Postoperative complications, symptoms, and treatment

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Complications of surgery may broadly be classified as those:

I. Due to Anesthesia

II. Due to Surgery
The anesthetic complications depend upon the mode (General, Regional & Local) and types of anesthetic (the anesthetic agent toxicity)

Local anaesthesia: Pain, haematoma, Nerve trauma, infection, Vasoconstrictors: Ischemic necrosis, Systemic effects of LA agent: Allergic reactions, toxicity

Spinal, epidural anaesthesia: Technical failure, Headache, Intrathecal bleeding, Permanent nerve or spinal cord damage, Paraspinal infection, Systemic complications (Severe hypotension)
General Anaesthesia

- Direct trauma to mouth or pharynx
- Slow recovery from anesthesia due to drug interactions OR in-appropriate choice of drugs or dosage
- Hypothermia due to long operations with extensive fluid replacement OR cold blood transfusion
- Allergic reactions to the anesthetic agent: Postoperative nausea & vomiting, Cardiovascular collapse, respiratory depression
- Haemodynamic Problems: Vasodilation & shock
Complication of surgery

- Perioperative:
  Haemorrhage, organ damage, electrocautery related etc…
  
- Postoperative complications which may be considered under 2 headings:
  I. Immediate OR early
  II. Late
POSTOPERATIVE COMPLICATIONS

- A. Circulatory system
- B. Pulmonary system
- C. Urinary system, renal failure
- D. Gastrointestinal system
- E. Cerebral
- F. Infection
- G. Impaired wound healing
Examination

- Observations & trend
- Cardio-respiratory examinations
- Abdominal examination
  - Abdominal signs
  - Wounds
  - Drains
- Calf tenderness
- Vascular access sites
- Blood transfusion
Overall assessment

- Vital signs - BP, HB, respiratory system
- Condition of dressings and drains
- IV fluid status, balance
- Urinary output
- Temperature
If BLOOD PRESSURE FALLS POSTOPERATIVELY, patient may be hypovolaemic because:

(1) The blood he lost at the operation has not been replaced, especially if he was hypovolaemic before it began.
(2) The fluid which patient lost into his sequestrated gut has not been replaced.
(3) P. was anaesthetised too deeply and his respiration is still depressed, leading to hypoxaemia and hypotension.
(4) P. has been given large doses of opioids, such as morphine or pethidine.
(5) P. has had a high subarachnoid (spinal) anaesthesic.
(6) P. may be septicaemic.
(7) Patient’s gut may have been roughly handled.
A. Circulatory system

A. Hemorrhage – Bleeding internally or externally
- Cause: Disruption of sutures, insecure ligation of blood vessels.
- Clinical signs: Rapid weak pulse, increasing respiratory rate, restlessness, lowered BP, cold clammy skin, thirst, pallor, reduced urine output.
  - Preventive intervention: Early recognition of signs.
When you have closed an operation wound it may start bleeding:
1. During the first 48 hours (reactionary haemorrhage) because a clot in a vessel has been displaced, or a ligature has slipped.
2. 8 to 14 days later (secondary haemorrhage) when the wound has become infected and eroded a vessel, usually quite a small one, sometimes a larger one. One of the purposes of monitoring a patient immediate lay after an operation is to watch for reactionary haemorrhage, so make sure your staff observe him carefully, and take his pulse and blood pressure regularly- MONITORING on ICU
- If WOUND BLEEDS, try firm local pressure and packing.
- If it bleeds briskly, you may have injured an artery, such as his inferior epigastric.
- Minor bleeding is probably coming from his subcutaneous tissues, and is unlikely to be serious.
- If local pressure fails to control bleeding, take him back to the theatre and open his wound.
- You can usually do this under local anaesthesia.
- Remove the sutures and tie or coagulate his bleeding vessels. Make sure he is on antibiotics.
SHOCK with a fast pulse, pallor, perhaps with abdominal distension, or bright red blood from a drain incision, he has probably bled into his peritoneum. If two units of blood do not restore his blood pressure, consider reopening his wound to control the bleeding.
If he BLEEDS FROM GUT, or stomach some days after the operation, the blood may be coming from a stress ulcer, or from a pre-existing duodenal ulcer. It may threaten life of patient.
Monitor his pulse, his blood pressure, and his urine output. Keep a good drip going, and measure his haemoglobin 3-hourly.
Have at least two units of blood cross-matched for patient.
Irrigate his stomach with iced saline or tap water containing noradrenalin 8 mg in 200 ml every half hour. Gastroscopy has to be performed!
Thrombus – Blood clot attached to wall of vein or artery (most commonly the leg veins).

