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The Impact of Laparoscopy in Comparison to Laparotomy in the Reduction of Complications and Postoperative Recovery: A Literature Review

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ABSTRACT

Surgical interventions are an essential part of medical practice, ranging from elective to emergency procedures. In the late 20th century, minimally invasive techniques, such as laparoscopy, emerged as an alternative to open laparotomy, aiming to reduce complications and improve patient recovery. This technique offers advantages such as less postoperative pain, faster recovery, and reduced hospital stay. The present study seeks to compare the impacts of laparoscopy and laparotomy by analysing complications and postoperative recovery; it is a retrospective review of the literature in the PubMed, ScienceDirect, and Cochrane Library databases, using the descriptors "laparoscopy", "laparotomy", and "minimally invasive surgery", with articles published between 2015 and 2025 being selected. From this study, it was possible to observe that laparoscopy is associated with lower complication rates, incidence of infections, and bleeding compared to laparotomy, as well as less postoperative pain, a reduced need for analgesia, faster recovery, shorter hospital stay, and a lower incidence of postoperative complications such as thrombosis and pneumonia. However, the technique requires the surgeon's experience and may not be suitable for all cases, depending on the complexity of the surgery and the patient's condition, and should always be an individualized choice. In conclusion, it is reaffirmed that the use of laparoscopy represents a significant advancement in surgery, offering benefits such as reduced complications and quicker recovery. With technological advancements and proper training, it is expected that laparoscopy will become the preferred approach for various surgical procedures.

INTRODUÇÃO / INTRODUCTION

Surgical interventions are part of the daily routine in medicine, ranging from elective procedures to emergency surgeries. At the end of the 20th century, a new approach emerged: minimally invasive operations, performed with the aim of reducing the high incidence of complications related to open laparotomy. Furthermore, while the choice of surgical technique should be individualised for each case, considering specific patient factors, it is generally noted that laparoscopic surgery can offer advantages over laparotomy, providing better outcomes for patients (1, 2).

Laparoscopy stands out as a beneficial alternative to laparotomy and is widely used for both diagnosis and treatment. Its main benefits include reduced postoperative pain, faster recovery, and shorter hospital stays, minimising the impact on the patient's quality of life. Additionally, as a minimally invasive approach, it reduces the risk of infection, improves aesthetic outcomes, and offers greater surgical precision (3, 4). In the treatment of abdominal trauma and colorectal cancer resection, studies indicate that laparoscopy may result in lower complication rates, reduced perioperative mortality, and greater therapeutic efficacy (5). However, when choosing the technique, factors such as haemodynamic stability, degree of

abdominal distension, and tumour resection options must be considered. Medical guidelines emphasise that the surgeon's experience with minimally invasive techniques is crucial to ensuring a safe and effective procedure, avoiding complications, and optimising the outcomes of laparoscopy (6).

On the other hand, despite its numerous advantages, laparoscopy is not without challenges and limitations. One of the main technical challenges is the laparoscopic dissection of lymph nodes, which can be complex and, in some cases, result in inaccurate tumour staging, compromising disease assessment and therapeutic planning (6, 7). Additionally, its application remains controversial due to potential risks, such as unexpected tumour rupture or spillage, thermal injuries caused by surgical instruments, and the development of metastases at the trocar entry sites. Nevertheless, various meta-analyses suggest that laparoscopic surgery is associated with lower complication rates compared to laparotomy (8, 9). Therefore, although laparoscopy provides significant benefits, its indication should be individualised, taking into account the specificities of each patient (10, 11). The present study aims to elucidate the impacts of laparoscopy compared to laparotomy. The impacts explored in this work range from complications that may occur during or after the surgical intervention to the patient's postoperative recovery.

MÉTODOS / METHODS

For this study, an integrative literature review was conducted using the PubMed, ScienceDirect, and Cochrane Library databases. Articles from the last ten years were selected, focusing on randomised clinical trials, systematic reviews, and meta-analyses that highlighted the impact of laparoscopy compared to laparotomy in reducing complications and improving postoperative recovery in patients. Additionally, the descriptors used were “laparoscopia”, “laparotomia”, “cirurgia minimamente invasiva”, as well as their English equivalents: "laparoscopy”, “laparotomy”, “minimally invasive surgery”. The Boolean operator "AND" was used for the database searches. The exclusion criteria included articles that were not relevant to the topic, as well as articles published outside the studied period from 2015 to 2025. In total, 318 articles were found across all databases. After reading the titles, it was noted that some articles did not meet the inclusion criteria for this study. Consequently, 26 duplicate articles were removed, leaving 292 articles for abstract reading. Of these, 242 studies were excluded based on the abstract analysis, as they did not meet the objective of elucidating the impact of laparoscopy compared to laparotomy as a surgical choice, nor its determining factors. As a result, 50 full-text articles were included in this literature review. The selection criteria included studies that met the following requirements: studies published in English and Portuguese, systematic reviews, case reports, clinical studies, and articles published between 2015 and 2025.

