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## A comparative study between open and laparoscopic appendectomy

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### Abstract

**Background:** Appendectomy is the commonest surgical condition that require a surgical intervention worldwide. Aim of the study to compare the advantages and disadvantages between open and laparoscopic appendectomy regarding Operative time, Hospital stay, Postoperative pain, Intraoperative and postoperative complication.

**Methods:** One hundred and eighty-three patients with acute appendicitis has been studied prospectively in the period between October 2018 and October 2019, 120 had their appendices removed by the open conventional method and 63 by laparoscope.

**Results:** As comparison to open method lap. Appendectomy need better operative skills, and more operative time. There is no difference in intra and postoperative complications, early diet resumption, shorter hospital stay.

**Conclusion:** Laparoscopy is safe and efficient method for appendectomy, and provides a wide range of advantages over the open method, shorter hospital stay, less pain, less post-operative complications.

**Keywords:** A Comparative, open, laparoscopic, appendectomy

### Introduction

Appendectomy is one of the most commonly performed surgical procedures worldwide and remains the most frequent cause of surgical abdomen across all age groups. Approximately 7-10% of the general population develops acute appendicitis, with the highest incidence occurring in the second and third decades of life <sup>[1, 2]</sup>. Open appendectomy has been the gold standard treatment for acute appendicitis since the first recorded appendectomy was performed by Claudius Amyand in London in 1736. In 1887, Reginald H. Fitz presented his findings on appendicitis, recommending operative treatment. Two years later, in 1889, Charles McBurney described the clinical signs of acute appendicitis, including the point of maximum tenderness in the right iliac fossa, now known as McBurney's point. In the same year, American surgeon Dr. Thomas Morton successfully performed the first appendectomy for appendicitis <sup>[2, 20]</sup>. Laparoscopic appendectomy, introduced by Kurt Semm in 1983, has since been compared with open appendectomy in terms of clinical outcomes. Despite its advantages, including a shorter hospital stay, less postoperative pain, and a faster return to daily activities, laparoscopic appendectomy has faced challenges in proving its superiority over the open technique <sup>[3]</sup>. Numerous retrospective studies, randomized trials, and meta-analyses have reported mixed results. Some studies demonstrate better clinical outcomes with the laparoscopic approach <sup>[4-6]</sup>, while others suggest only marginal benefits or no significant advantages, along with higher surgical costs <sup>[7-9]</sup>. To date, laparoscopic appendectomy has not yet become the standard of care in Iraqi governmental hospitals. The aim of study comparing between open and laparoscopic appendectomy regarding Operative time, Hospital stay, Postoperative pain, Intraoperative and postoperative complication. To find which procedure for appendectomy is better.

### Methods

This prospective study was conducted at Al-Hilla Teaching Hospital and Al-Imam Al-Sadiq Teaching Hospital from October 2018 to October 2019, involving patients clinically diagnosed with appendicitis. Patients included were over 15 years old, while those with contraindications to general or laparoscopic surgery, such as severe cardiac or pulmonary diseases, previous abdominal surgeries, large ventral hernias, ascites, and perforated or difficult appendicitis cases, were excluded.

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Preoperative investigations included full blood count, blood sugar, urinalysis, chest X-ray, abdominal ultrasound, supine abdominal X-ray, pregnancy tests (for women of childbearing age), and selective contrast-enhanced CT scans of the abdomen and pelvis. Preoperative care involved IV fluids and antibiotics (ceftriaxone or amikacin with metronidazole) administered one hour before surgery. Laparoscopic appendectomy was performed under general anesthesia with the patient in the Trendelenburg position. Three ports were introduced for exploration, and the appendix was identified and removed using cauterization, endoloops, or metal laparoscopic clips. In the open method, the surgery was performed via a McBurney incision, with the mesoappendix and base ligated using vicryl sutures. Postoperatively, patients received IV fluids and antibiotics, with oral diet initiated after bowel function returned. Patients were discharged upon tolerating a regular diet, being afebrile for 24 hours, and experiencing minimal pain. Outcomes measured included operative time (from skin incision to closure), postoperative pain (assessed by analgesic usage), and hospital stay (time from surgery to discharge). Patients were followed up for two weeks postoperatively. Data were analyzed using SPSS software version 25, with continuous variables reported as mean and standard deviation, and categorical variables analyzed using frequency distributions and chi-square tests ( $p$ -value < 0.05 considered significant). Verbal consent was obtained from all patients.

## Results

The 183 patients in this study was 53% (97) females, 61 of them underwent open appendectomy and 36 laparoscopic appendectomies and 47% (86) males. 59 underwent open appendectomy and 27 with laparoscopy as in table (1). The age of the patient was selected from 15 to 55 years.

