

L14- General Complications of Surgery



Surgery Team
MED 433

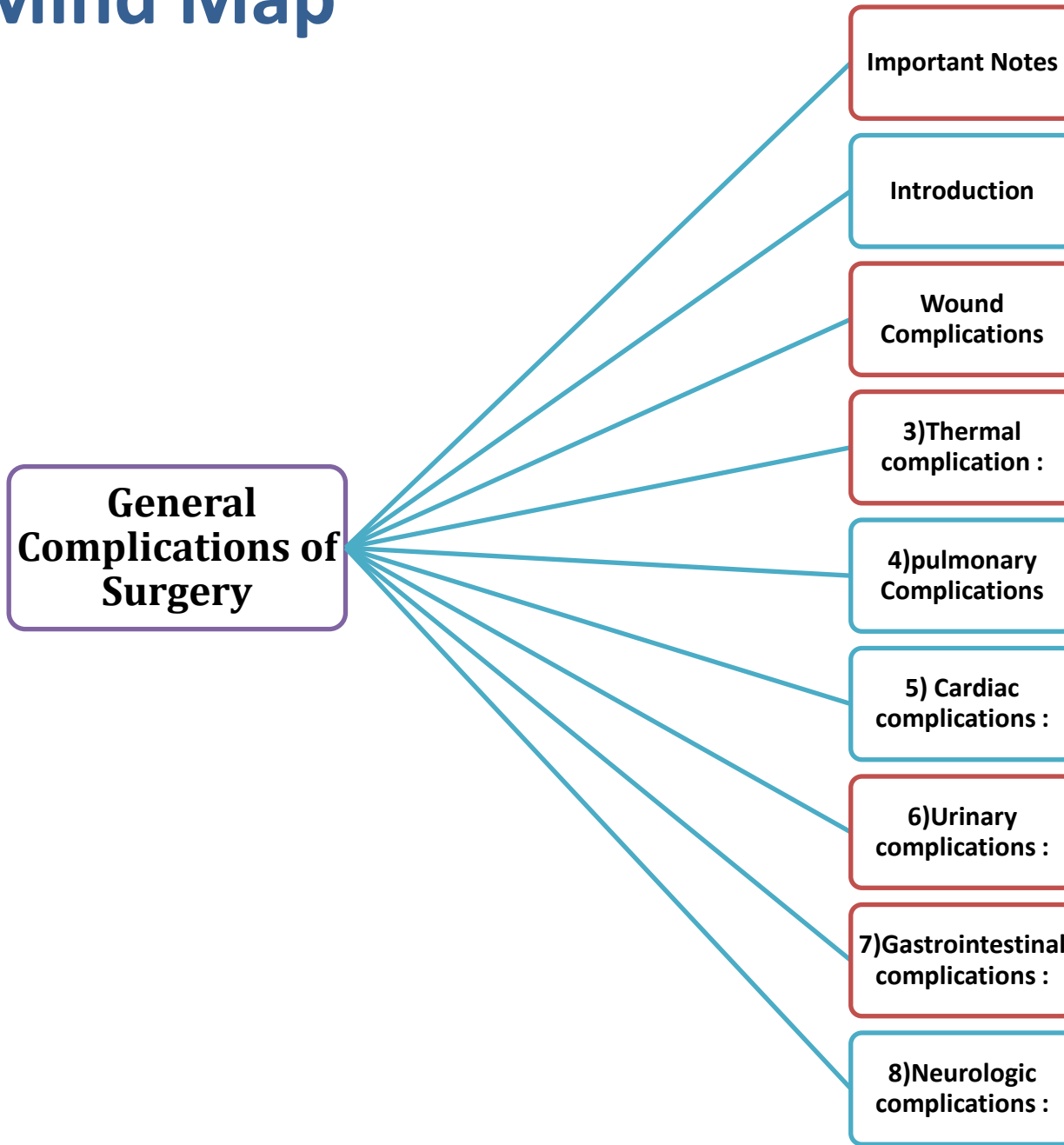


Objectives :

Color Index: Slides & Raslan's () | **Doctor's Notes** | Extra Explanation | **Additional**

This work is based on doctor's Slides +Notes and Raslan's only (Does not include the book)

Mind Map



The most important



Important Notes:-

- **Pre operative assignment is important to reduce the post operative complications**
- For example investigation before surgery help in reducing complications Some test like (CBC., LFT, echo, ECG..)

