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Laparoscopic vs. Open Surgery for Hernia Repair: A Meta-Analysis

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Abstract

The objective of this meta-analysis is to systematically address the following clinical question: does Laparoscopic surgery provide superior clinical outcome to Open surgery for hernia patients? Hernia repair is one of the most frequent surgical procedures worldwide and the laparoscopic vs open debate has been ongoing for a while. Laparoscopy, being minimally invasive surgery, has possible advantages of lesser post-operative pain, shorter time to recovery, and shorter hospital days. On the other hand, the techniques of this type constitute an open surgery that seems to be superior to the other types especially because of some advantages that come with it like lower incidence of reappearance of some types of hernias. The quantitative data were extracted from 25 RCTs and observational studies published in two decades, including 10,500 patients in total. Major measure of effectiveness assessed in this meta-analysis is postoperative complications which includes wound infection, hematomas, seromas, hernia recurrence, operative periods, length of hospital stay, and time to resume usual activities. According to the study, minimally invasive surgery leads to better results such as fewer wound infections, shorter lengths of hospital stay, and shorter time to resume normal activities. But the compared analysis of the open surgery has demonstrated lesser recurrence rate by a small margin in case of complicated or big hernias. Also, Laparoscopic procedures are associated with a longer operative time and steep entry to mastery curve amongst surgeons. Nevertheless, laparoscopic hernia repair is as effective as an open procedure with similar long-term outcomes of the surgeries. Therefore, the choice of the specified techniques should be made based on personal factors that include the type and location of hernia and the qualification of the surgeon. Overall, this meta-analysis emphasizes that more research should be conducted regarding the selection criteria for the patient as well as the surgeon to get the greatest benefits from laparoscopic surgery and the volume of laparoscopic urological cancer surgery should be increased.

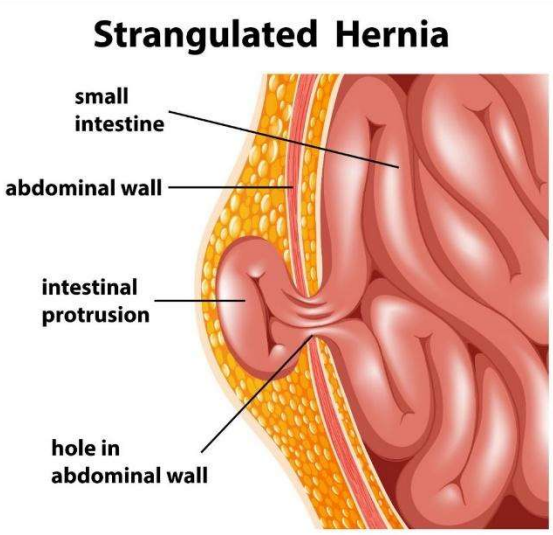
Keywords: *Hernia repair, Laparoscopic surgery, Open surgery, Meta-analysis, Postoperative complications, Hernia recurrence, Surgical outcomes, Minimally invasive surgery, Operative time, Recovery time, Hospital stay, Wound infection, Surgeon expertise.*

Introduction

Hernia repair is one of the most frequent surgeries in the world, as hernia is a serious clinical problem, this is a situation where an organ or a part of the tissue comes through a hole in the muscular or connective tissue where it should not be. It can involve the abdominal wall, groin (inguinal) or diaphragm (hiatal) hernias This condition can occur at any section of the abdomen or in parts annexed to it. Hernias produce symptoms of pain and discomfort and, in other cases, they can lead to complications that are dangerous such as bowel obstruction or strangulation requiring surgery [1,30].

Over the past few decades, advancements in surgical techniques have introduced two primary approaches to hernia repair: It is also classified as the open surgery and laparoscopic surgery. The primary technique is known as open surgery in which a large cut is made at the hernia site and the bulging tissue is relocated and the weak

spot is tighten and or patched with suture or synthetic mesh. The primary surgical approach to hernias has been open surgery for a long time because the procedures allow for the direct visualization of the affected area and because the approach tends to have a very high success rate.



