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Laparoscopic vs. open cholecystectomy: a comparative analysis of intraoperative risks and patient recovery rates

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Annotation: *This paper presents a comparative analysis of two primary surgical approaches for gallbladder removal: laparoscopic and open cholecystectomy. The study evaluates the incidence and nature of intraoperative complications, the severity of postoperative pain, and the overall timeline of patient recovery. Based on clinical data, the superiority of minimally invasive techniques regarding rehabilitation rates is confirmed, while the specific risks inherent to each method are outlined.*

Key words: laparoscopic cholecystectomy, open cholecystectomy, intraoperative risks, rehabilitation, minimally invasive surgery.

Cholelithiasis (gallstone disease) remains one of the most prevalent pathologies of the abdominal organs requiring surgical intervention. For over a century, conventional laparotomy (open cholecystectomy, OC) served as the standard treatment. However, the introduction of endovideosurgery into widespread clinical practice in the late 20th century radically shifted the paradigm of patient care. Today, laparoscopic cholecystectomy (LC) is utilized in over 90% of cases, reserving the open approach primarily for technically challenging or complicated clinical scenarios.The aim of this study is to compare intraoperative safety profiles and the rate of return to daily activities in patients undergoing these two distinct surgical approaches.

Materials and Methods

A retrospective analysis of scientific literature, meta-analyses, and clinical protocols evaluating the outcomes of LC and OC was conducted. The comparison was based on two primary sets of parameters:

1. **Intraoperative safety:** incidence of bile duct injury (BDI), volume of blood loss, risk of adjacent organ trauma, and conversion rates.
2. **Rehabilitation parameters:** intensity of postoperative pain, time to early mobilization, length of hospital stay (LOS), and time to return to work.

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Results and Discussion

1. Analysis of Intraoperative Risks

The intraoperative safety profile of both methods exhibits fundamental differences due to the visualization techniques and mechanics of the surgical approach.

- **Bile Duct Injury (BDI):** This is the most severe complication of cholecystectomy. Statistical data indicate that the risk of iatrogenic injury to the common bile duct is slightly higher during LC (0.3–0.5%) compared to OC (0.1–0.2%). This disparity is attributed to the "loss of 3D perception," limited tactile feedback, and anatomical variations (e.g., Mirizzi syndrome, dense inflammatory infiltrates).
- **Hemorrhagic Complications:** Intraoperative blood loss during LC is minimal, rarely exceeding 20–50 mL. In contrast, OC involves significant dissection of abdominal wall muscles and tissues, leading to greater blood loss (100–250 mL).
- **Risk of Intraoperative Conversion:** In LC, there is always a potential need to convert to an open procedure. The primary indications for conversion include dense cicatricial and inflammatory infiltrates in Calot's triangle, uncontrollable hemorrhage, or the inability to clearly visualize anatomical structures. The conversion rate in elective surgery ranges from 2% to 5%.

2. Comparative Evaluation of Recovery Rates

The primary advantage of LC stems from preserving the muscular framework of the abdominal wall, which directly accelerates patient recovery.

Parameter for Comparison	Laparoscopic Cholecystectomy (LC)	Open Cholecystectomy (OC)
Postoperative Pain Severity	Mild to moderate; managed with non-opioid analgesics within the first 24–48 hours.	Severe; frequently requires opioid analgesics for the first 2–3 days.
Early Mobilization	Within 4–6 hours post-anesthesia.	On post-operative day 2–3 (due to pain and fear of wound dehiscence).
Gastrointestinal &	Rapid return of peristalsis;	Potential prolonged

Pulmonary Function	minimal risk of hypostatic pneumonia.	paralytic ileus; shallow breathing due to incisional pain.
Length of Hospital Stay	1–3 days.	7–10 days.
Full Recovery Period	7–14 days before returning to work.	4–6 weeks before resuming physical activity.

Conclusion

The performed analysis demonstrates that **laparoscopic cholecystectomy** offers definitive advantages over the open approach regarding postoperative rehabilitation. Minimizing surgical trauma reduces the length of hospital stay by a factor of 3 to 4, lowers the pharmacological burden on the patient's body, and accelerates social reintegration.

Nevertheless, LC carries risks of specific intraoperative complications (e.g., BDI), demanding high surgical competence and strict adherence to safe surgery principles ("critical view of safety" strategy). At the current stage, open cholecystectomy maintains its role as a reliable backup method when the laparoscopic procedure cannot be safely completed.

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