

Laparoscopic versus open appendectomy in females with a clinical diagnosis of appendicitis

Abdulrahman S. Al-Mulhim, FRCSI, FICS, Faisal M. Al-Mulhim, FRCSI, Abdulmohsen A. Al-Suwaiygh, MBBS, Nabil A. Al-Masaud, MBBS.

ABSTRACT

Objective: Appendectomy can be performed using either a laparoscopic technique (LT) or an open technique (OT). We compared the following items operative, anesthesia, length of stay, post-operative pain, medicine, wound healing, days to return to normal activity in both groups.

Methods: This study was carried out at King Fahad Hospital, Hofuf, Al-Hassa, Kingdom of Saudi Arabia, from January 1999 to April 2000. We randomly assigned 60 female patients to appendectomy by LT or OT. The 2 groups were compared concerning demographic data. The differences were considered statistically significant at a P value < 0.05.

Results: The open group had shorter anesthesia and operative time (68, 50 versus 85, 65 minutes). The laparoscopic group had a significant reduced postoperative narcotic requirement ($P < 0.05$), quicker reintroduction of diet and quicker return to normal activity.

Conclusion: Laparoscopic appendectomy in female patients with clinical diagnosis of appendicitis is the procedure of choice for the diagnosis and the management of acute appendicitis.

Saudi Med J 2002; Vol. 23 (11): 1339-1342

Since its initial reporting by Semm¹ in 1983, laparoscopic appendectomy (LA) has not been fully accepted as the standard technique for the treatment of acute appendicitis. Even LA has been evaluated prospectively by many randomized trials,² but a clear consensus is still lacking as in some trial, it supports LA³ and other trials not.⁴ So most surgeons question the advantage of laparoscopic procedure for acute appendicitis especially in female patients as the female has a high negative appendectomy.

The aim of this study was to compare laparoscopic appendectomy with open appendectomy LA in

female patients with clinical diagnosis of acute appendicitis in a prospective randomized trial to assess whether laparoscopic appendectomy had advantage compared to conventional open appendectomy. We examined the patients demographic data, operating and anesthesia time, length of stay, post operative pain medicine requirements, wound complication, and the number of days needed to return to normal activity and operation finding.

Methods. From January 1999 through to April 2000, 60 non-selective female patients with clinical

From the Department of Surgery, King Fahad Hospital, Hofuf, Al-Hassa, Kingdom of Saudi Arabia.

Received 29th April 2002. Accepted for publication in final form 14th July 2002.

Address correspondence and reprint request to: Dr. Abdulrahman S. Al-Mulhim, Department of Surgery, King Fahad Hospital, PO Box 1164, Hofuf, Al-Hassa 31982, Kingdom of Saudi Arabia. Tel./Fax. +966 (3) 5755977. E-mail: abdu3939@yahoo.com

diagnosis of acute appendicitis necessitating surgery were randomized to laparoscopic $n=30$ or open appendectomy $n=30$ using a sealed envelope system and operated on an emergency basis. Following randomization, separate informed consent was obtained to perform the operation to which the patients were randomized. The criteria for inclusions were female patients with clinical diagnosis of acute appendicitis, patients suitable for a right iliac fossa muscle-splitting approach to the appendix, patients suitable for laparoscopy and no evidence of pregnancy. The patients' data include symptoms (fever, nausea, vomiting, diarrhea, constipation, dysuria), clinical signs (temperature, pulse, rigidity, rebound tenderness), white blood cell count and ultrasonography if carried out, were collected. The surgeons participating in this study were experienced in laparoscopic surgery; a Registrar with long general surgery experience usually did open appendectomy. Laparoscopic appendectomy required 3 stab incisions (a small midline incision was made at the umbilicus and 10 mm trocar was inserted, the camera was inserted at this site, a 5 mm trocar below the right costal margin and another 5 mm in the left iliac fossa of the abdomen were placed under direct vision. The appendiceal mesentery was divided using electrocautery. The base of the appendix was encircled with 2 vicryl endo-loops proximally and one metal clip distally, and was divided. The abdomen was irrigated with normal saline solution and the appendix was extracted through the lumen of the 10 mm port under direct vision as the camera withdrawn. The fascia defect repair with vicryl 3.0. These wounds were closed with nylon 4.0. Open appendectomy was carried out through a muscle-splitting incisor in the right iliac fossa, the mesoappendix and appendix stump were ligated with vicryl ligatures and appendix stump was buried into the cecum and the abdominal wall was closed in layers with absorbable sutures. The skin was closed with subcuticular stitch 4.0 nylon. All patients received 500 mg Metronidazole intravenously at the time of induction of anesthesia. These were continued for 24 hours postoperatively if the appendix was grossly inflamed or for a longer period (3-5 days) if the appendix was perforated with combination of ampicillin and gentamycin. A non-inflamed appendix was removed at both laparoscopic and open surgery, even with a definite cause of the patients' symptoms was found. Postoperative pain control for both groups was Pethidine one gm/kg every 6 hours if needed for the first 24 hours, then shifted to intramuscular Voltaren 75 mg per request. Discharge pain medicine was Paracetamol tablet. The nurses recorded the total operating time and it was the time from skin incision to the closure. Patients were released from the recovery room, as the anesthesiologist was satisfied. The study team surgeon to assess the progress during his or her

