

## Laparoscopic Versus Open Appendectomy

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**ABSTRACT.** All patients operated upon for possible acute appendicitis (laparoscopic or open) in a single private hospital starting in 1995 and ending when 50 patients (25 in each group) were prospectively completed. Patients were compared regarding operative time, hospital stay days, returns to normal activity, and complications. Operative time was more in laparoscopic versus open cases (79.6 min vs. 53.4 min ( $P < 0.0001$ )). The difference in return to normal activity and hospital stay days was not statistically significant. There were four cases (16%) of wound infections in the open cases and one intra-abdominal abscess (4%) in the laparoscopic cases, respectively. Laparoscopic appendectomy offers no greater advantage over open appendectomy for the average patient with suspected appendicitis.

**Keywords:** Appendicitis, Laparoscopic, Open appendectomy, Hospitalization, Complications.

### Introduction

Open appendectomy, as reported by McBurney in 1894, is considered the golden standard of dealing with suspected appendicitis<sup>[1]</sup>. Kurt Semm in 1982 described the technique of laparoscopic appendectomy<sup>[2]</sup>. In 1990, Pier *et al* published the first large series of laparoscopic appendectomy for acute appendicitis<sup>[3]</sup>.

Despite the general acceptance of general surgeons for many laparoscopic surgical procedures, laparoscopic appendectomy has not been widely embraced. Almost all surgeons believe that appendectomy can be performed through a small cosmetic incision with a low rate of complications and a short hospital stay.

Several reports have indicated many advantages of laparoscopic over open appendectomy<sup>[4-6]</sup>. In order to compare the safety, efficacy, and the outcome of both procedures, we herein report prospectively open and laparoscopic appendectomies with regard to the length of operation, hospital stay, return to work, and complications.

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### Patients and Methods

We compared prospectively 25 patients who had open appendectomy with 25 patients who had laparoscopic appendectomy in Dr. Bakhsh Hospital (a private hospital) starting January 1995 and ending when the numbers required are completed. Only adult patients were included. All patients received 750 mg Zinacef and 500 mg Flagyl preoperatively and discontinued according to the operative findings and the clinical course postoperatively. All patients except one had open appendectomies performed through the right lower quadrant muscle splitting incision. Laparoscopic appendectomies were performed using a 10 mm trocar in the periumbilical area, a 12 mm trocar in the right mid-abdomen, and a 5 mm trocar in the left lower quadrant. The mesoappendix was divided using the bipolar cautery and the appendix was divided using either an endoloop or Endo GIA v30 (U.S. Surgical Corp.).

The procedures were performed by one of three consultant surgeons in the hospital (all of them have good laparoscopic experience). Operative time was calculated as the time spent in the operative room under general anaesthesia (anaesthesia time). Postoperatively, patients were given intramuscular or oral analgesics on request and diet was allowed as tolerated. Once food is tolerated and no evidence of sepsis is apparent, patients were discharged home.

The postoperative course was monitored regarding complications, stay in the hospital, and return to normal activity. Statistical comparison was performed using the student's t-test.

### Results

A total of 50 patients were studied: 25 (open appendectomy group) and 25 (laparoscopic group), respectively. Laparoscopic appendectomy was converted to open in three cases (12%). One of these patients had acute appendicitis and the other two gangrenous perforated appendicitis. The reason to conversion was inadequate exposure in all cases.

In the laparoscopic group, 17 (68%) patients had acute appendicitis and 4 (16%) had perforative (gangrenous) appendicitis. In the open group, 17 (68%) patients also had acute appendicitis while 7 (28%) had perforative (gangrenous) appendicitis (Table 1).

TABLE 1. Patients' demographic and distribution.

	Laparoscopic	Open
No. of patients	25	25
Mean age (years)	27	29
Male : Female	1 : 1	2 : 1
Acute appendicitis	17 (68%)	17 (68%)
Perforated appendicitis	4 (16%)	7 (28%)

When the different groups were divided to subsets comparing patient who had perforated or gangrenous appendicitis, the difference in the operative time between the two groups was not statistically significant as in Table 3.

The mean operative time for the laparoscopic group was 79.6 min and for the open group was 53.4 min ( $P < 0.0001$ ), respectively. The hospital stay for the laparoscopic group was 3.76 days and 2.96 days for the open group ( $P = 0.032$ ), respectively. Patients who had laparoscopic appendectomy returned to their normal activities in 7.45 days while the open group patients did that in 10.21 days (Table 2).

TABLE 2. Laparoscopic versus open appendectomy (all patients).

	Laparoscopic	Open	P Value
No. of patients	79.60	25	
Operative time (min)	25	53.40	< 0.0001
Hospital stay (days)	3.76	2.96	0.0328
Return to normal activity (days)	7.45	10.21	0.0416

When the different groups were divided into subsets comparing patients who had perforated or gangrenous appendicitis, the difference in the operative time between the two groups was not statistically significant as shown in Table 3.

TABLE 3. Laparoscopic versus open appendectomy (patients with perforated or gangrenous appendicitis).

	Laparoscopic	Open	P Value
No. of patients	4	7	
Operative time (min)	86.25	62.14	0.0539
Hospital stay (days)	5.00	2.86	0.2155
Return to normal activities (days)	9.33	15.40	0.2945

There were four patients in the laparoscopic group who had normal appendices - all were females, two had hemorrhagic ovarian cysts, one had a multiple cystic ovary, and the fourth had mesenteric adenitis. Only one young male had a normal appendix in the open group.

There were no intraoperative complications in either group. Four patients (16%) had wound infections in the open group and one patient (4%) in the laparoscopic group had an intra-abdominal (right iliac fossa) purulent collection which required hospital readmission and percutaneous drainage under CT scan guidance. This patient's appendix was inflamed but not perforated and had pre-operative antibiotics. There were no mortalities and no other postoperative complications.

