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APPENDECTOMY; COMPARISON BETWEEN LAPAROSCOPIC & OPEN METHOD

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ABSTRACT... Objective: The purpose of this prospective study was to compare length of hospital stay, in hospital complications and operative time between laparoscopic appendectomy (LA) and open appendectomy (OA). **Setting:** This prospective study was carried out at King Khalid Hospital, Najran, Kingdom of Saudi Arabia over a period of 26 months from July 2002 to August 2004. **Methods:** Patients were randomly divided into laparoscopic and open appendectomy groups and length of stay, operative time and in hospital complications were noted. **Results:** 60 patients underwent laparoscopic appendectomy and 65 underwent open. Operating time was longer in laparoscopic group but length of stay was shorter in laparoscopic group. Wound infection was the common complication in both group but it was higher in patients who underwent open appendectomy. **Conclusion:** Laparoscopic appendectomy can be performed with morbidity similar to open appendectomy and may actually have decreased wound infection rate.

Key words: appendectomy, laparoscopic, appendicitis.

INTRODUCTION

Since its introduction by Mc Burney in 1894, appendectomy has been the treatment of choice for acute appendicitis. Appendicitis is the most common intraabdominal emergency with a life time risk of 6%^{1,2}. For more than a century, open appendectomy (OA) remains the treatment of acute appendicitis. The advent of endoscopic surgery led to the idea of performing laparoscopic appendectomy (LA). In 1981, Kurt Semm a German gynaecologist performed the first LA³. LA has gained acceptance more slowly than laparoscopic cholecystectomy, perhaps because the advantages are much less clear-cut over open procedure⁴. Open

appendectomy is well tolerated procedure with minimum morbidity so the advantages of the LA are debatable. There are three main problems with conventional open appendectomy – namely a misdiagnosis rate of 15-30% (up to 50% in females in the reproductive age group), wound infection rate 5 -10%, and postoperative adhesions. The laparoscopic approach can provide partial solution to these problems. The other advantages are same as in other laparoscopic procedures like quick recovery, less postoperative pain, fewer postoperative complications and better cosmesis especially in females. The purpose of this prospective study was to compare length of hospital stay, in hospital complications and

operative time between LA and OA.

PATIENTS AND METHODS

This prospective cohort study was carried out at King Khalid Hospital, Najran, Kingdom Of Saudi Arabia over a period of 26 months from July 2002 to August 2004. The patients were randomly divided into LA and OA groups. A total of 125 patients were operated for appendectomy (both LA & OA) during the same period. All adult patients (older than 14 years of age) who were admitted from emergency room with suspected diagnosis of acute appendicitis and underwent appendectomy (laparoscopic or open) were included in the study. Appendectomy performed during diagnostic laparoscopy for another indication and incidental appendectomies were excluded. All patients received 1 gm of ceftriaxone and 500mg of metronidazole preoperatively and the continuation of antibiotic was based on clinical course. OA were performed through Lanz incision.

Laparoscopic appendectomies were done using a standard approach involving an open technique for trocar insertion. A 10 mm Hassan trocar was placed in the infraumbilical area whereas a 12 mm trocar was placed in the right midabdomen and the third one; a 5 mm trocar was placed in suprapubic location. The mesoappendix was divided using Endo - clips or Endo GIA V 30. The base of appendix is ligated with loop ligature. The appendix was placed in glove and removed through 12 mm port. Laparoscopic procedure was converted to open when there was obscure and uncertain anatomy, excessive bleeding. Operative time was calculated from the time of incision until the time of closure and did not reflect the time required to set up the laparoscopic equipments. The postoperative course was monitored for number of hospital days and in hospital complications. The data was entered and analyzed in SPSS 16.0

Software Statistical program. p-value of 0.05 or less was considered significant for the purpose of comparison.

RESULTS

In all, 125 patients underwent appendectomy during the above mentioned study period. Sixty (48%) had LA and sixty five (52%) had open appendectomy. The mean age in both groups was about 27.7 years (+ 8.763) with range of 16 to 65. Within the laparoscopic group, the average length of stay was 3.18 (range: 2-5) days, compared with 5 (range: 2-12) days of open appendectomy (p-value 0.000). Operating time for laparoscopic group was 68 (60-90) minutes with three conversions to open procedures. In the converted group, two patients had acute appendicitis and one had perforated appendicitis. The reasons for conversion to open procedure were excessive bleeding due to inflammation and inadequate exposure due to perforation. The converted patients had a length of stay of 5.76 days, which is similar to that of the patients having OA. In OA the average operating time was 40 (range: 25-80) minutes (p-value 0.000).

The detailed account of operative time and hospital stay is mentioned in table I. The in hospital complication rate were lower in LA group as compared to the OA. Wound infection was more common in patients belonging to OA group, it accounted for 18.4% (12/65) as compared to 5% (3/60) patients belonging to LA group. Two patients in OA group had pelvic abscess during their stay in hospital which was subsequently drained under ultrasound guidance. There was an intraoperative complication, abdominal wall haematoma at the site of 5 mm trocar port, and this was treated conservatively. The statistical comparison of laparoscopic and open appendectomies with reference to the in hospital complications rate is mentioned in table II and III.

Table-I. Operative time and Hospital stay

Parameter	Laparoscopic appendectomy (n=60)			Open appendectomy (n=65)			
	Mean	Range	SD ±	Mean	Range	SD ±	p-value
Operative time (in minutes)	68	60-90	8.036	40	25-80	5.637	0.000
Hospital stay (in days)	3.18	2-5	0.676	5.02	2-12	2.274	0.000

SD stands for Standard Deviation

Table-II. Age, sex distribution of complications within each type of surgery.