Investigation guideline assessment pre-op.:

- Pt. age more than 40 →do Chest X-ray and ECG regardless if he has symptoms or not.
- Pt. heavy smoker + have symptoms → Chest x-ray and ECG regardless of the age.
- Pt. with a problem with in his blood → coagulation profile.
- if a patient diabetic, refer him/her to endocrinologist for consultation to assess and manage the level of glucose before surgery.

- Some diseases and condition you must be careful with such as (DM,HTN..)

-Or some habits like smoking should be **stopped 6 weeks before and 6 weeks after surgery**

-Also antibiotics should be given to patient (30m-1h) before surgery (doctor said in real life antibiotics given inside **OR**)

- Some doctors give anti inflammatory before surgery to reduce pain

-So from pre operative assessment we are trying to reduce error or complication after surgery by :

1/history

2/examination

3/investigation

4/consent

5/time out (like a check list in surgery)

****Aspirin should be stopped 5 days before surgery and Plavix (Clopidogrel)7 days**



1) Introduction

- All surgeons expect speedy, uneventful recovery
- Always recognized the risk of complications
- Affects result of surgery: poor scar, hernia
- Prolongs hospital stay and cost
- Increased morbidity/ mortality
- Medico-legal issues

Methods Of Reducing Post-operative Complications:

- Good pre-operative evaluation
- Optimizing the general condition of patients: a surgeon should delay his surgery until patients health status reaches optimality or relative optimality, even if that means delaying surgery, especially when is not a emergency surgery. So Medical problems and Nutritional issues must be corrected before surgery.
- Minimizing preoperative hospital stay: reduces likelihood of complications like hospital associated infections and DVT.
- Good surgical technique
- Early mobilization

Phases Of Post-operative Care:

- Recovery room
- Surgical ward
- On discharge

Pre Operative evaluation:

- History & Physical Examinations
- Investigations and Radiologic diagnostic Tools
- Routine lab, EKG, etc.

Testing

Determines ability to sustain surgical insult
Determines type of anesthesia delivery
Blood Pressure, Diabetes, EKG, Liver function, CBC, Chest X-ray, UA

Medications

Day before surgery, anti-inflammatory
Day of surgery, antibiotics
Post op pain meds
Smoking cessation?

Patient/Procedure Confirmation

Surgical Consent
Pre-operative marking
“Time Out” in the operating room

Classification of Post Operative Complications

Avoidable (Preventable, non Preventable)
- Physiological, Biochemical ; Anemia, Coagulopathy
- Related to timing

Types of Injuries

Wrong site, wrong procedure
Wrong medication
Skin breakdown/decubiti
Burns
Nerve damage
Ischemia
Eyesight

Surgical Complications

Primary disease
Operation
Unrelated factors
Complications leading to other complications
Prevention

Related to timing

❖ Immediate 0-24 Hrs.

- Anesthesia
- Pain
- Bleeding
- Shock, Renal failure

❖ Intermediate 1-30 days [avr. 7 day] (LOS)

- Organ
- Systems
- Other Systems

❖ Late > 30 Days, after D/C

40 years old postoperative patient present with hypotension within **8 hours** after surgery please think about Immediate cause of complications

Important Notes:-

At Day 0 the pt. with fever could have:

Pt. receive medication intra-op “drug reaction”

- 1- Missed pre-op infection (pneumonia)
- 2- Blood transfusion
- 3- Cancer
- 4- Malignant hyperthermia

At Day 1 the pt. with fever could have:

1. Atelectasis
2. Pneumonia
3. Wound infection (group A strept. E.g. necrotizing f.)

At Day 2 the pt. with fever could have:

