OUTCOME OF OPEN VERSUS LAPROSCOPIC APPENDICECTOMY IN DEPARTMENT OF SURGERY, LADY READING HOSPITAL, PESHAWAR

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ABSTRACT

Objective: *To compare safety and benefits of laparoscopic versus open appendicectomy in a randomized control clinical trial.*

Methodology: *Between January 2008 and October 2009 one hundred and twenty patients (86 male and 34 female) with suspected acute appendicitis were assigned either to laparoscopic [n=60] or open [n=60] appendicectomy. Surgical technique was standardized for both laparoscopic and open procedure. The patients were analyzed in terms of the following aspects and findings; operation time, postoperative pain, intra and post operative complications, hospital stay and return to normal daily activities.*

Results: *There was no mortality. Wound infection (8.3%) and intra-abdominal abscess (11.6%) formation rate was significantly higher in open group than in the laparoscopic group (1.6%) and (3.3%) respectively. Postoperative pain scores (assessed by a pain distress variable, indicated on visual linear scale 0 to 10 and a pain activity scale, indicated on visual linear scale 0 to 10) was significantly lower in laparoscopic group. Hospital stay was significantly shorter in laparoscopic group ($p<0.0353$) and mean operation time was similar in both groups. One patient (1.6%) was converted from laparoscopic to open appendicectomy due to diffuse pelvic adhesions.*

Conclusion: *Though operation time was same but complications, pain and hospital stay was less in the Laparoscopic group.*

Key Words: *Appendicitis, Laparoscopic, Appendicectomy.*

INTRODUCTION

Appendecectomy is one of the most commonly performed operations. In 1889 McBurney performed the 1st open appendicectmy[1], since then it has been the gold standard for the treatment of acute appendicitis for more than one hundred years. Although it is safe, the incidence of postoperative complications is 10% to 20%[1]. The clinical diagnosis of acute appendicitis is unreliable despite numerous attempts to improve diagnostic accuracy. The rate of negative exploration in young women still is in the range of 25% to 30% [2].

In 1983 the German gynecologist Kurt Semm removed the first appendix vermiformis via a laparoscopic approach[1], although its real value is still debated. Whereas the advantages of laparoscopic cholecystectomy are clear, the benefits of laparoscopic appendicectomy are not obvious. The reports of earlier prospective studies were equivocal[3], but more recent trial showed better results using the laparoscopic approach[4]. There also are studies showing that laparoscopy does not offer any advantages[2, 5].

In the continuing debate about laparoscopic versus open appendicectomy, the laparoscopic approach still has to prove its efficacy and safety in clinical trials. The aim of this study was to evaluate laparoscopic appendicectomy in comparison with open appendicectomy.

METHODOLOGY

Between January 2008 and October 2009, all patients with acute appendicitis and older than 16 years of age presented at surgical 'B' unit, Lady Reading Hospital Peshawar were included in the study. Patients were excluded if the diagnosis of appendicitis was not clinically established and if they had appendicular mass, appendicular abscess and perforated appendix.

The diagnosis of appendicitis was made on the following criteria ; History of right lower quadrant pain or periumbilical pain migrating to the right iliac fossa with nausea and\or vomiting, fever of more than 38C and/or leucocytosis above 10,000 cells per ml, right iliac fossa guarding, and tenderness on physical examination.

The total study group included 120 patients (male 86 and female 34) admitted with a suspected appendicitis. Randomization was done with lottery method. The patients were divided into two treatment groups, laparoscopic (n=60) and open (n=60). The patients were informed of the risks and benefits of assigned operation and asked to sign a detailed informed consent in their respective native language. In most cases, the surgeon was the one to explain the procedure with its possible complications to the patients.

Data analysis was done by SPSS v.10.

SURGERY

The participating surgeons were experienced in both laparoscopic and conventional appendectomy.

For laparoscopic appendicectomy, usually a three-trocar technique was used; the 1st just above the umbilicus (10mm) for 0 optic, the 2nd along the suprapubic line (05mm) and the third in the right iliac fossa (05mm).Thorough examination of the cavity to exclude other pathologic conditions was performed in every case, particularly exploration of adnexa in females and a search for meckel's diverticulum.

After the initial abdominal exploration, the appendix was identified, the mesoappendix was coagulated using bipolar diathermy or sometime ligated with intracarporial/or extracorporeal knotting to control the appendicular artery, as we were lacking the Harmonic.

The base of the appendix was ligated using single 1/0 vicryl (endoloop, intracarporial and/or extracorporeal) and the appendix was divided 1cm distally to the ligature. The appendix was removed through the 10mm umbilical trocar site with out direct contact with the wound. When the appendix was friable or too large, it was placed in a glove finger before removal through the port site as specimen plastic bag are very expensive.