hospital stay visited every patient. The number of doses of Pethidine and Voltaren was recorded. Reintroduction of diet was started as the patients tolerated fluid diet and then shifted to normal solid diet. The length of hospital stay was the number of days after surgery spent in the hospital until discharge. Patients were given verbal instructions to return to normal activity as soon as they felt fit enough, and return to normal activity was defined as the time needed to be able to perform daily tasks in the normal way. Patients were seen 7 days postoperatively for suture removal and wound inspection and 4 weeks for discharge evaluation. Wound infection was defined as presence of inflammatory signs with or without discharge at the wound site, need antibiotics with or without drainage and cleaning. Severity of appendicitis was determined intraoperatively. The appendix was considered gangrenous when there was necrosis and perforated when the appendix had a visible hole or presence of gross pus.

The data were collected on a pro forma and entered into a computer database. Comparison between the 2 groups was performed using the Mann-Whitney U Test. A P value of <0.05 was considered significant.

Results. From January 1999 through to April 2000, 60 female patients aged 12 years or over met the criteria to enter the study were randomized. Thirty patients to laparoscopic appendectomy and 30 patients to open appendectomy. The 2 groups were similar in age, height, weight, duration of symptom and white blood count (**Table 1**). Three patients randomized to the laparoscopic appendectomy ultimately had an open operation. All 3 converted as perforated appendicitis. This mean the operating time and anesthesia time were significantly longer in the laparoscopic cases, a median time of 65 minutes and 85 minutes; compared to open cases, a median time of 50 minutes and 68 minutes. (**Table 1**) The median of hospital stay was the same in both groups (2 days) but there was significant differences for postoperative pain analgesia and reintroduction of diet and returned to normal activity. (**Table 2**) The wound infection rate was 10% (3 patients) in open group and it is significantly higher than laparoscopic group (0%). A mortality rate of 0% was recorded for both groups. A mortality rate of 0% was recorded for both groups. The pathology findings for the 2 groups are summarized in **Table 3**.

Discussion. Laparoscopic surgery is a major surgical advance, but laparoscopy in patients with clinical diagnosis of acute appendicitis has not gained wide acceptance and this mainly due to the difference in the cost between the laparoscopic and open techniques.⁵

Table 1 - Patient characteristics and summary of results.

Characteristics	Laparoscopic group	Open group	P
Age (year)	23 (14-35)	26 (14-42)	NS
Height (cm)	162 (150-183)	160 (154-180)	NS
Weight (kg)	54 (30-82)	58 (35-90)	NS
Duration of symptom (hours)	20 (6-72)	30 (6-90)	NS
White blood count (x 1000)	12.8 (6.2-18.3)	14.5 (8.2-19.6)	NS
Operating time (minutes)	65 (60-125)	50 (45-105)	<0.05
Anesthesia time (minutes)	85 (80-145)	68 (55-115)	<0.05
Hospital stay (days)	2 (1-4)	2 (1-6)	NS
NS - no significant difference			

Operating and anesthesia times for laparoscopic appendectomy are longer in this study. A median time of 65 minutes and 85 minutes is longer than 50 minutes and 68 minutes recorded for the laparoscopic group. These results were similar to other studies and this can be in part due to time spending to establish a pneumoperitoneum and carry out diagnostic laparoscopy.⁶ The operating time for any new laparoscopic procedure will improve with time as the procedure becomes routine and the experience increased. There are other studies showing that operating time was similar for the 2 types of surgery.^{7,8} There was a significant difference in postoperative analgesic requirement in favor of the laparoscopic surgery and this is similar to other reports, this is one of the advantages of laparoscopic surgery in general. The median time to discharge from the hospital stay postoperatively was equal in this study for both groups but it showed significant earlier reintroduction of diet as well as ambulation from bed.⁶ Recovery time and return to normal activity was earlier in laparoscopic group (7 versus 14 days), and this is similar to Pederson et al,⁹ but Nguyen et al⁷ and Merhoff et al¹⁰ reports showed no change in the time to return to work.

Table 2 - Postoperative course.

Parameter	Laparoscopic group	Open group	P
Pain			
Dose of pethidine in first 24-hours, median (range)	1 (1-2)	3 (2-4)	<0.05
Post 24-hours diclofenac injection, median (range)	1 (1-2)	3 (2-5)	<0.05
After discharge, paracetamol tablet median (range)	1 (0-3)	4 (2-8)	<0.05
Mobilization from bed, hours median (range)	6 (6-8)	10 (8-20)	NS
Reintroduction of liquid diet, hours median (range)	8 (6-12)	18 (12-24)	<0.05
Reintroduction of solid diet, hours median (range)	24 (18-24)	24 (24-36)	<0.05
Return to normal activity, days median (range)	7 (4-10)	14 (10-21)	<0.05
NS - not significant			

Three patients (10%) in the open group had wound infection and those patients with perforated appendix were treated by antibiotic and this is similar to reports showing the incidence of complications for patients with perforated appendix is greater compared to those with non perforated appendix.¹⁰ Dressing was carried out in the hospital then in a primary health care center and follow-up in surgical out patient once a week. While there was no wound infection in the laparoscopic group, most likely as the contact between the appendix and the wound edge is avoided by withdrawing the appendix through the trocar, this offers significant improvement in postoperative outcome.

