Review Article:

Outcomes of Open Versus Laparoscopic Appendectomy in Saudi Arabia: A Narrative Review

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Received on Apr 14, 2025, accepted for publication on Jun 30, 2025, dx.doi.org/10.5455/mjhs.2026.01.017

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Abstract:

Appendicitis is a common surgical emergency affecting people of diverse ages and frequently requires surgical intervention. Guidelines recommend appendectomy as the preferred treatment, and it can be done through laparoscopic or open approach. While both techniques have been well-studied worldwide. However, there have been few studies conducted specifically in Saudi Arabia. In this comprehensive review, we included 22 articles. The articles came from different cities and centers across Saudi Arabia, focusing on outcomes of open and laparoscopic appendectomies. Our results show that laparoscopic appendectomy is safe and effective. Patients who undergo this approach usually recover faster, go home from the hospital sooner, and have fewer complications afterward compared to traditional open surgery. However, some studies in our review suggest that both techniques might be equally effective in certain situations. In conclusion, our findings support laparoscopic appendectomy as a safe and effective treatment for acute appendicitis in Saudi Arabia.

Keywords:

Open versus laparoscopic appendectomy, Acute appendicitis, Appendectomies in Saudi Arabia

Introduction:

appendicitis is inflammation of the appendix (vestigial structure attached to base of cecum).[1,2]

Appendicitis affects different age groups, from pediatric to adult, typically occurring most frequently in individuals aged between 5 and 45, with an average age of 28.[3] It is the most frequent emergency requiring abdominal surgery in childhood, often occurring during the second decade of life.[4,5,6] The American College of Surgeons and the World Society of Emergency Surgery recommend appendectomy (either laparoscopic or open) as the preferred treatment for both uncomplicated and complicated cases of appendicitis, making it one of the most frequently conducted surgical procedures.[3]

The procedure is generally safe, with a low incidence of mortality.[7] There are two approaches utilized for performing appendectomies: open surgery and laparoscopic surgery. Open appendectomy was initially described by McBurney in the late 19th century[8], and since then, the technique has remained almost the same. In 1983, Semm introduced laparoscopic appendectomy[9], which followed open appendectomy by almost a century. However, laparoscopic appendectomy has become more popular than its open counterpart.[10-13]

Nevertheless, there are advantages and disadvantages associated with the laparoscopic approach. Over 70 randomized trials have compared the two approaches, and numerous systematic reviews and meta-analyses have analyzed these comparisons.[10-12,14,15] A systematic review from 2015, which evaluated nine high-quality meta-analyses involving 8 to 67 randomized trials each, concluded that the laparoscopic approach exhibited advantages in terms of lower rates of wound infections, reduced pain on postoperative day 1, and shorter hospital stays. Conversely, the open approach was found to be superior in terms of lower rates of intra-abdominal abscesses and shorter operative times.[16] While numerous studies have compared the outcomes of open and laparoscopic appendectomies globally, research specifically focused on Saudi Arabia is relatively scarce. To date, only one article has reviewed this topic within the Saudi Arabia context, involving a small sample size of three studies[17]. In our comprehensive review, we aim to include all Saudi studies that potentially mention the outcomes of open, laparoscopic, or both types of appendectomies. This comprehensive review will provide a more detailed understanding of the outcomes associated with these surgical approaches in Saudi Arabia.

Methods:

In this review we conducted a comprehensive search across multiple databases, including PubMed, Google Scholar, and MEDLINE, to identify relevant studies exploring the outcomes of open and laparoscopic appendectomies in Saudi Arabia. Our search encompassed articles from any date and aimed to capture any potential comparisons between these surgical approaches. To ensure thorough coverage, we utilized various keywords such as “appendectomy outcome Saudi Arabia," laparoscopic appendectomy Saudi Arabia," "open appendectomy Saudi Arabia," "laparoscopic vs. open appendectomy Saudi Arabia," "pediatric appendectomy Saudi Arabia," and " acute appendicitis Saudi Arabia." Additionally, we leveraged the related articles function within databases to expand our search scope. All retrieved articles were in the English language.

Independent screening of titles and abstracts was conducted by two authors. Full text was retrieved for any study appearing to be satisfying inclusion criteria. Clarification of discrepancies on eligibility was done through discussion or consulting a third author. We included all Saudi Arabian studies published in English, reporting outcomes of open appendectomy, laparoscopic appendectomy, or both. Case reports, narrative overviews, and trials without clear outcome data were not included. The quality of each study's methodology was assessed qualitatively based on design (prospective vs. retrospective), sample size, and clarity of outcome reporting. No predefined scoring tool (e.g., Newcastle–Ottawa Scale) was used due to study design heterogeneity.

1. Inclusion criteria:

Our inclusion criteria comprised studies conducted in Saudi Arabia and published in English, specifically examining the outcomes of open and laparoscopic appendectomies. We included studies reporting any relevant outcomes of either approach, encompassing pediatric and adult populations.

2. Exclusion criteria:

For our exclusion criteria, we exclude studies that did not directly compare the outcomes of open and laparoscopic appendectomies, as well as case reports. Additionally, we excluded any study conducted outside Saudi Arabia, and any study that did not potentially mention any outcome of either approach.

