

## Laparoscopic Appendectomy: A Prospective Study on 107 Cases

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**ABSTRACT.** We report our experience in laparoscopic appendectomy starting October 1991 till May 1992. One hundred and seven patients with acute (85%) and seventeen patients with chronic (15%) appendicitis were operated upon successfully using the laparoscope. The appendix was gangrenous, forming a mass or an abscess in twenty-three patients (21.5%). In spite of that, only two patients had minor post-operative wound infection, *i.e.*, less than (2%) where the wound formed superficial abscess without any growth. All patients had an uneventful recovery and were discharged home within 24 to 72 hours post-operatively.

**KEY WORDS:** Appendicitis, Laparoscopic appendectomy, Surgery, Methods.

### Introduction

Acute appendicitis is a common surgical emergency. Conventional appendectomy is usually performed through the standard grid-iron incision with a complication rate of approximately 10%<sup>[1]</sup>. Wound infection is usually the most common complication. Laparoscopic appendectomies were performed in Germany in 1982 and 1983<sup>[2,3]</sup>. Laparoscopic appendectomy has solved the problem of wound infection which dropped down to less than 2%<sup>[4,5]</sup>.

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Between October 1991 and May 1992, we successfully performed 107 laparoscopic appendectomies for acute and chronic appendicitis in King Abdulaziz University Hospital and Al-Salama Hospital in Jeddah, Saudi Arabia.

We will describe here the procedure, complications and recommendations regarding this technique and compare our results with others.

### **Patients and Methods**

In a prospective study done between October 1991 and May 1992, we admitted 107 cases of acute (90 patients) and chronic (17 patients) appendicitis for laparoscopic appendectomy as an emergency and elective procedures, respectively. The mean age was 27 years (range 5 to 49). On admission, proper clinical diagnosis is established and a complete blood count with white cell count (total and differential) is done. Male to female ratio was 3 to 2. Children accounted for 10.3% of all the cases<sup>[6]</sup>.

### **Procedure**

Three trocar ports were used. The first one 10 mm for the scope and is inserted in the lower umbilical fold, the second is 11 mm in the suprapubic region on the hair line for the dissection and removal of the appendix, while the third 5 mm trocar is sited in the right hypochondrial region for the grasping forceps. Diagnostic laparoscopy is carried out to survey the abdominal organs and to confirm the diagnosis.

In our series, one patient had gangrenous appendix, ten had appendicular masses and twelve were forming appendicular abscesses, *i.e.* (21.5%) of our patients were complicated.

The meso-appendix is usually caught and cauterized by the bipolar diathermy forceps. The base of the appendix is tied with two loop ligatures, then diathermized 6-7 mm. distal to the loops. The GIA stapler was only used for the appendix with gangrene reaching its base. Some surgeons use it routinely<sup>[7]</sup> but we think it is an expensive tool for this purpose. Care should be taken not to cause thermal damage of the ligatures or caecal wall as it may lead to a fecal fistula formation later on<sup>[4]</sup>. A drain was left behind for 48 hours in the complicated cases. Good haemostasis and peritoneal toilette should be achieved before closure. A thorough peritoneal washout is done using warm saline with or without a cephalosporin or an aminoglycoside in perforated appendicitis. The CO<sub>2</sub> is driven away and the wounds are closed with subcutaneous vicryl stitches and steristrips. The procedure itself takes between 15-30 minutes in the simple cases and 30-45 minutes in the complicated ones. Patients are discharged home 24-72 hours post-operatively.

Three doses of broad spectrum antibiotic were given intravenously as a prophylaxis in the non-complicated cases and continued with aminoglycoside and Flagyl for five days in the complicated ones. The first dose was given with the induction of anaesthesia.

### **Results**

All patients admitted to our hospitals with symptoms of appendicitis between Oc-

tober 1991 and May 1992 were subjected to laparoscopic appendectomy. Eighty-five percent of the cases presented with acute symptoms while the other fifteen percent came for elective surgery because of previous repeated attacks of right iliac fossa pain. Out of the total number, 23 patients (21.5%) had complicated appendicitis. The mortality and conversion rates were (0%) in our series. Minor wound infection occurred in only 2 cases. All other patients were doing well during their follow-up.

### Discussion

Although appendicitis can be treated conservatively, early appendectomy is still the safest method of cure even in children and pregnant women<sup>[6-8]</sup>. The grid-iron incision was the standard portal to the peritoneal cavity for appendectomy. This incision, particularly if it is made small for cosmetic purposes will not allow the abdominal organs to be inspected and the patient might undergo unnecessary appendectomy leaving the original pathology behind such condition can occur in patients suffering from appendicitis mimicking diseases as Mickel's diverticulitis, Crohn's disease or ovarian and tubal pathology. By using the laparoscope, one can survey the whole abdomen and confirm or change the initial diagnosis and act accordingly.

