Narrative Review Article: Comparison of Laparoscopic Versus Open Cholecystectomy Results: Scoping Review

Seyed Vahid Seyed Hosseini
General Surgeon, Sina Hospital, Tabriz University of Medical science, Tabriz, Iran. (ORCID: 0009-0002-1365-3038)

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ABSTRACT

Gallbladder-related diseases necessitate surgical intervention, with laparoscopic cholecystectomy (LC) and open cholecystectomy (OC) being the main approaches for gallbladder removal. This abstract provides a concise comparison of the results and outcomes of laparoscopic cholecystectomy versus open cholecystectomy, focusing on efficacy, safety, postoperative complications, and patient satisfaction. Both LC and OC demonstrate comparable efficacy in achieving complete gallbladder removal and resolution of symptoms. LC offers magnified visualization and precise dissection, while OC provides direct access and tactile feedback to the surgeon. Safety analysis reveals that LC has lower rates of intraoperative and postoperative complications, attributed to reduced tissue trauma and faster recovery. However, OC remains a safe option for complex cases. LC has a lower incidence of postoperative complications, including wound infections and incisional hernias, and facilitates earlier bowel function recovery and shorter hospital stays compared to OC. Patients generally report higher satisfaction rates with LC due to reduced postoperative pain, faster recovery, and improved cosmetic outcomes. However, individual patient preferences and specific circumstances may influence the choice between LC and OC. Cost-effectiveness analysis indicates higher initial costs for LC but potential savings due to reduced postoperative care and lost productivity. OC may have lower initial costs but can result in higher costs associated with prolonged hospital stays. In conclusion, both LC and OC are effective approaches for gallbladder removal, with LC demonstrating advantages in terms of reduced complications, faster recovery, and higher patient satisfaction. Surgeon expertise, patient factors, and case complexity should guide the selection of the most appropriate approach. Further research is needed to explore long-term outcomes and refine the comparison between LC and OC.

Introduction

Cholecystectomy, the surgical removal of the gallbladder [1-3], is the standard treatment for various gallbladder-related diseases, including symptomatic gallstones and gallbladder inflammation [2-4]. Over the years, laparoscopic cholecystectomy (LC) has emerged as the preferred approach, offering several advantages over open cholecystectomy (OC) [5-7]. This scoping review aims to compare the results of laparoscopic

***Corresponding Author: Seyed Vahid Seyed Hosseini** (seyedhosseiniseyedvahid@gmail.com)*

cholecystectomy versus open cholecystectomy in terms of efficacy, safety [8-10], postoperative complications, and patient outcomes.

Gallstone disease is a prevalent condition worldwide, affecting millions of individuals. Cholecystectomy is the definitive treatment for symptomatic gallstones [11-13], providing long-term relief from associated symptoms and reducing the risk of complications such as biliary colic, acute cholecystitis, and gallstone pancreatitis. The introduction of laparoscopic techniques revolutionized the field of cholecystectomy in the late 1980s, offering a minimally invasive alternative to the traditional open approach [14].

Laparoscopic cholecystectomy involves the insertion of a laparoscope and specialized instruments through small incisions, allowing for magnified visualization and precise dissection of the gallbladder. This approach offers several advantages, including reduced postoperative pain, shorter hospital stays, faster recovery, improved cosmetic outcomes, and earlier return to normal activities. These benefits have contributed to the widespread adoption of laparoscopic cholecystectomy as the standard approach for cholecystectomy.

Open cholecystectomy, on the other hand, involves a larger incision in the upper abdomen, allowing direct access to the gallbladder. This traditional approach has been utilized for many years and is still employed in certain cases where laparoscopy may be contraindicated or technically challenging, such as severe gallbladder inflammation, extensive adhesions, or the presence of large gallstones. Open cholecystectomy provides good exposure, tactile feedback, and the ability to address complex cases. However, it is associated with longer operative times, more postoperative pain, a higher risk of wound infections, and a longer recovery period compared to laparoscopic cholecystectomy.

