

APPENDECTOMY; COMPARISON OF OUTCOMES OF LAPAROSCOPIC VERSUS OPEN

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ABSTRACT... Objective: The aim of this study was to compare the outcomes and morbidities of laparoscopic appendectomy (LA) and open appendectomy (OA) in patients with acute appendicitis. **Design:** Interventional study. **Setting:** The study was conducted at Madina Teaching Hospital, University Medical & Dental College, Faisalabad. **Period:** From June 2007 to August 2009. **Materials and Methods:** The study group consisted of two hundred patients suffering from acute appendicitis. One hundred patients underwent LA and one hundred patients underwent OA. Comparison was based on operating time, complications, requirements for postoperative analgesia, time until resumption to regular diet, hospital stay, and return to full activity in days. Comparisons were made between continuous variables using Student's t test of the means and were made between proportions using Fischer's exact or chi-square testing where appropriate. Statistical significance was taken to be a p value of .05 or less. **Results:** Of the hundred patients, five patients (5%) had the procedure converted to open surgery. The rate of infection was significantly lower in patients undergoing LA. The median length of stay was significantly shorter after LA (2 days after LA, 5 days after OA, $P < 0.05$) than after OA. The operating time was shorter {OA: 25 min (median), LA: 30 min (median), $P > .05$ } in patients undergoing open appendectomy compared to laparoscopic appendectomy. **Conclusion:** LA is associated with increased clinical comfort in terms of fewer wound infections, faster recovery, earlier return to work and improved cosmesis.

Key words: Appendectomy, Open, Laparoscopic

INTRODUCTION

Open appendectomy (OA) has been practiced for more than a century since its introduction by McBurney. It is the most common intra abdominal surgical emergency with a lifetime risk of 6%. Since its initial description by Semm¹ in 1983, laparoscopic appendectomy (LA) has struggled to prove its superiority over the open technique.

Although LA has gained much popularity among some surgeons, others remain skeptical of replacing the relatively straightforward OA. Criticism of the LA includes increased operative cost, primarily due to the use of disposable laparoscopic instruments, increased operative time, and concerns about a higher incidence of intra-abdominal abscesses, particularly after perforated appendicitis². Proponents of LA, however, claim that the advantages of the procedure include improved wound healing, reduced postoperative pain³, and ultimately

earlier discharge from hospital⁴, all translating to an earlier return to normal activity⁵. There are fewer postoperative complications and better cosmesis¹. They also support the idea of laparoscopically evaluating the peritoneal cavity prior to committing to appendectomy, particularly in difficult cases. Other advantages of LA are a reasonable operation time and short learning curve^{6,7}. This prospective study highlights the advantages of this procedure.

MATERIALS AND METHODS

The study was conducted at Madina Teaching hospital, University Medical & Dental College, Faisalabad from June 2007 to August 2009. It is a double blinded, randomized, prospective, interventional, study.

Inclusion criteria: Patients with acute appendicitis with ASA I & II were included in the study. All other causes of

pain right iliac fossa were excluded before making a final decision regarding operative intervention for appendicitis. All patients included were 16 years of age or older.

Exclusion Criteria: Patients were excluded if the diagnosis of appendicitis was not clinically established and if they had a history of symptoms for more than 5 days and/or a palpable mass in the right lower quadrant, suggesting an appendiceal mass/ abscess. Patients with the following conditions were also excluded: history of cirrhosis and coagulation disorders, generalized peritonitis, shock on admission, absolute contraindications to laparoscopic surgery (large ventral hernia, history of laparotomies for small bowel obstruction, ascites with abdominal distension, pregnancy), contraindication to general anesthesia (severe cardiac and/or pulmonary disease), inability to give informed consent due to mental disability.

The qualifying patients were informed of the risk and benefits of each operation and asked to sign a detailed informed consent in their respective native language. Computer-generated random numbers were used to assign the type of surgery (laparoscopic or open), which were written on a card sealed in a completely opaque envelope.

Antibiotic prophylaxis included a single dose of third generation cephalosporin for uncomplicated cases. For complicated cases, a third generation cephalosporin along with metronidazole preoperatively at induction and was continued postoperatively until the white blood cell count was within normal limits and the temperature under 37.9°C for 24 hours.

OA used a McBurney muscle-splitting incision 1.5 inches in the right lower quadrant. LA was performed using 3 ports, with the laparoscope positioned at the umbilicus through a 10 mm port. Two 5-mm ports were inserted in the right and left lower quadrants. The abdominal cavity was explored to locate the appendix and rule out other possible diagnoses. The mesoappendix was dissected and separated from appendix with diathermy hook and if required, a loop ligature was applied too. The appendix

was secured at the base with loop ligatures and removed through the 10 mm umbilical port. The right lower quadrant, the right colic gutter and the subhepatic space in the case of purulence were irrigated and the fluid was suctioned. Non suction drainage was left in situ in cases of abscess and residual cavity.

Laparoscopy was converted to open appendicectomy if technical difficulties, uncertain anatomy or bleeding was encountered. The resected appendix was routinely sent for histopathological examination.

Postoperatively, bowel sounds were checked every 12 hours. Once present, the patients were started on a clear liquid diet and advanced to regular diet when the liquid diet was tolerated and flatus observed. Analgesics in the form of Diclofenac sodium injections were given for twenty-four hours. Further analgesics were given based on patients' perception of pain. Drain was removed when drainage was less than 30 ml in twenty-four hours.