Open appendicectomy was performed, through a Mcburney's muscle, splitting incision in the right iliac fossa.The arteries in the mesentery and the base of the appendix was ligated using catgut 1/0. The appendix was divided 1cm distally to ligature with out invagination of the appendicular stump.The resected appendicular specimens both from laparoscopic and open appendicectomy were submitted to histopathological examination.

With the induction of anaestheria, all the patients were given antibiotics (single dose of intravenous 1g cefuroxime and 100ml metronidazole). The operating time, hospital stay, and postoperative complications were recorded. The operating time was measured from incision to last stitch. The discharge usually was made by the surgeon based on the clinical conditions of the patient. Positive microbiologic examination was required to count the cause as an infection.

POSTOPERATIVE COURSE

Strict criteria were followed for the reintroduction of nutrition. Bowel sounds were checked every 8hours.Once present, the patients were started on a clear liquid diet & advanced to regular diet when the liquid diet was tolerated. Patients were discharged when they tolerated a regular diet & were afebrile for 24 hours.

OUTCOME PARAMETERS

The following parameters were recorded;

Anesthesia time in minutes from the time of induction to reversal Operation time skin to skin in minutes Type of appendix (retocaecal, pelvic, paracaecal, subcaecal) complications (intra abdominal abscess, wound infection, intra abdominal abscesses were defined by the presence of fever & elevated WBC & evidence by ultrasonography; wound infections were defined as redness & drainage from the wound requiring opening of the skin incision & packing Pathology based on reports (acute, gangrenous, phlegmonous, recurrent) Time until resumption of diet (clear liquid & regular diet) in hours & hospital stay in days.

Pain and discomfort were also assessed qualitatively using 2 items: a pain distress variable and a pain activity scale. The pain distress variable was a single response item that the patient used to indicate on a visual linear scale the severity of the worst pain that they experienced in the preceding 24 hours. The item was scaled from 0 to 10, with 0 being no pain and 10 being the most intense pain imaginable.

The pain activity scale assessed pain

during 3 activities, namely, (1) rest, (2) normal daily activities, and (3) exercising or during strenuous work. The patient's response to the 3 levels of activity was assessed using a visual linear score with a score of 0 to 10, with 0 being no pain sensation and 10 being the most intense pain imaginable.

At two weeks, patients were seen in the OPD and checked for complications (wound infection, intraabdominal abscess formation, & any other complications).

RESULTS

A total of one hundred and twenty patients (male; 86 female; 34) had surgery for suspected appendicitis. 0f these surgeries, sixty (60) were performed laparoscopically and sixty by open surgery. One patient (1.6%) was converted to open access due to diffuse pelvic adhesions.

The laparoscopic group included 42 men & 18 women, for a male-to-female ratio of 2.3:1. Their mean age was 23.6±14.2 years. The open group included 44 men & 16 women, for a male-to-female ratio of 2.7:1. Their mean age was 20.8± 11.4 years. According to an analysis of variance (ANOVA), the age was comparable between the two groups (p=0.612). The sex ratio, as determined by chi-square analysis, also was comparable (p=0.718) (Table 1).

The mean operation time in laparoscopic was 37±5.6 minutes. In open group it was 35±8.9 minutes. The operative time was approximately similar in both groups (Figure 1).

The appendix was in the retrocaecal position in 65patients (70.8%), the pelvic position in 27 patients (22.5%), the paracaecal position in 5 patients (4%), subcaecal position in 3 patients (2.5%) in both groups.

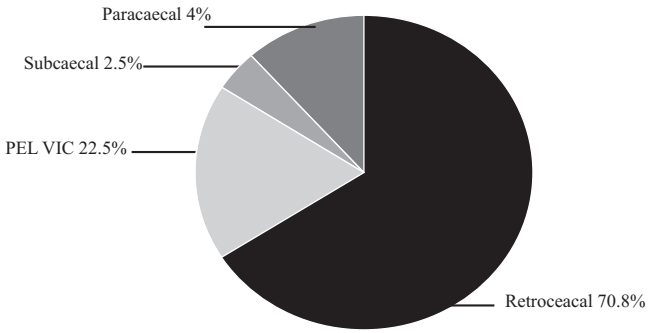
Postoperatively there was port-site infection in one patient (1.6%), where as in the open group five had wound infection(8.3%), according to chi-square test this difference was highly significant (p=0.005). Two patients (3.3%) in laparoscopic group had intraabdominal abscess, there were interloop abscess (n=1) and pelvic collection (n=1). In open group seven patients (11.6%) had intraabdominal abscesses, there were right subphrenic abscess (n=3), pelvic collection (n=2) and generalized peritonitis resulting from overlooked ileal perforation (n=2). The intraabdominal infection was statistically significant (p=0.039) (Table2).