Table 3 - Histopathology (n=60).

Type of appendicitis	Laparoscopic group	Open group	P
Acute appendicitis	24	23	NS
Perforated appendix	4	3	NS
Gangrenous appendix	1	2	NS
Normal appendix	1	2	NS
NS - not significant			

This study is small to resolve the issue of laparoscopic versus open appendectomy in female patients, but it supports studies that show diagnostic laparoscopy is beneficial in female patients¹¹ and also supports a meta-analysis study that show laparoscopic appendectomy is superior in terms of pain, recovery, and low wound infection rates.¹² The incidence of a normal appendix in women with a clinical diagnosis of acute appendicitis is 22-47% whereas in men it is only 7-15%¹³ and this indicates the importance of laparoscopic as diagnostic and therapeutic if needed in females particularly. Many studies showed that diagnostic laparoscopy in women reduced the negative diagnosis rate to 6% and avoided an unnecessary laparotomy in 35% of women with suspected acute appendicitis^{14,15} we do believe in that. Although the open procedure was quicker, required less operating time, the laparoscopic procedure had fewer wound infections and early return to normal activities.

Although classic open surgery is simple, expeditious, and effective, it has some disadvantages like wound sepsis, delayed recovery, operative difficulties especially in female patients. As the aim of this study was to assess the applicability and safety of LA in female patients, we found that LA was associated with fewer wound infections, faster recovery, earlier return to work and improved cosmetics without significant increase in operative duration or the incidence of complications.

We do agree with Cox Unit Policy¹⁴ in that women with a clinical diagnosis of acute appendicitis should undergo an initial diagnostic laparoscopy and could not justify their randomization to an open appendectomy.

Acknowledgment. The authors would like to acknowledge the assistance of Mr. Ramon F. Fulgar for his secretarial support.

References

1. Semm K. Endoscopic appendectomy. *Endoscopy* 1983; 15: 59-64.
2. Pier A, Gotz F, Bacher C, Ibal R. Laparoscopic appendectomy. *World J Surg* 1993; 17: 29-33.
3. Attwood SEA, Mill ADK, Murphy PH, Thornton J, Stephens RB. A prospective randomized trial of laparoscopic versus open appendectomy. *Surgery* 1992; 112: 497-501.
4. Kum CK, Ngoi SS, Goh PMY, Terant Y, Isaac JR. Randomized controlled trial comparing laparoscopic and open appendectomy. *Br J Surg* 1993; 80: 1599-1600.
5. Schroder DM, Lathrop JC, Lioyd LR, Boccaccio JE, Hawasli A. Laparoscopic appendectomy for acute appendicitis: is there really any benefit? *Am Surg* 1993; 59: 547-548.
6. Robert JK, Tomas MH. Comparison of open and laparoscopic treatment of acute appendicitis. *Am J Surg* 2001; 182: 211-214.
7. Nguyen DB, Silen W, Hodin RA. Appendectomy in the pre- and post-laparoscopic eras. *J Gastrointest Surg* 1999; 1: 67-73.
8. Schirmer BD, Schmieg RE, Edge SB, Hanks JB. Laparoscopic versus traditional appendectomy for suspected acute appendicitis. *Am J Surg* 1993; 165: 670-675.
9. Pederson AG, Petersen OB, Wara P, Ronning H, Qvist N, Laurberg S. Randomized clinical trial of laparoscopic versus open appendectomy. *Br J Surg* 2001; 88: 200-205.
10. Merhoff AM, Merhoff GC, Franklin ME. Laparoscopic versus open appendectomy. *Am J Surg* 2000; 179: 375-378.
11. Michael RC, John LM, James T, Robert TA, Thomas GW, David AW et al. Prospective randomized comparison of open versus laparoscopic appendectomy in Men. *World J Surg* 1996; 20: 263-266.
12. Chung RS, Rowland DY, Li P, Diaz J. A meta-analysis of randomized controlled trials of laparoscopic versus conventional appendectomy. *Am J Surg* 1999; 177: 250-256.
13. Change FC, Hogle HH, Welling DR. The fate of the negative appendix. *Am J Surg* 1973; 126: 752-756.
14. Cox MR, McCall JL, Padbury RTA, Wilson TG, Wattchow DA, Toouli J. Laparoscopic surgery in women with a clinical diagnosis of acute appendicitis. *Med J Aust* 1993; 63: 840-845.
15. Jadallah FA, Abul-Ghani AA, Tibblin S. Diagnostic laparoscopic reduces UN necessary appendectomy in fertile women. *Eur J Surg* 1994; 160: 41-45.