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Postoperative complications: Identification and management in general surgery

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Abstract

Preoperative evaluation plays a crucial role in surgical patient safety, functioning as a systematic process to identify risks, optimize clinical conditions, and reduce perioperative complications. Surgery, as an invasive intervention, imposes significant physiological challenges, which vary according to individual factors such as age, comorbidities, and the type of procedure to be performed. The objective of this study is to identify the main postoperative complications in general surgery and analyze effective management strategies to reduce morbidity and mortality and improve clinical outcomes. This study is a narrative literature review, aiming to identify and analyze the main postoperative complications in general surgery and the most effective management strategies. The review was conducted by searching and analyzing scientific articles published in the last 5 years (2020-2024), in English and Portuguese. Postoperative complications in general surgery can be severe and require proper management to prevent and treat risks. Among the most common complications are surgical site infection (SSI), which occurs due to the introduction of microorganisms at the incision site, being prevented with antibiotic prophylaxis and treated with broad-spectrum antibiotics and drainage, if necessary. Deep vein thrombosis (DVT) and pulmonary embolism are common after major surgeries and are prevented with anticoagulants and early mobilization, treated with anticoagulants and, in severe cases, thrombolytics. In summary, continuous monitoring and proactive management are essential to reduce mortality and improve patients' quality of life in the postoperative period, emphasizing the importance of an interdisciplinary and adaptive approach in surgical care.

Keywords: Postoperative complications; General surgery; Perioperative management; Prevention of complication; Surgical Site Infection

1. Introduction

Preoperative evaluation plays a crucial role in the safety of surgical patients, functioning as a systematic process to identify risks, optimize clinical conditions, and reduce perioperative complications. Surgery, as an invasive intervention, imposes significant physiological challenges, which vary according to individual factors such as age, comorbidities, and the type of procedure to be performed (COSTA et al., 2024).

During this evaluation, the medical team analyzes cardiovascular, respiratory, metabolic, and infectious aspects, in addition to reviewing medications in use and potential interactions. Complementary methods, such as laboratory tests and imaging, help stratify risks and guide preoperative decisions, such as medication adjustments or the need for ventilatory support. Thus, proper planning enhances the safety of the procedure, reduces morbidity and mortality rates, and promotes a more effective postoperative recovery (COSTA et al., 2024).

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Postoperative complications represent a significant challenge in surgical practice, with a direct impact on patients' recovery. Studies estimate that between 30% and 40% of individuals undergoing surgical procedures experience some type of complication, varying in severity and clinical consequences. Among the main negative outcomes associated with postoperative complications, the following stand out:

- **Increased length of hospitalization:** Patients who develop infections, thromboembolism, or hemodynamic instability often require prolonged monitoring. This not only elevates the risk of hospital-acquired infections but also increases the burden on the healthcare system.
- **Need for reoperations:** Some complications, such as wound dehiscence, significant hemorrhage, or organ perforation, may require further surgical interventions. Each reoperation exposes the patient to new anesthetic and infectious risks, delaying the healing and recovery process.
- **Organ dysfunction:** Complications such as septic shock, acute respiratory distress syndrome (ARDS), and acute renal failure can compromise multiple systems, resulting in increased morbidity and mortality. The impact of these dysfunctions can lead to permanent sequelae or, in extreme cases, death (COSTA et al., 2024).

The prevention and proper management of these complications involve a thorough preoperative evaluation, optimization of the patient's clinical conditions, and evidence-based postoperative protocols. Strategies such as antibiotic prophylaxis, thromboprophylaxis, rigorous monitoring, and early rehabilitation are essential to reduce the incidence of complications and improve clinical outcomes. Therefore, the aim of this work is to identify the main postoperative complications in general surgery and analyze effective management strategies to reduce morbidity and mortality and improve clinical outcomes.

2. Methodology

This study is a narrative literature review aimed at identifying and analyzing the main postoperative complications in general surgery and the most effective management strategies. The review was conducted through the search and analysis of scientific articles published in the last five years (2020-2024), in English and Portuguese.

The search for articles was carried out in databases recognized by the scientific community, including: PubMed (Medline), Scopus, Web of Science, and SciELO.

Articles were included if they discussed postoperative complications in general surgery, were published between 2020 and 2024, available in English or Portuguese, and consisted of original studies, systematic reviews, or meta-analyses.

Articles were excluded if they were duplicates, did not directly address postoperative complications in general surgery, or were restricted to case reports without in-depth analysis of management and prevention.

The descriptors were selected based on DeCS (Health Sciences Descriptors) and MeSH (Medical Subject Headings), ensuring a broader and more precise search. The main descriptors used were: "Postoperative Complications," "General Surgery," "Perioperative Care," "Surgical Site Infection," "Deep Vein Thrombosis," and "Postoperative Respiratory Failure."