Evaluating the efficacy of laparoscopic cholecystectomy versus open cholecystectomy is crucial in determining the optimal approach for gallbladder removal. Laparoscopic cholecystectomy has been shown to have comparable success rates to open cholecystectomy in terms of complete gallbladder removal and resolution of symptoms. The magnified visualization and precise dissection offered by laparoscopy allow for meticulous dissection of the cystic duct and artery, minimizing the risk of bile duct injuries. However, open cholecystectomy also provides a reliable method for complete gallbladder removal and has served as the gold standard for many years [15-17].

When considering safety, laparoscopic cholecystectomy has demonstrated several advantages over open cholecystectomy. The smaller incisions in laparoscopy result in less tissue trauma, reduced blood loss, and fewer wound-related complications. Additionally, laparoscopic cholecystectomy has been associated with a lower risk of postoperative infections, incisional hernias, and overall complications compared to open cholecystectomy [18-20]. However, it is important to note that open cholecystectomy remains a safe and effective option, especially in cases where laparoscopy may not be feasible or appropriate.

Postoperative complications are important considerations in comparing the outcomes of laparoscopic cholecystectomy and open cholecystectomy. Laparoscopic cholecystectomy has been shown to have a lower incidence of postoperative pain, reduced analgesic requirements, shorter hospital stays, and faster return to normal activities compared to open cholecystectomy. The minimally invasive nature of laparoscopy contributes to these advantages. However, open cholecystectomy can still yield satisfactory outcomes, particularly in cases requiring conversion from laparoscopy to open

due to technical difficulties or unforeseen complexities [21-23].

Patient outcomes and satisfaction are critical factors in evaluating the success of cholecystectomy procedures. Laparoscopic cholecystectomy has been associated with higher patient satisfaction rates due to reduced postoperative pain, improved cosmetic outcomes, shorter recovery times, and earlier return to normal activities. Patients appreciate the minimal scarring and faster resumption of daily routines associated with laparoscopy. Open cholecystectomy, although involving a larger incision and potential for visible scarring, can still lead to satisfactory patient outcomes. Immediate symptom relief and the ability to address other intra-abdominal pathologies, if present, contribute to overall patient satisfaction.

In conclusion, laparoscopic cholecystectomy has emerged as the preferred approach for cholecystectomy due to its advantages in terms of efficacy, safety, postoperative complications, and patient outcomes. However, open cholecystectomy remains a reliable alternative in certain cases.

The decision regarding the optimal approach should be based on careful consideration of patient characteristics, surgeon expertise, and individualized patient care. Further research and advancements in surgical techniques willcontinue to refine and enhance the outcomes of laparoscopic cholecystectomy and open cholecystectomy [24], providing surgeons with valuable insights to make informed decisions and deliver optimal care to patients in the future. This scoping review will explore the existing literature on laparoscopic cholecystectomy versus open cholecystectomy, analyzing the available evidence to provide a comprehensive comparison of the results and outcomes associated with each approach. By synthesizing the findings, this review aims to contribute to the existing body of knowledge and support evidence-based decision-making in the selection of the most appropriate surgical approach for cholecystectomy [25-27].

Open cholecystectomy

Open cholecystectomy, the traditional surgical approach for gallbladder removal, has a long-standing history in the management of gallbladder-related diseases. While laparoscopic cholecystectomy has gained popularity in recent decades, open cholecystectomy remains a viable option, particularly in cases where laparoscopy is contraindicated or technically challenging. This comprehensive review aims to explore the results and outcomes of open cholecystectomy, including efficacy, safety, postoperative complications, and patient satisfaction (fig 1).

