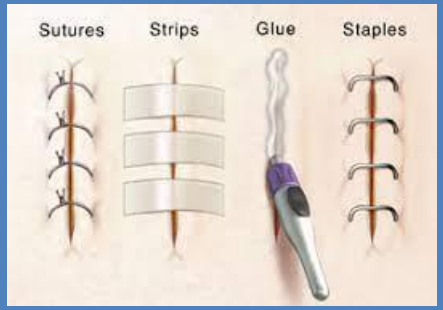
Contaminated, as-

- folllowing bowel perforation.

Dirty-

- where there is faecal contamination.

The incidence of infection, morbidity and mortality increases from clean to dirty wound.



Risk Factor

Obesity.

Hematoma.

Diabetes mellitus.

Steroid therapy.

Immunosuppression.

Malnutrition.

Obstructive jaundice.

Sources-

- Clean surgeries – exogenous agent as S.aureus.
- GI surgeries – endogenous agent as E.coli.
- Colorectal surgeries – anaerobes.

Prophylaxis

- Identify patients at risk.
  - Surgeries involving prosthesis.
  - Hip replacement , vulvoplasties are the examples.
- Antibiotics are given perioperatively.
- 1 dose is given preoperatively.
- 2 doses are given post operatively.
- 1 more dose if operation last >4hrs. Or soiling occurs.
- Mechanical bowel preparation.
- Shaving of operating area?

Management-

- Open the wound--adequate drainage .
- Debridement & regular dressing.
- Antibiotic if septicemia or cellulitis.

Chronic wound infections may be due to-

- Possibility of specific organisms i.e. *Actinomyces.*
- Presence of a foreign body i.e. suture in the wound.
- Associated fistula i.e. crohn's disease.
- Irradiation.
- Perineal wounds.

Management *(contd..)*:

Postoperative abscess

- Usually intraperitoneal.
- Can be found deep in the wound.
- Localize the abscess and attempt drainage, if necessary under USG or CT guided.
- Exclude anastomotic leakage as a cause.
- *Feature suggesting intra abdominal abscess-*

1. High temperature>39ºC.

2.No wound infection>5th P.O.D.

Treatment:

- Drainage under CT or USG.
- If fail then Exploratory laparotomy.

Infection (Cont.)

Septicaemia & septic shock

- An infection may progress to septicaemia & shock in patients who are debilitated by disease or drug therapy.
- The problem is most likely to be encountered when diagnosis and localization of a septic focus is delayed, and initial treatment is inadequate.

Danger Signs

- Persistent and swinging pyrexia with tachycardia.
- Tachypnea , glazed eyes , flushed warm skin.
- Hypoxemia.
- Oliguria<40ml/hr.

Septicaemia & septic shock (contd..)

Principles of treatment are-

1. Ensure adequate circulating blood volume using a miuxture of crystalloids and colloids, aiming for a CVP of 10-15cm H_20.

