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Research Article

**LAPAROSCOPIC VERSUS OPEN APPENDECTOMY:  
A RETROSPECTIVE COMPARATIVE STUDY****Dr. Sultan Alsaigh<sup>1</sup>, Mawiah Alshebromi<sup>2</sup>, Alhanouf Alammar<sup>2</sup>, Dr. Abdulaziz Altwejri<sup>3</sup>.**<sup>1</sup>MBBs, MD, SBGS, Consultant General Surgery, Head of OR/Anesthesia

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**Abstract:**

*Appendectomy is a common surgical procedure carried out to handle acute appendicitis. Now-a-days open appendectomy (OA) and laparoscopic appendectomy (LA) are preferred surgical techniques to operate acute appendicitis. Till date, no much studies have been carried out in Saudi Arabia on comparative efficacies of the OA and LA. Therefore, this research compared these surgical procedures and also found the relationship between their complications. This retrospective study was carried out King Fahad Specialist Hospital (KSFH) in Buraidah, Saudi Arabia. The data of acute appendicitis patients were collected from 01/01/2015 and 01/01/2017. Baseline characteristics such as age, gender, surgery type, total time of surgery etc. were defined for this study. The data were analyzed using SPSS 18. The p value <0.05 was considered as significant. The result of this study showed less operational time and early reintroduction of oral diet in LA. The LA also reduced hospital stay. However, this study did not find any significant correlation between complications (intra-operative and post-operative) of OA or LA (p >0.05). This study concludes that LA has definitely advantage over OA regarding early discharge and recovery. However, the cost need to be considered for LA. Overall, this research will help KSFH to determine effective surgical technique to treat patients with acute appendicitis.*

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**INTRODUCTION:**

Appendectomy is the one of most commonly performed urgent abdominal surgeries [1], with a lifetime incidence of about 8%. [1] It's often the first major surgery a surgeon in training will perform. [1]

There are many surgical techniques for treating appendicitis, the first surgeon to successfully perform appendectomy was Claudius Amyand in 1735, at St. George's Hospital in London. [2] The patient was an 11-year-old boy who had swallowed a pin that perforated his appendix. [2] Moreover, in 1880 Robert Lawson Tait was the first to diagnose appendicitis and perform an appendectomy.

Charles McBurney was the first to describe and consolidate the approach for open appendectomy in 1894, [1] and it has not changed significantly since then. There are three incision can be employed in an open Appendectomy; McBurney-McArthur incision, Lanz incision, and Pararectus (Jalaguier, Battle, Kammerer, Lennander, Senn) Incision. [1]

In 1981, Kurt Semm performed the first laparoscopic appendectomy, and since then, the surgeons slowly shifted away from the open method to the laparoscopic method. The laparoscopic approach involves three ports placed at the umbilicus-A 10-millimeter camera port-, and two 5 millimeter ports placed in the right iliac fossa and the right hypochondriac quadrant. [1]

Ever since McBurney introduced the approach for open Appendectomy, it has been the gold standard in treating acute appendicitis for more than a century. [3] And after Semm introduced the laparoscopic approach, it sparked an ongoing discussion and debate as to what is the most effective approach. To this day, surgeons still debate the effectiveness of both methods. Our study aims to investigate the differences between laparoscopic and open appendectomy in the management of acute appendicitis in King Fahad Specialist Hospital (KFSH) in AlQassim, Buraidah.

**OBJECTIVE :**

1. Compare the differences between laparoscopic and open appendectomy in terms of operative time, length of hospital stays, postoperative pain, the use of analgesia, reintroduction of oral diet, and return to normal activities.
2. Investigate and compare the intraoperative and postoperative complications between laparoscopic and open appendectomy.

**METHODS:****Study design:-**

Our study design is a retrospective chart review analytic study, in which all the medical records of patients with a discharge diagnosis of acute appendicitis will be included.

**Study Population:-**

All medical records of patients with a discharge diagnosis of acute appendicitis within 01/01/2015 and 01/01/2017 at King Fahad Specialist Hospital (KSFH) in Buraidah.

**Study Setting:-**

Our study will be conducted at King Fahad Specialist Hospital in Buraidah city, the capital of AlQassim region, in Saudi Arabia with a population of almost 600,000 people and a typical desert climate.

**Inclusion criteria:-**

Patients with discharge diagnosis of acute appendicitis.

**Exclusion criteria:**

1. Patients with ASA score greater than 2.
2. Patients with other postoperative diagnosis (e.g.: ruptured ovarian cysts).

**Sample size determination:-**

The data will be collected from all the medical records of patients who are diagnosed with acute appendicitis between 01/01/2015 and 01/01/2017 at KFSH. All files that match the exclusion criteria will be discarded.