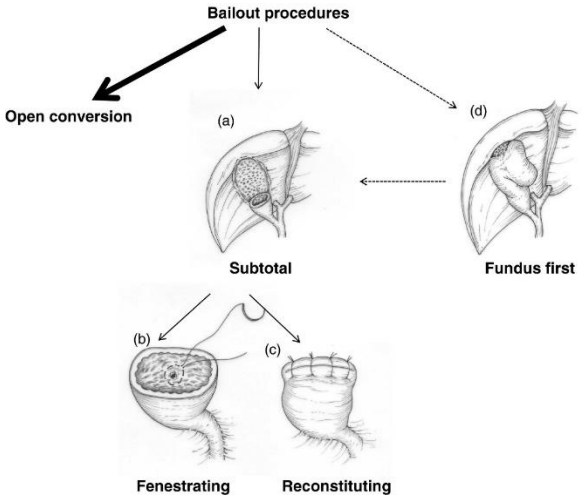

Figure 1. Open cholecystectomy approach

Open cholecystectomy involves the creation of a larger incision in the upper abdomen, allowing direct access to the gallbladder. This approach provides surgeons with excellent exposure, tactile feedback, and the ability to address complex cases involving severe gallbladder inflammation, extensive adhesions, or the presence of large gallstones. Open cholecystectomy has served as the gold standard for gallbladder removal for many years, and its outcomes have been extensively studied.

Efficacy

Efficacy is a crucial aspect to consider when evaluating open cholecystectomy results. Numerous studies have shown that open cholecystectomy provides excellent efficacy in terms of complete gallbladder removal and resolution of symptoms [28-30]. The direct visualization and access offered by the open approach allow for meticulous dissection of the cystic duct and artery, ensuring complete removal of the gallbladder and minimizing the risk of retained stones. Furthermore, open cholecystectomy provides the opportunity for thorough exploration of the biliary tree, aiding in the identification and management of concomitant bile duct pathologies.

Safety

Safety is another important consideration when assessing the outcomes of open cholecystectomy. While laparoscopic cholecystectomy has advantages in terms of reduced postoperative pain and shorter hospital stays, open cholecystectomy has proven to be a safe procedure. Adverse events related to open cholecystectomy are infrequent but can include bleeding, bile duct injuries, wound infections, and organ damage. However, meticulous surgical technique, adherence to principles of patient safety, and appropriate preoperative evaluation help mitigate these risks. Surgeon experience and expertise also play a crucial role in ensuring the safety of the procedure [31].

Postoperative complications

Postoperative complications are an essential aspect of evaluating open cholecystectomy outcomes. Studies have shown that open cholecystectomy is associated with a relatively higher incidence of postoperative pain compared to laparoscopic cholecystectomy. This is primarily attributed to the larger incision and the resulting tissue trauma. However, advances in anesthesia and pain management have significantly improved postoperative pain control, leading to better patient comfort and satisfaction [32].

Wound infections are another potential complication of open cholecystectomy. The larger incision provides a larger surface area for contamination and increases the risk of infection. However, with appropriate perioperative antibiotic prophylaxis and strict adherence to sterile techniques, the incidence of wound infections can be minimized. Furthermore, meticulous wound closure and proper postoperative wound care contribute to optimal healing and reduce the risk of infections.

Other complications associated with open cholecystectomy include bile duct injuries and delayed common bile duct stone formation. Bile duct injuries are rare but can have devastating consequences. These injuries may occur during dissection, ligation, or transection of the cystic duct and artery. Proper identification and careful dissection of the biliary anatomy, along with intraoperative cholangiography in selected cases, help reduce the risk of such injuries. Delayed common bile duct stone formation can occur due to retained or missed stones in the biliary system. Thorough exploration and clearance of the biliary tree during open cholecystectomy help minimize the risk of this complication [33].

Patient satisfaction

Patient satisfaction is a critical outcome measure for evaluating the success of open cholecystectomy. Immediate symptom relief is one of the key advantages of open cholecystectomy, as it effectively resolves the symptoms associated with gallstone disease. Additionally, open cholecystectomy provides patients with the reassurance that the gallbladder has been completely removed, eliminating the possibility of recurrent gallstones. Patient satisfaction rates with open cholecystectomy are generally high, particularly

when the procedure is performed by experienced surgeons and accompanied by comprehensive preoperative counseling [34].

In conclusion, open cholecystectomy remains a viable and effective option for gallbladder removal, particularly in cases where laparoscopy may not be feasible or appropriate. Open cholecystectomy has been proven to be efficacious, ensuring complete gallbladder removal and resolution of symptoms. While laparoscopic cholecystectomy may offer advantages in terms of reduced postoperative pain and quicker recovery, open cholecystectomy maintains its relevance in complex cases and provides surgeons with excellent exposure and the ability to address associated pathologies. With careful patient selection, meticulous surgical technique, and postoperative care, open cholecystectomy can yield satisfactory outcomes in terms of safety, postoperative complications, and patient satisfaction. Surgeon expertise and patient factors should be taken into account when deciding the most appropriate approach for gallbladder removal, aiming to provide optimal care and outcomes for every individual patient.