Results:

Our comprehensive review study involving 22 articles from various cities and centers across Saudi Arabia, with diverse methodologies. Table 1 provides a summary of these 22 studies.

Table 1: Summary of the studies.

Title	Study type	Sample Size	City/Center	Main Findings	Reference #
Analysis of 190 Female Patients after Appendectomy	Retrospective cohort	190 females	Jeddah, Saudi Arabia	LA is a low-risk operation for pregnant women with acute appendicitis.	18
Laparoscopic vs. Open Appendectomy in Females	Comparative study	60 females	Al-Hassa, Saudi Arabia	OA had shorter anesthesia & surgery time; LA had less pain, faster recovery.	19
LA for Complicated Appendicitis in Children	Retrospective review	59 children	Riyadh, Saudi Arabia	Minimal post-op pain, short hospital stay, low conversion rate.	20
LA vs OA in Men	Comparative study	100 males	Multi-center	No significant advantage of LA over OA.	21
LA vs OA	Prospective comparative	50 patients	Jeddah, Saudi Arabia	Longer operative time for LA; no significant difference in hospital stay.	22
LA vs OA Outcomes	Prospective study	502 patients	Tabuk, Saudi Arabia	LA had shorter hospital stay, lower infection rates, shorter operative time.	23
LA vs OA	Comparative study	100 cases	Jeddah, Saudi Arabia	LA had significantly shorter operative time; no difference in infection rates.	24
Clinical, Radiological & Pathological Review	Retrospective analysis	336 patients	Al Qassim, Saudi Arabia	OA had higher surgical site infection rates.	25
Advantages & Complications of LA	Cross-sectional study	243 patients	Jeddah, Saudi Arabia	LA had shorter hospital stay, faster recovery, lower infection rates.	26
LA in Children	Critical review	113 children	Riyadh, Saudi Arabia	LA is safe and effective for managing acute appendicitis in children.	27
LA vs OA	Prospective comparative	227 patients	Saudi Arabia	LA had fewer infections, shorter hospital stay, longer operative time.	28
Surgical Site Infection Post-Appendectomy	Retrospective review	433 patients	Jeddah, Saudi Arabia	OA had higher infection rates, longer surgery, and hospital stay.	29
LA vs OA in Pediatric Patients	Retrospective review	1883 children	Riyadh, Saudi Arabia	LA had longer operative time and hospital stay, more complications.	30
Two-Trocar LA in Adults	Retrospective study	129 adults	Medinah, Saudi Arabia	Most procedures successful, minor wound infections, low conversion rate.	31

LA vs OA	Retrospective study	200 patients	Buraidah, Saudi Arabia	LA had shorter hospital stay, faster return to diet, lower pain medication use.	32
LA for Perforated Appendicitis in Children	Retrospective study	81 children	Jeddah & Egypt	LA had shorter operative time, OA had more complications.	33
Safety of LA	Retrospective study	113 patients	Jeddah, Saudi Arabia	LA had varied operative time, low conversion rate, minimal complications.	34
Early vs Late Appendectomy	Retrospective analysis	311 patients	Dharan, Saudi Arabia	No significant difference in recovery outcomes.	35
LA vs OA in Pregnancy	Retrospective analysis	116 pregnant women	Riyadh, Saudi Arabia	LA had shorter surgery time and hospital stay; no adverse fetal outcomes.	36
Predictors of Surgical Approaches	Retrospective cross-sectional	405 patients	Riyadh, Saudi Arabia	LA preferred in uncomplicated cases; OA better for patients with prior surgery.	37
LA Review over 7 Years	Retrospective study	331 patients	Riyadh, Saudi Arabia	LA had low infection rates, shorter hospital stays, and was safe.	38
LA vs OA	Prospective cohort	125 patients	Najran, Saudi Arabia	LA had shorter surgery, lower infection rates, and shorter hospital stay.	39

Table 2. Summary of Hospital Stay Duration and Preferred Surgical Approach Based on Complication Trends.

Table 2: Summary of Hospital Stay Duration and Statistical Significance.

Study	Laparoscopic (days)	Open (days)	Statistical Significance
Al-Mulhim et al.	2.0	2.0	No significant difference
Merdad et al.	3.76	2.96	Significant difference (P = 0.032)
Soomro et al.	1.88	2.14	Not significant (P = 0.098)
Khanzada et al.	3.18	5.02	Significant difference (P < 0.001)

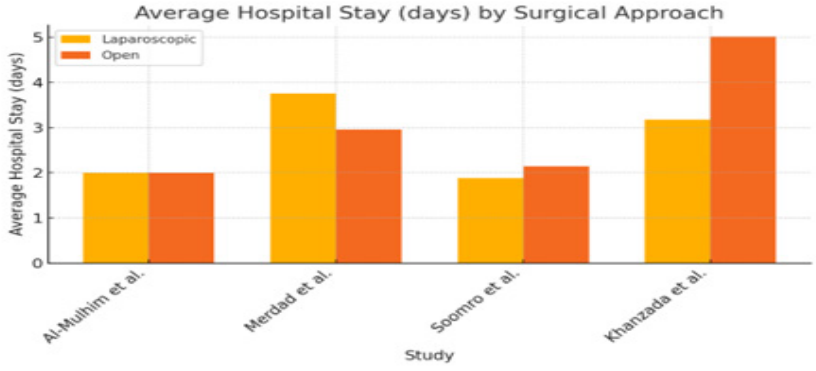


Figure 1: Bar chart comparing average hospital stay (days) for laparoscopic versus open appendectomy.

