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# COMPARISON OF POST OPERATIVE RECOVERY BETWEEN OPEN VS LAPAROSCOPIC APPENDECTOMY

General Surgery

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## ABSTRACT

**Introduction:** Appendicectomy has been one of the commonest emergency procedures in surgery. Appendicectomy may be performed as a laparoscopic or as an open operation. Open appendicectomy (OA) through laparotomy has been the gold standard for more than a century as far as surgical removal of appendix is concerned. This study to aim comparison of post operative recovery between open vs laparoscopic appendectomy. **Method :** Patients diagnosed clinically or by imaging technique as appendicitis were recruited in the study. Patients were randomly divided into two groups, and written consent was obtained from each patient. A total of 60 patients of appendicitis of all ages and both sexes were included in the study. To compare post operative pain, hospital stay, surgical site infection between these two group. **Results :** This study include a total 60 patients. Patients in laparoscopic appendectomy group significantly reported lower post op pain, hospital stay & surgical site infection. **Conclusion:** This study suggests laparoscopic appendectomy's post operative pain, stay, ssi. Is improved.

## KEYWORDS

laparoscopic appendectomy, open appendectomy

## INTRODUCTION

Despite the fact that the appendix—a poorly formed remnant of the caecum known as a "vestigial" organ—serves no clear purpose, appendix diseases are common in surgical practice, and appendicitis is still the primary cause of emergency abdominal surgery.[1]

Despite universal recognised as a medical emergency requiring the removal of the inflamed appendix, appendicitis remains a notoriously difficult diagnosis. [2-3]

With millions of people enduring appendectomy annually, it is certainly one of among the most common surgical procedures performed worldwide. The primary purpose for this surgical approach is to treat acute appendicitis which is an inflammatory illness of the appendix that, if left untreated, can cause perforation, abscess formation, and peritonitis among other fatal effects. For a long time, surgeons debated and explored the benefits and drawbacks of performing appendectomy via open or laparoscopic procedures. Both procedures have perks and drawbacks; choosing which is most effective depends on a variety of factors, including the well-being of the individual, the surgeon's personal preference and the institution's available resources. Appendicectomy can be performed either open or laparoscopically. For almost a century, laparoscopic open appendicectomy (OA) has been the preferred surgical approach for removing the appendix. [4]

Minimally invasive surgery is a new subspecialty that has arisen during the previous decade. Surgeons have made enormous advances in the previous fifteen years, transitioning from simple diagnostic procedures to more complicated laparoscopic surgeries, which has transformed the concept of general surgery. A number of writers have recently advocated that laparoscopic appendicectomy (LA) is the best way to treat acute appendicitis. Several randomised trials comparing OA with LA found that LA offers several advantages, including less discomfort, faster recovery, fewer wound infections, better cosmetic results and lower post-operative morbidity. According to a global literature assessment, the trend is obviously shifting from open appendicectomy to laparoscopic appendicectomy.[5]

In 1977, De Kok performed an appendicectomy using laparoscopy. Kurt Semm had one of his first Los Angeles concerts in 1983.Schreiber utilised LA to treat acute appendicitis in 1987. Nowadays, several treatment trials are being undertaken with diverse results.[6-7]

It has grown in popularity among surgeons because to its less invasive nature, although not everyone agrees that it should be used as a substitute to open appendectomy.[8]

Those in favour of laparoscopic appendectomy believe that the approach allows for speedier recovery times, less discomfort following surgery and a quicker return to normal life. The advantages of laparoscopy include a safer exploration technique, better view into the peritoneal cavity and a smaller incision than previous approaches.[9]

In this scenario, the primary concern is the difference in post-operative recovery durations between open and laparoscopic appendectomy. Although both treatments seek to completely remove the inflamed appendix, the impact on the patient's health and recovery may be significantly different. In comparison to the less invasive laparoscopic appendectomy, the more traditional open appendectomy necessitates a larger incision and in some cases, an intraperitoneal approach. Surgeons and patients alike must prioritise understanding the differences in postoperative outcomes between the two techniques. [10-11]

The goal of this thesis is to provide a detailed evaluation of the subject by comparing and contrasting the advantages and disadvantages of open versus laparoscopic appendectomy using relevant research, clinical data, and patient accounts. This study may aid surgeons and healthcare workers by clarifying the post-operative recovery process, while patients may benefit by knowing what to expect during their appendectomy recovery.

