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Review Article

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Complications of Laparoscopic Cholecystectomy: A Literature Review

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ABSTRACT

Laparoscopic cholecystectomy has become the gold standard for the treatment of symptomatic cholelithiasis and other gallbladder conditions, as it offers shorter hospitalization times and quicker recovery compared to open surgery. However, despite its advantages, serious complications such as bile duct injuries, hemorrhage, infections, and anesthetic complications can occur. This review analyzes the primary complications associated with this procedure and discusses the importance of adequate training, meticulous surgical techniques, and appropriate perioperative management. It concludes that although the overall incidence of complications is considered low, the consequences can significantly impact morbidity and mortality, underscoring the necessity of continuous improvement of surgical teams and well-established protocols.

Keywords:

Laparoscopic cholecystectomy, Surgical complications, Bile duct injury, Hemorrhage, Infection.

Introduction

Introduced into surgical practice in the 1980s, laparoscopic cholecystectomy marked a milestone in the evolution of minimally invasive techniques [1,2]. This procedure has gradually replaced open surgery in most reference centers due to its benefits, such as reduced postoperative pain, quicker recovery, shorter hospital stays, and enhanced patient satisfaction. Furthermore, widespread training and access to laparoscopic instruments have enabled surgeons to acquire proficiency, reinforcing the adoption of this technique as the standard treatment for symptomatic cholelithiasis and other gallbladder diseases [3-5]. Despite the benefits and broad clinical acceptance, laparoscopic cholecystectomy is not free of risks. Although infrequent overall, complications can be severe, increasing morbidity, mortality, hospital stay length, and healthcare costs [6,7]. Among major concerns are iatrogenic bile duct injuries potentially leading to strictures, fistulas, and cholangitis intraoperative bleeding, adjacent organ perforations, infectious complications, and anesthetic incidents. The potential for such complications underscores the need to deeply investigate risk factors, preventive strategies, and effective management. Patient characteristics also significantly influence complication risks. Conditions such as obesity, acute cholecystitis, anatomical variations, and previous abdominal surgeries may increase procedural complexity. Thus, successful laparoscopic cholecystectomy depends not only on the surgeon's technical skills but also on a rigorous preoperative assessment to identify potential challenges and tailor surgical planning accordingly [8-10].

Objective

This review aims to analyze the primary surgical complications associated with laparoscopic cholecystectomy, exploring their causes, risk factors, and preventive measures.

Materials and Methods

A bibliographic review was conducted using articles from PubMed, ScienceDirect, and SciELO databases to support this study.

Discussion

The overall complication rate for laparoscopic cholecystectomy ranges from 2% to 6%, with bile duct injuries considered the most severe. When unidentified or untreated promptly, these injuries may result in cholangitis, strictures, and impaired biliary function, requiring complex reconstruction interventions [11]. Errors in anatomical identification, intense local inflammation, and anatomical variations predispose patients to bile duct injuries. Adopting the “critical view of safety” technique and employing intraoperative examinations (such as cholangiography) or technological aids (e.g., indocyanine green fluorescence) can considerably reduce these complications. Hemorrhage may result from injuries to vessels such as the cystic artery, hepatic artery, or adjacent structures. Aggressive manipulation and improper use of hemostatic methods contribute to bleeding risks. Severe cases might necessitate conversion to open surgery for effective hemorrhage control [12,13].

Infectious complications, though less frequent, include intra-

abdominal abscesses, surgical site infections, and cholangitis. Antibiotic prophylaxis, strict aseptic technique, and adequate drainage management are essential preventive measures. Additionally, perforations of adjacent organs (e.g., stomach and duodenum) and anesthetic complications (hypotension, arrhythmias, adverse drug reactions) may occur. Bowel obstruction from adhesions and post-cholecystectomy syndrome are also potential complications, necessitating thorough postoperative assessment. Ultimately, surgeon training, mastery of biliary anatomy, and refinement of minimally invasive techniques are crucial for minimizing complications. Safety protocols, surgical skill laboratory simulations, and systematic adverse event documentation contribute to ongoing surgical service improvements [14,15].

Conclusion

Laparoscopic cholecystectomy has solidified its role as the primary therapeutic approach for gallbladder diseases, particularly due to its lower morbidity compared to open surgery. Nevertheless, potential complications, though infrequent, can severely impact patient outcomes and healthcare resources. Thus, mastery of surgical techniques, development of specific skills, and investment in supportive technologies are vital to ensure procedural precision and reduce adverse events. It is essential to emphasize continuous surgeon education, evidence-based clinical protocols, and meticulous preoperative evaluations as pivotal factors in complication prevention. Likewise, multidisciplinary collaboration involving surgical teams, anesthesiologists, nurses, and other healthcare professionals facilitates timely management of complications, reducing negative outcomes and enhancing postoperative recovery. With ongoing advancements in minimally invasive techniques and imaging technologies-such as robotic surgery and indocyanine green fluorescence-a promising future emerges for reducing laparoscopic cholecystectomy complications. Striving for excellence in surgical care through evidence-based practices and continuous process improvement further underscores the importance of studies enhancing our understanding of complications and promoting effective preventive and treatment strategies.

Conflict of Interest

None.

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