Alotaibi, Abdulrahman M., et al. conducted a retrospective cohort review at Dr. Soliman Fakeeh Hospital (Jeddah, Saudi Arabia) to evaluate the clinical presentation and outcomes of pregnant and non-pregnant female patients underwent appendectomy. From January 2016 to December 2018, 190 females met the study's criteria. It demonstrated that laparoscopic appendectomy is a low-risk operation for pregnant women with acute appendicitis.[18]

Al-Mulhim, Abdulrahman S et al. conducted a study from January 1999 to April 2000 at King Fahad Hospital, Hofuf, Al-Hassa, Kingdom of Saudi Arabia, to compare laparoscopic versus open appendectomy in the following terms: operative, anesthesia, length of stay, post-operative pain, medicine, wound healing, and days to return to normal activity. It demonstrated that the open group had lower anesthetic and operating times (68, 50 vs. 85, 65 minutes). The laparoscopic group had a significantly lower postoperative narcotic demand ($P<0.05$), quicker reintroduction of diet, and faster return to regular activities.[19]

Mallick, Mohammad Saquib, et al. performed a retrospective review of children who had laparoscopic appendectomy for complicated appendicitis at King Khalid University Hospital in Riyadh, Saudi Arabia, between January 1998 and March 2006. The study included 59 children ages 3 to 12 years old. An average operation time was 62 minutes. The average duration of hospitalization was 5 days. The postoperative narcotic analgesic requirement was modest. Two patients (3.38%) had their laparoscopy converted to open surgery. These two cases were excluded from further analysis. Four out of 57 participants (7.01%) experienced postoperative complications. Three individuals (5.26%) developed wound infections. One patient (1.75%) developed a hematoma near the umbilical port site. There was no postoperative intraabdominal collection. Laparoscopic appendectomy was shown to be a safe alternative for treating complicated appendicitis.[20]

Helmy, M A conducted a comparative study of laparoscopic versus open appendicectomy in men to evaluate clinical parameters, anesthesia duration, operating time, duration of ileus, and length of hospital stay. Between November 1998 and December 2000, a hundred males aged 15 to 65 were admitted to Ain Shams Specialized Hospital and El Demerdash Hospital in Cairo, as well as the Saudi German Hospital in Saudi Arabia, were randomly assigned to have an open or laparoscopic appendectomy. The results demonstrated that laparoscopic

appendectomy had no significant advantages over open appendectomy in the treatment of male patients with suspected appendicitis.[21]

Merdad, Adnan conducted a prospective study to compare laparoscopic and open appendectomy in terms of operative time, hospital stay days, return to regular activity, and complications. The study compared 25 patients who underwent open appendectomy versus 25 patients who had laparoscopic appendectomy at Dr. Bakhsh Hospital (a private hospital), beginning in January 1995 and terminating when the numbers required were met. Only adult patients were considered. The study indicated that laparoscopic surgery took longer than open surgery (79.6 minutes vs. 53.4 minutes, P < 0.000I). The difference in return-to-normal activity and hospital stay days was not statistically significant. There were four cases (160/0) of wound infections in the open patients and one intra-abdominal abscess (4%) in the laparoscopic cases, respectively. Laparoscopic appendectomy offers no greater advantage over open appendectomy for the average patient with suspected appendicitis.[22]

prospective comparative study is performed in the Department of Surgery, North West Aramed Forced Hospital, Tabuk, Kingdom of Saudi Arabia by Eledreesi, Mohannad, et al to compare laparoscopic vs open appendectomy with regard to postoperative pain and nausea, operative results, perioperative and postoperative complications, hospital admission. A total of 502 patients underwent Appendectomy from 1/1/2012 till 31/12/2015 were enrolled. Laparoscopic appendectomy has improved diagnostic accuracy along with advantages in terms of fewer seroma, hematoma, wound infections, faster recovery, and earlier retention to normal activity but longer operative time.[23]

Soomro, Aftab Ahmed, et al.conducted a comparative study at Jeddah National Hospital, KSA, to assess the differences between laparoscopic appendectomy (LA) and open appendectomy (OA) regarding operative time, complications, and hospital stay. The study involved 100 cases with an average patient age of 33.34+7.23 years. The LA group demonstrated a significantly lower average operating time of 37.11+8.41 minutes compared to the OA group's average of 47.45+4.34 minutes (p=0.001). However, there was no significant difference in the average post-operative hospital stay between the LA group (1.88+0.62 days) and the OA group (2.14+0.90 days) (p=0.098).

