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Post-Operative Complications: A Review



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ABSTRACT

Postoperative complications are the problems that may occur after surgery. These are divided into immediate, late, and early based on the time duration. The complications are divided into types based on the organ system-wise like general complications, Bleeding wound and skin complications, surgical infections, Breathing & lung complication, Heart complications, Kidney and bladder complications, Bowel complications, anesthesia complications.



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INTRODUCTION:

Complication: A Complication is a Hostile result of disease, treatment, or health condition. Complications may affect the Projection or outcome, of a disease. Complications generally involve exacerbation in the severity of disease or the development of new pathological changes which may lead to an extension to the entire body and affect other organ systems ^[1].

The numbers of factors that influence to develop complications are Age, Gender, Health status, Degree of vulnerability, Susceptibility, Immune system conditions ^[1].

Post-Operative Complication:

Post-Operative complications are the problems that may occur after surgery or an operative procedure that was not a deliberate cause of surgery ^[2]. Post-operative complications are not only specifically based on the surgical procedure the patient underwent but also based on the patient's physical & mental health status, Comorbidities, Past medical history, Past drug history, etc. ^[2].

Immediate	Early	Late
<ul style="list-style-type: none">• Bleeding.• Lung Blockage or collapse.• Shock.• Heart problems.• Pulmonary Embolism [PE].• Severe infection.• Acute kidney injury.	<ul style="list-style-type: none">• Bruising.• Fever.• Confusion.• Bleeding.• Wound Breakdown.• Deep vein Thrombosis.• Acute urinary retension.• Constipation.• Pressure sores.• Bowel problems.• Infections: Wound infections, Urinary tract infection.	<ul style="list-style-type: none">• Bowel Blockage due to scarring.• Persistent sinus.• Thickening of scar.• Incisional Hernia.

General Complications:

Pain

Postoperative pain is a condition of tissue injury along with muscle spasms that occurs later in surgery ^[3].

Delirium

Postoperative delirium is an acute confusional state characterized by alteration in consciousness and reduction in cognitive function and it occurs between hours and days later to surgery, which leads to an increase in the period of hospital stay ^[4]. Postoperative delirium occurs in around 15% of Geriatric patients later than any general surgery ^[5].

Pyrexia

Postoperative pyrexia is a condition in which the body temperature is higher than 100.4^o F for two continuous days or higher than 102.2^o F for anyone postoperative day ^[6]. It is one of the most common postoperative complications caused either due to the underlying disease or as a postoperative complication ^[6].

Septicemia

Postoperative infection can cause septicemia, this might be because of an infection due to an incision or might be the infection developed later to surgery ^[7]. Postoperative septicemia causes a higher risk of infection in abdominal surgery which involves incision of the bowel, post-traumatic surgery where wounds might be contaminated and it may occur in patients with severe burns ^[7].

Other Bodily injuries

Bleeding, Wound, and skin Complications:

Bleeding / Hemorrhage.

Post Operative Bleeding is Bleeding after any surgical procedure. The Hemorrhage may be delayed or Immediate after the surgical procedure ^[8].

Hemorrhage may be classified as:

1. Primary Hemorrhage.
2. Reactive Hemorrhage.
3. Secondary Hemorrhage.

1) Primary Hemorrhage:

It occurs within the surgical Period. This can be resolved during the surgical procedure ^[8].

2) Reactive Hemorrhage:

It occurs within 24hrs of surgery. This is due to the Raises in blood pressure at the final stage of surgery, which causes resulting in hemorrhage of blood vessels which are previously in normal condition ^[8].

3) Secondary Hemorrhage:

It occurs 7-10 days Postoperatively. This is caused due to infection which causes damage to vessels days after surgery ^[8].

Hematoma Formation

Postoperative Hematoma is caused by an injury to the walls of blood vessels, leading the blood to leak into the surrounding tissues ^[9]. Symptomatic postoperative hematoma may have a chance of occurring within several days of surgery but in case of delayed symptoms, it may occur days to weeks after surgery ^[9].