**Management and work plan:-****Study duration and timeline:**

Stage		2017		
		April	May	June
1	Protocol Development			
2	Ethical Clearance			
3	Data Collection			
	Data Entry and Data Analysis			
5	Manuscript Writing			

**DATA COLLECTION AND MANAGEMENT:**

The data will be retrospectively collected from all the medical records of the patients who are discharged with a diagnosis of acute appendicitis between 1/1/2015 to 1/1/2017 at King Fahad Specialist Hospital (KFSH) in Buraidah. The sample size will include all the patients' files. Then, we will apply the Inclusion and Exclusion criteria. After that, we will label the selected files numerically to keep the identity of the patients anonymous. We will assess and record the operative time, length of hospital stays, postoperative pain based on the recorded pain scale in the patient file that is recorded by doctors and nurses, the use of analgesia in controlling post-operative pain, reintroduction of oral diet, and return to normal activities based on the length of the sick leave they were given. Also, record any intraoperative or postoperative complications. Then, the collected data will be entered into Excel database then will be transferred to SPSS for statistical analysis.

**STATISTICAL ANALYSIS:**

Descriptive statistics were used to describe the baseline characteristics of all appendectomy patients. The mean and standard deviations were reported for continuous variables, frequencies were used for categorical variables. Chi-square test was done to see if there is any relationship between complications of operation (intraoperative or postoperative) and methods of operation (laparoscopic or open).

Data analysis was performed using Statistical Package for Social Science (SPSS), version 20 (IBM, Armonk, NY, USA).

**RESULTS:**

Data from all medical records of patients with a discharge diagnosis of acute appendicitis within

01/01/2015 and 01/01/2017 at King Fahad Hospital (KSFH) in Buraidah were collected for this study. With a sample size of 200, this retrospective comparative study was done to compare the outcomes of patients received laparoscopic vs open appendicitis. The mean  $\pm$  SD age of patients was  $25.50 \pm 9.62$  years. 134 (67%) patients were male and remaining 66 (33%) were female. Laparoscopic and open appendectomy were done to 88 (44%) and 104 (52%) patients respectively. The mean  $\pm$  SD duration of surgery for all patient was  $72 \pm 26.08$  minutes. 118 (59%) patients did not take postoperative analgesics whereas 82 (41%) patients took at least one postoperative analgesic. The mean  $\pm$  SD number of postoperative analgesics taken by all patients were  $0.75 \pm 1.18$  with a minimum of 0 and maximum of 10 analgesics. Patients stayed in hospital on an average of  $3.01 \pm 1.92$  days with a range of 1 to 14 days. Mean  $\pm$  SD time of reintroduction of oral diet took  $26.53 \pm 24.08$  hours. 9 patients had intraoperative massive bleeding and 1 had bowel injury. Total 11 patients had postoperative complication. Among those 11 patients, 4 had abscess, 3 had wound infection, 2 had pain, 1 had bleeding and 1 had paralytic ileus. (Table 1)

When laparoscopic appendectomy was compared against open appendectomy we have found that the duration of operation for these two methods of operation were  $68.20 \pm 21.19$  minutes and  $70.29 \pm 23.53$  minutes respectively. Minimum surgery duration for both methods were 30 minutes while maximum duration for the laparoscopic group was 120 minutes and for open appendectomy group was 145 minutes. Length of hospital stay was  $2.51 \pm 1.28$  days for laparoscopic appendectomy patients and  $3.22 \pm 1.98$  days for open appendectomy patients. The number of analgesics taken by laparoscopic appendectomy patients was  $0.84 \pm 1.40$  and by open appendectomy patients was  $0.65 \pm 0.97$ . Mean

$\pm$  SD duration of reintroduction of laparoscopic and open appendectomy patients were  $20.58 \pm 19.26$  and  $30.17 \pm 24.95$  respectively. (Table 2)

Chi-square test was done to find out the relationship between type of operation and complications (intraoperative and postoperative). Test showed that there is no significant relationship between type of surgery and frequency of intraoperative complications ( $X^2 (1) = 0.026$ , p-value .872). There was also no significant relationship between type of appendectomy (open vs laparoscopic) and postoperative complications ( $X^2 (1) = 3.736$ , p-value .053).

### DISCUSSION:

Both open appendectomy (OA) and laparoscopic appendectomy (LA) are performed to treat acute appendectomy throughout the world [3]. Studies have been carried out to compare these surgical procedures [4-5]. Similar to these studies, our retrospective study was carried out to compare OA and LA procedures at King Fahad Specialist Hospital in Buraidah, Saudi Arabia. In our study, we found no significant difference between operative time. The operative time for LA and OA were 68.80 and 70.29 minutes, respectively. However, the OA took somewhat longer time interval as compared to LA. Many previous studies have reported longer time duration in OA as compared to LA [6-7-8], which is in agreement with our study. However, in a prospective blind study, Katkhouda et al. reported that LA took 80 minutes to perform which was significantly longer ( $p=0.000$ ) [5]. Another study by Safiyya et al. in Saudi Arabia also reported longer time interval in OA [9].