The occurrence of post-operative infection was statistically insignificant in

both groups, with one case reported in the LA group and an unspecified number in the OA group (p=558). In one case, conversion to an open procedure was necessary due to extensive cecal adhesions, retrocecal gangrenous appendicitis, and local peritonitis.

Regarding recovery time, 70% of patients in the LA group returned to their normal routine within 10 days, while the remaining patients resumed their normal activities within 15 days. In the OA group, 60% of patients returned to normal activity, and 40% returned to work after 20 days.[24]

A retrospective review spanning 24 months was conducted at Buraidah Central Hospital in Al Qassim, Saudi Arabia, to analyze patients who underwent appendectomy between July 1, 2019, and June 30, 2021. The study included 205 cases (61%) of open appendectomy and 131 cases (39%) of laparoscopic appendectomy. The overall postoperative complication rate was 21.4%, with surgical site infection being the sole complication observed. The open approach had a significantly higher incidence of surgical site infections compared to the laparoscopic approach (p=0.001).[25]

Nassir et al group, conducted a study at King Abdulaziz Hospital and Oncology Center in Jeddah, Saudi Arabia, to evaluate the prevalence of laparoscopic appendectomy (LA) and its associated advantages across various variables. The study involved 243 patients diagnosed with acute appendicitis between April and July 2016. The findings revealed several benefits of the laparoscopic approach, including a shorter hospital stay, reduced requirement for postoperative analgesia, faster recovery of food tolerance, earlier return to work, and a lower incidence of wound infection. Additionally, the study observed a significant preference among patients for laparoscopic appendectomy and high levels of satisfaction following the surgical procedure.[26]

Al-Bassam conducted a prospective study to evaluate the safety, efficacy, and complications of laparoscopic appendectomy (LA) specifically in children. The study included a total of 113 children who met specific inclusion criteria, and underwent LA between January 1999 and May 2003 at King Khalid University Hospital in Riyadh, Kingdom of Saudi Arabia. The findings indicated that LA is a safe and effective method for managing acute uncomplicated appendicitis in children.

During the study period, 113 children underwent attempted laparoscopic appendectomy. Out of these, the procedure was successfully completed in 100 patients, with 85 having uncomplicated appendicitis

and 15 having complicated appendicitis. However, in 13 cases (11.5%), a conversion to open appendectomy was necessary due to the presence of complicated appendicitis.[27]

Marzouk et al group conducted a study comparing laparoscopic appendectomy (LA) with open appendectomy (OA). The study included a total of 227 consecutive patients admitted with suspected appendicitis between 1995 and 1999. Patients were divided into two groups: LA (n=108) and OA (n=119).

The findings revealed that wound infection incidence was significantly higher in the OA group (7.6%) compared to the LA group (0%) ($p<0.003$). However, there was no significant difference in intraabdominal infections between the two groups. The laparoscopic group had a significantly shorter hospital stay ($p<0.046$), although the operative time was slightly longer compared to the open group ($p<0.002$). Conversion to open surgery was required in only one case.

Overall, the study indicated that laparoscopic appendectomy is as effective and safe as open appendectomy, with lower rates of wound infection and shorter hospital stays.[28]

Koumu et al. conducted a retrospective study at King Abdulaziz University Hospital

(KAUH). The study included all patients who underwent appendectomy between 2013 and 2017. Among the 433 patients analyzed, 31 individuals were identified as having developed surgical site infection.

The statistical analysis revealed significant associations between SSI and several factors. Notably, an open technique of appendectomy, longer surgical duration, presence of perforated appendicitis, extended hospitalization time, high postoperative white blood cell count, and low albumin levels were all significantly correlated with SSI.

However, no significant relationships were found between SSI and other factors,

including demographics, clinical characteristics, intraoperative variables, perioperative variables, and hemoglobin levels.

To reduce the high rate of SSI post-appendectomy, it is recommended to employ the optimal technique of approach, minimize surgical duration, and provide early intervention. Considering other perioperative factors is also crucial for achieving improved outcomes for patients.[29]

1883 pediatric patients diagnosed with acute appendicitis and underwent surgery either open or laparoscopic appendectomy at King Abdulaziz Medical city in Riyadh were included in a retrospective study to assess and compare advantages of LA with

OA In regard of outcomes, operative time, hospital stay and antibiotic use and other variables. OA was the dominant procedure with whopping 88.8%. they've seen a statistically significant difference between LA and OA neutrophil percentages and operative surgeons and histopathology reports. Regarding complications of surgery, LA had a higher percentage than OA, 5.7% and 3.2% respectively. The operative time in LA was significantly longer at 73.2 +_ 25.3 minutes compared with OA which was 53.1 +_ 25 minutes, consequently, LA patients had a longer stay at hospital at 3.81 +_ 2.4 days compared with OA 3.19+_ 2.3 days. Antibiotic consumption during admission had no significant difference between the two groups but those who underwent LA had used antibiotic upon discharge longer than OA patients. However, the LA procedure had significantly increased over the timeframe of the study.[30]