- Cause: Venous stasis; vein injury resulting from surgery of legs, pelvis, abdomen; factors causing increased blood coagulability (eg, use of estrogen-contraceptives)

- Clinical signs: Sudden chest pain, cyanosis, shock(tachycardia, low BP).

- Preventive Interventions: LMWH, leg exercises, antiemboli stockings, adequate fluid intake.
Embolus – Clot that has moved from its site of formation to another area of the body.
Prevention: Same as thrombus.
Postoperative pulmonary complications are common and a major cause of overall perioperative morbidity and mortality. The major categories of clinically significant complications include:

- Atelectasis
- Infection, including bronchitis and pneumonia
- Prolonged mechanical ventilation and respiratory failure
- Exacerbation of underlying chronic lung disease
- Bronchospasm
- Aspiration
Postoperative pulmonary complications include all patients with fever and either pulmonary signs, symptoms (e.g., productive cough, rhonchi, or diminished breath sounds), or changes on chest x-ray (e.g., atelectasis, consolidation, or incomplete expansion).

Many such liberally defined postoperative complications are of no clinical relevance.
Urinary retention – Accumulation of urine in the bladder and inability of the bladder to empty itself.

- Cause: Depressed bladder muscle tone from narcotics & anesthetics (mostly after spinal anaesthesia); handling of tissues during surgery on adjacent organs (rectum, vagina).

- Clinical signs: Fluid intake larger than output; inability to avoid or frequent voiding of small amounts, bladder distention, suprapubic discomfort, restlessness.

- Preventive Intervention: Monitoring of fluid intake and output, interventions to facilitate avoiding.

- Treatment: inserting of urine catheter for 24 hours
Urinary tract infection – Inflammation of the bladder.
- Cause: Immobilization and limited fluid intake, long persisting of urine catheter
- Clinical signs: Burning sensation when voiding, urgency, cloudy urine, lower abdominal pain
- Preventive Intervention: Adequate fluid intake, early ambulation, early ambulation, good perineal hygiene
- Renal failure: oliguria, anuria, ARI
Gastrointestinal Bowel paralysis – stool passage for abnormal length of time (e.g., within 48 hours after solid diet started)

Cause: Lack of dietary roughage, analgesics (decreased intestinal motility).

Clinical signs: Absence of stool elimination, abdominal distention, and discomfort.

- Preventive Interventions: Adequate fluid intake, high-fiber diet, early ambulation, lower amount of i.m. analgetics (epidural insertion of analgetics has less side effects)
Nausea and vomiting
- **Cause:** anaesthetics drugs, pain, abdominal distention, ingesting fluids or foods before return of peristalsis, certain medications, anxiety.
  - **Clinical signs:** Complaints of feeling sick to the stomach, retching or gagging.
  - **Preventive Intervention:** medicaments again vomiting, IV fluids until peristalsis returns; then clear fluids, full fluids and regular diet when peristaltic returns.
Psychological
Neuropsychiatric complications (delirium, etc. – alcoholics patients)
Inflamatory response

Hyperinflamatory reaction

SIRS

MARS mixed antagonist response syndrome

MODS, MOF

Antiinflamatory response

Hypoinflamatory reaction

CARS Compensatory anti-inflammatory response sy.

Imunosupresion
Intraabdominal infection is the most common infection as the reason of hospitalisation on ICU in the world -30% of patients with intraabdominal infection die because of it -if the reason of infection is previous operation, mortality is more than 50% !!!
Drainage of abscessus

it is removing of infected with percutaneous drainage under US, CT control
or by open laparotomy
Pancreatitis necroticans
Lavage and laparostomy
- wound is not closed by suture, it is covered only with foil, or Ethizip
- Indication:
  intraabdominal high pressure-compartment syndrome, need for repeated revision within 24-48 hours, huge defect of abdominal wall after necrectomy of fascia m. rectus abdominis-infection
Peritoneal lavage – surgical washing out of fluid

A silicon drains are inserted towards the focus of infections (subphrenium, omental bursa, paracolic, Douglas space)
Impaired Wound Healing
Factors affecting wound healing