The principal determinants of morbidity and mortality in acute appendicitis are age of the patient and the status of the appendix. The mortality rate in the non-perforated appendicitis is (0.1%) and is usually related to co-existing diseases); while it is (3-5%) in the perforated appendix and directly related to it. This figure can go up to (15%) in patients over 70 years of age<sup>[9]</sup>. On the other hand, the complication rate after open appendectomy is (10%) in the non-perforated cases and reaches up to (33%) in the perforated ones<sup>[1]</sup>. After laparoscopic appendectomy, the complication rate was only (2%) according to Pier & Gotz<sup>[4,5]</sup>. This was verified by this study too. Wound infection is always the most common complication. Other complications such as bleeding, post-operative ileus or adhesions such as well as pelvic abscess or fecal fistula due to thermal damage to the ligatures or the caecum itself might rarely occur<sup>[3,4]</sup>. The largest series reported results of standard surgical appendectomy came from Lewis *et al.* in 1975 on 1000 cases<sup>[9]</sup>. He reported a mortality rate of (0.4%) and wound infection of (6.6%) in the non-perforated appendicitis, while in the perforated appendicitis the mortality rate was (2.5%) and wound infection rate was (17.5%) (Table 1). On the other hand, Pier and Gotz<sup>[9]</sup> in 1991 reported (0%) mortality rate and (2%) wound infection rate in their series of 625 patients who underwent laparoscopic appendectomy (Table 2).

TABLE 1. Results for the standard surgical appendectomy.

Series	No. of cases	Perforated	Outcome non-perforated appendix			Outcome perforated appendix		
			Mort	Comp	Wd infx	Mort	Comp	Wd infx
Lewis <i>et al.</i> 1975	1000	21%	0.4%	10%	6.6%	2.5		17.5%
Law <i>et al.</i> 1975	216	29%	0	10%	8%	0	33%	15%
Scher & Coil 1980	335	32%	0	3%	0.8%	0.9	47%	35%

TABLE 2. Results for laparoscopic appendectomy.

Series	No. of cases	Gangrenous or perforated	Mortality	Complications	WD infx	Conversion rate
Pier & Gotz 1991	625	3%	0%	1%	2%	2%
Saye <i>et al.</i> 1991	109	1%	0%	0%	0	0
O'Reagan 1992	40	15%	0%	5%	0	17%
Valla <i>et al.</i> 1991	465 (children)	16%	0%	3%	0	1%
Ashy <i>et al.</i> 1992	107	21.5%	0%	0%	1.9%	0%

In our series, we operated on 107 cases of acute and chronic appendicitis between October 1991 and May 1992. Twenty-three patients (21.5%) had complicated appendicitis, *i.e.*, gangrene, mass or abscess formation. Post-operatively, all the patients had uneventful recovery. Two patients developed minor wound infection (1.9%), a result which compares well with other series<sup>[4,5]</sup>.

No deaths occurred among our patients, and the conversion rate was (0%) (Table 2). The hospital stay was 1-3 days (average 2 days) for all the patients. They returned to work one week in the non-complicated cases, and after two weeks in the complicated ones.

The only prospective controlled study comparing open and laparoscopic appendectomy was done by MC Anena in 1991 (Table 3)<sup>[10]</sup>. His results also compare well to others.

TABLE 3. Open appendectomy versus laparoscopic appendectomy. A prospective study done by McAnena *et al.* (1991).

	Open method (36 patients)	Laparoscopic technique (29 patients)
- Post-operative stay	4.8 days	2.2 days
- Mean anaesthesia time	52 minutes	48 minutes
- Wound infection	11%	4%

### Conclusion

Although laparoscopic appendectomy is a new technique by now, it has become a routine procedure in some hospitals. It is a quick and safe operation in the experienced hands even during pregnancy and in children as young as 3 years old<sup>[6,8,11]</sup>. This procedure is superior to conventional (open) appendectomy because the laparoscope gives better visualization of the entire abdomen and management of the diseased organ. In complicated cases, a thorough washout with saline of the whole

peritoneal sac is achieved easily and the rate of post-operative intra-abdominal sepsis is markedly reduced. The post-operative pain and hospital stay are much less than with the standard open technique and the wounds are more cosmetic. Wound infection is also much less as the inflamed appendix is removed through the sheath of the trocar or in an endopouch with no wound contamination.

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## دراسة مستقبلية عن استئصال الزائدة الدودية بالمنظار الجراحي لـ ١٠٧ مريض

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المستخلص . سنستعرض في بحثنا هذا الدراسة التي أجريناها على ١٠٧ مريض يعانون من التهاب الزائدة الدودية الحاد بنسبة (٨٥٪ من الحالات) والمزمن بنسبة (١٥٪ من الحالات) والتي أجريت لهم عملية استئصال الزائدة الدودية عن طريق المنظار الجراحي في الفترة ما بين أكتوبر ١٩٩١م ومايو ١٩٩٢م بنجاح دون تحويل أية حالة منها إلى جراحة مفتوحة . وقد كانت نسبة الحالات التي وجد لديها غرغرينا في الزائدة الدودية أو تجمع صديدي من خلال الدراسة تحتل ٢١,٥٪ من المجموع الكلي . وبالرغم من ذلك ، فقد حدث التهاب طفيف في مكان الجرح عند اثنين من المرضى فقط (١,٩٪) حيث إن التحليل البكتيريولوجي لم يُظهر وجود أي نوع من الميكروبات . أما بقية المرضى فلم تحدث عندهم أية مضاعفات . وكانت مدة إقامة جميع المرضى بعد العملية بالمستشفى ما بين ٢٤-٧٢ ساعة .