1. Thrombophlebitis
2. Bad Atelectasis

At Day 3-5 the pt. with fever could have:

1. UTI

At Day 5-7 the pt. with fever could have:

1. PE
2. Thrombosis

At Day 7-10 the pt. with fever could have:

1. Wound infection

Work up includes :

- Blood cultures
- UA and Urine Cultures
- CXR
- Sputum cultures
- Tylenol/Motrin



Complications Developing In The Recovery Room:

- The complications in this stage are mostly due to cardiopulmonary disease. These happen when patients are recovering from anaesthesia, so Anaesthesiologists are people in charge of these problems.
- Airway obstruction
- Acute pulmonary complications
- Cardio-vascular complications
- Fluid derangements
- Reactive haemorrhage is the most important post-operative complication in the recovery room either: Slipped ligature or Dislodgement of clot

“general” Complications:

- **Nausea/ vomiting:** this maybe due to effects of drugs given to the patients. This usually isn't a significant problem, antiemetics can be given to stop vomiting in sever cases.
- **Persistent hiccups:** -gastric distension: gastrointestinal peristalsis can be greatly reduced and as a result gas can build up in the stomach causing gastric distension and irritation of the diaphragm (diaphragmatic irritation causes hiccups). This can be corrected by decompressing the stomach with a nasogastric tube. Otherwise, renal failure must be excluded.
- **Headache** - spinal anaesthesia
- **IV site-** bruising, haematoma, phlebitis, vein thrombosis, air embolism, infection

2) Wound Complications

- Dehiscence
- Seroma
- Hematoma
- Infection
- Incisional Hernia
- Necrotizing fasciitis

1- Wound infection

The most common complication

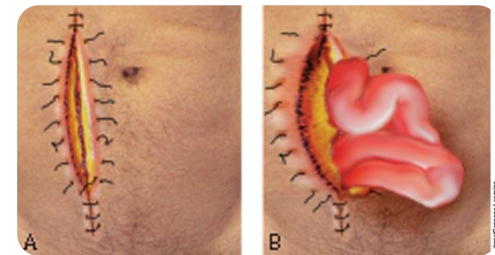
- Incidence 1% (clean) surgeries to 30% (dirty) cases.
- **Haematoma** formation common before infection
- Manifests **within 7 days** of surgery
- **symptoms** : Fever, tachycardia, increased pain at operation site
- **signs** : Red, tender, swollen, discharging wound
- **Management** : Remove few sutures to drain the wound
Antibiotics, if septicaemic



2-Wound Dehiscence :

Involves abdominal wall. Incidence <1%

- Partial (deep layer), Complete (deep+ skin)
- Serosanguinous discharge, **evisceration**
- Manifests **within 2 weeks**
- **Risk factors**: Obesity, resp. disease, infection, malnourishment, renal failure, malignancy, diabetes, steroid use, & poor surg. Technique
- **treatment** : Re-suture under GA. Develops hernia later



A : Dehiscence

B : eversion

3-Seroma

-Collection of liquefied fat, serum and lymphatic fluid under the incision

-**Benign**

-No erythema or tenderness

-Mastectomy, axillary and groin dissections

-**Treatment :**

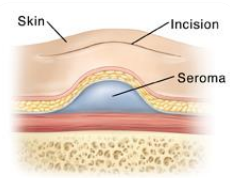
if the pt has **symptoms** → drain it

no symptoms → it will disappear with time

A-small seromas = body may naturally reabsorb the fluid in a few weeks

B-Medication take over-the-counter pain such as ibuprofen + reduce pain

C-Larger seromas= drainage



4-Hematoma

-Abnormal collection of blood

A- Discoloration of the wound edges (purple/blue)