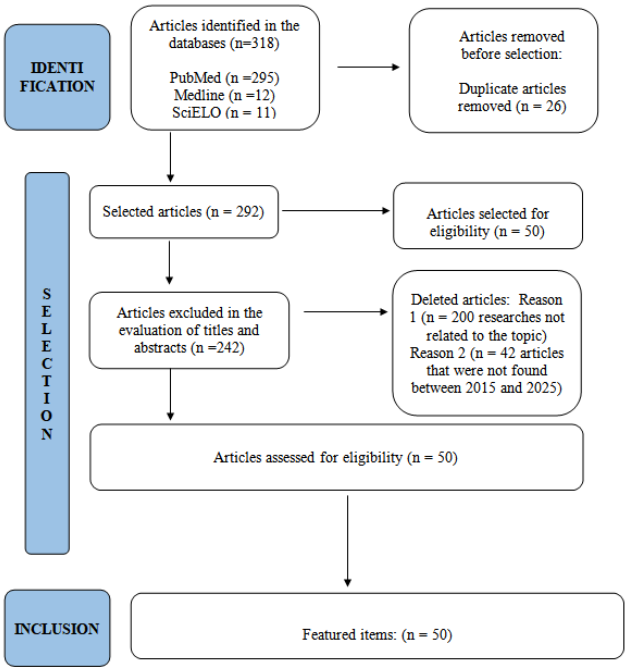

Figure 1. PRISM method for the research presented.

RESULTADOS & DISCUSSÃO / RESULTS & DISCUSSION

Minimally invasive techniques have been widely used in modern surgical practice, generating significant interest and discussion regarding their impact on reducing complications and improving postoperative recovery (12, 13). This section will address the main results observed with the use of these techniques, as well as their implications for postoperative patient management (14, 15).

Several studies highlight a significant reduction in complications associated with minimally invasive techniques compared to traditional approaches. The literature suggests that the reduced tissue invasion, characteristic of minimally invasive techniques, contributes to a lower inflammatory response and a decreased incidence of postoperative infections (16, 17). Furthermore, studies show that patients undergoing laparoscopic cholecystectomy had an infection rate of 2%, compared to a 6% rate observed in patients who underwent the traditional open approach (18, 19). This difference can be attributed to the shorter exposure time of tissues to pathogenic agents, as the incisions are smaller and the technique allows for more precise control of the surgical area (20, 21).

Additionally, the minimization of surgical trauma, resulting from the reduced need for dissection of healthy tissues, lowers the risk of accidental injury to adjacent organs, which directly impacts the incidence of complications such as excessive bleeding and damage to peripheral nerves (22, 23). Moreover, the safety of laparoscopic techniques in complex procedures, such as radical prostatectomy, shows a substantial reduction in the incidence of hemorrhage and thromboembolism compared to traditional techniques (24, 25).

Postoperative recovery is one of the greatest benefits associated with minimally invasive techniques. Patients undergoing these

approaches often experience a quicker return to their daily activities, as postoperative pain is considerably less (26, 27). The reduction in surgical trauma results in a decreased need for analgesics, minimizing the typical side effects of opioids, such as nausea, vomiting, and constipation (28). Thus, it is evident that patients undergoing laparoscopy for the treatment of acute appendicitis experienced a 30% reduction in hospital stay and a 40% decrease in the need for postoperative analgesia compared to those who underwent the conventional open approach (29, 30).

Functional recovery is also faster, with early mobilization and a lower risk of secondary complications related to immobility, such as deep vein thrombosis (DVT) and pneumonia (31, 32). Moreover, the incidence rate of deep vein thrombosis was 50% lower in patients who underwent minimally invasive techniques compared to those who underwent open surgery (33, 34). The average hospital stay was also significantly reduced, ranging from seven days for the traditional approach to three days for the laparoscopic technique (35, 36).

The reduction in complications and the positive impact on postoperative recovery are undeniable advantages of minimally invasive techniques (37). The use of methods such as laparoscopy has shown consistency in reducing complications, which can be attributed to the reduced surgical trauma and enhanced precision provided by the technology (38). Additionally, the lower postoperative pain and faster recovery directly contribute to improving patients' quality of life, reducing the time away from work and other activities (39, 40).

However, it is important to note that, despite the overall benefits, not all patients or types of surgery are ideal for these techniques. In some cases, such as patients with severe diseases or intraoperative complications, the traditional approach may still be necessary (41, 42). Furthermore, the learning curve for surgeons is a critical factor for the success of these techniques, and it is essential that professionals are adequately trained to minimize risks and optimize outcomes (43). Thus, it is highlighted that the cost of technologies associated with minimally invasive techniques can be a limiting factor for their adoption in resource-limited healthcare systems (44, 45). However, many studies suggest that the additional costs may be offset by the reduction in hospital stay and the decreased need for intensive postoperative care (46, 47).

In this way, minimally invasive techniques have demonstrated a substantial positive impact on reducing surgical complications and accelerating postoperative recovery (48, 49). Although there are challenges associated with the implementation of these techniques, the benefits far outweigh the risks, making them a preferred choice in many areas of modern surgery (50).

CONCLUSÃO / CONCLUSION

In summary, it is emphasised that minimally invasive techniques represent a significant advancement in the field of surgery, providing substantial benefits in reducing complications and accelerating postoperative recovery. The reduced tissue trauma, precision of the approaches, and decreased exposure time to infection are key factors in lowering complications such as infections and haemorrhages. Patients undergoing these procedures typically experience faster recovery, reduced need for analgesia, and a lower risk of secondary complications, such as thrombosis and pneumonia, reflecting in shorter hospital stays and reduced financial impact on the healthcare system.

However, it is essential that the adoption of these techniques is carefully considered, taking into account factors such as the complexity of the surgery, the patient's clinical condition, and the surgeon's experience. Although the benefits are clear, the learning curve associated with applying these techniques requires continuous training and access to the necessary technologies. With the ongoing evolution of techniques and associated technologies, it is expected that, in the future, minimally invasive techniques will become even more accessible and effective, establishing themselves as the preferred approach in a wide range of surgical procedures.

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