The number of days to stay at hospital was longer in case of OA compared to LA; however, no significant difference was observed. A study carried out in Saudi Arabia reported no significant difference in length of hospital stays [9], while Peiser and Greenberg reported longer hospital stay during OA [6]. Though the data regarding difference between lengths of hospital stay are conflicting, some cohort studies or chart studies documented that LA reduces hospital stays. Besides, some other retrospective studies did not find any significant difference [9]. In an seminal study by Marzouk et al. carried out in Jeddah, Saudi Arabia found that LA required less operative time ( $p<0.002$ ) and reduces the hospital stay ( $p<0.046$ ) [3]. Sauerland et al. also reported the early recovery to normal activity among LA treated patients [8], whereas Guller et al. reported early discharge in case of LA [9]. Similarly, another study carried out in Jeddah also documented an early reintroduction of diet and recovery to normal activity in LA as compared to OA [10].

No significant correlation was found between intra-operative or post-operative complications to OA or LA ( $p>0.05$ ). Further, no significant complications was correlated to the either of the surgery carried out by Khali et al. [11]. Other studies also found no significant correlation between complications of LA or OA, however, different conflicting report was found in literatures when efficacy of LA is compared to OA in reducing complications [9]. Conclusively, this research will help KSFH to determine efficacious surgical procedure for the treatment of patients with acute appendicitis.

**Table 1:** Baseline characteristics of all patients (n = 200)

Characteristics	Values
<b>Age (years)</b>	
Mean	25.50
Standard deviation	± 9.62
Standard error	0.68
Minimum	12
Maximum	58
<b>Gender</b>	
Male	134 (67%)
Female	66 (33%)
<b>Type of surgery</b>	
Laparoscopic	88 (44%)
Open	104 (52%)
<b>Total time of surgery (minute)</b>	
Mean	72.00
Standard deviation	± 26.08
Standard error	1.84
Minimum	30
Maximum	220
<b>Use of postoperative analgesics</b>	
Yes	82 (41%)
No	118 (59%)
<b>Number of postoperative analgesics</b>	
Mean	0.75
Standard deviation	± 1.18
Standard error	0.08
Minimum	0
Maximum	10
<b>Length of hospital stay (days)</b>	
Mean	3.01
Standard deviation	± 1.92
Standard error	0.14
Minimum	1
Maximum	14
<b>Reintroduction of oral diet (hours)</b>	
Mean	26.53
Standard deviation	± 24.08
Standard error	0.17
Minimum	4
Maximum	168
<b>Intraoperative complications</b>	
Yes	10 (5%)
No	190 (95%)
<b>Postoperative complications</b>	
Yes	11 (5.5%)
No	189 (94.5%)

**Table 2:-**Laparoscopic (n = 88) vs open appendectomy (n = 104) in terms of operative time, length of hospital stay, number of postoperative analgesic use and time taken for reintroduction of oral diet

	Type of appendectomy	Mean	Standard deviation	Standard error	Min	Max
Duration of operation (minutes)	Laparoscopic	68.80	± 21.19	2.26	30	120
	Open	70.29	± 23.53	2.31	30	145
Length of hospital stay (days)	Laparoscopic	2.51	± 1.28	0.14	1	8
	Open	3.22	± 1.98	0.19	1	14
Number of postoperative analgesics	Laparoscopic	0.84	± 1.39	0.15	0	10
	Open	0.65	± 0.97	0.10	0	4
Reintroduction of oral diet (hours)	Laparoscopic	20.58	± 19.26	2.05	6	112
	Open	30.17	± 24.95	2.45	6	168

**Table 3:-**Chi-square test to see the relationship between type of appendectomy and complications (intraoperative and postoperative, n = 192)

	X <sup>2</sup>	df	p-value
Relationship between type of appendectomy (laparoscopic or open) and intraoperative complications	0.026	1	.872
Relationship between type of appendectomy (laparoscopic or open) and postoperative complications	3.736	1	.053

**LIMITATION:**

1. The sample size was less than the expected.
2. Patient files had missing information that were important to our research questions.

**RECOMMENDATIONS:**

Based on our study result which is going parallel with the literatures, we believe that laparoscopic appendectomy is superior to open appendectomy in terms of duration of the operation, length of hospital stay and re-introducing of oral feeding especially with far better cosmetic results with minimal access surgery.

**ETHICAL PART & CONFIDENTIALITY:**

The data will be collected anonymously without any personal identifiers. All the data will be collected and analyzed, no one can link the results with patients'

identity. When the data is collected, the inclusion and exclusion criteria will be applied. Then, the data will be entered into an excel-format file.

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