Patients were discharged when they tolerated a regular diet, had a normal white blood cell count under 10,000/mL, afebrile for 24 hours, fully mobilized without the need for assistance from attendants to secure personal hygiene. They were encouraged to resume normal activity and work as soon as they felt fit. Normal activity was defined as return to usual activity of domestic and social life at the discretion of the patient.

The following parameters were recorded: Operating time skin to skin in minutes, complications, Pathology at the time of operation, indications for conversion from LA to OA, time until resumption to regular diet in days, hospital stay in days, return to full activity in days, requirement for parenteral and oral analgesics for Postoperative pain. Postoperative pain was assessed by the data collector blinded to the type of operation by daily tabulation of medication requirements.

At 2 weeks, patients were seen in the wound clinic and checked for complications (wound infection, intraabdominal abscess formation, and any other complication). Any patients having complications were admitted through emergency, investigated and treated.

STATISTICAL METHODS

Comparisons were made between continuous variables using Student's t test of the means and were made between proportions using Fischer's exact or chi-square testing where appropriate. Statistical significance was taken to be a p value of .05 or less.

RESULTS

Two hundred patients were included in the study of which one hundred patients underwent laparoscopic appendectomy while one hundred patients underwent open appendectomy.

Patients were comparable regarding age, sex, preoperative white blood cell (WBC) count and fever (Table I).

Table-I. Patients characteristic			
Variable	A (n=100)	A (n=100)	P value
Mean age (years)	22 (16-62)	24 (17-64)	P=0.57
Female / Male	68/32	71/29	P=0.9
Preoperative WBC>13000 / mm3	67	69	P=0.87
Fever >99.9F	35	39	P=0.82

Of the hundred patients subjected to laparoscopy, the procedure was successfully completed in 95 patients, while five patients (5%) had the procedure converted to open surgery. Reasons for conversion were difficulty in dissection of appendix in all the patients. These five patients were included in LA group (intention to treat).

In the OA group vs. LA group, ratio of normal (5%vs6%), inflamed (77%vs72%), suppurative/gangrenous (8%vs11%), gangrenous (5%vs 6%) and appendicular mass (5%vs5%) was comparable (Table II).

Appendicular lump was found in 5 patients in the laparoscopic group. These were early lumps which were gently dissected with the tip of the sucker nozzle and by hydro-dissection. Caution was also taken during ligation of the base which was friable and tended to cut through. Five patients in the open group had appendicular lump.

Table-II. Pathology of appendix as noted during operation

Pathology	OA	LA
Normal	5	6
Inflamed	77	72
Suppurative / gangrenous	8	11
Perforated	5	6
Appendicular mass	5	5

Table-III. Complications

Complication	OA	LA	P value
Wound / port site infection	8	2	
Intra abdominal abscess	-	-	0.034
Enterocutaneous fistula	1	-	

Table-IV. Comparison of major parameters of the study

Variables	OA	LA	P value
Operative time (minutes)	25	30	>.05
Parenteral analgesia (days)	5	1	<.05
Oral analgesia (days)	8	2	<.05
NPO to general diet (days)	3	1	<.05
Hospital stay (days)	5	2	<.05
Return to full activity (days)	14	4	<.05

After comparing other major variables, LA remained associated with fewer days return to general diet, shorter duration of parenteral analgesia, fewer milligrams of oral analgesia, a shorter postoperative hospital stays and earlier return to full activity.

Length of hospital stay ranged from 2 days to 9 days. The length of stay was significantly shorter after LA (2 days after LA, 5 days after OA, $P < 0.05$).

DISCUSSION

The results of the present study support several previous studies where laparoscopic appendectomy has been shown to be both feasible and safe in comparison with

open appendectomy^{1,8,9,10,11,12}. In addition to improved diagnostic accuracy, laparoscopic appendectomy confers advantages in terms of fewer wound infections¹³, less pain, faster recovery and earlier return to work¹⁴. Some recent retrospective cohort studies or chart reviews found laparoscopic appendectomy associated with significantly shorter hospital stay^{10,11,12}. Similarly, some randomized controlled trials associated laparoscopic appendectomy with decreased hospital stay^{9,10,11,12,13,15,16}. Sauerland and associates summarized the results of 28 randomized controlled trials and almost 3000 patients and reported a significant decrease in length of hospital stay in patients undergoing LA15. Similar results were found by Golub and colleagues¹⁵. In a study by Guller U, et al, laparoscopic appendectomy was associated with shorter median hospital stay, lower rate of infections, decreased gastrointestinal complications, lower overall complications, and higher rate of routine discharge¹⁷. S. Demirbas, et al in their study concluded that LA offers less pain sense, reasonable short hospitalization, shorter time to return to vital work¹⁸. The present study revealed a significantly shorter hospital stay for patients undergoing laparoscopic appendectomy.

Significant variation in operating time was noted in various controlled studies^{10,15}. In the present study more operating time ($p>0.05$) was noted for laparoscopic appendectomy.

In accordance with other studies, there were significantly fewer wound infections in the laparoscopy group^{9,10,14}. We definitely find an over all advantage of laparoscopic appendectomy.

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PREVIOUS RELATED STUDIES

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