2. Oxygen supplementation.

3. Broad spectrum IV antibiotics.

4. Ventilatory support if P_a0_2 is <75mmHg.

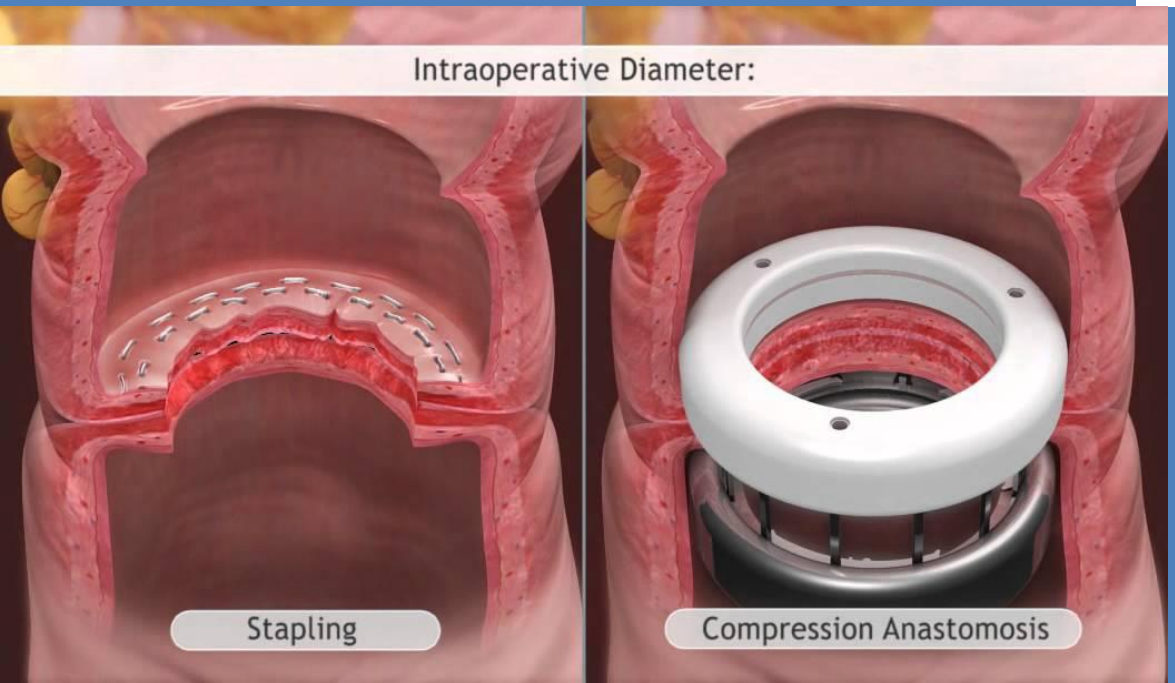
5. Cardiac support as dopamine, dobutamine, digitalis & catecholamines.

6. Attention to renal function with dialysis for established renal failure.

7. Early recognition and treatment of any evidence of multiple organ failure.

Anastomotic leakage

- Small intestine,
- Ileocolic &
- Ileorectal anastomosis- safe.



- Oesophageal,
- Pancreaticoenteric
- Colorectal anastomosis

-considered high risk.

Anastomotic leakage
Predisposing factors

General factors

- Nutritional deficiency (protein, vitamin C and zinc)
- Old age.
- Impaired blood flow.