B- Blood leaks through skin sutures

-Imperfect hemostasis

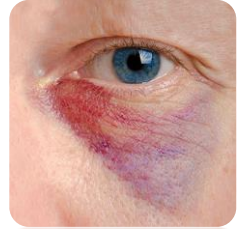
-Potential for secondary infection

-Neck hematomas can be dangerous

Treatment :

if the pt has **symptoms** → drain it

no symptoms → it will disappear with time



5-Necrotizing fasciitis

- Bacterial infection of underlying fascia
- **best diagnostic tool biopsy**
- Classically Streptococcus ,most often polymicrobial with anaerobes/GNR
- **Treatment** : Surgical debridement and IV antibiotics

From history : sudden wound infection within 7-10 days post-op + fever

organisms could cause infection in the first day (clostridium and group A streptococcus)

3)Thermal complication :

A)Hypothermia

Drop in body temperature of 2 degrees C (Temperature below 35 C)

Causes :Body' s Response
(redistribution of heat) , using of cool blood and IV fluids , Coagulopathic Platelet dysfunction



B)Malignant Hyperthermia

Rare; autosomal dominant

Fever, tachycardia, rigidity, cyanosis

First sign is increased end tidal CO2

Often within 30 minutes


Treatment: Dantrolene, correct electrolytes, cooling blanket



4) pulmonary Complications

- Largest single cause of post-op. morbidity
- 2nd most common cause of death in over 60 age
- Higher risk to patients with chronic pulmonary disease (COPD)

1- Atelectasis:

- **Inability to breath deeply/ cough up secretions:** happens in cases when patient breath shallowly and don't cough. Secretions build up and collapse airways. This is complicated by process like Paralysis of cilia (due to anesthetics), impaired diaphragmatic movement, abdominal distension, pain
- Bronchus/bronchiole obstructed by secretions
- Distal alveolar space close (atelectasis), solidify
- Usually occurs within 24 hours
- Tachypnoea, tachycardia, mild fever (most common cause of increased temperature after operation),
↓ breath sound on affected side, ↓PaO₂.
- Chest X-ray- areas of opacification
- If left untreated: Infection- lobar or bronchopneumonia can develop
- Prophylaxis: stop smoking, physiotherapy for COPD
- Delay surgery if chest infection
- Treatment: encourage deep breathing/cough, mobilization, analgesia, chest physiotherapy 
- If severe hypoxia develops- intubation, suction, bronchoscopy

2-Pulmonary Infection:

- Follows atelectasis, gastric aspiration
- **Strep. pneumo., H. influenzae or gram negatives are the most common causatives**
- Pyrexia, tachypnoea, greenish sputum
- ↓ breath sounds, coarse crepitations, bronchial breath.
- Chest X-ray: patchy fluffy opacities
- Treatment: antibiotics, encourage to cough
- Severe cases: O₂, bronchoscopy, ventilation

3-Respiratory Failure:

- **Definition:** Inability to maintain normal PaO₂ & PaCO₂ levels
- Normal PaO₂= 11.6 -13 kPa
- Resp. failure PaO₂ < 6.7 kPa
- Central cyanosis
- ABG- key to early recognition
- **Treatment:** Intubation and ventilation

4-Acute Respiratory Distress Syndrome (ARDS):

- **Characterized by:** Impaired oxygenation, diffuse lung opacification and lung stiffness (↓ compliance)
- **Signs:** Tachypnoea, ↑ventilatory effort, confusion, hypoxia
- **Causes:** Systemic/lung sepsis, massive Blood transfusion, aspiration of gastric contents
- **Pathophysiology:** Endotoxin activated leucocyte → oxygen-derived free radicals, cytokines & chemical ↑capillary permeability → interstitial & alveolar oedema
- CXR- bilateral diffuse fluffy opacities
- **Treatment** is ventilation
- Mortality: 50%

5-pleural Effusion:

- **Causes:** usually happens after surgery only if the patient has another form of pulmonary pathology like: collapse, consolidation, infarction, tumour deposit.
- Also as a result in abdominal pathology: subphrenic abscess
- **Approach:** Small effusions left to reabsorb, while large effusions aspirated for culture/ cytology.