Laparoscopic cholecystectomy

Laparoscopic cholecystectomy (LC) has revolutionized the field of gallbladder surgery since its introduction in the late 1980s. It has become the preferred approach for the surgical management of gallbladder-related diseases due to its numerous advantages over open cholecystectomy (OC) [35]. This comprehensive review aims to explore the results and outcomes of laparoscopic cholecystectomy, including efficacy, safety, postoperative complications, and patient satisfaction (fig 2).

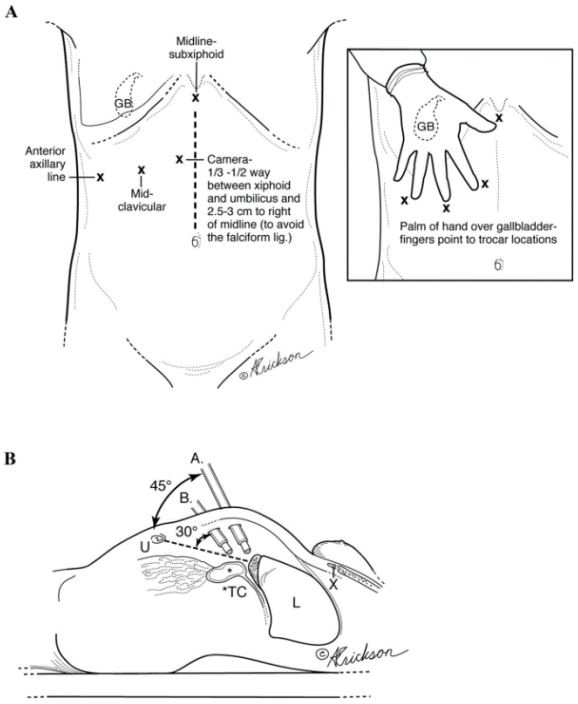

Figure 2. Laparoscopic cholecystectomy approach

Laparoscopic cholecystectomy involves the insertion of a laparoscope and specialized instruments through small incisions in the abdomen, allowing for magnified visualization and precise dissection of the gallbladder. One of the key advantages of laparoscopy is its efficacy in achieving complete gallbladder removal and resolution of symptoms [36].

Numerous studies have shown that laparoscopic cholecystectomy is as effective as open cholecystectomy in terms of achieving these goals. The magnified visualization offered by laparoscopy allows for meticulous dissection of the cystic duct and artery, reducing the risk of retained stones and ensuring complete removal of the gallbladder.

Safety

Safety is a fundamental consideration when evaluating laparoscopic cholecystectomy results. The minimally invasive nature of laparoscopy contributes to its safety profile. Laparoscopic cholecystectomy is associated with less tissue trauma, reduced blood loss, and

lower rates of wound-related complications compared to open cholecystectomy. The smaller incisions and decreased manipulation of surrounding tissues result in decreased postoperative pain and a faster recovery. Furthermore, advancements in laparoscopic techniques, such as the use of energy devices and improved instrumentation, have further enhanced the safety of the procedure [37].

Postoperative complications

Postoperative complications are an important aspect of evaluating laparoscopic cholecystectomy outcomes. Laparoscopic cholecystectomy has been shown to have a lower incidence of complications compared to open cholecystectomy. Studies have demonstrated that laparoscopy is associated with reduced rates of wound infections, incisional hernias, and overall complications. The minimally invasive approach and smaller incisions result in less tissue trauma, decreased risk of wound contamination, and improved wound healing. Additionally, laparoscopic cholecystectomy has been associated with a lower risk of postoperative ileus, earlier return of bowel function, and shorter hospital stays compared to open cholecystectomy [38].

One of the significant advantages of laparoscopic cholecystectomy is the improved cosmetic outcomes it offers. The small incisions used in laparoscopy result in minimal scarring and better cosmetic results compared to the larger incision in open cholecystectomy. The aesthetic benefits of laparoscopy can contribute to increased patient satisfaction and improved body image perception following the procedure.