Fazili and Al Bouq et al have done a retrospective study at Medinah Al-Munawarah, Saudi Arabia between July 2002 and December 2003 to assess the efficacy and safety of the two-trocar technique. The study included 129 patients older than 12 years old. The modified procedure was successful in most cases (101, 78.3%) with only two trocars, third trocar was needed in 14 cases while 5 cases needed to be drained through the third trocar incision, the remaining patients (6 cases) had to be converted to an open appendectomy. Complications happened in a small percentage, 6 cases had minor wound infections, while port abscess and appendiceal carcinoma with peritoneal metastases each had one case.[31]

Alsaigh and Alshebromi et al compared the differences in the outcomes of open and laparoscopic appendicectomy in patients with acute appendicitis in Buraidah, Saudi Arabia. The study was conducted between 2015 and 2017 and included 200 cases, 52% of patients had open appendicectomy. The duration of operation was less in laparoscopic with mean time of 68.80 ± 21.19 min while open was 70.29 ± 23.53 min, both procedures had the same minimum time, but the maximum time was less in the laparoscopic by 25 min. also, hospital stay was less in the laparoscopic at 2.51 ± 1.28 days while the open was 3.22 ±1.98 days. The use of analgesics was less in those who underwent open procedure with only 0.65 ± 0.97 while laparoscopic patients were 0.84 ± 1.40. laparoscopic patients were reintroduced to oral diet earlier than those with open appendicectomy, 20.58 ± 19.26 and 30.17 ± 24.95 hours respectively.[32]

Kasem and Alshahat evaluated the outcome between laparoscopic and open appendectomy in pediatric patients with perforated appendicitis in two countries,

Saudi Arabia and Egypt, there was no separate results to each country. The retrospective study was conducted between January 2023 and October 2016, 81 pediatric patients less than 14 years were included. Laparoscopic approach median time was 51.6 ± 20.3 min while the open approach which was 62.8 ± 28.6 min. hospital stay was significantly different, the laparoscopic procedure was 3.5 ± 2.6 days, while the open procedure was 5.8 ± 2.9 days. Regarding postoperative complications, in total there were 17 cases in the open appendectomy while the laparoscopic had only 7 cases with no intraabdominal abscesses.[33]

AL-Mashat has done a study between January 2003 to December 2004 to evaluate laparoscopic appendectomy results compared with other studies, included 113 patient who underwent Laparoscopic approach. The mean temperature was 37.42C and mean white blood count was 11.60(4-11 10^g/l). the minimum operation time was 30 minutes, and the maximum time was 140 minutes. 7.1% of patients had to be converted to an open appendectomy due to difficult anatomy, appendicular mass and appendicular abscess. 12.4% of cases had postoperative complications. Wound infection ranking the highest of complications followed by paralytic ileus and lastly abscesses. Duration of hospital stay was between 1 to 7 days.[34]

The study by Emad M AL-Osail et al. aimed to evaluate the practice of early appendectomy for acute appendicitis and compare outcomes between early and delayed procedures. They analyzed data from 311 patients admitted between 01/01/2013 and 30/11/2017, defining early appendectomy as within 12 hours of diagnosis. It demonstrated no significant differences in outcomes between early and late appendectomy in terms of combined drain procedures, time to a soft diet, length of hospital stay, costs, and opioid intake. The conclusion indicated that early appendectomy is not commonly performed in their center, and outcomes between early and delayed procedures were similar.[35]

A retrospective review by Elshamy, E., et al. at Menoufia University (Egypt) and Rabia Hospital (Riyadh, Saudi Arabia) to assess outcomes of open versus laparoscopic appendectomy in 116 pregnant women with acute appendicitis between 2011 and 2021. They found no significant difference in abortion rates or other maternal and fetal outcomes between the two groups. Laparoscopic appendectomy showed advantages in terms of shorter operative time, faster return of bowel motility, and shorter hospital stay, suggesting its safety and feasibility during pregnancy under

strict criteria.[36]

Khalid Ahmed Aljasser et al. conducted a study to compare laparoscopic and open appendectomy approaches in 405 patients with acute or complicated appendicitis. They found that laparoscopic appendectomy was more effective in reducing postoperative outcomes in less complicated cases, while open appendectomy was preferred in patients with a history of surgery due to adhesion formation and infection risks. The choice of surgical approach depends on the patient's history, overall health, and the appendix's condition, with laparoscopic surgery generally favored for uncomplicated appendicitis.[37]

Tucker et al. conducted a retrospective study from 1992 to 1999, evaluating the role of laparoscopic appendicectomy in diagnosing and treating acute appendicitis. They enrolled 331 patients with suspected appendicitis, achieving a 98% success rate in laparoscopic appendix removal with a median operating time of 63.3 minutes. Postoperative complications occurred in 6% of patients, including wound infection, enterocutaneous fistula, pelvic abscess, hemorrhage, urinary tract infection, respiratory tract infection, incisional herniae, and pain at trocar sites, with a mean hospital stay of 2.31 days. The study concluded that laparoscopic appendicectomy is a safe procedure with low morbidity, especially beneficial for obese patients, those with other pathologies, unusual appendix positions, and it has a low infection rate.[38]