6-pneumothorax:

- Insertion of central venous line is the most common cause of post-operative pneumothorax
- CXR after insertion central venous line is necessary to exclude this complication. ?
- Positive pressure ventilation- rupture of pre-existing bullae
- Drained by underwater seal

5) Cardiac complications :

- Likelihood of anaesthetic/surgery complications are increased in patients with **cardiovascular disease**.
- In Severe aortic/mitral valve disease .- carefully monitor iv fluid administration.
- Aortic stenosis impairs heart response to increased post-operative demand

Treatment : Whenever possible, treat these before surgery.

1)Myocardial infarction :

Usually history of preceding cardiac disease

- Patients may experience Gripping chest pain.
- Sometimes **hypotension** is the only sign. *This is greatly due to the anaesthetics/post operative analgesics, where these drugs mask the other symptoms of ischemia/MI.*
- If ischemia is suspected: ECG changes, Cardiac enzymes should be obtained, and Cardiologist should be consulted.
- 1/3rd postoperative MI are fatal



The most important cause of cardiac complications: poor assessment of the pt pre-op.



2) Arrhythmias: :

Sinus tachycardia: hypovolaemia, hypotension, pain, fever, restlessness

- **Sinus bradycardia**: anaesthetic agents, pharyngeal suction.
- **Atrial fibrillation** may need medications especially in hyperthyroid patient

3) post operative shock :

Hypovolaemic: Inadequate fluid replacement, bleeding.

- **Cardiogenic:** acute MI, arrhythmias.
- ↑ pulse, ↓ BP, sweating, pallor, vasoconstriction, ↓ urine.

• **Septic:**

○ **Early: hyperdynamic circulation, bounding pulse, fever, rigor and warm extremity.**

○ **Later: hypotension and peripheral vasoconstriction**



4)cardiac failure:

Happens in context of Ischaemic or valvular diseases, arrhythmia

• **Causes:** CF is **commonly caused by excessive fluid administration** in a patient with limited Cardiac reserve.

• **Signs:** Progressive dyspnoea, hypoxaemia, and – diffuse pulmonary congestion on x-ray

• **Treatment:**

○ Avoid fluid overload.

○ CVP monitoring.

○ Diuretics, cardiac inotropes.

○ Cardiologist consultation.

6) Urinary complications :

Associated with: Groin, pelvic, perineal surgery, operations under spinal/epidural anaesthesia

- **Causes:** Pain, effect of anaesthetic drugs, lying/sitting position, BPH
- Males > females, especially when men have prostatic problems
- **Signs:** Palpable distended bladder
- **Treatment:** Catheterization

1) Urinary Tract Infections :

Most common nosocomial infection, including in postoperative patients.

- It usually happens between **3-5 days** .

- Pre-existing UTI, urinary retention, catheterization
- **symptoms** : Frequency, dysuria, fever, flank tenderness
- Urine culture
- **Treatment:** Adequate hydration, urinary drainage, antibiotics

2) Renal failure :

Acute renal Failure : protracted inadequate renal perfusion

• **Causes:** Hypovolaemia (**most common cause ; urinary Na <20**) , sepsis, nephrotoxic drugs like certain antibiotics.

Patients with pre-existing **renal disease, jaundice** are the **most** susceptible

• **Prevention:** adequate **IV fluid**, urine >0.5ml/kg/hr

• **Treatment:**

o replace fluid loss+ 500ml

o restrict dietary protein to <20Gm/day

o urea electrolytes monitoring, haemodialysis

If pt hypotensive + Urine Output Is Low, I Have To Order Urine Electrolytes.

