

Short-term Outcomes of Laparoscopic Appendicectomy versus Open Appendicectomy in Acute Appendicitis: A Comparative Study

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ABSTRACT

Background: Appendectomy is the most common surgical procedure performed in general surgery. The aim of this study is selection of best method for appendicectomy in acute appendicitis. **Patients and methods:** This study was conducted upon 40 patients with acute appendicitis randomly allocated into two groups: (A) included twenty patients underwent laparoscopic appendectomy (LA) and (B) included twenty patients underwent open appendectomy (OA). **Results:** The most prevalent signs in both groups in descending order of frequency were right iliac fossa tenderness (100% in both groups), rebound tenderness (100% in both groups), elevated temperature (90% in LA & 80% in OA), Psoas sign (60% in LA & 60% in OA), Rovsing sign (50% in LA & 40% in OA). The overall postoperative complications were 2 complications in laparoscopic group (10%) and 8 complications in open group (40%). The overall postoperative complications in the 2 groups. The mean hospital stay was 1.7 days in LA and 3.3 days in OA group with (P<0.0008**) which was highly significant. About 6 patients of the open group were satisfied with the cosmetic results of wound scars while 18 patients of the laparoscopic group were satisfied with the cosmetic results of wound scars. **Conclusion:** The use of laparoscope in suspected appendicitis is better than the open method especially in equivocal cases to reach an exact diagnosis. We must not hesitate to convert laparoscopic appendectomy to open appendectomy for the sake and safety of the patient.

Keywords: Laparoscopic Appendicectomy; Acute Appendicitis; Open Appendicectomy

INTRODUCTION

Appendicitis is the most common cause of acute abdominal pain and Appendectomy is the most common emergency in abdominal surgery. Approximately 7%-10% of the general population develops acute appendicitis with the maximal incidence being in the second and third decades of life (1).

Diagnosing appendicitis can be tricky, Symptoms are often unclear or similar to those of other illnesses including: gall bladder problems, bladder or urinary tract infection, Crohn's disease, gastritis, kidney stones, intestinal infection and ovary problems (2).

Since 1889, when McBurney first reported appendectomy as the treatment for acute appendicitis, surgical intervention has been the gold standard treatment strategy for acute appendicitis and the procedure is standardized among surgeons(3).

Open appendectomy remaining mainly unchanged for 100 years due to its favorable and efficacy and safety. It has also been associated with potential disadvantages like post-operative pain, wound sepsis and complications like intestinal obstruction which may delay recovery (4).

Laparoscopic appendectomy described by Semm in 1983 has emerged as a perfect procedure for both diagnosis and treatment of acute appendicitis with significantly shorter hospital stay, less postoperative pain, faster return to daily activities and better cosmetic outcome (5).

No consensus exists as to whether laparoscopy should be performed in selected patients or routinely (6).

Therefore, this study aimed to select the best method for appendectomy in acute appendicitis.

PATIENTS AND METHODS

This study was conducted in Department of General Surgery of Zagazig University Hospitals and Zagazig General Hospital, casualty department from April 2020 to October 2020. Patients were fully informed about the risks and benefits of the two procedures. Informed consent was obtained from every patient. Forty cases of acute appendicitis were randomly divided into two groups:-

Group(A):included 20 patients who underwent laparoscopic appendectomy.

Group(B): included 20 patients who underwent open appendectomy.

Each patient was subjected to full history taking and general and abdominal examination. Laboratory investigations including full blood count (with special concern to total and differential leukocytic count); kidney and liver function tests; random blood glucose level; widal test was done only in suspected cases of typhoid or paratyphoid fever; urine analysis only in suspected cases of renal disease and pregnancy test in female patients in childbearing period. Radiological screening tests such as ultrasound scan was done for all patients. Also, pre-operative chest X-ray were done for all patients of laparoscopic group.

Inclusion criteria:

Patients of acute appendicitis of both genders.

Exclusion criteria:

Patients with generalized peritonitis, appendicular mass, appendicular abscess, major pulmonary pathology especially in laparoscopic group and ascetic or cirrhotic patients.

Procedure:

Pre-operative preparation:

- a) Markedly dehydrated patients had fluid resuscitation and Foley catheter to ensure adequate urine output. Any electrolyte deficiencies were corrected prior to the induction of general anaesthesia.