The selected articles were analyzed qualitatively, highlighting the main complications, their risk factors, and recommended management strategies. The synthesis of the findings was structured to provide a comprehensive view of the topic and support future guidelines in clinical practice.

3. Literature Review

3.1. Preoperative Preparation: Clinical Assessment and Perioperative Optimization

Preoperative preparation begins with the indication for surgery and involves a multidisciplinary approach to minimize risks and optimize clinical outcomes. In most cases, patients are referred to the surgeon by other specialists, often with prior tests that assist in the therapeutic decision-making. The surgical indication should be discussed clearly with the patient and their family, considering risks, benefits, and non-surgical alternatives. This process strengthens the physician-patient relationship and contributes to treatment adherence (MEDEIROS et al., 2023).

3.2. Clinical Evaluation and Complementary Examinations

According to Medeiros et al. (2023), preoperative evaluation is based on a systematic approach that includes detailed medical history and a thorough physical examination. Patients with significant comorbidities may require consultations with specialists to optimize their clinical condition before surgery. The main aspects assessed include:

- **Medical history:** Previous diseases (such as diabetes, hypertension, heart failure, and renal failure), previous surgeries, allergies, and current medications.
- **Functional capacity:** Assessment of physical exercise tolerance, important for cardiovascular risk stratification.
- **Sociodemographic factors:** Age, sex, social support, and cultural factors that may influence recovery.
- **Location and type of surgery:** Large procedures or those with a high risk of bleeding require more stringent planning.

The request for laboratory tests should be individualized, avoiding routine tests without clinical indication. Evidence shows that unnecessary tests increase costs and do not significantly impact the reduction of complications. Therefore, tests such as complete blood count, coagulation profile, glucose, and electrolytes are only requested in specific conditions, such as the presence of comorbidities, advanced age, or increased risk of complications (MEDEIROS et al., 2023).

3.3. Surgical Risk Stratification

Perioperative risk assessment is essential for clinical decision-making and reducing surgical morbidity and mortality. Cardiopulmonary risk is one of the most relevant, assessed using scales such as the Revised Cardiac Risk Index (RCRI) and the American Society of Anesthesiologists (ASA) Classification. Patients with pre-existing cardiovascular diseases may require complementary exams, such as an electrocardiogram and chest radiograph, for better anesthetic and surgical planning (MEDEIROS et al., 2023).

3.4. Importance of Preoperative Optimization

The optimization of the patient's clinical condition before surgery is one of the most important factors in reducing complications. Measures such as tight glycemic control in diabetic patients, adjustment of anticoagulants, and prevention of venous thromboembolism with prophylactic heparin are essential for improving postoperative recovery (MEDEIROS et al., 2023).

The proper perioperative approach aims to reduce complications and optimize patient recovery. Antimicrobial prophylaxis, management of patients with comorbidities, and postoperative conduct should be based on updated guidelines and the pathophysiology of surgical complications (INTO, 2024).

Antibiotic prophylaxis aims to reduce the incidence of surgical site infection (SSI), being indicated according to the procedure's potential for contamination. The choice of antimicrobial should consider the most prevalent microorganisms and the pharmacokinetics of the drug (INTO, 2024).

Clean surgeries are procedures where there is no violation of mucosal surfaces or contact with contaminated tissues. Although, in general, these do not require antibiotic prophylaxis, there are exceptions, such as orthopedic procedures with implants, cardiovascular interventions, and neurosurgeries. Staphylococcus aureus is the main pathogen involved, with first-generation cephalosporins like cefazolin or cephalothin recommended (INTO, 2024).

Potentially contaminated surgeries involve contact with organs that have resident bacterial flora, such as the biliary tract, esophagus, and upper gastrointestinal tract. The main microorganisms involved are enterobacteria and anaerobes. In these cases, amoxicillin/clavulanate or first-generation cephalosporins are recommended (INTO, 2024).

Contaminated surgeries involve procedures where there is contact with contaminated intestinal contents, such as in colon resections or non-perforated appendicitis. The antimicrobial coverage should include Gram-negative bacteria and anaerobes, with combinations like gentamicin + metronidazole or second-generation cephalosporins like cefoxitin recommended (INTO, 2024).

Infected surgeries refer to procedures performed on patients with active infections, such as abscesses and peritonitis. The antimicrobial treatment should be directed to the identified etiological agent or, in the absence of culture, to the expected spectrum for the affected surgical site (INTO, 2024).

The ideal time for the administration of prophylactic antibiotics is within 60 minutes before the surgical incision, ensuring the drug is present in the tissue during the critical moment of surgery. Most cases require only a single dose, with additional doses based on the drug's half-life and procedure duration (INTO, 2024).