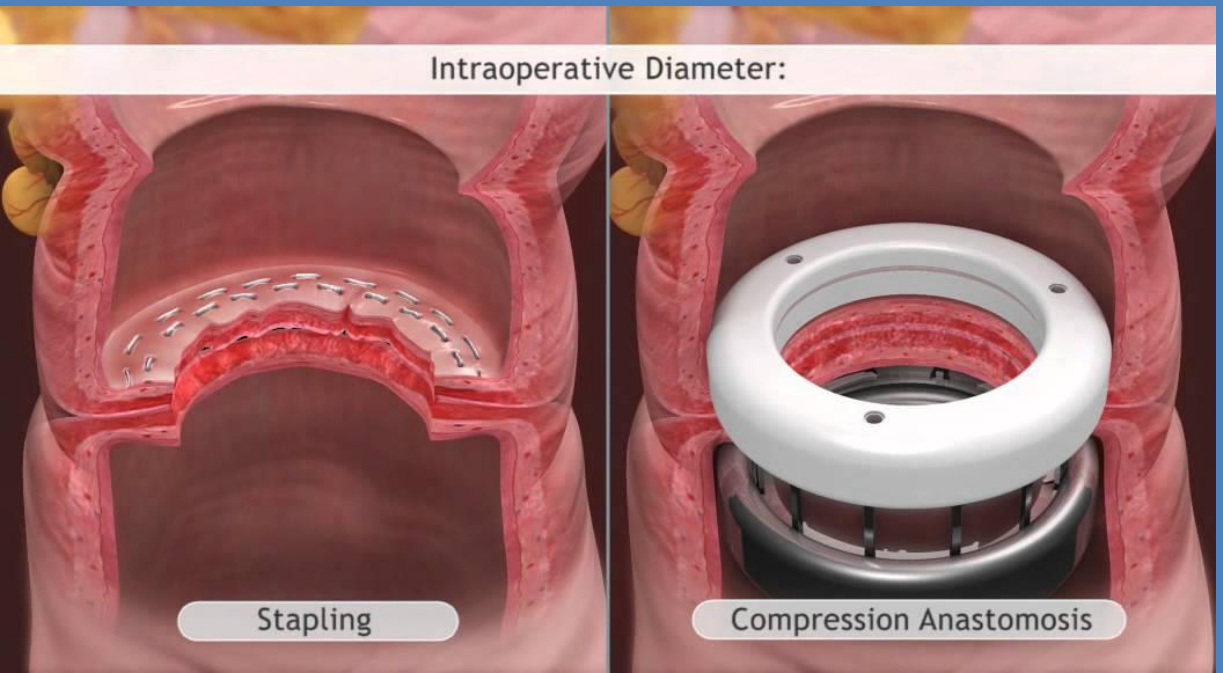
Local factors

- Tension.
- Inadequate vascular supply.
- Poor surgical technique-
  - unprepared bowel ends.
  - handling of tissues,
  - excessive use of diathermy,
  - insertion and ligation of sutures,
  - contamination of anastomotic site.

Principles of anastomosis

- Good blood supply.
- Tension free anastomosis.
- Air tight & water tight.
- Anastomosis with healthy, non diseased bowel ends.

- 3-0 R/B vicryl.
- Single layer seromuscular extramucosal.
- Single layer full thickness.



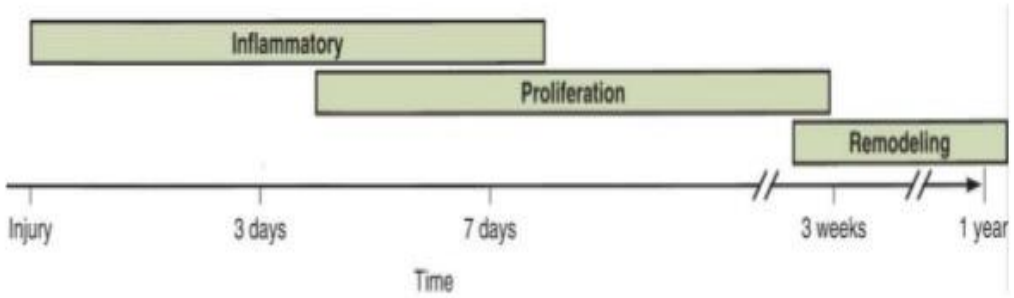
Patency test.

Healing of anastomosis

- Inflammatory / Lag phase.
  - 0-4 days.
- Proliferative phase- Fibroplasia.
  - 3-14 days.
- Remodelling / maturation phase.
  - >10 days.

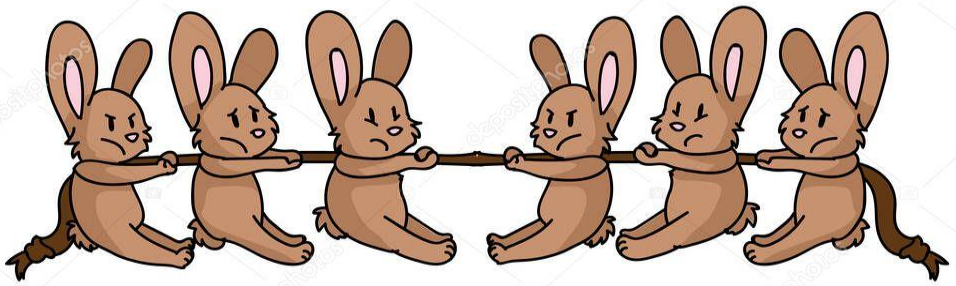
Intestinal healing

- Occurs like other tissues
- Hemostasis & Inflammatory phase
- Proliferative phase
- Remodelling & maturing phase



Anastomotic strength

- From collagen of submucosa.
- Low during the 1st POD.
- Early strength- on suture or stapler.
- Weakest- 3- 4th POD.