- b) Prior to the surgical incision, all patients received a standard regimen of intravenous antibiotics (1.5 gm of ampicillin, sulbactam and 500 mg metronidazole).

Surgical technique:

Technique of open procedure (group A):

The patient is positioned in the supine position with the legs together, right arm angled on a board, and left arm tucked alongside the body, underwent general anesthesia with endotracheal intubation. A small incision was made in the external oblique fascia along the line of its fibers. The cecum was delivered into the field gently grasping the cecum with moistened gauze and delivering it into the wound using a rocking movement and the anterior tenia of the cecum was followed till identification of appendix. The mesoappendix was divided between clamps and ligated with 2/0 vicryl suture. The wound was closed in layers with or without drain according to the case.

Technique of Laparoscopic appendectomy (group B):

The patient was placed supine in a 15° Trendelenburg position with both arms tucked. Rotation to the left was done. The surgeon stood on the patient's left side. Laparoscopy was then performed with "zero" angle viewing laparoscope to ensure the clinical diagnosis and identify the position of the appendix so as to determine the best site of insertion of the other trocars. The surgeon's right hand operated a dissecting instrument or cautery scissors, which were used to create a window in the mesoappendix at the base of the appendix. After transection, the appendiceal stump mucosa was carefully cauterized. The appendix was pulled into the umbilical port and withdrawn with the whole port or was placed in an impermeable retrieval bag before its removal. Fascia at the 10-mm trocar site was closed, and all wounds were closed primarily.

Postoperative Management :

Patients were given sips of water after hearing intestinal sounds to avoid paralytic ileus from early introduction of food or liquids. Postoperatively all patients received analgesics in the form of NSAIDs early postoperatively, then analgesics were given upon the patient request.

The discharge criteria are met once the patients were afebrile, with audible bowel sounds and were able to tolerate a liquid diet and oral analgesia. The specimens were sent for pathology for assessing pathological diagnosis.

Statistical analysis:

Data collected and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) software for analysis. According to the type of data qualitative represent as number and percentage , quantitative continues group represent by mean \pm SD. Differences between quantitative independent multiple by ANOVA or Kruskal Wallis,. P value was set at <0.05 for significant results &<0.001 for high significant result.

RESULTS

The present study showed The patients' ages ranged from 15-55 years with median age 27 years in Group A and 27.5 years in Group B and mean age 35 years in Group A and 36.20 years in Group B (**Table 1**). Gender distribution was different in both groups with males (14=70%) more than females (6=30%) in open group while females (16=80%) were more than males (4=20%) in laparoscopic group (**Table 2**).

The most prevalent signs in both groups in descending order of frequency were Right iliac fossa tenderness (100% in both groups), Rebound tenderness(100% in both groups),Elevated temperature(90% in LA& 80%in OA), Psoas sign (60% in LA& 60% in OA), Rovsing sign(50% in LA&40% in OA)(**Table 3**).

Total leukocytic count was $4-11 \times 10^9/L$ in(4 patients=20% in LA & 4 patients= 20% in OA),while T.L.C was $11-15 \times 10^9/L$ in (10 patients=50% in LA & 8 patients=40% in OA) and it was $15-18 \times 10^9/L$ in(6 patients= 30% in LA & 8 patients=40% in OA) (**Table 4**).

The overall postoperative complications were 2 complications in laparoscopic group (10%) and 8 complications in open group (40%). the overall postoperative complications in the 2 groups (**Figure 1**).

The mean hospital stay was 1.7 days in LA and 3.3 days in OA group with (PV.0008**) which was highly significant.The mean number of days to return to work was 5.15 in LA while it was 10 days in OA group and(PV was 0.001**) (**Table 5**). About 6 patients of the open group were satisfied with the cosmetic results of wound scars while 18 patients of the laparoscopic group were satisfied with the cosmetic results of wound scars (**Figure 2**).