- Age
- Infections
- Nutrition
- Hypoxia
- Anemia
- Hypoperfusion
- Metabolic disorders (DM, uremia)
- Steroids and chemotherapeutic drugs
- Ionising radiation
## Classification of Surgical Wounds

<table>
<thead>
<tr>
<th>Type of wound</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean</td>
<td>1. No hollow viscus entered</td>
</tr>
<tr>
<td></td>
<td>2. Primary wound closure</td>
</tr>
<tr>
<td></td>
<td>3. No inflammation</td>
</tr>
<tr>
<td></td>
<td>4. No breaks in septic technique</td>
</tr>
<tr>
<td></td>
<td>5. Elective procedure</td>
</tr>
<tr>
<td>Clean contaminated</td>
<td>1. Hollow viscus entered but controlled</td>
</tr>
<tr>
<td></td>
<td>2. No inflammation</td>
</tr>
<tr>
<td></td>
<td>3. Primary wound closure</td>
</tr>
<tr>
<td></td>
<td>4. Minor break in aseptic technique</td>
</tr>
<tr>
<td></td>
<td>5. Mechanical drain used</td>
</tr>
<tr>
<td></td>
<td>6. Bowel preparation preop</td>
</tr>
<tr>
<td>Contaminated</td>
<td>1. Uncontrolled spillage from viscus</td>
</tr>
<tr>
<td></td>
<td>2. Inflammation apparent</td>
</tr>
<tr>
<td></td>
<td>3. Major break in aseptic technique</td>
</tr>
<tr>
<td>Dirty</td>
<td>1. Untreated, uncontrolled spillage from viscus</td>
</tr>
<tr>
<td></td>
<td>2. Pus in operative wound</td>
</tr>
<tr>
<td></td>
<td>3. Open suppurative wound, severe inflammation</td>
</tr>
</tbody>
</table>
- Wound surfaces opposed
- Healing without complications
- Minimal new tissue
- Results optional
Primary healing wound
Secondary

- Surfaces not approximated
- Defect filled by granulation
- Covered with epithelium
- Less functional
- More sensitive to thermal and mechanical injury
Secondary Wound Healing
Secondary healing wound
Secondary Wound Healing
Secondary Wound Healing
Infection

- Decreased tissue PO2 and prolongs the inflammatory phase
- Impaired angiogenesis and epithelialization
- Increased collagenase activity
Nutrition
- Low protein levels prolonged inflammatory phase
- Impaired fibroplasia
- Of the essential amino acids, methionine is critical

Hydration
- A well hydrated wound will epithelialize faster than a dry one
- Occlusive wound dressings hasten epithelial repair and control the proliferation of granulation tissue
**Diabetes Mellitus**
- Larger arteries, rather than the arterioles, are typically affected
  - Sorbitol accumulation
  - Increased dermal vascular permeability and pericapillary albumin deposition
  - Impaired oxygen and nutrient delivery
- Stiffened red blood cells and increased blood viscosity
- Affinity of glycosylated hemoglobin for oxygen contributing to low O2 delivery
- Impaired phagocytosis and bacterial killing
- Neuropathy
Radiation Therapy

- Acute radiation injury
  - stasis and occlusion of small vessels
  - fibrosis and necrosis of capillaries
  - decrease in wound tensile strength
  - direct, permanent, adverse effect on fibroblast
- may be progressive
- fibroblast defects are the central problem in the healing of chronic radiation injury
Excessive contraction - contracture
Process in which surrounding skin is pulled circumferentially toward an open wound

Does not occur with closed surgical incisions

Speeds wound closure compared to epithelisation and scar formation alone

Contraction is the greatest in the trunk and perineum, least on the extremities, and intermediate on the head and neck
Wound contraction must be distinguished from contracture:

Clinically, contacture is defined as tissue shortening or distortion that causes decreased joint mobility and function. Scar contracture commonly refers to decreased function in the area, whereas contraction refers to shortening of the scar length compared with original
Normal contraction
Excessive Healing

- Hypertrophic Scars
- Keloids
Hypertropic Scar
Keloids

- Extends beyond original bounds
- Raised and firm
- Rarely occur distal to wrist or knee
- Predilection for sternum, mandible and deltoid
- Rate of collagen synthesis increased
- Water content higher
- Increased glycosaminoglycans
Keloid Treatment