- Na\K → Normal → Pre-Renal Problem
- Na\K → Abnormal → Renal Problem

3) Urinary retention

Inability to evacuate a urine-filled bladder

-Commonly a reversible abnormality that usually happens in

Perianal and Hernia repairs

7)Gastrointestinal complications :

Postoperative Ileus : Lack of function without definitive obstruction

Prolonged by extensive operative manipulation, Small bowel injury, narcotic and sedative use, abscess and pancreatitis

Must be distinguished from Small bowel obstruction

Flat and Upright abdominal film

Postoperative Ileus: dilated bowel throughout+ air in colon and rectum

Small Bowel Obstruction: air fluid levels, no colonic or rectal air

GI Bleeding

From Any source (get a detailed history)

Gastric “stress” ulcers (Curling’ s Ulcer)

Uncommon with invention of H2Blockers and PPIs

Pseudomembranous colitis

Superinfection with C difficile

Alteration of intestinal flora by **perioperative antibiotics**

Toxic colitis is a surgical emergency (mortality of 20-30%)

Ischemic Colitis

Bowel affected helps determine cause

Surgical devascularization, hypercoagulable states, hypovolemia and emboli

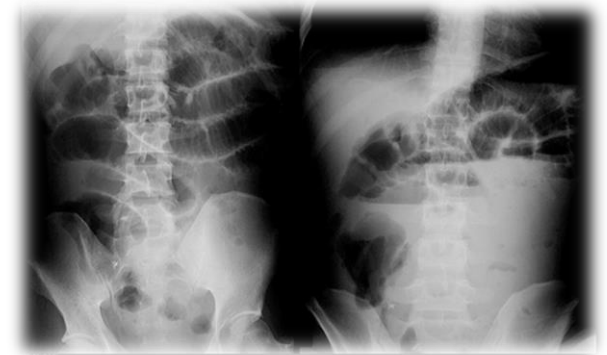
Anastomotic leak

CASE →patient of surgery had bowel resection present with high fever two days after surgery and abdominal pain + ↑WBC → the diagnosis is leak

Action →CT scan

Enterocutaneous fistula

The most complex and challenging surgical complication.



RT : small bowel obstruction &
LT : postoperative illus

8) Neurologic complications :



Cerebrovascular accidents (CVA): sudden ↓ in BP during/ post surgery, hypertensive patients.
Carotid endarterectomy, cardiac surgery

- Psychiatric disturbance: elderly, dementia due to cerebral atrophy, use of **sedatives/hypnotics** “ **Be aware of the drugs that you use** “
- Acute toxic confusion: **sepsis, hypoxia, uraemia, electrolytes imbalance**
- Sleep deprivation particularly in **ICU**
- **Delirium** tremens: agitation, tremors, hallucinations and usually in day 3 post-op in **ICU**

9) Deep venous thrombosis:



Virchow's triad: stasis, ↑coagulability, vessel wall injury

- **Risk factors:** old age, obesity, prolonged surgery, pelvic/ hip surg, malignancy, past DVT, varicose veins, pregnancy, use of oral contraceptive pills
- **Presentation:** painful swollen tender calf & fever.
- **Diagnosis:** Duplex ultrasonography
- **Prevention:** Compression stockings, mechanical compressions of calf during surgery, subcutaneous heparin
- **Treatment:** iv bolus/ infusion heparin, LMWH, Warfarin for 3-6 months (INR 2-3 times normal)



10) Pulmonary embolism :

