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Efficacy of Laporoscopic appendectomy compared to open appendectomy

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Abstract

Background: Appendectomy is the most common surgical procedure performed in emergency surgery. Because of lack of consensus about the most appropriate technique, appendectomy is still being performed by both open (OA) and laparoscopic (LA) methods. In this retrospective analysis, we aimed to compare the laparoscopic approach and the conventional technique in the treatment of acute appendicitis.

Material and Method: We collected data of 40 appendectomies done in Baquba teaching hospital between September 2020 and May 2021. These comprised 20 patients who underwent conventional appendectomy and 20 patients treated laparoscopically. The two groups were compared for operative time, length of hospital stay, postoperative complication.

Results: We found Laparoscopic appendectomy was associated with a shorter hospital stay (1.4 ± 0.6 day in LA and 2.7 ± 2.5 days in OA). Operative time was significantly shorter in the Laparoscopic group (30 ± 3.2 in LA and 35 ± 5.2 min in OA). Total number of complications was less in the LA group with a significantly lower incidence of wound infection (00.00% vs 15 %, $P=1.00$).

Conclusion: The laparoscopic approach is a safe and efficient operative procedure in appendectomy and it provides clinically beneficial advantages over open method (including shorter hospital stay, earlier return to work, lower rate of wound infection).

Keywords: Open appendectomy, Laparoscopic appendectomy, Appendicitis.

Introduction

The vermiform appendix is a blind muscular tube with mucosal, submucosal, muscular and serosal layers. Morphologically, it is the undeveloped distal end of the large caecum found in many lower animals. In approximately one-quarter of cases, rotation of the appendix does not occur, resulting in a pelvic, subcaecal or paracaecal position. Especially in childhood, the mesoappendix is so transparent that the contained blood vessels. In many adults, it becomes laden with fat, which obscures these vessels. The appendicular artery, a branch of the lower division of the ileocolic artery, passes behind the terminal ileum to enter the mesoappendix a short distance from the base of the appendix. It then comes to lie in the free border of the mesoappendix. An accessory appendicular artery may be present but, in most people, the appendicular artery is an 'end-artery', thrombosis of which results in necrosis of the appendix (synonym: gangrenous appendicitis). Four, six or more lymphatic channels traverse the mesoappendix to empty into the ileocaecal lymph nodes (1).

Appendicitis is the inflammation of the vermiform appendix. It typically presents acutely, within 24 hours of onset, but can also present as a more chronic condition. Classically, appendicitis presents with initial generalized or periumbilical abdominal pain that later localizes to the right lower quadrant. This activity reviews the presentation, evaluation, and treatment of appendicitis and stresses the role of the interprofessional team in evaluating and treating patients with this condition (2). The clinical features include peri-umbilical abdominal pain shifting to the right iliac fossa, vomiting, nausea, fever, anorexia, tenderness over McBurney point (3).

Symptoms	%
Abdominal pain	100
Right lower quadrant	75
Periumbilical	15
Diffuse	10
Anorexia	80
Nausea	80
Vomiting	60
Signs	
Abdominal tenderness	100
Right lower quadrant	95
Other	5
Temperature >37.5°C	70
Rebound tenderness	70
Rectal tenderness	45
Guarding or rigidity	35

Table 1. Clinical features of acute appendicitis and their rate of occurrence

Since the first recorded appendectomy performed by Claudius Amyand in 1735 and its description by McBurney in 1894, appendectomy is the treatment of choice for acute appendicitis. It soon became one of the most frequently performed surgical procedures. The surgical technique remained nearly unchanged for over a century, as it combines therapeutic with low morbidity and mortality rates. The evolution of endoscopic (using an instrument to look inside the body) surgery led to the idea of performing appendectomy via laparoscopy (surgery using small incisions), which was first described by Semm in 1983 (4).

Open appendectomy (OA) is standardized among surgeons and, unlike cholecystectomy, OA is typically completed using a small right lower quadrant incision and postoperative recovery is usually uneventful (5). It is the second most common general surgical procedure performed after laparoscopic cholecystectomy, and the most common intra-abdominal surgical emergency, with a lifetime risk of 6%. The overall mortality of OA is around 0.3%; and morbidity, about 11%.4. The

introduction of laparoscopic appendectomy (LA) was therefore greeted with initial reluctance, skepticism, or outright rejection by many surgeons. Surgeons were discouraged by the disadvantages of the laparoscopic approach, including longer duration of operation, increased cost to the patient, and reports of complications (6).