- Triamcinolone injections
- 3-4 weeks
- Cross linking modulated
- Injections continued until no excess abnormal collagen
- Excise
- Prevention during healing – pressure and injection
- Laser abrasion
Keloid
Keloid Scar
The most common early postoperative complications in wound healing

1. Haematoma
2. Seroma
3. Infection of wound
4. Dehiscence of suture
To treat the wound, you have to treat the patient

Optimize the patient

- Circulatory
- Pulmonary
- Nutrition
- Associated diseases or conditions
Treatment with antibiotics

- Should be used only when there is obvious wound infection
- Marks of infections: erythema, cellulitis, swelling, purulent discharge
- Indiscriminate use of antibiotics should be avoided to prevent emergence of multidrug resistant bacteria
The main purpose of wound dressings is to provide the ideal environment for wound healing.

The dressing should facilitate the major changes taking place healing to produce an optimally healed wound.
Characteristics of wound dressings

- Promote wound healing
- Conformability
- Pain control
- Odor control
- Nonallergic and nonirritating
- Permeability to gas safety
- Nontraumatic removal
- Cost effectiveness
- Convenience
Characteristics of wound dressings

- Are classified as primary or secondary.
- **Primary dressing** is placed directly on the wound and may provide absorption of fluids and prevent dessication, infection, and adhesion of a secondary dressing.
- **A secondary dressing** is one that is placed on the primary dressing for further protection, absorption, compression and occlusion.
Absorbent dressings
Non adherent dressings
Occlusive and semiocclusive dressings
Hydrophillic and hydrophobic dressings
Hydrocolloid and hydrogel dressings
Alginates absorbing dressings
Absorbent dressings

- Accumulation of wound fluid can lead to maceration and bacterial overgrowth
- The dressing should absorb without getting soaked through, as this would permit bacteria from the outside the enter the wound
- The dressing must be designed to match the exudative properties of the wound and may include cotton, wool and sponge
Absorbent dressing
Nonadherent dressings

- Are impregnated with paraffin, petroleum jelly, or water-soluble jelly for use nonadherent coverage

- A secondary dressing must be placed on top to seal the edges and prevent desiccation and infection
Nonadherent dressing

Non-Adherent Sterile Pad

FOR COVERING & CLEANING WOUNDS
2 Sides-2in x 3in (5cm x 7.5cm)
STERILE Sterility guaranteed
unless package is damaged or open

DIRECTIONS
• Clean wound and surrounding
• Apply pad on wound
• Secure with surgical tape or wrap
Keep Out of Reach of Children
Unless Under Adult Supervision
Occlusive and semioocclusive dressings

- Good environment for clean, minimally exudative wounds
- They are waterproof and impervious to microbes, but permeable to water and oxygen
Occlusive dressing
Hydrophillic: The aim is absorption
Hydrophobic: is waterproof and prevents absorption
Hydrocolloid and hydrogell dressings

- It combines benefits of occlusion and absorbency
- Absorption of exudates by the hydrocolloid dressing leaves a yellowish-brown gelatinous mass after dressing removal that can be washed off
- Hydrogels allow a high rate of evaporation without compromising wound hydration, which makes them useful in burn treatment
Hydrocolloids

Hydrocolloids Paste & Powder

Smith & Nephew
10 cm x 10 cm (4 in. x 4 in.)

Replicare Ultra

Elastoplast

DuoDERM

ConvaTec
Hydrocolloid Dressing in Use
Alginates Absorbing Dressings
(for medium to high exudate)

Alginates
- seaweed derived
- form gel with exudate
- moist interface
- highly absorbent
- easily removed
- haemostatic
- need secondary dressing

Haemostatic Dressings

Non-Haemostatic Dressings
**Mechanical Devices**

Augments and improves on certain functions of dressings, in particular the absorption of exudates and control of odor. The vacuum-assisted closure system assists in wound closure by applying localized negative pressure to the surface and margins of the wound.

The negative pressure therapy is applied to a special foam dressing cut to the dimensions of the wound and positioned in the wound cavity or over a flap or graft.

This form of therapy has been found to be effective for chronic open wounds (diabetic ulcers and stages 3 and 4 pressure ulcers), acute and traumatic wounds, flaps and grafts.
Surgical Cavities
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