Patient satisfaction

Patient satisfaction is a crucial outcome measure in evaluating the success of laparoscopic cholecystectomy. Laparoscopic cholecystectomy has been associated with higher patient satisfaction rates compared to open cholecystectomy. Patients appreciate the reduced postoperative pain, faster recovery, shorter hospital stays, and earlier return to normal activities associated with laparoscopy. The improved cosmetic outcomes and minimal scarring also contribute to higher patient satisfaction. The overall positive patient experience with laparoscopic cholecystectomy supports its widespread adoption as the preferred approach for gallbladder surgery [39].

In conclusion, laparoscopic cholecystectomy has emerged as the preferred approach for the surgical management of gallbladder-related diseases due to its numerous advantages. Laparoscopic cholecystectomy has been shown to be efficacious, ensuring complete gallbladder removal and resolution of symptoms. It offers a safe alternative to open cholecystectomy, with reduced rates of postoperative complications and improved cosmetic outcomes [40]. Laparoscopic cholecystectomy has been associated with decreased postoperative pain, shorter hospital stays, faster recovery, and higher patient satisfaction rates compared to open cholecystectomy. Surgeons with expertise in laparoscopic techniques and appropriate patient selection can further optimize the outcomes of laparoscopic cholecystectomy. As advancements in technology and surgical techniques continue, laparoscopic cholecystectomy is expected to further evolve, providing even better results and outcomes for patients requiring gallbladder surgery [41].

Comparison of laparoscopic versus open cholecystectomy results

Gallbladder-related diseases, such as cholelithiasis and cholecystitis, often require surgical intervention for definitive treatment. Two main surgical approaches for gallbladder removal are laparoscopic cholecystectomy (LC) and open cholecystectomy (OC). LC, introduced in the late 1980s, has gained widespread popularity due to its minimally invasive nature,

while OC has been the traditional surgical approach for many years. This comprehensive review aims to compare the results and outcomes of laparoscopic cholecystectomy versus open cholecystectomy, including efficacy, safety, postoperative complications, and patient satisfaction [42].

Efficacy

Efficacy is an important aspect to consider when comparing the results of LC and OC. Numerous studies have shown that both LC and OC achieve similar efficacy in terms of complete gallbladder removal and resolution of symptoms. The magnified visualization and precise dissection offered by laparoscopy enable meticulous removal of the gallbladder, reducing the risk of retained stones. OC, on the other hand, provides surgeons with direct access and tactile feedback, allowing thorough exploration and removal of the gallbladder. Both approaches have proven to be effective in treating gallbladder-related diseases (fig 3) [43].