This study is noteworthy outside the scope of surgical practice. It expands our collective understanding of surgical procedures, patient-cantered care, and healthcare resource optimisation. At a time when evidence-based treatment is critical, this study seeks to provide light on how appendectomy and other surgical procedures are chosen.

## METHODS

**Study Design:**

It was a prospective observational comparative study.

**Study Duration**

The study was carried out at the Department of Surgery, SGT hospital for a period one and a half years following ethical clearance .

**Source Of Data**

Patients admitted with confirmed clinical or radiological diagnosis of appendicitis in the Department of Surgery, SGT Hospital, Budhera, Gurugram , Haryana during the study period.

**Sample Size**

A total of 60 patients of appendicitis of all ages and both sexes were included in the study.

**Inclusion Criteria**

All patients diagnosed as appendicitis of all ages and both sexes were included in the study.

**Exclusion Criteria**

- Pregnant patients
- Patients not fit for surgery
- Patients with signs of diffuse peritonitis and septicaemia

## METHODOLOGY

Patients diagnosed clinically or by imaging technique as appendicitis were recruited in the study. Patients were randomly divided into two groups, and written consent was obtained from each patient.

**Group I:** In this group, 30 patients were admitted and diagnosed with acute appendicitis and underwent open appendectomy. An 8 cm long oblique incision known as McArthur's gridiron incision was made passing through McBurney's point. The incision was deepened and opened in layers and the peritoneal cavity was accessed. The taeniae coli were identified and followed up to the base of the cecum to locate the appendix. The mesoappendix was skeletonized and the base was crushed and transacted.

**Group II:** In this group, 30 patients underwent laparoscopic appendectomy. Three ports were inserted after obtaining adequate pneumoperitoneum. One port was supraumbilical, 10 mm in size, inserted just above the umbilicus through a curvilinear incision for a camera, while two 5 mm ports were inserted, one towards the left and one towards the right of the midline. Two non-traumatic graspers were inserted through both 5 mm trocars to mobilise the appendix adequately and cauterize the mesoappendix. The base of the appendix was crushed, ligated and then amputated.

All patients were closely monitored during their postoperative stay until discharge and observed for postoperative recovery, hospital stay, postoperative pain, and surgical site infection for a follow-up period of 6 weeks on an outpatient basis.

Follow-up: Patients were followed up after 7 days, 15 days, and 1 month postoperatively. Observations were recorded regarding any fever (>38.6°C), wound infection (SSI), postoperative pain, or other complaints. Ultrasonography (USG) was conducted if necessary to assess for any collections.

## RESULTS

| Sign and symptoms | Lap | | Open | | p-value |
|---|---|---|---|---|---|
| | Count | % | Count | % | |
| Pain | 30 | 100.0% | 30 | 100.0% | NA |
| Nausea and vomiting | 20 | 66.7% | 21 | 70.0% | 0.781 |
| Tenderness | 30 | 100.0% | 30 | 100.0% | NA |
| Guarding | 9 | 30.0% | 12 | 40.0% | 0.417 |
| Fever | 12 | 40.0% | 12 | 40.0% | 1.000 |
| Past history of pain | 9 | 30.0% | 12 | 40.0% | 0.417 |

The distribution of signs and symptoms among study participants in both the laparoscopic (Lap) and open surgery (Open) groups shows that all participants in both groups (100%) experienced pain and tenderness, making these symptoms universally present and resulting in a non-applicable (NA) p-value for statistical comparison. Nausea and vomiting were reported by 66.7% (20 out of 30) of participants in the laparoscopic group and 70.0% (21 out of 30) in the open surgery group, with a p-value of 0.781, indicating no significant difference between the groups. Guarding was observed in 30.0% (9 out of 30) of the laparoscopic group and 40.0% (12 out of 30) of the open surgery group, with a p-value of 0.417, suggesting no statistically significant difference. Both groups had an equal incidence of fever, at 40.0% (12 out of 30), with a p-value of 1.000. Lastly, a past history of pain was noted in 30.0% (9 out of 30) of the laparoscopic group and 40.0% (12 out of 30) of the open surgery group, with a p-value of 0.417, indicating no significant difference. Overall, the distribution of signs and symptoms between the two groups showed no statistically significant differences.