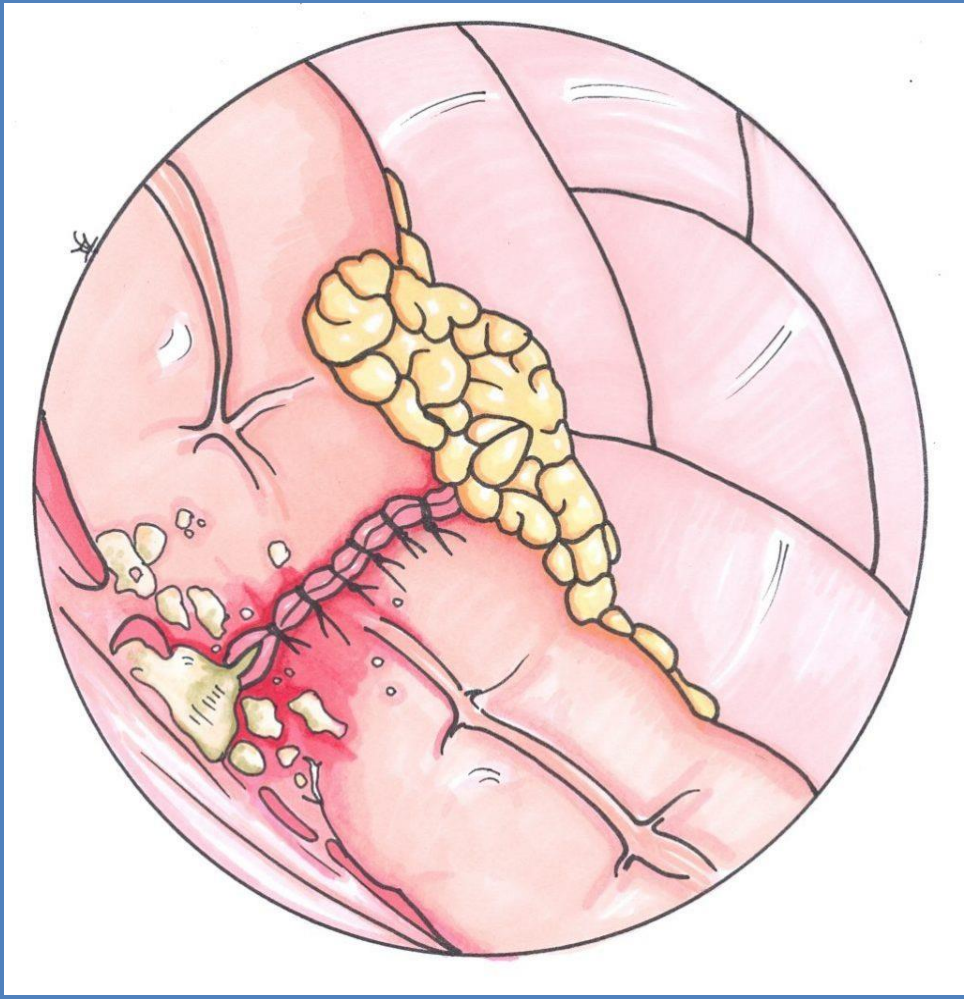
Anastomotic leakage

Presentation-

- GI contents may be identified in the wound or at a drain site.
- An intraabdominal abscess or more serious septic complication may develop.
- Prolonged ileus, unexplained fever or tachycardia, sudden collapse postoperatively or development of an internal fistula.
- Confirmation-
  - can be done by performing X-ray using contrast medium- Gastrograffin .

Grading of anastomotic leakage

- A- leakage with-
  - Minimal or
  - No clinical impairment.
  - Require no active intervention.
- Leakage require-
  - Active intervention.
  - But manageable without surgical intervention.
- Leakage require-
  - Repeat surgical intervention.
  - Often require diversion.



Surgery

- Thorough peritonial lavage with cefuroxime and warmed saline.
- Identification of leak.
- Resection of the area.
- Exteriorization.
- Rarely anastomosis.
- Re anastomosis is done after 3 months.

Fistulas

Management-

In the presence of a fistula management depends on the state of the patient and the fistula output.

When volume is small (<500ml/24hr) and the patient well, initial treatment is conservative(NPO,NG suction, I/V fluid, Antibiotic, Octreotide.)

If such treatment fails or the output is high (>500ml/24hr) or there is associated sepsis, intervention is necessary- surgery.

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