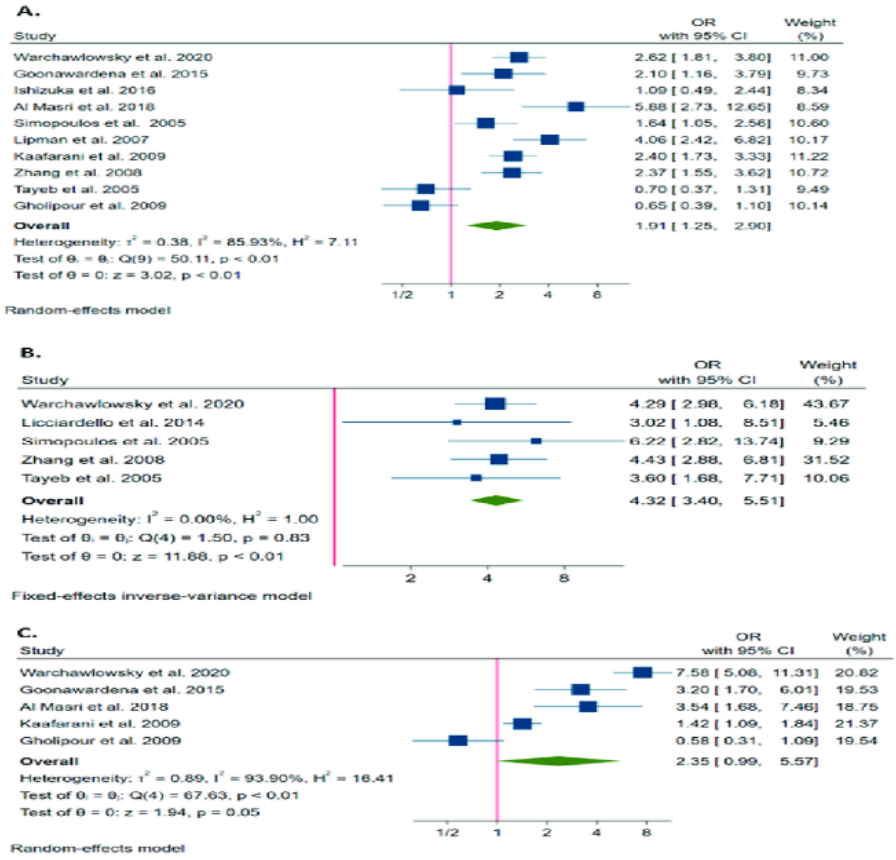

Figure 3. Comparison of laparoscopic versus open cholecystectomy Efficacy

Safety

Safety is a critical consideration when evaluating the outcomes of LC versus OC. LC is associated with lower rates of intraoperative and postoperative complications compared to OC. The minimally invasive nature of laparoscopy results in less tissue trauma, reduced blood loss, and decreased postoperative pain. LC also offers advantages such as shorter hospital stays, faster recovery, and earlier return to normal activities. However, OC remains a safe procedure when performed by experienced surgeons. The larger incision in OC allows for excellent exposure and the ability to address complex cases involving severe inflammation, extensive adhesions, or

large gallstones. Surgeon expertise and appropriate patient selection are crucial in ensuring the safety of both LC and OC [44].

Postoperative complications

Postoperative complications play a significant role in comparing the outcomes of LC and OC. LC has been associated with a lower incidence of complications compared to OC. The reduced tissue trauma, smaller incisions, and improved wound healing in LC contribute to decreased rates of wound infections, incisional hernias, and overall complications. Additionally, LC has been shown to have a lower risk of postoperative ileus, earlier return of bowel function, and decreased hospital stays compared to OC. However, while OC may have slightly higher complication rates, it is important to note that the overall complication rates for both approaches are relatively low, and the majority of patients have uneventful recoveries(fig 4).