1- Massive PE: severe chest pain, pallor & shock

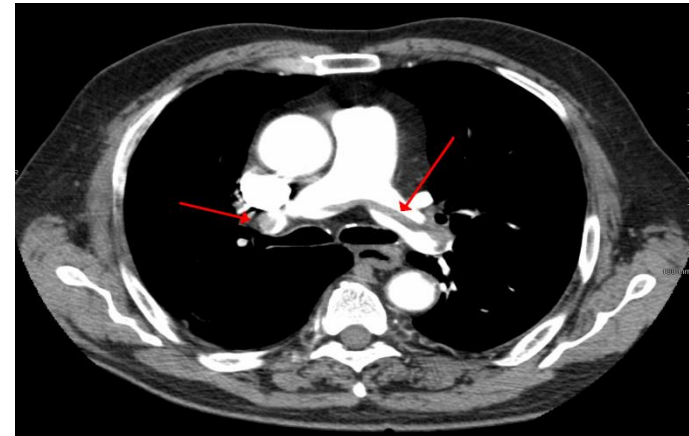
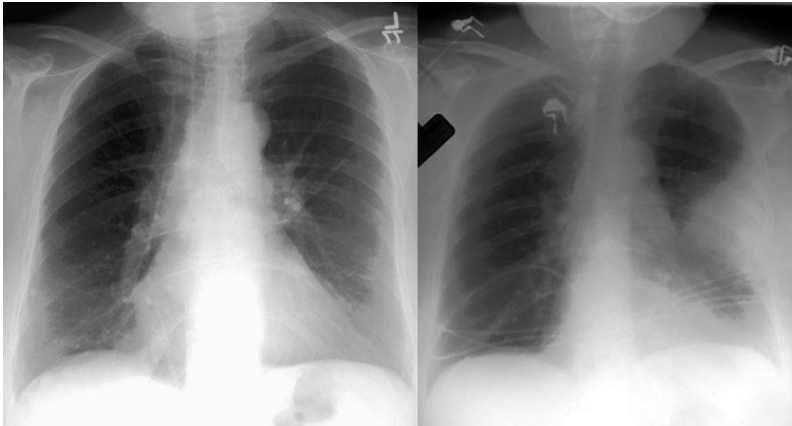
Management : Cardio Pulmonary resuscitation, heparinization, CT angiography, streptokinase/urokinase

(if 6 days post surgery)

2-Small PE: chest pain, tachypnoea, haemoptysis CXR, ECG , V/Q scan, CT

Management : Heparinization

Warfarin for 3-6 months



11. Metabolic complications :

A) Adrenal Insufficiency

Uncommon but potentially lethal
Sudden cardiovascular collapse
Hypotension, fever, confusion, abdominal pain
“Stim” test, administration of hydrocortisone
Baseline serum cortisol, 30 min, 60 min

B) Hyper/Hypothyroidism

C) Syndrome of inappropriate anti diuretic secretion (SIADH)

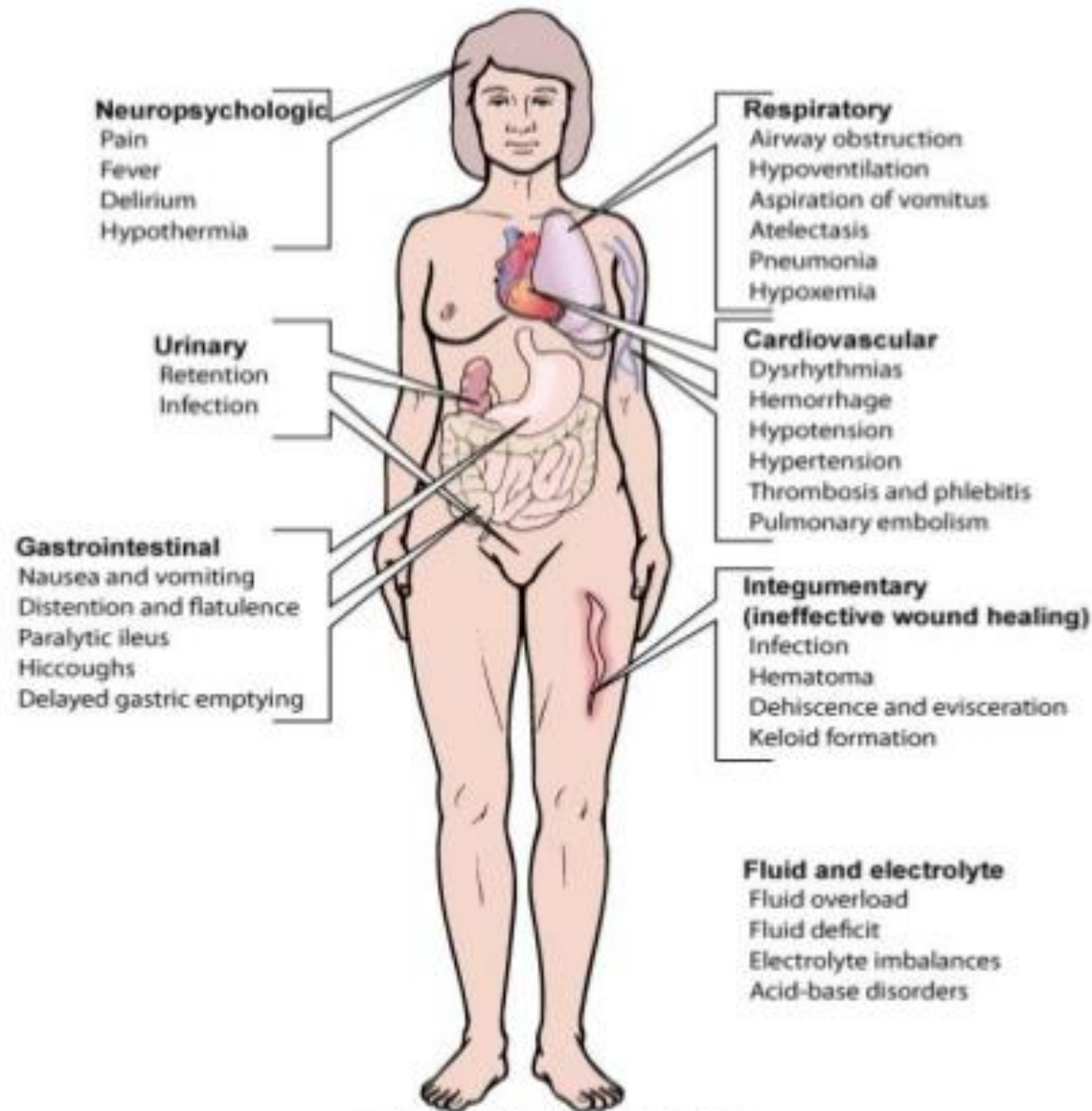
Continued ADH secretion despite hyponatremia
Neurosurgical procedures, trauma stroke, drugs (ACE-I, NSAIDs)