Bruising

Postoperative Bruising is the most common complication. After any surgical incision, some amount of blood is leaked from small blood vessels beneath the skin which results in Bruising ^[10]. Bruising may last for 1-2 weeks after surgery ^[11].

Surgical Infection:

Wound Infection.

Post-operative Wound infection is a common complication. Wound infection is complex and involves many biological pathways ^[11].

Superficial Wound Infection

This only involves the skin and subcutaneous tissues. These are associated with Purulent wound discharge, isolated organism, symptoms of infection. This accounts for greater than 50% of overall surgical infections ^[12].

Deeper infections

This involves deeper tissues like muscles and fascia. These are associated with Purulent wound discharge, isolated organism, symptoms of infection. It occurs any time, immediately

after surgery to 3 weeks later. They cause high temperatures, sometimes with confusion, nausea, and feeling unwell ^[13].

Abscess.

An abscess is a collection of pus within the body; it is more common after abdominal surgery. These Cause swinging fever, nausea, and confusion are common ^[13].

Wound Sinus.

A Blind ended discharged track which extends from the surface of an organ to an underlying area or abscess cavity ^[13]. These can be caused by infection, Liquefaction, or a foreign body ^[14].

Poor wound healing:

Wound dehiscence:

Wound dehiscence is caused by the reopening of the surgical incision. Partial wound dehiscence: The Edges of the incisional area opened at two or more sites. Complete wound dehiscence The Entire incisional area opens from all layers of skin and muscles ^[15].

Incisional hernia:

An incisional hernia is a Tissue protrusion that forms at the site of a healing surgical scar. These are more often seen in patients who have undergone abdominal surgeries ^[16]. The Bulge of a hernia can be visualized when you are standing in an upright position and performing any physical activities like lifting heavy weights because they occur typically at the front of the abdomen ^[16].

Nerve damage:

This is caused by Scarring of the tissues around the nerve. This is also caused by the damaging of nerve fibers. It is also caused by damage to the fatty sheath which covers the myelin. This can be divided into ^[17].

NEURAPRAXIA – Damaged to the covering of the Myelin sheath.

AXONTOMEIS – Damage to the neurons.

NEURONTOMESIS – Turning of Nerves ^[17].

Pressure ulcers:

Postoperative pressure ulcers are an injury to tissues and skin mainly caused by prolonged pressure on the skin. These may be caused to any patient, but are most commonly seen in patients who sit in a chair or wheelchair, or who are confined to bed for a long time ^[18].

Breathing and Lung Complications:

Lung atelectasis:

Lung atelectasis refers to a condition in which small airways are partially collapsed. It occurs in the majority of post-operative cases ^[19]. It leads to abnormal alterations in lung functions. This can be a precursor or contributor to severe postoperative pulmonary complications ^[19].

Pneumonia:

Postoperative pneumonia is an infection in the lungs. It can be defined as either nosocomial infection or ventilator-associated pneumonia. It is the third most common complication of surgery and it is associated with increased patient mortality and morbidity ^[20].

Deep Vein thrombosis:

DVT is a dreadful complication in post-operative patients. Most of the postoperative patients with DVT are asymptomatic. It is a condition where the developing of blood clots or thrombus in a deep vein, most often in legs ^[21].

Pulmonary embolism:

Postoperative pulmonary embolism occurs when one of the arteries of the lung is blocked by a blood clot ^[22]. There is a risk of a blood clot may form in the veins after surgery it was due to the period of inactivity during and after surgery. Pulmonary embolism can be varied according to individual comorbidities and risk factors ^[22].

Aspiration pneumonia:

Postoperative aspiration pneumonia is the main complication of aspiration of anesthesia, when a patient cannot vomit or swallow food from the stomach it leads to aspiration pneumonia. It is a severe complication with significant mortality ^[23]. The incidence of aspiration pneumonia is approximately 1% of the patients who underwent abdominal surgeries. It develops within 48 – 72 hours after surgery ^[23].