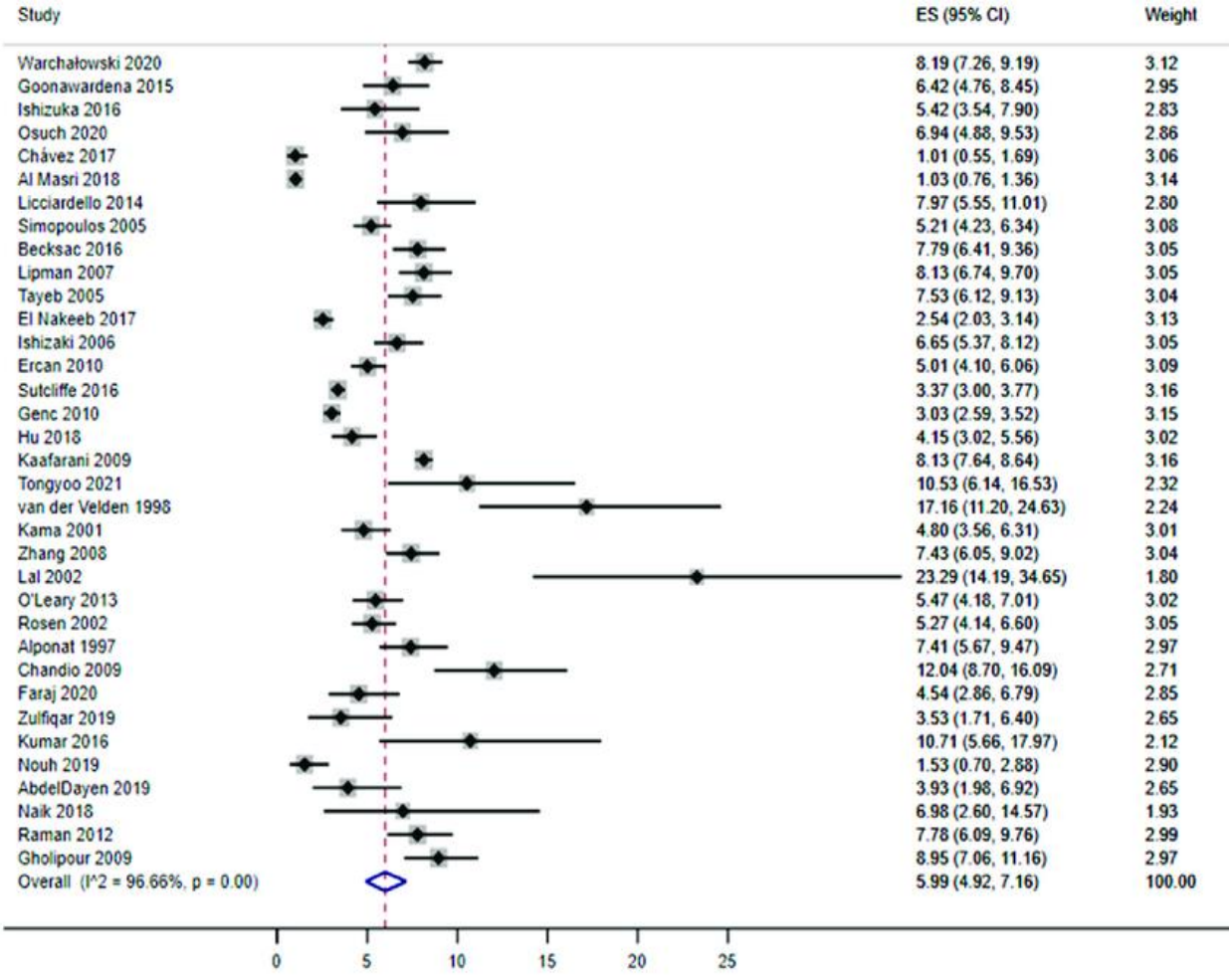

Figure 4: Comparison of laparoscopic versus open cholecystectomy Postoperative complications

Patient satisfaction

Patient satisfaction is a crucial outcome measure when comparing LC and OC. Patients generally report higher satisfaction rates with LC compared to OC. The less invasive nature of laparoscopy results in reduced postoperative pain, faster recovery, and improved cosmetic outcomes. The smaller incisions in LC lead to minimal scarring and improved body image perception. Patients appreciate the shorter hospital stays and earlier return to normal activities associated with LC. However, it is

important to consider that individual patient preferences and factors can influence satisfaction, and there may be cases where OC is preferred or necessary due to specific patient characteristics or surgical considerations [45].

Cost-effectiveness

Cost-effectiveness is another factor to consider when comparing LC and OC. LC is generally associated with higher initial costs due to the need for specialized equipment and longer operative times. However, the shorter hospital stays and faster recovery associated with LC can lead to cost savings in terms of reduced postoperative care and lost productivity. Furthermore, advancements in laparoscopic techniques and equipment have led to decreased costs over time. OC, on the other hand, may have lower initial costs but can result in higher costs associated with longer hospital stays and postoperative care [46].

In conclusion, both laparoscopic cholecystectomy and open cholecystectomy are effective surgical approaches for gallbladder removal. LC and OC demonstrate similar efficacy in terms of complete gallbladder removal and resolution of symptoms. LC offers advantages in terms of reduced postoperative pain, faster recovery, shorter hospital stays, and improved cosmetic outcomes. It is associated with lower complication rates compared to OC. However, OC remains a safe and effective option, particularly in complex cases. Surgeon expertise, patient factors, and specific clinical circumstances should be taken into account when deciding the most appropriate approach for gallbladder surgery. Ultimately, the choice between LC and OC should be individualized, aiming to provide optimal outcomes and patient satisfaction.