Stim test (cosyntropin)

:the ACTH stimulation test measures how well the adrenal glands respond to adrenocorticotropin hormone ([ACTH](#)).

Common postoperative complications:



Summary

- Good pre-operative evaluation is the **key** element to prevent the surgical complications .
- The most frequent complications that seen in the recovery are due to **cardiopulmonary diseases** .
- Atelectasis** is the most **common** cause of fever after operation and it appears within the first **24 hours** .
- Pneumonia usually follows the atelectasis or gastric aspiration and **Strep. pneumo.**, **H. influenzae** or gram negatives are the most common.
- **Acute respiratory distress syndrome** Characterized by: Impaired oxygenation, diffuse lung opacification and lung stiffness (↓ compliance) .
- **Management of pleural effusion** : Small effusions left to reabsorb, while large effusions aspirated for culture/ cytology.
- If **ischemia** is suspected: ECG changes, Cardiac enzymes should be obtained, and Cardiologist should be consulted.
- **Congestive heart Failure** is commonly caused by **excessive fluid administration** in a patient with limited Cardiac reserve.
- **URINARY TRACT INFECTIONS** is the most common nosocomial infection and usually Manifests between **3-5 days**.
- **Acute kidney injury usually due to hypovolemia “ urinary Na < 20”**.
- **Dehiscence** : a previously closed wound reopening.
- **evisceration** : The process whereby tissue or organs that usually **reside** within a body cavity are displaced outside that cavity .
- **Hypothermia** result in disturbance of many physiological functions of the body.



MCQs

All of the following complications happened at day 1 classically except:

1. Atelectasis
2. Pneumonia
3. Wound infection (group A strept. E.g. necrotizing f.)
4. **Cancer**

What is Virchow's triad?

1. Stasis
2. Endothelial injury
3. Hypercoagulable state (risk factors or thrombosis)

What are the common causes of dyspnea following central line placement?

Pneumothorax, pericardial tamponade, carotid puncture (which can cause a hematoma that compresses the trachea), air embolism

Thank You..

Done By :

Majed Altulyan

Muhannad Al-Wabel

Revised By:

Sara Alkharashi

surgery433@gmail.com