Acute respiratory distress syndrome (ARDS):

Postoperative ARDS occurs when the tiny elastic air sacs in the lungs are filled with fluid, which leads to severe shortness of breath ^[24]. It usually develops within a few hours to a few days after surgery. The risk of the patient depends upon age & severity of illness. The incidence of Postoperative ARDS after abdominal surgery and thoracic surgery is about 3.4 to 4.3% ^[25].

Heart Complications:

Heart attacks:

Postoperative heart attacks are common complications after noncardiac surgeries. Incidence of about 8 million adults each year postoperatively of which 10% die within 30 days ^[26]. The overall percentage of heart attacks, only 15% of the symptomatic, and 85% of them are asymptomatic. Most heart attacks occur within the first 48 hours of surgery ^[26].

Arrhythmias:

Post-operative arrhythmias are one of the main causes of morbidity and mortality after cardiac surgery. In post-operative patients' rhythm disturbances cause hemodynamic instability ^[27]. Atrial fibrillation is one of the most common among the heart rhythm disturbances post-operatively. 40% of post-operative Patients experience atrial fibrillation ^[27].

Angina

Postoperative angina occurs mainly in coronary artery bypass grafting surgery (CABG). Postoperative angina occurs early postoperatively, usually caused due to the technical issue with graft or early closure of graft ^[28].

Kidney and bladder Complications:

Urinary retention:

Postoperative urinary retention is one of the main complications after surgery and is also associated with age and risk associated with anesthesia (certain anesthesia – particularly spinal anesthesia which is with long-acting local anesthetics) ^[29]. This is the main risk after hernioplasty, anorectal surgery, orthopedic surgery. Postoperative urinary retention is with bladder spasm, suprapubic pain, urine leakage, inability to urinate ^[30].

Cystitis

Postoperative cystitis is inflammation of the urinary bladder. Postoperative cystitis is associated with pain, burning sensation, dark urine; the need to pass urine more often ^[30].

Acute kidney injury:

Postoperative AKI is one of the most common and serious complications. Ischemic injury and systemic inflammation are the two main factors responsible for the AKI post-operatively ^[31]. AKI is characterized by an increase in serum creatinine levels and oliguria. The incidence of postoperative AKI depends upon the type of surgery. Postoperative AKI in cardiac surgery incidence lies within the range of 7.7 – 40%. Postoperative AKI leads to sepsis and coagulopathy ^[31].

Bowel Complications:

Constipation:

Postoperative constipation is mainly due to the anesthesia effect, immobility during the surgery, pain medications. All patients who underwent surgery are at risk of developing constipation due to various factors. Postoperative constipation may be an adverse drug effect due to the opioid's usage, which leads to acting upon opioid receptors in the GI tract ^[32].

Paralytic ileus:

Postoperative paralytic ileus is an absence of bowel function for a prolonged time generally after abdominal or non-abdominal surgery. It is one of the most common postoperative complications with unknown causes and pathophysiology. It leads to severe complications like bowel obstruction ^[33].

Bowel obstruction:

Postoperative bowel obstruction is caused by adhesions that occurred between the early few weeks to the late several years without showing any events. This leads to the contents inside the bowel moving back into the stomach, this leads to nausea and bilious vomiting ^[34].

Bowel leakage:

Postoperative bowel leakage may see in days to weeks after surgery, which allows the contents of the bowel to spill of the bowel contents into the abdomen leads to pain, sepsis,

fever, and even death ^[35]. Patients who undergo high-risk surgeries like rectum, bowel leakage rates can attain up to 30% ^[35].

Anesthesia Complications:

Nausea and vomiting [PONV]:

Postoperative nausea and vomiting [PONV] are usually referred to as nausea and vomiting in the post-anesthesia care unit [PACU]. It occurs during the initial 24 to 48 hours of surgery ^[36]. It is one of the most common complications after anesthesia, around 30% of the post-operative individuals and 80% in high-risk patients ^[37].

Sore throat [POST]:

Postoperative sore throat is a common complication after general anesthesia. It occurs in patients who are tracheal intubated ^[38].