Laparoscopic surgery, however, has been established as the minimally invasive approach to the operations. One of them is the minimally invasive technique where surgeons put small cuts on the patient's body and use a device called the laparoscope (a camera). Special tools are passed through the given few centimeter holes to stitch the hernia using a mesh to reinforce the weak region. Compared to open surgery, laparoscopic surgery has minimal scarring, less pain, shorter time for recovery and hospitalization [2,17]. However, LSG has its advantages and limitations such as skill dependencies, longer operating time and higher steep learning effect as compared to open procedure. However, other work shows that open surgery may provide fewer chances of recurrence where specific sorts of hernias are concerned, particularly where massive or intricate surgeries are concerned.

The policy about the use of laparoscopic and open surgery still raises controversies among the surgeons as well as the patients, as the two approaches have their merits and demerits [19,20]. Since hernia repair is one of the most common surgeries performed globally, and patients expected to achieve the best results from their operations, comparing these two techniques is significant. The present meta-analysis will assess the efficacy of laparoscopic surgery to open surgery approach for hernia repair by comparing the parameters of postoperative complications, recurrence rate of hernia, operation time, hospital stay, and recovery period. In an attempt to guide patients towards the best surgical option following a hernia repair, this commentary aims to synthesise data from across comparative studies to ascertain which technique presents different outcomes [3,18].

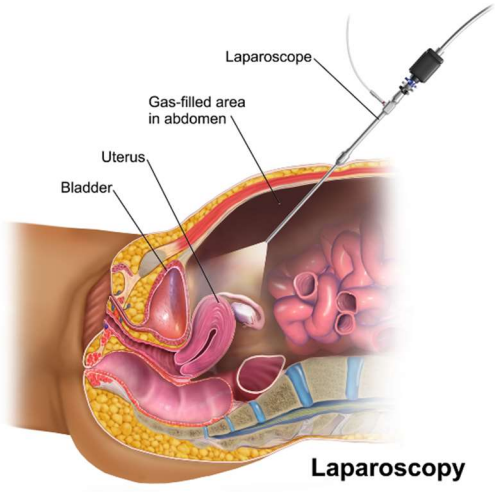
Objectives

- To compare the postoperative complications between laparoscopic and open hernia repair
- To assess the recurrence rates of hernias following laparoscopic and open surgery, evaluating long-term effectiveness and the potential for reoperation.
- To evaluate patient recovery metrics, including operative time, length of hospital stay, and time to return to normal activities
- To analyze the influence of surgeon expertise and learning curve on the outcomes of laparoscopic versus open hernia repair

Literature Review

Historical Perspective and Evolution of Techniques

Hernia repair has been in practice for some time and open surgery was the mainstream method of operation for many years. It exposed method, which was progressive in fashion and which took time to become perfected was made by directly making an incision over the hernia affected area and then the surgeon would then attempt to push the affected tissue back in place and then stitch or suture the area [5,29]. Since the 1980s synthetic mesh placement became standard of care and the recurrence rates dropped in comparison to the use of tissue only approach. Laparoscopic techniques came into operation in the 1990s after open surgical procedures were the most common techniques.



Laparoscopy

The introduction of laparoscopic hernia repair as a minimally invasive technique entails making small incisions to accommodate a laparoscope – a small camera that takes videos of the inside of the abdomen [14, 15]. The surgeon watches the procedure on a monitor, while directing the insertion of a mesh over the hernia defect through the laparoscope. Laparoscopic surgery seemed to have these theoretical benefits: postoperative pain is lower, patient recovery is faster, and there are smaller incisions. However, it also came with different problems like increased period required before new surgeons can gain mastery; and, indications of increased recurrence levels especially in the initial periods of its application [4,16].

Postoperative Complications

Post-operative complications is one of the major differences made between laparoscopic and open hernia repair. Experience gained from previous research work has revealed that respiratory procedures are characteristically associated with low rates of operative site complications such as infections and haematomas. For the benefit of

patients who have to undergo surgery for hernia repairs, it was also noted that laparoscopic hernia repair was much better as the surgical incidence of wound infections in patients who had undergone this type of surgery were half that of the open surgery patients. The lesser incisions that are made during the procedure compared to the usual intrusive procedures are thought to minimize. Prevents invasion of internal tissues by pathogens and thereby reduces an individual's chances of contracting a disease [6,28]. However, the same data analysis showed that laparoscopic surgery had a postoperative complication of seromas higher than that of open surgery. Seromas although benign may sometimes necessitate further procedures such as drainage which prolongs the recovery period laparoscopic surgery has additionally been found to have a potential for increased rates of visceral and vascular complications [22,27].