Ariq Wahab Khanzada et al. conducted a prospective study at King Khalid Hospital in Najran, Saudi Arabia, comparing laparoscopic appendectomy (LA) and open appendectomy (OA) regarding length of hospital stay, operative time, and in-hospital complications. The study spanned 26 months from July 2002 to August 2004, with 60 patients in the LA group and 65 in the OA group. Although the operating time was longer for LA, the length of hospital stay was shorter compared to OA. Both groups experienced wound infections, but it was more prevalent in the OA group. The study concluded that LA can be performed with similar morbidity to OA and may even have a reduced wound infection rate.[39]

In the four studies that directly compared laparoscopic and open hospital stay duration, there were disparate findings: Al-Mulhim et al. found no significant difference, with both laparoscopic and open procedures averaging 2.0 days. Merdad et al. reported greater hospital stays for the laparoscopic group (3.76 days) compared to the open group (2.96 days, P = 0.032). Soomro et al. reported shorter hospital stays with laparoscopic appendectomy (1.88 days)

versus open (2.14 days), though without statistical strength (P = 0.098). Khanzada et al. reported significantly lower hospital stays in the laparoscopic group (3.18 days) versus open appendectomy (5.02 days, P < 0.001).

Discussion:

The majority of studies included in our review indicated that laparoscopic appendectomy is a safe and effective treatment. Different articles from around the world agrees.[40-42] It shows that laparoscopic appendectomy has benefits like shorter hospital stays (Table 2, Figure 1), quicker recovery, and less post-op complications compared to open appendectomy. For example, Al-Mulhim et al. found that laparoscopic appendectomy leads to a fast return to normal activities and needs fewer pain drugs after surgery compared to open appendectomy.[19] Nassir et al. also found benefits like shorter hospital stays, less post-op pain, and faster recovery with laparoscopic appendectomy.[26]

But some studies differ and revealed that laparoscopic and open appendectomy are equally effective. Merdad found no big differences in surgery time, time in the hospital, or complications between the two methods.[22] Alsaigh and Alshebromi saw similar surgery times between laparoscopic and open appendectomy, but laparoscopic appendectomy had shorter hospital stays.[32] These differences might come from the people in the studies, ways of doing surgery, and care after surgery.

Also, a few studies point out how it's key to pick the right patients and have skilled surgeons for laparoscopic appendectomy to work well. Al-Mashat said choosing the right patients and right surgery methods is key for good results with laparoscopic appendectomy.[34] Fazili and Al Bouq said surgeon skills and know-how are crucial for laparoscopic appendectomy, as shown by their two-trocar technique.[31]

We additionally noticed the requirements for more research on the best surgery method for certain groups and cases. Like, studies on laparoscopic and open appendectomy in pregnant women had mixed results on how it affected the mother and baby. Alshamy et al. saw no big differences in risk of miscarriage or for the mother and baby with both methods. However they found benefits with laparoscopic appendectomy, such as faster surgery and time in the hospital.[36]

In conclusion, most studies in our review align with many articles around the world, supporting the idea that laparoscopic appendectomy is a safe and effective way to treat acute appendicitis in Saudi Arabia.

Limitations:

This narrative review is subject to several limitations. First, included studies were

mostly retrospective with small to moderate sample sizes, placing them at greater risk of selection and reporting bias. Second, there was considerable heterogeneity in study design, patient populations (e.g., adult vs. pediatric vs. pregnant), and outcome definitions (e.g., definition of "complication" or "recovery time"). Finally, only English-language publications were included, which may lead to publication bias. Fourth, no quality-assessment tool was employed formally in this review, but study quality was evaluated qualitatively. Finally, because results were synthesized narratively and not through meta-analysis, no pooled estimates or statistical weighting were performed. Therefore, these considerations should be kept in mind when interpreting our findings.

References:

1. Bhangu, A., Søreide, K., Di Saverio, S., Assarsson, J. H., & Drake, F. T. (2015). Acute appendicitis: modern understanding of pathogenesis, diagnosis, and management. Lancet (London, England), 386(10000), 1278–1287. https://doi.org/10.1016/S0140-6736(15)00275-5
2. Snyder, M. J., Guthrie, M., & Cagle, S. (2018). Acute Appendicitis: Efficient Diagnosis and Management. American family physician, 98(1), 25–33.
3. Addiss, D. G., Shaffer, N., Fowler, B. S., & Tauxe, R. V. (1990). The epidemiology of appendicitis and appendectomy in the United States. American journal of epidemiology, 132(5), 910–925. https://doi.org/10.1093/oxfordjournals.aje.a115734
4. Rentea, R. M., & St Peter, S. D. (2017). Pediatric Appendicitis. The Surgical clinics of North America, 97(1), 93–112. https://doi.org/10.1016/j.suc.2016.08.009
5. Hennelly, K. E., & Bachur, R. (2011). Appendicitis update. Current opinion in pediatrics, 23(3), 281–285. https://doi.org/10.1097/MOP.0b013e32834604da
6. Marzuillo, P., Germani, C., Krauss, B. S., & Barbi, E. (2015). Appendicitis in children less than five years old: A challenge for the general practitioner. World journal of clinical pediatrics, 4(2), 19–24. https://doi.org/10.5409/wjcp.v4.i2.19
7. Humes,D.J.,&Simpson,J.(2006).Acute appendicitis. BMJ (Clinical research ed.), 333(7567), 530–534. https://doi.org/10.1136/bmj.38940.664363.AE
8. McBurney C. (1895). Appendicitis. The Southern medical record, 25(1), 32–34.
9. Semm K. (1983). Endoscopic appendectomy. Endoscopy, 15(2), 59–64. https://doi.org/10.1055/s-2007-1021466