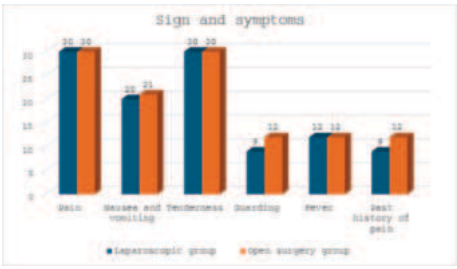



**Table : Distribution Of Study Participants According To USG Findings Among Both Group**

| Inflamed appendix | Lap | | Open | | p-value |
|---|---|---|---|---|---|
| | Count | % | Count | % | |
| No | 10 | 33.3% | 9 | 30.0% | 0.781 |
| Yes | 20 | 66.7% | 21 | 70.0% | |
| Total | 30 | 100.0% | 30 | 100.0% | |

The distribution of study participants according to ultrasound (USG) findings reveals that in the laparoscopic group (Lap), 33.3% (10 out of 30) did not have an inflamed appendix, while 66.7% (20 out of 30) had an inflamed appendix. In the open surgery group (Open), 30.0% (9 out of 30) did not have an inflamed appendix, and 70.0% (21 out of 30) did have an inflamed appendix. The p-value of 0.781 indicates that there is no statistically significant difference in the distribution of USG findings between the laparoscopic and open surgery groups.

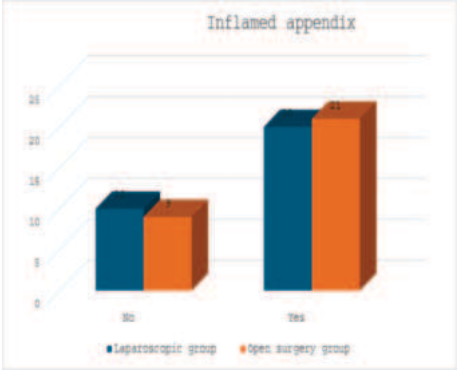



**Table : Comparison Of Post-op Pain Score Between Both Groups**

| Group | Mean | SD | Median | Minimum | Maximum | p-value |
|---|---|---|---|---|---|---|
| Lap | 1.367 | .4901 | 1.000 | 1.0 | 2.0 | 0.0001 |
| Open | 3.300 | .7944 | 3.500 | 2.0 | 4.0 | |
| Total | 2.333 | 1.1741 | 2.000 | 1.0 | 4.0 | |

This table presents the comparison of post-operative pain scores between the laparoscopic (Lap) and open surgery (Open) groups. The mean pain score for the laparoscopic group is 1.367, with a standard deviation (SD) of 0.4901, while the median score is 1.000. The scores range from a minimum of 1.0 to a maximum of 2.0. In contrast, the mean pain score for the open surgery group is 3.300, with an SD of 0.7944, and a median score of 3.500. The scores range from a minimum of 2.0 to a maximum of 4.0. The p-value of 0.0001 indicates a statistically significant difference in post-operative pain scores between the laparoscopic and open surgery groups, with the laparoscopic group experiencing lower pain scores on average.