3.5. Preparation of Patients with Special Conditions

Hyperbilirubinemia is associated with immunological changes, liver dysfunction, and an increased risk of infection. Preparation includes intravenous hydration, biliary decompression, and antibiotic prophylaxis in high-risk procedures (MEDEIROS et al., 2023).

Perioperative hyperglycemia increases the risk of infectious complications and delayed healing. Strict glycemic control should be maintained, with oral hypoglycemic agents replaced by rapid-acting insulin and continuous monitoring (SBD, 2023).

Colon manipulation predisposes to bacterial translocation, making mechanical bowel preparation (e.g., mannitol or polyethylene glycol) and specific antibiotic therapy against enterobacteria and anaerobes (neomycin + metronidazole orally or systemic cephalosporins) essential (MEDEIROS et al., 2023).

The postoperative period is critical for recovery and the prevention of complications. Continuous patient monitoring includes vital signs, urine output, respiratory examination, and inspection of the surgical wound. Laboratory tests should be ordered according to clinical progress (MEDEIROS et al., 2023).

Postoperative pain should be effectively managed to allow early mobilization and avoid secondary complications. The use of opioids, nonsteroidal anti-inflammatory drugs (NSAIDs), and analgesics should follow individualized protocols (MEDEIROS et al., 2023).

Venous stasis, endothelial injury, and hypercoagulability increase the risk of thrombosis. The Caprini score is used for risk stratification, indicating prophylactic measures such as early ambulation, pneumatic compression, and low molecular weight heparin (e.g., enoxaparin 40 mg/day). Nausea and vomiting are common postoperatively, especially in gastrointestinal surgeries and with general anesthesia. The use of metoclopramide and ondansetron helps prevent these symptoms (COSTA et al., 2024).

Transient intestinal hypomotility occurs due to increased sympathetic activity and manipulation of bowel loops. In major surgeries, the elimination of flatus should be awaited before restarting the diet. However, early refeeding is encouraged whenever possible (COSTA et al., 2024 & MEDEIROS et al., 2023).

Postoperative devices such as the nasogastric tube should be removed once the output is less than 400 mL/day and peristalsis returns. The urinary catheter should be removed early to minimize the risk of urinary infection. Drains should be used judiciously, preferably using closed systems, and removed as soon as possible to prevent secondary infections (COSTA et al., 2024 & MEDEIROS et al., 2023).

Postoperative complications in general surgery can be severe and require proper management to prevent and treat risks. Among the most common complications are surgical site infections (SSI), which occur due to the introduction of microorganisms at the incision site and can be prevented with antibiotic prophylaxis and treated with broad-spectrum antibiotics and drainage, if necessary. Deep vein thrombosis (DVT) and pulmonary embolism are common after major surgeries and are prevented with anticoagulants and early mobilization, treated with anticoagulants and, in severe cases, thrombolytics (CDC, 2021 & BRITO et al., 2021).

Respiratory complications, such as atelectasis and pneumonia, occur due to immobility and anesthesia, and are prevented with respiratory exercises and treated with respiratory physiotherapy and antibiotics. Postoperative hemorrhages may arise from vascular injuries or coagulation complications and are prevented with strict hemostasis, treated with transfusions and, in severe cases, re-exploration surgery. Diabetic patients face difficulties in glycemic control, which can delay healing and increase the risk of infections, with glycemic control monitored using insulin and continuous adjustments (CDC, 2021 & BRITO et al., 2021).

Acute renal failure may occur due to hypotension or the use of nephrotoxic medications and is treated with aggressive hydration and, in severe cases, dialysis. In major abdominal surgeries, digestive disorders such as short bowel syndrome can occur, which are treated with progressive enteral nutrition and nutritional monitoring (CDC, 2021 & BRITO et al., 2021).

Effective management of these complications depends on continuous surveillance, appropriate use of medications, and specific interventions, with individualized planning according to preoperative conditions and the type of surgery (CDC, 2021 & BRITO et al., 2021).

4. Conclusion

Postoperative management is a crucial component for the recovery of patients undergoing general surgery, requiring a vigilant and multifaceted approach to prevent and treat common complications. Surgical site infections, deep vein thrombosis, respiratory complications, hemorrhages, glycemic imbalances, renal complications, and digestive disorders are recurring challenges that demand evidence-based prevention strategies and prompt interventions. The proper use of antibiotic prophylaxis, anticoagulants, respiratory and glycemic monitoring, as well as hydration and renal function monitoring, are essential pillars in mitigating these risks.

Furthermore, the management of complications should be personalized, taking into account the patient's preoperative conditions, the complexity of the surgery performed, and clinical evolution. The ability to detect signs of complications early and implement appropriate treatments is crucial to avoid severe sequelae and improve clinical outcomes. In summary, continuous vigilance and proactive management are key to reducing mortality and improving patients' quality of life in the postoperative period, emphasizing the importance of an interdisciplinary and adaptive approach in surgical care.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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