Other postoperative complications included paralytic ileus experienced by two patients in open group and one patient in the laparoscopic group. Three patients in the open group experienced adhesive intestinal obstruction early after surgery and were treated conservatively.

Table 1: Age, gender, mean operative time and mean hospital stay in laparoscopic and open groups

	Laparoscopic	Open	p-value
Male : Female (total)	2.3:1 (60)	2.7:1 (60)	0.612
Mean Age	23.6±14.2	20.8± 1	0.718
Mean Operative Time (min)	37±5.6	35±8.9	<0.003
Mean Hospital Stay (days)	1.3	2.5	<0.0353

Figure 1: Frequency of Different Types of Appendix Location Preoperatively on Anatomic Bases



The mean hospital stay was 1.3 days in the laparoscopic group and 2.5 days in the open group. According to ANOVA, the hospital stay was significantly shorter in the laparoscopic group ($p<0.0353$) (Table 1).

Histological analysis in both groups showed acute appendicitis in 79 patients (65.8%), 11 cases of phlegmonous appendicitis(9.16%), 8 cases of gangrenous appendicitis (6.5%) 12 cases of chronic appendicitis (10.00%) (Figure 2). In 10 patients with a normal appendix, other diseases were found during the operation (Table 3).

Postoperatively, the severity of pain experienced and its influence on activity were significantly less in laparoscopic group than open group (Graph 1). Postoperatively, laparoscopic group experienced less severity of pain on postoperative days 1, 2, 3, and at 2 weeks.

The impact of the patient's pain and its limitation on various daily activities were again less in laparoscopic group than open group through the postoperative period. The P value in all the variables was less than 0.05, hence it is statistically significant (Table 4). There was significant difference between the 2 groups (laparoscopic group less than open group) with respect to the performance of routine daily activities and the limitation imposed by such activities on day 1, day 2, day 3, and at 2 weeks postoperatively (Table 4).

Table 2: Postoperative septic complications in laparoscopic and open groups

	laparoscopic	Open	P value
Wound Infection	1 (1.6%)	5 (8.3%)	0.005
Intra Abdominal Abscess	2 (3.3%)	7 (11.6%)	0.039

Figure 2: Frequency of Types of Appendictis on Histological Analysis Basis

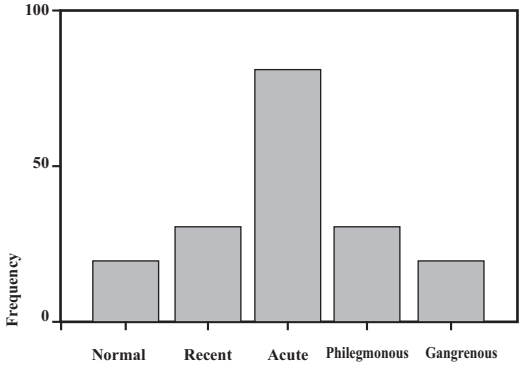


Table 3: Findings during Appendectomy in 10 patients with a normal Appendix

Diagnosis	Laparoscopic (n=7)	Open (n=3)
Mesenteric Lymphadenitis	2	0
Ovarian Cyst	3	1
Acute Salphingitis	2	0
Meckle's Diverticulum	0	1
Terminal Ileitis	0	1

Graph 1: Severity of Pain in both the groups.