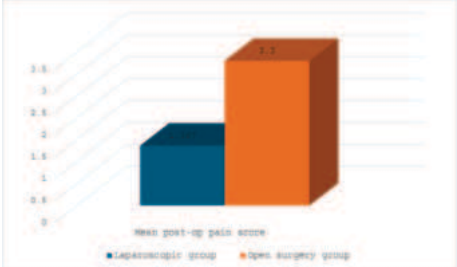



**Table : Comparison Of Post-op Pain Score Severity Between Both Groups**

| Severity | Lap | | Open | | p-value |
|---|---|---|---|---|---|
| | Count | % | Count | % | |

| | | | | | |
|---|---|---|---|---|---|
| No | 19 | 63.3% | 0 | 0.0% | 0.0001 |
| Mild | 11 | 36.7% | 6 | 20.0% | |
| Moderate | 0 | 0.0% | 9 | 30.0% | |
| Severe | 0 | 0.0% | 15 | 50.0% | |
| Total | 30 | 100.0% | 30 | 100.0% | |

The comparison of post-operative pain score severity between the laparoscopic and open surgery groups reveals that in the laparoscopic group, 63.3% (19 out of 30) reported no pain, while 36.7% (11 out of 30) experienced mild pain. Conversely, in the open surgery group, none reported no pain, 20.0% (6 out of 30) experienced mild pain, 30.0% (9 out of 30) reported moderate pain, and 50.0% (15 out of 30) experienced severe pain. The p-value of 0.0001 indicates a statistically significant difference in the severity of post-operative pain scores between the laparoscopic and open surgery groups, with the laparoscopic group having a higher proportion of participants reporting no pain and a lower proportion experiencing mild, moderate, and severe pain.

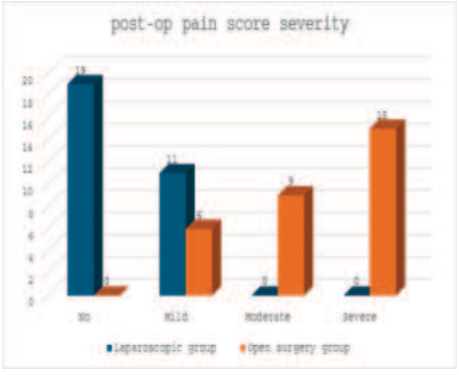



**Table : Comparison Of Post-op Vomiting Between Both Groups**

| Vomiting | Lap | | Open | | p-value |
|---|---|---|---|---|---|
| | Count | % | Count | % | |
| No | 25 | 83.3% | 14 | 46.7% | 0.003 |
| Yes | 5 | 16.7% | 16 | 53.3% | |
| Total | 30 | 100.0% | 30 | 100.0% | |

The comparison of post-operative vomiting between the laparoscopic and open surgery groups indicates that in the laparoscopic group, 83.3% (25 out of 30) did not experience vomiting, while 16.7% (5 out of 30) did. In contrast, in the open surgery group, 46.7% (14 out of 30) did not experience vomiting, while 53.3% (16 out of 30) did. The p-value of 0.003 suggests a statistically significant difference in the occurrence of post-operative vomiting between the laparoscopic and open surgery groups, with a higher proportion of participants in the open surgery group experiencing vomiting compared to the laparoscopic group.

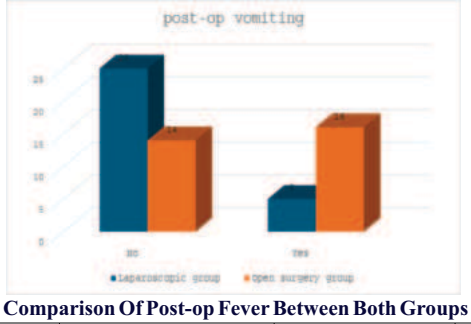



**Table : Comparison Of Post-op Fever Between Both Groups**

| Fever | Lap | | Open | | p-value |
|---|---|---|---|---|---|
| | Count | % | Count | % | |
| No | 27 | 90.0% | 22 | 73.3% | 0.095 |
| Yes | 3 | 10.0% | 8 | 26.7% | |
| Total | 30 | 100.0% | 30 | 100.0% | |

The comparison of post-operative fever between the laparoscopic and open surgery groups reveals that in the laparoscopic group, 90.0% (27 out of 30) did not experience fever, while 10.0% (3 out of 30) did. In contrast, in the open surgery group, 73.3% (22 out of 30) did not experience fever, while 26.7% (8 out of 30) did. The p-value of 0.095 indicates no statistically significant difference in the occurrence of post-operative fever between the laparoscopic and open surgery groups, although there is a trend towards a higher proportion of participants in the open surgery group experiencing fever compared to the laparoscopic group.