There are studies showing that laparoscopic appendectomy does not offer any advantages, with improved visualization of the entire abdomen, laparoscopic appendectomy improves the diagnostic accuracy and can identify the definitive pathology causing lower abdominal pain in young females than the open approach. It was concluded that laparoscopy reduces unnecessary appendectomies and improves diagnosis in fertile women (7).

Many advantages of Laparoscopic surgery have been documented over to open appendectomy. It requires small incisions and its gives good visualization, it also gives better access to reach the organs in abdomen, as well as fast recovery in the postoperative period. Even Meta- analyses of randomized, controlled trials proved that this approach in better as compared to open appendectomy. It also showed that the incidence of intra-abdominal abscess is thrice more in LA than OA (8).

Aim of study

To demonstrate the efficacy of laparoscopic appendectomy its advantages, disadvantages and reasons for conversion from open appendectomy to laparoscopic appendectomy.

Patients and Methods

We conducted retrospective review study of patients with appendectomy in Baquba teaching hospital between September 2020 and May 2021. Pregnant women and patients with severe medical disease (hemodynamic instability, chronic medical or psychiatric illness, cirrhosis, coagulation disorders) requiring intensive care were excluded. The decision about the type of the operation was made according to the preference and experience of the surgical team on duty. We analyzed 40 patient that met the inclusion criteria and their clinical data .. The patients were divided into two groups: open appendectomy (OA) group 20 patients and laparoscopic appendectomy (LA) group 20 patients. The collected clinical data included demographic data, comorbidities, initial laboratory findings, operation time, intraoperative findings , time to soft diet, postoperative hospital stay, amount of analgesics and postoperative complications. The diagnosis was made clinically with history (right iliac fossa or periumbilical pain, nausea/vomiting), physical examination (tenderness or guarding in right iliac fossa).

In patients where a clinical diagnosis could not be established, imaging studies such as abdominal ultrasound or CT were performed. Both groups of patients were given a prophylactic dose of third-generation cephalosporin and metronidazole at induction of the general anesthesia as part of the protocol. OA was performed through standard McBurney incision. After the incision, peritoneum was accessed and opened to deliver the appendix, which was removed in the classical appendectomy. A standard 3-port technique was used for laparoscopic group. Pneumoperitoneum was produced by a continuous pressure of 12–14 mmHg of carbon dioxide via a Verres canula, positioned in supraumbilical site. The patient was placed in a Trendelenburg position, with a slight

rotation to the left. The abdominal cavity was inspected in order to exclude other intrabdominal or pelvic pathology. After the mesoappendix was divided with bipolar harmonic, the base of the appendix was secured with two legating loops, followed by dissection distal to the second loop. Then, the distal appendicular stump was closed to avoid the risk of enteric or purulent spillage.

The specimen was placed in an endobag and was retrieved through a 10-mm supraumbilical port. All specimens were sent for histopathology. The patients were not given oral feed until they were fully recovered from anesthesia and had their bowel sounds returned when clear fluids were started. Soft diet was introduced when the patients tolerated the liquid diet and had passed flatus. Patients were discharged once they were able to take regular diet, afebrile, and had good pain control. The operative time (minutes) for both the procedures was counted from the skin incision to the last skin stitch applied. The length of hospital stay was determined as the number of nights spent at the hospital postoperatively. Wound infection was defined as redness or purulent or seropurulent discharge from the incision site. Seroma was defined as localized swelling without redness with ooze of clear fluid. Paralytic ileus was defined as failure of bowel sounds to return within 12 h postoperatively. Waiver of informed consent from patients was approved because of the observational nature of the study.

Statistical analysis

Data of current study were analyzed by using Chi-square (X²) test to compared between percentages. Numeric date were described by (Mean ± SD). T test used to compare between two numeric variables. A level of significance of $\alpha=0.05$ was applied to test. (Excel 2013) programs used to analyze current data.

Results

Out of 40 patients with acute appendicitis, 20 patients underwent open appendectomy and 20 patients underwent laparoscopic appendectomy. Demographic and preoperative clinical data between OA group and LA group are showed in Table 1. There were no significant differences with respect to age and associated comorbidities. On the contrary, the difference in gender at presentation was statistically significant. Out of the total 20 open procedures, 13 (65%) males and 7(35%) females. In the laparoscopic group, 20 procedures,9(45%) males and 11(55%) females. operative and postoperative complication showed in table 2 In our study, the mean \pm standard deviation (SD) operative time of 30 ± 3.2 min for the LA group was shorter than the mean operative time of 35 ± 5.2 min for open appendectomy ($p=0.049^*$). Hospital stay was significantly shorter in the laparoscopic group with a mean \pm SD of 1.4 ± 0.6 days compared with 2.7 ± 2.5 of the open appendectomy group ($P = 0.019^*$). A highly significant difference existed between the 2 groups in time taken to return to routine daily activities, which was less in the laparoscopic group with a mean 11.5 ± 3.1 days compared with mean 16.1 ± 3.3 days in the open appendectomy group (Table 2). We observed a greater overall incidence of complications in open surgery than in laparoscopic surgery. Wound infection was reported by only 03(15.00%) individuals from open appendectomy group.