10. 10. Sporn, E., Petroski, G. F., Mancini, G. J., Astudillo, J. A., Miedema, B. W., & Thaler, K. (2009). Laparoscopic appendectomy--is it worth the cost? Trend analysis in the US from 2000 to 2005. Journal of the American College of Surgeons, 208(2), 179–85.e2. https://doi.org/10.1016/j.jamcollsurg.2008.10.026
11. Nguyen, N. T., Zainabadi, K., Mavandadi, S., Paya, M., Stevens, C. M., Root, J., & Wilson, S. E. (2004). Trends in utilization and outcomes of laparoscopic versus open appendectomy. American journal of surgery, 188(6), 813–820. https://doi.org/10.1016/j.amjsurg.2004.08.047
12. Brügger, L., Rosella, L., Candinas, D., & Güller, U. (2011). Improving outcomes after laparoscopic appendectomy: a population-based, 12-year trend analysis of 7446 patients. Annals of surgery, 253(2), 309–313. https://doi.org/10.1097/SLA.0b013e3181fc9d53
13. Faiz, O., Clark, J., Brown, T., Bottle, A., Antoniou, A., Farrands, P., Darzi, A., & Aylin, P. (2008). Traditional and laparoscopic appendectomy in adults: outcomes in English NHS hospitals between 1996 and 2006. Annals of surgery, 248(5), 800–806. https://doi.org/10.1097/SLA.0b013e31818b770c
14. Jaschinski, T., Mosch, C. G., Eikermann, M., Neugebauer, E. A., & Sauerland, S. (2018). Laparoscopic versus open surgery for suspected appendicitis. The Cochrane database of systematic reviews, 11(11), CD001546. https://doi.org/10.1002/14651858.CD001546.pub4
15. Andersson R. E. (2014). Short-term complications and long-term morbidity of laparoscopic and open appendicectomy in a national cohort. The British journal of surgery, 101(9), 1135–1142. https://doi.org/10.1002/bjs.9552
16. Jaschinski, T., Mosch, C., Eikermann, M., & Neugebauer, E. A. (2015). Laparoscopic versus open appendectomy in patients with suspected appendicitis: a systematic review of meta-analyses of randomised controlled trials. BMC gastroenterology, 15, 48. https://doi.org/10.1186/s12876-015-0277-3
17. Miftah, M., Attiah, J., Alawaji, O., Alghamdi, F., Alasmari, A., Elsayed, A., Alfarrah, B., Almohideb, M., Majrashi, R., & Al Adi, M. (2018). Open versus laparoscopic appendectomy among Saudi patients. International Journal Of Community Medicine And Public Health, 5(9), 3725–3729. https://doi.org/10.18203/2394-6040.ijcmph20183557
18. Alotaibi, A. M., Moshref, L. H.,

Moshref, R. H., & Felemban, L. S. (2021). Analysis of 190 female patients after appendectomy. Obstetrics and Gynecology International, 2021.

19. Al-Mulhim, A. S., Al-Mulhim, F. M., Al-Suwaiygh, A. A., & Al-Masaud, N. A. (2002). Laparoscopic versus open appendectomy in females with a clinical diagnosis of appendicitis. Saudi medical journal, 23(11), 1339-1342.
20. Mallick, M. S., Al-Qahtani, A., & Al-Bassam, A. (2007). Laparoscopic appendectomy is a favorable alternative for complicated appendicitis in children. Pediatric surgery international, 23, 257-259.
21. Helmy, M. A. (2001). A comparative study between laparoscopic versus open appendicectomy in men. Journal of the Egyptian Society of Parasitology, 31(2), 555-562.
22. Merdad, A. (1999). Laparoscopic versus open appendectomy. Medical Science, 7(1).
23. Eledreesi, M., Alhwati, T., Alayed, A., Aledreesi, A., & Alawi, Y. (2022). Laparoscopic versus Open Appendectomy Outcomes. Surgical Science, 13(4), 183-187.
24. Soomro, A. A., Memon, J., Gharno, R., Memon, A. S., Chana, K., & Malik, H. A. (2022). Laparoscopic Appendectomy VS Open Appendectomy at Jeddah National Hospital Saudi Arabia; A Comparative Study. Pakistan Journal of Medical & Health Sciences, 16(05), 733-733.
25. Alnuaymah, F., Etonyeaku, A. C., Alsaeed, H. S., AlSamani, A. N., Alshubrmi, A. A., Aldoubiab, R. K., ... & Almushiqeh, M. (2022). Clinical, Radiological and Pathological Appraisal of Acute Appendicitis in Al Qassim, Saudi Arabia: A Single-Center Retrospective Analysis. Cureus, 14(8).
26. Nassir, A. Y., Kashha, A. M., Altrabolsi, A. H., Ghannam, A. N., Sindi, O. A., & Alzimaity, A. M. (2017). Laparoscopic appendectomy between the advantages and complications: a cross section study–Jeddah–Saudi Arabia–2016. The Egyptian .Journal of Hospital Medicine, 67(2), 660-665
27. Al-Bassam, A. A. (2005). Laparoscopic appendectomy in children. Saudi medical journal, 26(4), 556-559.
28. Marzouk,M.,Khater,M.,Elsadek,M.,& Abdelmoghny, A. (2003). Laparoscopic versus open appendectomy. Surgical Endoscopy And Other Interventional Techniques, 17, 721-724.
29. Koumu, M. I., Jawhari, A., Alghamdi, S. A., Hejazi, M. S., Alturaif, A. H., Aldaqal, S. M., ...& Alturaif, A. (2021). Surgical site infection post-