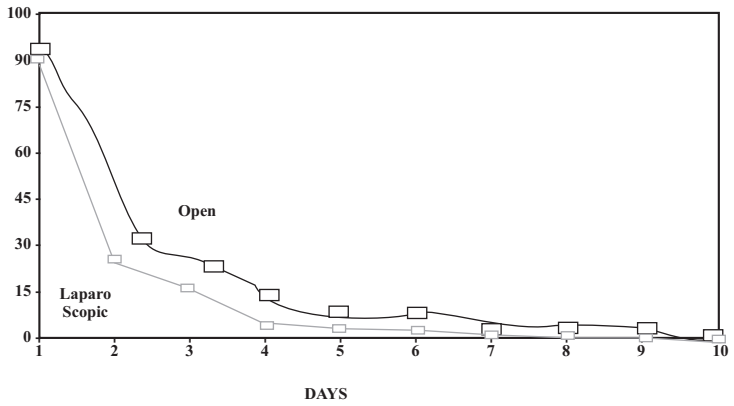


Table 4: Qualitative Pain Assesment (VAS) and Activity Score

	Assigned to open Appendicectomy	Assigned to Laparoscopic Appendicectomy	p-value
Pain / Distress			
Post operative	9 (7-10)	7 (4-10)	
Day1	7 (7-8)	5 (3-7)	
Day2	5 (5-7)	3 (2-6)	0.035
Day3	3 (1-5)	2 (2-5)	
2 wk	2 (0-5)	1 (0-10)	
Pain Activity Score			
Post operative	18 (10-20)	14 (12-20)	
Day1	9 (8-15)	7 (4-11)	
Day2	7 (5-13)	5 (3-9)	0.041
Day3	5 (3-10)	3 (1-6)	
2 wk	2 (3-7)	1 (3-4)	
Activity Assessment			
Post operative			
Day1	4 (3-6)	6 (4-7)	
Day2	3 (2-6)	4 (4-5)	
Day3	3 (2-5)	5 (4-6)	0.047
Wk2	5 (5-9)	5 (4-6)	
	3 (2_4)	3 (2_4)	

VAS indicates visual analog scale

DISCUSSION

The rate of conversion of laparoscopic to open access was significantly lower (1.6%) in our study as the laparoscopic appendicectomies were performed by consultant and complicated appendicitis (e.g.; perforated appendix, appendicular mass and appendicular abscess) were excluded from the study as compared to studies conducted by Katkhouda et al and Roviaro et al, in which the rate of conversion from laparoscopic to open access was 8% and 7.3% respectively[5]. Other studies, however, reported longer operating times and higher costs for laparoscopy [3, 4] or did not find sufficient advantages, to prove the superiority of the laparoscopic approach [3, 6].

In our study, there was wound infection in one patient (1.6%) in laparoscopic group, whereas in open group 5 patients (8.3%) had wound infection. Compared to other studies in which the incidence of wound infection in laparoscopic and open appendicectomy was 0 v/s 7.6% respectively[2, 5]. This is because with laparoscopic approach, the inflamed appendix was dissected without direct contact with the trocar wound. Also, removal of the appendix was done completely within the port opening. When the appendix was too big to pass

through the trocar site, we removed it in a finger glove. This is in contrast to open surgery, in which both the inflamed appendix and the infected fluid come in contact with the abdominal incision.

Intraabdominal abscesses formation rate was also significantly lower in laparoscopic group (3.3%) than in the open group (11.6%), while in another study, the rate of intraabdominal abscess was equal in both groups where as in study by Katkhouda et al the rate of intraabdominal abscess was 5.3% v/s 3% in laparoscopic v/s open appendicectomy [2, 5]. This is because with laparoscopic approach the peritoneal cavity can be washed out thoroughly, reducing the risks of intraabdominal abscesses or adhesions formations [7, 8]. This is very important for women, in whom pelvic adhesions from pelviperitonitis after acute appendicitis or salphingitis may lead to infertility[9].

Other postoperative complications such as intestinal obstruction and ileus were slightly higher in open group but this was not statistically significant. In general the postoperative complications in the laparoscopic group were less than in the open group.

In our study, laparoscopic appendicectomy did not result in intraoperative complications related to the laparoscopic approach such as bowel injury or severe hemorrhage caused by injury to major vessels. This may be explained by the fact that the laparoscopic appendicectomies in this study were performed by surgeons experienced in laparoscopic surgery.

The operative time was approximately equal in both laparoscopic and open group, compared to another study in which the author reported significantly longer operative time for laparoscopic appendicectomy (laparoscopic 67.3 v/s open 59.4 minutes) [2].

The hospital stay was shorter in laparoscopic group than in the open group, which is consistent with the findings of other studies [5, 7, 10, 11].

In our study the severity of pain experienced (indicated on visual analog scale) and its influence on daily activities (indicated on visual linear scale) was significantly less in laparoscopic appendicectomy v/s open appendicectomy while Katkhuouda et al and Marzouke et al reported similar severity of pain for both groups [2, 5].

Laparoscopy provides benefits in terms of accurate diagnosis, especially in female patients[4]. In our study, 6 in 34 female patients (17.6%), were found to have a normal appendix and a gynecologic cause for their abdominal pain. Also, the diagnostic role of the laparoscope added in the management of these problems. In cases of benign disease, affecting mainly young people, the cosmetic question can be very important. Videolaproscopic scars are virtually invisible.

CONCLUSION

Laparoscopic appendicectomy offer a reasonable advantagesbut it is not yet considered the gold standard for appendiceal pathology. Though operation time was same but complications, pain and hospital stay was less in the Laparoscopic group. Laparoscopic appendicectomy is safe to perform with a high degree of acceptibility among patients.

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