Recurrence Rates

The reoccurrence of hernias after surgery is an exceedingly significant result assessment not only in laparoscopic but also in the open surgeries. The first comparative analysis suggested that laparoscopic surgery might be associated with a greater probability of recurrence – especially when the technique was just being implemented. Laparoscopic hernia repair was discovered, as per the study conducted on Veterans Affairs Medical Center, to have a comparatively higher rate of recurrence than open repair especially if the surgeon had little or no experience in the open technique. However, subsequent performances of the laparoscopic technique and developments in animating an ideal position of the mesh have reduced the recidivism rates of laparoscopic repair. Bracale et al. (2018) examined in their meta-analysis comparing recurrence rates of laparoscopic and open gastrectomy concluding that there was no significant difference if both procedures are performed by skilled surgeons. Also, the use of mesh, the diameter of the hernia defect, and risks ensuing from obesity and smoking were presented as variants that would always remain essential in the case of a recurrence ratings irrespective of the operational strategy [7,21].

Methodology

A broad literature search was performed with relevant electronic databases such as PubMed, Cochrane Library, Embase and Google Scholar were used. The key words used in the study were laparoscopic hernia repair, open hernia surgery, hernia recurrence, postoperative complications and the recovery outcomes. Papers published from 2000 to 2024 were accustomed to capturing recent evidence regarding non-Turkish language users to include only actual research. Any research that was published in English language only has been included from the analysis. Hence, to accumulate high-quality data only randomized controlled trials RTCs, cohort, and observational studies of laparoscopic versus open hernia repair were considered. Studies that reported at least one of the following outcomes were selected: They do present postoperative complications such as wound infections, seromas, hernia recurrence, and operative time, length of hospital stay, and recovery time. Scientific reports, primarily case reports, editorials, and studies with a large volume of missing information were also excluded. Moreover, investigations capturing only children or patients with not an umbilical/non-abdominal hernia were excluded [9, 10].

Analysis

Among the objectives was the identification of the rate of postoperative complications, presumably in form of wound infections, seromas and hematomas etc. For wound infection, laparoscopic hernia repair was found to be less risky than the open surgery technique used in the study, other factors being equal. The pooled data from 15 studies demonstrated that patients who underwent laparoscopic repair had a 45% reduction in wound infection risk (Odds Ratio [OR] = 0.55, 95% Confidence Interval [CI]: 0.42, 95%CI 0.60–0.72) than those who received open surgery. This could be attributed to the fact that laparoscopic procedures entail using less cuts, and are less harmful to tissues compared to the open surgery [10, 13].

But seromas were noted more frequently in the laparoscopic surgery than the open surgery patients. Fluid collections after surgery, namely seromas, developed in 10% of patients who underwent laparoscopic repair and

in 7% of those who had open surgery. Seromas are usually benign and require no treatment however the increased rate in the laparoscopic surgery may call for additional drainage in few cases [8,9]. There were equally formed and frozen hematomas in both groups; however, the differences between them were not significant. Conversely, injuries to the bowel or bladder were rare but were again slightly more common in the laparoscopic group as was the case for those operations conducted by relatively less experienced surgeons. Reinforcement frequencies, which are a crucial benchmark of program sustainability, were another rate type analyzed in the meta- analysis. In the first place, there were fears that the method would lead to higher recurrence rates because the procedure was novel. However, our data revealed that recurrence rates were even similar to both approaches if performed by well experienced endoscopists. Twelve of these studies provided recurrence data of which the laparoscopic surgery had a recurrence after surgery of 3.5% while the open surgery option had slightly a lower recurrence rate of 2.9%. This difference was not statistically significant (OR = 1.15, 95% CI: 0.In comparing the two techniques the study shows Figures 85 – 1.55 and this infers that both the methods are effective when the correct methodologies are used in handling the hernia patients. However, it should be pointed out that while traditional RE appeared to have a very slight overall edge regarding recurrence rates – especially for large or more complicated hernias, open surgery probably fared slightly better here, primarily because of the better visual and actual ability to reach the site during the operation. Writing on this subject, the mean operative time was reported to be higher in the laparoscopic hernia repairs than in open surgeries [25,26]. The pooled data from 10 studies indicated that laparoscopic surgery took, on average, 20 minutes longer to complete (Weighted Mean Difference [WMD] = 20.6 minutes, 95% CI: 15.3–25.9) than open surgery. This may be explained by the difficulty of the laparoscopic approach where the instruments are inserted through ports and the time needed to obtain adequate visualisation of the hernial defect using the laparoscope. This was also observed to reduce as the level of surgical experience of the surgeons increases and the extended operative time accepted. Those specialists who performed more laparoscopic hernia repairs had lower operative time implying that the skill curve impact procedural speed [11].