appendectomy in a tertiary hospital, Jeddah, Saudi Arabia. Cureus, 13(7).

30. Al Namshan, M., & Khubrani, A. (2018). Laparoscopic Appendectomy Versus Open Appendectomy in Pediatric Patients.
31. Fazili, F. M., Al Bouq, Y., El Hassan, O. M., & Gaffar, H. F. A. (2006). Laparoscope-assisted appendectomy in adults: the two-trocar technique. Annals of Saudi Medicine, 26(2), 100-104.
32. Alsaigh, S., Alshebromi, M., Alammar, A., & Altwejri, A. (2019). LAPAROSCOPIC VERSUS OPEN APPENDECTOMY: A RETROSPECTIVE COMPARATIVE STUDY. INDO AMERICAN JOURNAL OF PHARMACEUTICAL SCIENCES, 6(1), 1925-1931.
33. Kasem, H., & Alshahat, W. (2018). Laparoscopic Appendectomy for Perforated Appendicitis in Children. World Journal of Laparoscopic Surgery, 11(1), 1-4.
34. Al-Mashat, F. M. (2009). Is laparoscopic appendectomy a safe procedure? A single surgeon experience at a University Hospital. Medical Science, 16(1).
35. AL-Osail, E. M., Abouleid, A., Alowairdhi, T. M., Bu Bshait, M., Almulhem, A., & Alyami, H. (2018). Is appendectomy performed early for patients with acute appendicitis: Single Centre experience. Jurnalul de Chirurgie, 14(3). https://doi.org/10.7438/1584-9341-14-3-7
36. E, E., LA, E.-S., & A, S. (2022). Laparoscopic versus open appendectomy during pregnancy: Is fetal outcome really different? Austin Journal of Obstetrics and Gynecology, 9(2). https://doi.org/10.26420/austiniobstetgynecol.2022.1203
37. Aljasser, K., Alhouli, A., Alqudaimi, A., Alamer, R., Aloufi, K., Al-Mutairi, N., Alyousef, Z., Alrofydi, A., Al-Rubaki, S., Alghutayghit, A., Bakri, K., Majeed, Z., Alkharraz, A., Alsawat, O., & Abdullah, L. (2022). Patterns and predictors of surgical approaches among patients diagnosed with appendicitis. International Journal of Medicine in Developing Countries, 608–614. https://doi.org/10.24911/ijmdc.51-1637850363
38. Tucker, O., Rashid Al-Faqih, S., El-Amin, O., & Zaki, A. (2002). Laparoscopic appendicectomy: review of 331 cases over 7 years, in a Saudi Arabian hospital. Endoscopy, 34(8), 639–642. https://doi.org/10.1055/s-2002-33241
39. KHANZADA, T. W., SAMAD, A., &

MEMON, W. (2008). Appendectomy; The Professional Medical Journal, 15(04), 425–430. https://doi.org/10.29309/tpmj/2008.15.04.2926

40. Di Saverio, S., Podda, M., De Simone, B. et al. Diagnosis and treatment of acute appendicitis: 2020 update of the WSES Jerusalem guidelines. World J Emerg Surg 15, 27 (2020). https://doi.org/10.1186/s13017-020-00306-3
41. Ventham, N. T., Dungworth, J. C., & Benzoni, C. (2015). Transition towards laparoscopic appendicectomy at a UK center over a 7-year period. Surgical laparoscopy, endoscopy & percutaneous techniques, 25(1), 59–63. https://doi.org/10.1097/SLE.0000000000000017
42. Markar, S. R., Penna, M., & Harris, A. (2014). Laparoscopic approach to appendectomy reduces the incidence of short- and long-term post-operative bowel obstruction: systematic review and pooled analysis. Journal of gastrointestinal surgery : official journal of the Society for Surgery of the Alimentary Tract, 18(9), 1683–1692. https://doi.org/10.1007/s11605-014-2572-7