Table (1): Age distribution in the 2 groups (40 patients)

Age(years)	Laparoscopic(GroupA) 20 patients		Open (Group B) 20 patients		X ²	P
	Number of Patients	Percentage	Number of Patients	Percentage		
15-19	8	40%	6	30%	1.99	0.57
20-24	6	30%	8	40%		
25-29	4	20%	4	20%		
30-55	2	10%	2	10%		
Median age	27.00		27.50		T	P
Mean age	35		36.20		0.11	0.81
Standard deviation	9.03211		8.46214			

Table (2): Gender distribution in both groups

Gender	Laparoscopic (GroupA)(n=20)		Open(GroupB) (n=20)	
	No	%	No	%
Male	4	20	14	70
Female	16	80	6	30

Table (3): Signs presented in both groups

Signs	Laparoscopic(groupA) (n=10)		Open(group B) (n=10)	
	N	%	No	%
Elevated temperature	18	90	16	80
Right iliac tenderness	20	100	20	100
Rebound tenderness	20	100	20	100
Rovsing sign	10	50	8	40
Psoas sign	12	60	12	60

Table (4): Totalleukocytic count in both groups

T.L.C	Laparoscopic(groupA) (n=20)		(Open(group B) (n=20)	
	No	%	No	%
4-11×10 ⁹ /L	4	20	4	20
11-15×10 ⁹ /L	10	50	8	40
15-18×10 ⁹ /L	6	30	8	40

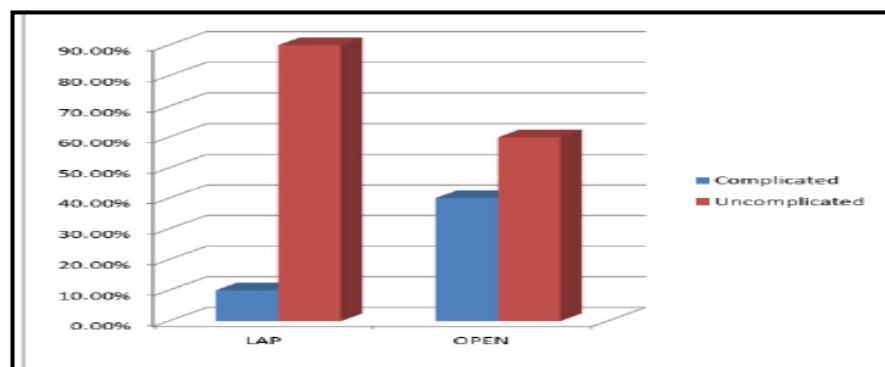
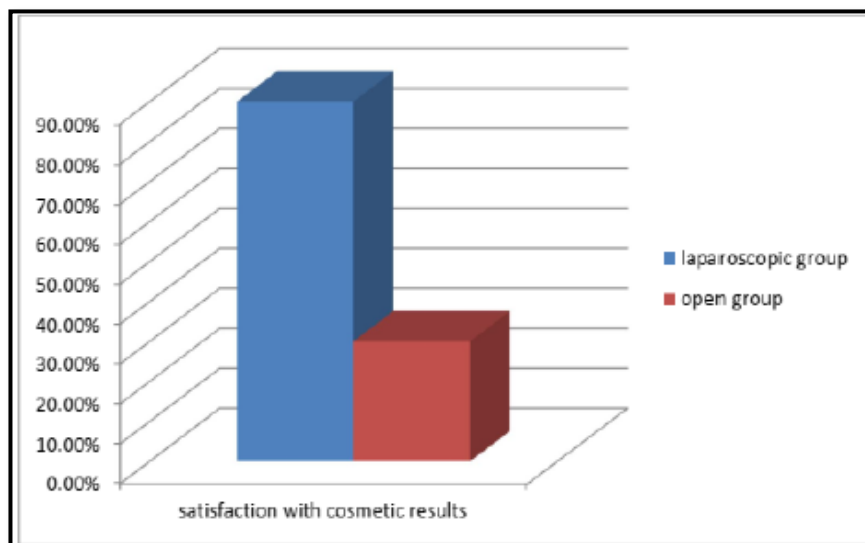


Figure (1):Overall postoperative complications

Table (5): Hospital stay, and time needed to return to work

Group	Lap (20 patients)					Open (20 patients)					P V
	Mea n	SD	Minimu m	Maximu m	Media n	Mean	SD	Minimu m	Maximu m	Median	
Hospital stay(days)	1.70	1.15	1.00	4.00	1.0	3.30	1.21	1.00	6.00	3.00	.0008* *
Work return(da ys)	5.15	2.06	3.00	10.00	5.0	10.00	2.1	5.00	15.00	8.50	0.001* *

**Figure (2): Patient satisfaction with the cosmetic results.**

Discussion

Acute appendicitis is the most common intra-abdominal condition requiring emergency surgery, although debate exists as to whether this is a true emergency (7). Open appendectomy (OA) was the principal procedure for patients with acute appendicitis during the past century before the emergence of laparoscopic devices (8).