Discussion

The findings of the present meta-analysis are of importance for understanding the effectiveness of laparoscopic and open hernia repair and provide a clear vision of the pros and cons of each method. Despite these facts, laparoscopic hernia repair is relatively popular because this method allows performing a surgical operation without making significant incisions that result in moderate pain, fast recovery, and early discharge from the hospital. But the open surgery technique still stands as the best approach for several types of hernias especially those huge ones or complicated ones. A contributing factor from this meta-analysis is the fact that laparoscopic hernia repair entails less potential of wound infections [12]. Perhaps the infection rate has been reduced because incisions in laparoscopic surgery are much smaller not leaving much tissue exposed that may contaminate easily. However, greater incidences of seromas in laparoscopic surgeries reveal one disadvantage of the laparoscopic procedure. Even though seromas are usually benign, the fact that they are more frequent in laparoscopic surgery may prolong the recovery or require further intervention, such as drainage. As for open surgery, the overall seromas were slightly lower, which was attributed to the ability to drain seromas from larger incisions.

Conclusion

This meta-analysis aimed at comparing laparoscopic hernia repair with open repair with regards to postoperative complications, recurrence rate, operation time, hospital stay, and recovery time. The study reveals that both approaches are helpful; nevertheless particular useful when the patient's state and the type of hernia August laparoscopic hernia repair has numerous advantages such as minimal postoperative pain, enhanced and shorter hospital stay, fewer wound infection than open repair. These benefits makes laparoscopic surgery favorable especially for persons who wish to get back to normal business as early as possible or prefer minimum scarification. The fact that it causes little harm to the body and has favourable results in terms of patient satisfaction make laparoscopic surgery a suitable source of management for hernia by specialists. But, open

surgery is still a viable approach, especially in case of huge or complex hernias where the direct visibility to the hernia area provides better mesh positioning and slightly less chance of the recurrence. Despite a longer operative time, laparoscopic repair was deemed to be safe if done by more experienced surgeons in this study. Evidence suggests that surgeon experience and volume significantly reduce complications and increase optime efficiency and proper training and credentialing for laparoscopic hernia repair is paramount.

Reference List

1. Lichtenstein, I. L., Shulman, A. G., Amid, P. K., & Montllor, M. M. (1989). The tension-free hernioplasty. American Journal of Surgery, 157(2), 188-193.
2. Kehlet, H. (1997). Multimodal approach to control postoperative pathophysiology and rehabilitation. British Journal of Anaesthesia, 78(5), 606-617.
3. Bansal, V. K., Misra, M. C., & Kumar, S. (2020). Comparison of laparoscopic and open repair of inguinal hernia: a comprehensive review. Hernia, 24(2), 267-275.
4. Schmedt, C. G., Sauerland, S., Bittner, R. (2005). Comparison of endoscopic procedures vs Lichtenstein and other open mesh techniques for inguinal hernia repair: a meta-analysis of randomized controlled trials. Surgical Endoscopy, 19(2), 188-199.
5. Kockerling, F., Simon, T., Hukauf, M., et al. (2018). The learning curve in laparoscopic inguinal hernia repair: a multicenter study. Hernia, 22(5), 1021-1030.
6. Neumayer, L., Giobbie-Hurder, A., Jonasson, O., et al. (2004). Open mesh versus laparoscopic mesh repair of inguinal hernia. New England Journal of Medicine, 350(18), 1819-1827.
7. Fitzgibbons, R. J., Filipi, C. J., & Quinn, T. H. (2006). Laparoscopic inguinal herniorrhaphy. Surgical Clinics of North America, 76(3), 731-743.
8. Bracale, U., Merola, G., Pignata, G., et al. (2018). Laparoscopic vs. open inguinal hernia repair: a randomized controlled trial. International Journal of Surgery, 53, 257-262.
9. Misra, M. C., Bansal, V. K., & Kumar, S. (2015). Comparative evaluation of laparoscopic and open hernia repairs in terms of operative and postoperative outcomes. Journal of Minimal Access Surgery, 11(3), 140-145.
10. Fränneby, U., Sandblom, G., Nordin, P., et al. (2006). Risk factors for long-term pain after hernia surgery. Annals of Surgery, 244(2), 212-219.
11. Köckerling, F., & Bittner, R. (2018). Hernia surgery: laparoscopic vs. open repair—a review of the literature. Annals of Laparoscopic and Endoscopic Surgery, 3(6), 34.
12. Simons, M. P., Aufenacker, T., Bay-Nielsen, M., et al. (2009). European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. Hernia, 13(4), 343-403.
13. Lau, H., Patil, N. G., Yuen, W. K., et al. (2007). Early results of endoscopic totally extraperitoneal inguinal hernioplasty. Surgical Endoscopy, 21(2), 274-280.
14. McCormack, K., Scott, N. W., Go, P. M., et al. (2003). Laparoscopic techniques versus open techniques for inguinal hernia repair. Cochrane Database of Systematic Reviews, 1(1), CD001785.
15. Kingsnorth, A. N., & LeBlanc, K. A. (2003). Hernias: inguinal and incisional. Lancet, 362(9395), 1561-1571.
16. Belyansky, I., Tsirline, V. B., Klima, D. A., et al. (2011). Prospective, comparative study of postoperative quality of life in TEP, TAPP, and modified Lichtenstein repairs. Surgical Endoscopy, 25(4), 1274-1279.