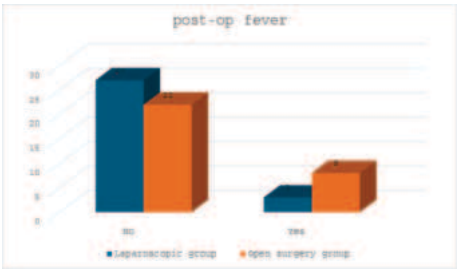



**Table : Comparison Of Wound Infection Between Both Groups**

| Wound infection | Lap | | | | p-value |
|---|---|---|---|---|---|
| | Count | % | Count | % | |
| No | 29 | 96.7% | 22 | 73.3% | 0.011 |
| Yes | 1 | 3.3% | 8 | 26.7% | |
| Total | 30 | 100.0% | 30 | 100.0% | |

The comparison of wound infection between the laparoscopic and open surgery groups demonstrates that in the laparoscopic group, 96.7% (29 out of 30) did not experience wound infection, while 3.3% (1 out of 30) did. Conversely, in the open surgery group, 73.3% (22 out of 30) did not experience wound infection, while 26.7% (8 out of 30) did. The p-value of 0.011 indicates a statistically significant difference in the occurrence of wound infection between the laparoscopic and open surgery groups, with a higher proportion of participants in the open surgery group experiencing wound infection compared to the laparoscopic group.

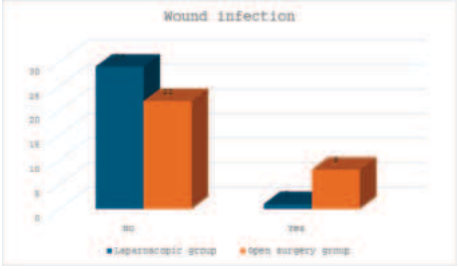



**Table : Comparison Of Duration Of Surgery (min) Between Both Groups**

| Group | Mean | SD | Median | Minimum | Maximum | p-value |
|---|---|---|---|---|---|---|
| Lap | 33.667 | 12.4522 | 30.000 | 15.0 | 60.0 | 0.0001 |
| Open | 17.500 | 5.2111 | 15.000 | 10.0 | 30.0 | |
| Total | 25.583 | 12.4904 | 20.000 | 10.0 | 60.0 | |

This table presents the comparison of the duration of surgery (in minutes) between the laparoscopic (Lap) and open surgery groups. The mean duration of surgery for the laparoscopic group is 33.667 minutes, with a standard deviation (SD) of 12.4522 minutes, and a median duration of 30.000 minutes. The durations range from a minimum of 15.0 minutes to a maximum of 60.0 minutes. In contrast, the mean duration of surgery for the open surgery group is 17.500 minutes, with an SD of 5.2111 minutes, and a median duration of 15.000 minutes. The durations range from a minimum of 10.0 minutes to a maximum of 30.0 minutes. The p-value of 0.0001 indicates a statistically significant difference in the duration of surgery between the laparoscopic and open surgery groups, with laparoscopic surgeries having a longer duration on average.

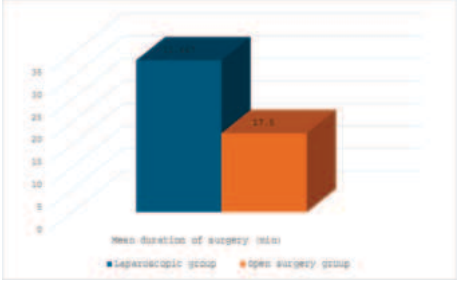
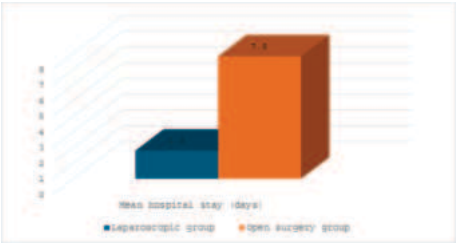