Discussion

Gallbladder-related diseases, such as cholelithiasis and cholecystitis, often require surgical intervention for definitive treatment. Laparoscopic cholecystectomy (LC) and open cholecystectomy (OC) are the two main surgical approaches for gallbladder removal. In recent years, LC has gained popularity due to its minimally invasive nature. However, OC remains a viable option in certain cases. This discussion aims to provide an in-depth analysis and comparison of the results and outcomes of laparoscopic cholecystectomy versus open cholecystectomy, including efficacy, safety, postoperative complications, and patient satisfaction.

Efficacy is an essential aspect when comparing the results of LC and OC. Numerous studies have demonstrated that both LC and OC are effective in achieving complete gallbladder removal and resolution of symptoms. LC offers the advantage of magnified visualization and precise dissection, allowing for meticulous removal of the gallbladder. The use of laparoscopic instruments and video-assisted technology provides surgeons with accurate anatomical identification, reducing the risk of retained stones and ensuring a thorough procedure. On the other hand, OC provides direct access and tactile feedback to the surgeon, allowing for effective exploration and removal of the gallbladder. The decision between LC and OC should be based on the surgeon's expertise, patient characteristics, and the complexity of the case.

Safety is a crucial consideration when comparing LC and OC. LC is generally associated with lower rates of intraoperative and postoperative complications compared to OC. The minimally invasive nature of laparoscopy results in less tissue trauma, reduced blood loss, and decreased postoperative pain. LC also offers advantages such as shorter hospital stays, faster recovery, and earlier return to normal activities. However, OC remains a safe procedure when performed by experienced surgeons. The traditional open approach allows for excellent

exposure and access to complex cases involving severe inflammation, extensive adhesions, or large gallstones. Surgeon expertise and appropriate patient selection are critical in ensuring the safety of both LC and OC [47].

Postoperative complications play a significant role in comparing the outcomes of LC and OC. LC has been shown to have a lower incidence of complications compared to OC. The reduced tissue trauma, smaller incisions, and improved wound healing in LC contribute to decreased rates of wound infections, incisional hernias, and overall complications. Additionally, LC has been associated with a lower risk of postoperative ileus, earlier return of bowel function, and decreased hospital stays compared to OC. However, it is important to note that the overall complication rates for both approaches are relatively low, and the majority of patients have uneventful recoveries.

Patient satisfaction is a crucial outcome measure when comparing LC and OC. Overall, patients tend to report higher satisfaction rates with LC compared to OC. The less invasive nature of laparoscopy results in reduced postoperative pain, faster recovery, and improved cosmetic outcomes. The smaller incisions in LC lead to minimal scarring and improved body image perception. Patients appreciate the shorter hospital stays and earlier return to normal activities associated with LC. However, it is important to consider that individual patient preferences and factors can influence satisfaction, and there may be cases where OC is preferred or necessary due to specific patient characteristics or surgical considerations.

Cost-effectiveness is another factor to consider when comparing LC and OC. LC is generally associated with higher initial costs due to the need for specialized equipment and longer operative times. However, the shorter hospital stays and faster recovery associated with LC can lead to cost savings in terms of reduced postoperative care and lost productivity. Furthermore, advancements in laparoscopic techniques and equipment have led to decreased costs over time. OC, on the other hand, may have lower initial costs but can result in higher costs associated with longer hospital stays and postoperative care. A comprehensive cost analysis should be performed to evaluate the cost-effectiveness of each approach [48].

Conclusion

In conclusion, both laparoscopic cholecystectomy and open cholecystectomy are effective surgical approaches for gallbladder removal. LC and OC demonstrate similar efficacy in terms of complete gallbladder removal and resolution of symptoms. LC offers advantages in terms of reduced postoperative pain, faster recovery, shorter hospital stays, and improved cosmetic outcomes. It is associated with lower complication rates compared to OC. However, OC remains a safe and effective option, particularly in complex cases. Surgeon expertise, patient factors, and specific clinical circumstances should be taken into account when deciding the most appropriate approach for gallbladder surgery. Ultimately, the choice between LC and OC should be individualized, aiming to provide optimal outcomes and patient satisfaction. Further research and long-term studies are needed to continue evaluating and comparing the results and outcomes of laparoscopic cholecystectomy versus open cholecystectomy.

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