## Discussion

Many published prospective randomized trials<sup>[6,8-13]</sup> of open versus laparoscopic appendectomy showed conflicting results regarding the routine use of laparoscopic appendectomy in the treatment of acute appendicitis. Frazee and his colleagues<sup>[13]</sup> concluded that "patients who underwent laparoscopic appendectomies have a shorter duration of analgesic use and return to full activities sooner postoperatively when compared with patients who underwent open appendectomies. These latter authors considered laparoscopic appendectomy to be the procedure of choice in patients with acute appendicitis." Martin and his colleagues<sup>[11]</sup> concluded that "laparoscopic appendectomy is comparable to open appendectomy with regard to complications, hospital stay, cost, return to activity, and return to work. There was a greater operative time involved with the laparoscopic technique. Laparoscopic appendectomy does not offer any significant benefit over the open approaches for the routine patient with appendicitis." There is no doubt that laparoscopic appendectomy did not gain the wide acceptance of laparoscopic cholecystectomy and the contradictory data from these trial added to the confusion.

Early reports centered on the use of the laparoscope to increase diagnostic accuracy and decrease the negative appendectomy rate which ranges in some series from 20 to 30%<sup>[14,15]</sup>. The surgical technique of laparoscopic appendectomy is now well established and several methods have been reported<sup>[16-18]</sup>.

On the basis of this background we reviewed prospectively our experience of 50 patients who underwent appendectomy in one private hospital at a certain period (1995) where all surgeries were performed by one of three consultant surgeons with good laparoscopic experience. There was clear bias into performing laparoscopic procedures on females as reflected by the 1:1 male-to-female ratio in the laparoscopic group compared to 2:1 male-to-female ratio in the open group. There were no statistical difference between the open and the laparoscopic patients in hospital stay duration or time to return to activity. Contrary to most other reports, our laparoscopic patients stayed longer in the hospital than the open group which reflects more-or-less tradition and pattern of practice more than actual patient needs.

The mean operative time in the laparoscopic group was significantly longer than in patients who underwent an open procedure (79.6 min vs. 53.4 min) which is comparable to operative time reported by others<sup>[10,13]</sup> and less than operative time reported by Martin *et al*<sup>[11]</sup>.

There were no intraoperative complications in either groups. Four patients in the open group developed wound infections while none in the laparoscopic group had wound infections. One patient in the laparoscopic group developed intra-abdominal collection which required readmission and CT-guided percutaneous drainage. Ortega *et al*<sup>[10]</sup> noted six intra-abdominal abscesses in the laparoscopic and none in the open appendectomy patients (P=NS), although their wound infections were more common during open appendectomy patients (11 vs. 4, P < 0.05). It seems that most of the appendectomy manipulations in the open cases are done outside the abdomen, favouring wound infections, while all the manipulations in the laparoscopic cases done intraperitoneally favouring intra-abdominal abscesses.

The cost of laparoscopic appendectomy is of a major concern. Operating room costs are significantly greater for laparoscopic cases and in the Bounani *et al*<sup>[19]</sup> study, it was twice that for comparable open cases. McCahill *et al*<sup>[20]</sup>, in their cost analysis of laparoscopic versus open appendectomy, found statistically significant higher hospital costs, operating room time, and more than twice as much operating room cost for laparoscopic cases. The length of hospital stay after appendectomy is more of a tradition than patients' needs as most patient can be discharged home within a day or two, even with perforated appendectomies, and can continue on antibiotics at home.

In conclusion, laparoscopic appendectomy can be performed safely in almost all patients with suspected appendicitis. It does not offer any major advantages over open appendectomy. It has a lower wound infection rate and may have a higher rate of intra-abdominal abscess when compared to the open cases. Additionally, the operative time is increased with the laparoscopic appendectomies with a possible increase in total hospital cost.

In a subset of patients of obese, young, female patients, diagnostic laparoscopy and appendectomy are beneficial but its routine use offers no real advantage over the routine open appendectomy.

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## مقارنة إستئصال الزائدة الدودية بالجراحة المفتوحة أو بالمنظار

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قسم الجراحة العامة ، كلية الطب والعلوم الطبية ، جامعة الملك عبدالعزيز ،

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المستخلص . أجريت عملية الزائدة الدودية إما بالجراحة المفتوحة أو بالمنظار للزائدة الملتهبة لدى ٥٠ مريضاً في أحد المستشفيات الخاصة بدأت من عام ١٩٩٥م وحتى إجراء العملية للمريض رقم ٥٠ (٢٥ مريضاً بكل طريقة) . قورنت النتائج من حيث مدة العملية ، البقاء في المستشفى والعودة لممارسة النشاطات اليومية والمضاعفات الناتجة . مدة العملية للجراحة بالمنظار كانت بمعدل ٦, ٧٩ دقيقة مقارنة ٤, ٥٣ دقيقة بالجراحة المفتوحة ، أما المقارنة في مدة البقاء بالمستشفى أو العودة لممارسة النشاط اليومي فلم يكن هنالك إختلاف ذاقيمة . كان هنالك ٤ حالات بمعدل ١٦٪ ممن أجريت لهم الجراحة المفتوحة ظهر لديهم إنتهابات ، وحالة واحدة ممن أجريت لهم الجراحة بالمنظار ظهر بها خراج بداخل البطن . يبدو أن الجراحة بالمنظار لا تقدم مميزات أكثر من الجراحة المفتوحة فيما يختص بالمريض العادي المشتبه إصابته بالتهاب الزائدة الدودية .