**Table 1:** Patient numbers and gender distribution

Gender	Open	Laparoscopic	Total
Male	59 (49.16%)	27 (42.85%)	86 (46.99%)
Female	61 (50.84%)	36 (57.15%)	97 (53.01%)
Total	120 (100%)	63 (100%)	183 (100%)

Open appendectomy time ranging from 15 to 35 minutes 7 (12.5%) of them completed in 15 minutes 33 (27.5%) of them in 20 minutes, 37(30.83%) in 25 minutes, 27(22.5%) in 30 minutes, 12(10%) in 35 minutes, and 4(3.33%) in 40 minutes with mean time of 25.66 SD 5.97 minutes while laparoscopic method ranging from 25 to 5 minutes. None of them completed in 15 minutes, 5(7.93%) in 20 minutes, 11(17.46%) in 25 minutes, 16(25.39%) in 30 minutes, 19(30.15%) in 35 minutes, 9(14.28%) in 40 minutes and 3(4.76%) in 45 minutes. With mean time of 31.98 SD 6.44 minutes and  $p$  value of  $P$  value <0.0001 to open appendectomy. As shown below, table (2).

**Table 2:** Operative time in open and laparoscopic appendectomy

Operative time in minutes	Open method	Laparoscopic method
15 - 19	7 (12.5%)	0 (0%)
20 - 24	33(27.5%)	5(7.93%)
25 - 29	37(30.83%)	11(17.46%)
30 - 34	27(22.5%)	16(25.39%)
35 - 36	12(10%)	19(30.15%)
40 - 44	4(3.33%)	9(14.28%)
≥ 45	0 (0%)	3(4.76%)

Postoperative pain assessment done according to amount of analgesia needed (narcotic) (tramadol) during the admission

period. In open method ranging from 2 to 5 doses while in laparoscopic method ranging from 0 to 2 doses of narcotic analgesia, all of the patients who underwent open appendectomy required narcotics for post-operative pain relief. 14 (11.66%) had single injection, 46 (38.33%) received 2 injections, 39 (32.5%) 3 injections, 16 (13.33%) 4 injections and 5 (4.16%) of them needed 5 injections with mean of 2.5 SD 1.01doses. While in laparoscopic method 9 (14.28%) of them had just simple analgesia without any narcotic use. 39(61.9%) 2 injections needed, 11(17.46%) 3 injections and only 4 (6.3%) received 3 injections with mean 1.15 SD0.74 and  $P$  value0.0002 as shown below table (3).

**Table 3:** Post-operative narcotics use.

No. of doses	Open	Laparoscopic
0	0 (0%)	9 (14.28%)
1	14 (11.66%)	39(61.9%)
2	46 (38.33%)	11(17.46%)
3	39 (32.5%)	4 (6.3%)
4	16 (13.33%)	0 (0%)
5	5 (4.16%)	0 (0%)

Regarding the hospital stay in open method ranging from 1 to 4 days in open method and 1 to 3 days in laparoscopic method. In open appendectomy 16 (13.33%) only discharged in the first post-operative day, 72 (60%) in the 2<sup>nd</sup> day, 21 (17.5%) in the 3<sup>rd</sup> day and 11(9.1%) discharged in the 4<sup>th</sup> day with mean 2.20 SD0.77. in the laparoscopic appendectomy 43 (68.25%) were discharged in the 1<sup>st</sup> post-operative day, 15(23.8%) in the 2<sup>nd</sup> day and only 5(7.9%) were discharged in the 3<sup>rd</sup> post-operative day with mean 1.39 SD 0.63 and  $p$  value < 0. 0001. As shown in table (4).

**Table 4:** Hospital stay

Hospital stay	Open method	Lap. method
1	16 (13.33%)	43 (68.25%)
2	72 (60%)	15(23.8%)
3	21 (17.5%)	5(7.9%)
4	11(9.1%)	0 (0%)

Surgical site infection seen in 9 (7.5%) patients in open appendectomy while port site infection seen in one case (1.58%) of laparoscopic appendectomy Paralytic ileus seen in 5 (4.1%) cases in open appendectomy while none in laparoscopic appendectomy. No intra peritoneal abscesses seen in the study. No conversion to open method.

## Discussion

There was a significant difference between open and laparoscopic appendectomy regarding operative time, mean time 25.66 SD 5.9 and 31.98 SD 6.44 minutes respectively ( $p$  value 0.0001) this is comparable to some researches [10, 11], other studies show shorter operative time [12-14] which may have attributed to better surgical skills and facilities. A significantly shorter hospital stay has been shown in the laparoscopic appendectomy mean 1.39 days SD0.63 compared to mean 2.2 days SD 0.77 in the open appendectomy ( $p$  value 0.0002), most published researches show similar results [15-17]. The decrease in pain killers (narcotics) use with laparoscopic appendectomy show a significant decrease in postoperative pain with mean of 1.15SD0.74 laparoscopic appendectomy compared with 2.5 SD 1.01 doses for open and  $p$  value 0.0002. Significantly less postoperative complication had been encountered with the laparoscopic compared to open approach, as SSI occurred in

1.58 and 7.5 respectively, Paralytic ileus in zero and 4.1% respectively that comparable to other studies <sup>[12, 18]</sup>.

### Conclusion

Although laparoscopic appendectomy requires advanced surgical skills and specialized facilities, which are often not readily available-particularly during nighttime in many Iraqi hospitals-it has been shown to offer several advantages over the conventional open approach. These include a shorter hospital stay, fewer postoperative complications, and reduced postoperative pain. Despite the challenges of implementing laparoscopic techniques in some settings, its benefits in terms of faster recovery and improved patient outcomes make it a favorable option when resources and expertise permit.

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