**Table: Comparison Of Duration Of Hospital Stay (days) Between Both Groups**

| Group | Mean | SD | Median | Minimum | Maximum | p-value |
|---|---|---|---|---|---|---|
| Lap | 1.800 | .7144 | 2.000 | 1.0 | 3.0 | 0.0001 |
| Open | 7.800 | 1.3235 | 8.000 | 6.0 | 10.0 | |
| Total | 4.800 | 3.2038 | 4.500 | 1.0 | 10.0 | |

This table compares the duration of hospital stay (in days) between the laparoscopic (Lap) and open surgery groups. The mean duration of hospital stay for the laparoscopic group is 1.800 days, with a standard deviation (SD) of 0.7144 days, and a median duration of 2.000 days. The stays range from a minimum of 1.0 day to a maximum of 3.0 days. In contrast, the mean duration of hospital stay for the open surgery group is 7.800 days, with an SD of 1.3235 days, and a median duration of 8.000 days. The stays range from a minimum of 6.0 days to a maximum of 10.0 days. The p-value of 0.0001 indicates a statistically significant difference in the duration of hospital stay between the laparoscopic and open surgery group with patients undergoing open surgery having a longer stay on average.




## DISCUSSION

Appendectomy, the surgical removal of the appendix, is a common procedure performed to treat appendicitis, an inflammation of the appendix. Traditionally, this surgery has been conducted through an open approach, but in recent years, laparoscopic appendectomy has gained popularity due to its minimally invasive nature. While both approaches aim to alleviate symptoms and prevent complications associated with appendicitis, there is ongoing debate regarding which method offers superior outcomes in terms of postoperative recovery, pain management and infection rates. This study seeks to compare the postoperative recovery between open and laparoscopic appendectomy, examining factors such as postoperative pain, hospital stay duration, and the incidence of surgical site infections. Understanding the differences in outcomes between these two surgical techniques is crucial for informing clinical decision-making and optimising patient care.

Age: The study found no statistically significant difference in the age distribution between the laparoscopic appendectomy (Lap) and open appendectomy (Open) groups. The mean age was around 29 years in both groups, with the majority of patients (73-87%) being 40 years old or younger.

These findings align with the results reported in the study by Takami et al.,[12] which also found no significant difference in the mean age between the Lap and Open groups (50.17 ± 22.77 years vs. 50.13 ± 25.84 years, respectively). Similarly, the study by Basukala et al. [13] reported a mean age of 26.72 ± 9.70 years for the Open group and 23.89 ± 6.32 years for the Lap group, with a statistically significant difference ($p = 0.010$).

The lack of a significant age difference between the surgical approach groups in the present study suggests that the choice of laparoscopic or open appendectomy may not be primarily driven by the patient's age. This is an important finding, as it indicates that both surgical techniques can be safely and effectively employed across a wide age range of patients presenting with acute appendicitis.

The slightly younger mean age observed in the Lap group compared to the Open group in the study by Basukala et al.[13] may reflect a growing trend towards the adoption of laparoscopic appendectomy, particularly among younger patients, as this approach has become more widely available and accepted in recent years. Surgeons may be more inclined to recommend the laparoscopic approach to younger patients, who may be more motivated to pursue a minimally invasive procedure and a faster recovery.

Gender: The study found no statistically significant difference in the gender distribution between the Lap and Open groups. In the Lap group, 46.7% were male and 53.3% were female, while in the Open group, 63.3% were male and 36.7% were female.

For instance, the study by Basukala et al. [13]did not report any statistical analysis on the gender distribution between the Lap and Open groups. The study by Takami et al. also did not find a significant difference in the gender composition between the two groups.

The lack of a significant gender difference in the present study suggests that both male and female patients can equally benefit from the laparoscopic approach, with no clear preference for one surgical technique over the other based on the patient's gender.

Signs and Symptoms: The study found no statistically significant differences in the distribution of various signs and symptoms, including pain and tenderness, nausea and vomiting, guarding, fever, and past history of pain, between the Lap and Open groups.