Type of surgery	Sex and age distribution	No infection	Total infections	p-value	p-value
Laparoscopic appendectomy	Male	22	2	0.673	0.022
	Female	34	2		
	Under 20 year	14	2	0.541	
	21-40 year	41	2		
	Above 40 year	1	0		
Open appendectomy	Male	34	8	0.540	
	Female	17	6		
	Under 20 year	9	2	0.295	
	21-40 year	35	12		
	Above 40 year	7	0		

Table-III. Effect of type of surgery on in-hospital complications rate

Type of surgery	Complications			
	Wound infection	Pelvic abscess	Abdominal wall hematoma	Total
Open appendectomy (n=65)	12 (18.4%)	2 (3.1%)	0 (0%)	14 (21.5%)
Laparoscopic appendectomy (n=60)	3 (5%)	0 (0%)	1 (1.6%)	4 (6.7%)

DISCUSSION

The first successful appendectomy for acute appendicitis was performed in 1848 by Henry Hancock in England. In 1889, Charles McBurney published the first of the several papers that standardized the diagnosis and treatment of

appendicitis. Since then, the surgical approach for appendicitis has remained nearly unchanged. However the widespread use of laparoscopic techniques by general surgeons is changing the surgical approach. Many commonly performed procedures are now being

modified so they can be performed by the use of laparoscopic techniques. Laparoscopic operations for the biliary tract and gastroesophageal reflux disease have been particularly successful. The advantage of laparoscopic surgery for these two conditions, compared with their conventional counterparts in terms of decreased postoperative pain, shorter hospital stay, shorter duration on convalescence, and rapid return to normal daily activities, have made laparoscopic approaches increasingly popular among surgeons and patients. LA like other laparoscopically adapted procedures such as colon resection, splenectomy, inguinal hernia repair have not gained such wide spread acceptance because the benefits of laparoscopic approach are not immediately self evident⁵. Laparoscopy has an important diagnostic role in patients with equivocal symptoms of acute appendicitis. Despite advantages in technology, there is no laboratory test or examination with sufficient specificity and sensitivity to diagnose appendicitis consistently. Many surgeons are turning from a philosophy of "when in doubt, take it out" to "when in doubt, check it out". Laparoscopy provides the surgeon with a tool to rule out appendicitis and then inspect other organs to determine the real cause of patients' symptoms. Laparoscopy is far superior to the limited exploration that can be accomplished through a classical McBurney incision⁵. The first largest series of laparoscopic appendectomy, performed for acute appendicitis came from Germany and was published by Pier and colleagues in 1991⁶. These surgeons demonstrated laparoscopic appendectomy could be applied to most cases of appendicitis, with a high degree of success, a low complication rate, and an operative speed as fast as open appendectomy⁶. More benefits of LA are still controversial. Despite the success of OA, there have been numerous attempts to improve the diagnostic accuracy and outcome of patients with acute appendicitis, because the negative appendectomy rate in most series is still in the range of 20% to 30%. Despite numerous case series and randomized clinical trials comparing LA versus OA, a consensus concerning the

relative advantages of each procedure has not yet been reached⁷⁻⁹. Initially laparoscopy was used as diagnostic tool to decrease the rate of negative appendectomy while minimizing the complications. With the advent of time surgical technique for LA is now well developed.

In our study, the conversion rate to OA was 5% (3/60). The reason for conversion to open procedure was excessive bleeding due to inflammation and inadequate exposure. Pier et al¹⁰ in a study of 678 patients with 625 LA had only 2% conversion rate. However others have documented higher conversion rates. Richard et al¹¹ had a conversion rate of 11%. The conversion rate to open procedure contributes to increased costs; however the safety of operation is of utmost importance.

The age and sex groups are statistically insignificant within each type of surgery.

The average length of hospital stay in LA group was 3.03 days as compared to 5 days in OA group, and this difference is statistically significant as p-value is 0.000. Schirmer et al¹² reviewed 122 non randomized patients who had either diagnostic laparoscopy and OA or LA and found no difference in hospital stay. Ortega et al¹³ reviewed 253 patients which were randomized to three groups to compare laparoscopic and open appendectomies. The question of whether LA decreases the length of hospitalization has been a matter of great debate over the past decade^{9,14}. The literature provides contradictory results. Although some recent retrospective cohort studies found LA with significantly shorter hospital stay,¹⁵⁻¹⁹ other retrospective investigations reported non significant differences^{9,20,21}. This heterogeneity of published results regarding length of hospital stay may be caused by variety of factors, like hospital related factors, social habits and diverse health care policies in different countries²². The mean operative time in laparoscopic group was longer than that in patients undergoing open procedures.

Significant variations in operating time have been noted in various controlled studies²²⁻²⁴. Some studies noted a shorter operating time for patients undergoing open appendectomy, while others revealed no difference. In this study the operating time was longer in cases of LA group.

There was one intraoperative complication in the LA group involving the abdominal wall hematoma. Wound infection was noted in 18.4% (12/65) patients as compared to 5% (3/60) in cases of LA group. This is in accordance with other studies^{7,13,23} which have also reported significantly fewer wound infections in LA group. Good out come has been reported with the laparoscopic approach in uncomplicated appendicitis, but a higher incidence of postoperative intraabdominal abscesses has been reported after laparoscopic appendectomy in complicated appendicitis^{25,26}. Open and laparoscopic groups are statistically significant with respect to overall complications.

CONCLUSION

Laparoscopic appendectomy can be performed with morbidity similar to open appendectomy and may actually have decreased wound infection rate. The length of hospital stay is also decreased in comparison to open appendectomy but it is more time consuming and expensive as compared to open appendectomy.

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