Generally, OA was performed through a relatively small skin incision and in a short operating time; therefore, patients experienced less pain and returned to work earlier as compared to those who underwent surgical procedures for other disease.

Since **Semm** described the first laparoscopic appendectomy (LA) in 1983, laparoscopic procedures have been adopted in almost all surgical fields. Therefore, new laparoscopic instruments have been developed and laparoscopic surgical techniques have improved, and the ratio of patients undergoing LA rather than OA for appendicitis has increased. Moreover, recently introduced trans-umbilical single-port LA has become a popular procedure at some hospitals because it has a better cosmesis(9).

If patients with acute right lower quadrant pain visited our outpatient clinic or emergency room, we evaluated them through comprehensive history taking, physical

examination and laboratory tests. We used Alvarado score to reach the diagnosis. Only patients with a score of 7-10 were included in this study.

If appendicitis was suspected, radiologic studies, such as abdominal sonography was performed on all patients. Radiologic evaluation helped us to confirm the diagnosis and to recognize the location of the appendix and other intra-abdominal conditions requiring additional procedures. When the diagnosis was made, the operative procedure was chosen by the patient who received detailed descriptions of the procedures.

On the other hand, the study done by **Katkhouda et al. (10)** showed that the severity of pain experienced and its influence on activity were similar for both groups. Narcotic medication usage to control postoperative pain was also equivalent between the 2 groups which cannot be compared to this study. These results may be related to different pain threshold and different pain perception among the studied groups of different authors. In all laparoscopic surgeries, the hospital stay after laparoscopic appendectomy was significantly lower than after open appendectomy in all of the reported studies.

In the work of **Alfredo et al. (11)** the hospital stay was significantly lower in the laparoscopic group (mean hospital stay was 27.2hours) compared the open group (53.1hours),($P=0.001$).In another study by **Jan et al. (12)** reported the mean hospital stay was 1.3 days in the laparoscopic group and 2.5 days in the open group group. According to ANOVA, the hospital stay was significantly shorter in the laparoscopic group ($p<0.0353$).

Similarly another study done by **Kehagias et al. (13)** reported the mean postoperative hospital stay was 2.2 d (range, 1-17 d) after laparoscopic appendectomy and 3.1 d (range, 1-18 d)after open appendectomy ($P=0.04$).

A study done by **Shiraziet al. (14)** showed that the length of hospital stay ranged from 2 days to 9 days. The mean length of stay was significantly shorter after LA (3days safter LA,5 days safter OA,($P<0.0001$).

In one study done by **Goudaret al. (15)** revealed that hospital stay in our study was significantly less in LA than in OA [>24 hours] and this was similar to the findings of other reported series.

The results of the previous studies were comparable to our study where the mean hospital stay of the LA group was (1.70 D)while it was (3.30Ds) in the OA group with ($pv=0.0008$) which is highly significant on the other hand, in a study done by **Peiser and Greenberget al. (16)** showed that There was no significant difference in length of hospital stay between the two surgery groups. The average time to discharge was 2.5 days for the laparoscopic group and 2.7 days for the open appendectomy group.

In this study, the overall postoperative complications were higher in the OA group 8 (40%) patients than LA group 2 (10%) patients, the result was statistically significant ($P=0.019^*$). Similarly in a study done by **Shiraziet al. (14)** reported that the rate of over all complications (LA: 15%, OA: 31.8%, $P< 0.0001$) was significantly lower in patients undergoing LA.

As regard cosmetic results, 18 patients (90%) of laparoscopic group showed high satisfaction concerning the cosmetic appearance of scars compared to only 6 patients (30%) the open group patients and this difference was of highly significant value. In one

study by **Kapischke et al. (17)** showed that there was a significantly higher satisfaction of the patients of the laparoscopic group concerning size and appearance of scars ($p=0.004$).

CONCLUSION:

The use of laparoscope in suspected appendicitis is better than the open method especially in equivocal cases to reach an exact diagnosis. We must not hesitate to convert laparoscopic appendectomy to open appendectomy for the sake and safety of the patient.

No Conflict of interest.

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