Gender	Open appendicectomy	Laporascopic appendicectomy	P value
Male	9 (45%)	13 (65%)	0.394
Female	11 (55%)	7 (35%)	0.346
Mean age	27.75 ± 14.24	29.66 ± 15.13	0.761

Table 1: Demographic and preoperative clinical data

Variants	Open appendectomy	Laporoscopic appendectomy	P value
Operative time (in minutes)	30±3.2	35±5.2	0.049*
Hospital stay (in days)	1.4±0.6	2.7±2.5	0.019*
Wound infection	0(0.0)	3(15)	1.00
Return to normal activity	11.5±3.1	16.1±3.3	0.053

Table 2: operative and postoperative complication clinical data

Discussion

Acute appendicitis is the most common intra-abdominal condition requiring emergency surgery. The possibility of appendicitis must be considered in any patient presenting with an acute abdomen, and a certain preoperative diagnosis is still a challenge (9)

Muhammad et al. conducted a similar study and reported that the mean age in the laparoscopic appendectomy group was 32 ± 14 years; the mean age of patients in the open appendectomy group was 34 ± 13 years(22). These results are quite close to the mean ages in our study. This similarity in age is because appendicitis is more common in the younger age group, as shown by Thomas et al (10). According to Drinkovic et al., appendicitis was most common in the 11 to 20year age group, but the increasing incidence in older patients may be due to increased life expectancies (11). The significantly shorter mean operating time for laparoscopic as compared to open appendectomy noted in our study differs from Muhammad et al.'s findings, who reported the mean operating time as 75 ± 23 minutes for a laparoscopic appendectomy and 64 ± 15 minutes for an open appendectomy. While in our study operative time as 30 ± 3.2 minutes for a laparoscopic appendectomy and 35 ± 5.2 minutes for an open appendectomy. Another study conducted by Lin et al. showed that

laparoscopic appendectomy took a longer time to complete (96.1 ± 43.1 minutes) than open appendectomy (67.8 ± 32.2 minutes) (12). These results were in contradiction to ours. However, our findings of shorter mean operating times via the laparoscopic approach align with studies by Tiwari et al., who found a mean operating time for laparoscopic appendectomy were 47.8 ± 14.5 minutes and 49.10 ± 12.5 for open appendectomy (13).

The variation reported in the literature in mean operating times may be due to variations in skill levels and experience with laparoscopic techniques in different centers. Comparison of mean hospital stay in both groups in our setup showed an insignificant difference between the laparoscopic appendectomy group (1.4 ± 0.6 days) and the open appendectomy group (2.7 ± 2.5 days). Result of our study align with study done by, Muhammad et al. reported the mean length of hospitalization for the laparoscopic appendectomy group was 5.3 ± 2.1 days while open appendectomy group had a mean length of hospitalization of 7.2 ± 3.2 days (10).

In our study postoperative wound infection similar Muhammad et al., who reported that the rate of infections in the laparoscopic appendectomy group was 8.3% while that in the open appendectomy group was 24.4% (10). Lin et al. also showed that the rate of infections was significantly lower in laparoscopic appendectomy (15.2%) than in open appendectomy (30.7%) (12). This may be attributed to the fact that laparoscopic appendectomy requires less manipulation of the gut by the surgeon's hands and instruments as compared to open appendectomy. Furthermore, the gut does not come into contact with the incision in the layers of the anterior abdominal wall during laparoscopic appendectomy as the appendix is explored in situ. Result of return to normal activity in our study similar to

study done by Antonio et al., who reported 11.5 ± 3.1 days in laparoscopic appendectomy and 16.1 ± 3.3 (15).

Conclusions

Our results showed the advantages of laparoscopic superior better than open appendectomy including shorter hospital stay, earlier return to work and lower rate of wound infection.

Recommendations

We recommend use Laparoscopic surgery for acute appendicitis because give a better results and less complications.

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