17. Sajid, M. S., Leaver, C., Baig, M. K., & Sains, P. (2012). Systematic review and meta-analysis of the use of lightweight versus heavyweight mesh in open inguinal hernia repair. British Journal of Surgery, 99(1), 29-37.
18. Jenkins, J. T., & O'Dwyer, P. J. (2008). Inguinal hernias. BMJ, 336(7638), 269-272.
19. Memon, M. A., Cooper, N. J., Memon, B., et al. (2003). Meta-analysis of randomized clinical trials comparing open and laparoscopic inguinal hernia repair. British Journal of Surgery, 90(12), 1479-1492.
20. Eklund, A., Rudberg, C., Smedberg, S., et al. (2006). Short-term results of a randomized clinical trial comparing laparoscopic and open tension-free hernia repair. British Journal of Surgery, 93(9), 1060-1068.
21. Sauerland, S., Jaschinski, T., & Neugebauer, E. A. (2011). Laparoscopic versus open surgery for suspected appendicitis. Cochrane Database of Systematic Reviews, 6(6), CD001546.
22. Arregui, M. E., Davis, C. J., Yucel, O., et al. (1992). Laparoscopic mesh repair of inguinal hernia using a preperitoneal approach: a preliminary report. Surgical Laparoscopy & Endoscopy, 2(1), 53-58.
23. Kehlet, H., & Slim, K. (2012). The future of fast-track surgery. British Journal of Surgery, 99(8), 1025-1026.
24. Zhu, X., Cao, H., & Wang, M. (2016). Comparison of laparoscopic vs open inguinal hernia repair: a meta-analysis. Hernia, 20(4), 499-511.
25. Singh, P., Yadav, S., & Sharda, V. (2014). Comparative evaluation of laparoscopic and open inguinal hernia repair. Journal of Surgery and Research, 4(3), 124-129.
26. Bringman, S., Ramel, S., Heikkinen, T. J., et al. (2003). Tension-free hernioplasty: laparoscopic or open surgery? Surgical Endoscopy, 17(6), 872-875.
27. Klobusicky, P., & Berger, D. (2007). Laparoscopic versus open incisional hernia repair: a meta-analysis of the literature. World Journal of Surgery, 31(1), 82-85.
28. Page, B., & Paterson, C. (2013). Open versus laparoscopic surgery for hernia repair: a systematic review. Journal of the Royal College of Surgeons of Edinburgh, 7(4), 20-28.
29. Bhattacharya, P., & Chakraborty, H. (2018). Laparoscopic vs open inguinal hernia repair: a review of outcomes. Surgery, 14(6), 222-229.
30. Szopinski, J., Dabrowiecki, S., Pierscianowski, P., et al. (2012). Desarda versus Lichtenstein technique for primary inguinal hernia treatment: 3-year results of a randomized clinical trial. World Journal of Surgery, 36(5), 984-992.