The universal presence of pain and tenderness in both groups in the current study is a reflection of the typical clinical presentation of acute appendicitis, which is characterised by these cardinal symptoms. The lack of significant differences in the occurrence of other signs and symptoms such as nausea, vomiting, guarding, and fever, suggests that the underlying pathophysiology of acute appendicitis may not be significantly influenced by the choice of surgical approach.

## CONCLUSION

In conclusion, this study comparing open versus laparoscopic appendectomy reveals several significant findings. Laparoscopic appendectomy demonstrates advantages in postoperative recovery, with lower postoperative pain scores, reduced incidence of vomiting, and shorter hospital stays compared to open surgery. Additionally, laparoscopic procedures exhibit a lower risk of wound infection, highlighting their potential for minimising postoperative complications. However, open surgery boasts a shorter duration of surgery, suggesting a quicker operative process. Overall, these results underscore the benefits of laparoscopic appendectomy in promoting faster recovery and reducing the risk of complications, providing valuable insights for clinicians in choosing the most appropriate surgical approach for patients with appendicitis.

## REFERENCES

1. Mishra M, Agarwal V. Randomised clinical trial of laparoscopic versus open appendicectomy in overweight patients [dissertation]. Mumbai: Sir J.J. Hospital and Grant Medical College; 2005.
2. Srivastav. Randomized clinical trial of laparoscopic versus open appendicectomy [dissertation]. Mumbai: Sir J.J. Hospital and Grant Medical College; 2003.
3. Zinner MJ, Ashley SW. Maingot's Abdominal Operations. 10th ed., Vol. 2. New York: Appleton & Lange; 1997. p. 1191-2.
4. Bosch PF. Laparoscopic Sterilization. Schweiz Z Krankenh Anstalt Swensen. 1936;10:45-53.
5. Attwood SE, Hill AD, Murphy PG, Thornton J, Stephens RB. A prospective randomised trial of laparoscopic versus open appendectomy. Surgery. 1992;112(4):497-501.
6. Semm K. Endoscopic appendectomy. Endoscopy. 1983;15(2):59-64.
7. Schreiber JH. Early experience with laparoscopic appendectomy in women. Surg Endosc. 1987;1(4):211-6.
8. Dai L, Shuai J. Laparoscopic versus open appendectomy in adults and children: a meta-analysis of randomized controlled trials. United European Gastroenterol J. 2016;5(5):542-53.
9. Mohamed AA, Mahran KM. Laparoscopic appendectomy in complicated appendicitis: is it safe? J Minim Access Surg. 2013;9(2):55-8.
10. Semm K. Endoscopic appendectomy. Endoscopy. 1983;15(2):59-6.
11. McBurney C. The incision made in the abdominal wall in case of appendicitis with a description of a new method of operating. Ann Surg. 1894;20:38.
12. Basukala S, Thapa N, Bhusal U, Shrestha O, Karki S, Regmi SK, Shah KB, Shah A. Comparison of outcomes of open and laparoscopic appendectomy: a retrospective cohort study. Health Sci Rep. 2023;6(8)
13. Nazir A, Farooqi SA, Chaudhary NA, Bhatti HW, Waqar M, Sadiq A. Comparison of open appendectomy and laparoscopic appendectomy in perforated appendicitis. Cureus. 2019;11(7)
14. Jaschinski T, Mosch CG, Eikermann M, Neugebauer EA, Sauerland S. Laparoscopic versus open surgery for suspected appendicitis. Cochrane Database Syst Rev. 2018;11(11)
15. Biondi A, Di Stefano C, Ferrara F, Bellia A, Vacante M, Piazza L. Laparoscopic versus open appendectomy: a retrospective cohort study assessing outcomes and cost-effectiveness. World J Emerg Surg. 2016;11(1):44.
16. Takami T, Yamaguchi T, Yoshitake H. A clinical comparison of laparoscopic versus open appendectomy for the treatment of complicated appendicitis: historical cohort study. Eur J Trauma Emerg Surg. 2020;46(4):847-51.