General headache:

Headaches are common after any anesthesia, in which the maximum range of headaches is caused by spinal anesthesia via the epidural region. These types are caused mainly by changes of pressure in the spine and damage of the spinal membrane ^[39]. Spinal anesthesia headaches are generally occurring within 24 hours after surgery. They are resolved within a couple of days to weeks. Local and general anesthesia can also cause headaches, they have early onset after surgery and they can be resolved earlier than spinal anesthesia ^[39].

Dizziness:

Postoperative dizziness is most frequent after general surgery and laparoscopy.

General surgery – Around 16.1% of the individuals are associated with post-operative dizziness ^[40]. This is related to the age of the individual appearing for general surgery.

Laparoscopy – Around 24.1% of the individuals are associated with post-operative dizziness. This is related to the duration of the anesthesia given during surgery ^[40].

Cognitive dysfunction [POCD]:

Postoperative cognitive dysfunction is one of the most common complications in elderly patients and patients with preexisting neurological disorders ^[41]. It is a state in which there is

a decrease in patients' memories and learning skills. It is reported as 1 in 3 patients who are discharged will suffer from POCD. It is reported as 1 in 10 patients will suffer from POCD up to 3 months after surgery [42]. All age groups are at risk with POCD post-operatively, but who are aged more than 60 are at higher risk.

Airway obstruction:

Postoperative airway obstruction is a life-threatening complication. These can be classified into Functional and pathoanatomical. Functional – Associated with Bronchospasm or laryngospasm, sagging tongue. Pathoanatomical – Associated with the formation of hematoma within the airways, airway swelling [43].

Malignant hyperthermia [MH]:

Postoperative malignant hyperthermia is an exceptional phenomenon that leads to a rise in body temperature. MH may occur an hour after discontinuation of the anesthesia [44]. These can occur in patients who are given particular muscle relaxant drugs and anesthetic gas for surgery. The main causes of post-operative MH are Catabolism, infection, convulsion, toxicity, dehydration. [45].

Suxamethonium apnea.

Postoperative suxamethonium apnea occurs when the patient has given suxamethonium a muscle relaxant, which doesn't have an enzyme called plasma cholinesterase to metabolize it. The patient remains paralyzed for a prolonged length of time and they cannot breathe sufficiently at the end of anesthesia [46].

Abnormal reaction to anesthetic drugs:

Abnormal reaction to anesthetic drugs may be postoperative delirium, which means confusion and memory loss temporarily. This may become a long-term associated with learning difficulties [47].

Pressure sores:

These are also known as post-operative pressure ulcers. Studies show that post-operative pressure sores have a prevalence of 18.96%. This may commonly see in patients who undergo a prolonged duration of surgery and those who experience post-operative UTI are at a higher risk of developing pressure sores [48]. The main reason for developing pressure ulcers

in post-operative patients are immobility, discomfort from pressure, shearing force, and friction. This can be prevented by frequent mobility, partial standing, and walking ^[49].

Perfusion mismatch:

Perfusion mismatch occurs when lung problems occur because patients don't perform deep breathing and coughing exercises within 48 hrs of surgery. This may also occur due to pneumonitis or aspiration of contents like water, food, blood into the airways ^[50]. This leads to chest pain, wheezing, SOB, cough, and fever.

Hypoventilation:

Postoperative hypoventilation is caused due to the overdose of opioids, inhaled anesthetics, and sedative-hypnotics, due to metabolic alkalosis and severe hypothyroidism, ventilatory muscle dysfunction, neuromuscular disease ^[51].

Loss of vision [POVL]:

Postoperative loss of vision is a rare complication of surgery. The prevalence of loss of vision after surgery of the spine, head, neck, cardiac, and some orthopedic surgeries. The main cause of post-operative loss of vision or ocular injury is corneal abrasion which may or may not include visual loss ^[52].

Residual paralysis.

Postoperative residual paralysis is the persistence of muscle weakness postoperatively ^[53]. Postoperative residual paralysis is affiliated with postoperative complications like weakness, respiratory, hypoxia ^[54].

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