

# To Compare the Outcomes of Laparoscopic and Open Appendectomies

Ahmad Shah, Samina Karim and Nazir Ahmed Sasoli

## ABSTRACT

**Objective:** To compare the surgical site infection, hospital stay and time duration of procedure in patients undergoing laparoscopic and open appendectomies.

**Study Design:** Prospective study.

**Place and Duration of Study:** The study was conducted at the Department of Surgery, Bolan University of Medical & Health Sciences, Quetta from January 2017 to February 2019.

**Materials and Methods:** Two hundred male/female patients with ages >10 years presented with acute appendicitis were included. Patients demographic including age, sex and body mass index were recorded after written consent. Equally divided all the patients into two groups. Group-I (Laparoscopic appendectomy) consist of 100 patients and Group II (Open appendectomy) with 100 patients. Outcomes such as surgical site infection, hospital stay and time duration of procedure were examined and compare the results between both groups. SPSS 24.0 was used for analyzing the data.

**Results:** here were 110 (55%) patients (52 Group I, 58 Group II) were male with mean age  $24.3 \pm 7.45$  years while 90 (45%) patients (48 Group I, 42 Group II) were females with mean age  $25.2 \pm 8.2$  years. No significant difference regarding BMI between both groups  $p > 0.05$ . Significant difference was observed in term of surgery time duration between both groups  $45.42 \pm 10.95$  minutes Vs  $30.48 \pm 9.68$  minutes ( $P = 0.001$ ). No significant difference observed in term of hospital stay ( $p = 0.345$ ). 10 (10%) patients in Group II and 6 (6%) patients in Group I had developed surgical site infection with no significant difference ( $p = 0.41$ ).

**Conclusion:** Open appendectomy is better in term of operative time as compared to laparoscopic appendectomy. We found no significant difference regarding surgical site infection and hospital stay.

**Key Words:** Acute appendicitis, Appendectomy, Laparoscopic, Open, Outcomes.

**Citation of article:** Shah A, Karim S, Sasoli NA. To Compare the Out Comes of Laparoscopic and open Appendectomies. Med Forum 2019;30(10): 21-24.

## INTRODUCTION

In 1984, McBurney introduced open appendectomy and the procedure becomes a method of choice for acute appendicitis.<sup>1</sup> Globally, acute appendicitis is one of the most common disorders with a risk of 6%. The incidence rate of acute appendicitis is quite high as compared to other abdominal diseases.<sup>2,3</sup> In recent years there are many technique applying for the treatment of acute appendicitis but laparoscopic and open appendectomy are the most performing surgical techniques because of fewer rate of complications. A German gynaecologist firstly introduced laparoscopic appendectomy in 1983.<sup>4</sup>

There is still a controversy between both open and laparoscopic. Some of studies reported laparoscopic technique for acute appendicitis is and better in term of surgical site infection as compared to open appendectomy techniques regarding surgical site infection.<sup>5</sup> Nosocomial infections are directly associated with surgical treatments but surgical site infection is one of the most common complication associated with open and laparoscopic procedures.<sup>6</sup> The incidence rate of surgical site infection is approximately 60% after surgical treatment and it leads to severe complications, mortality and increase length of hospital stay.<sup>7-8</sup> Many op studies regarding acute appendicitis demonstrated that the open appendectomy procedure has high rate of surgical site infection as compared to laparoscopic appendectomy and some of studies reported no significant difference between both techniques. However, laparoscopic appendectomy considered a method of choice for the treatment of acute appendicitis.<sup>9-10</sup> Many of factors are involved for increased incidence of surgical site infection between laparoscopic and open appendectomies.<sup>11</sup> The present study was conducted to determine the outcomes of laparoscopic and open appendectomy in term of Surgical site infection, hospital stay and operative duration.

---

Department of Surgery, Bolan University of Medical & Health Sciences Quetta.

---

Correspondence: Dr Ahmad Shah, Assistant Professor of Surgey Unit, Bolan University of Medical & Health Sciences, Quetta.

Contact No: 0300 2180284

Email: ahmadqta@yahoo.com

---

Received: March, 2019

Accepted: August, 2019

Printed: October, 2019

---

## MATERIALS AND METHODS

This prospective study was carried out at Department of Surgery, Bolan University of Medical & Health Sciences, Quetta from 1<sup>st</sup> January 2017 to 28<sup>th</sup> February 2019. A total of 200 patients of both genders with ages >10 years presented with acute appendicitis were included. Patients demographic including age, sex and BMI were recorded after written consent. Histopathology findings of the patients were recorded. Pregnant women, patients with history of abdominal surgery, patients with recurrence and those with no consent were excluded. Patients were equally divided into two groups. Group I consist of 100 patients and treated with laparoscopic technique and Group II with 100 patients treated with open technique. Outcomes such as surgical site infection, hospital stay and time duration of procedure were examined and compare the results between both groups. Computer statistical software SPSS 24.0 was used to analyze the data. Student t' test and chi-square test was applied to analyze the finding between both procedures with P-value set at <0.05 as significant.

## RESULTS

There were 110 (55%) patients (52 Group I, 58 Group II) were male with mean age  $24.3 \pm 7.45$  years while 90 (45%) patients (48 Group I, 42 Group II) were females with mean age  $25.2 \pm 8.2$  years. No significant difference regarding BMI between both groups, Group I and II ( $24.5 \pm 4.2$  vs  $24.3 \pm 3.6$ ). According to the histopathology findings 85% patients had inflammation, 3% had phlegmonous, 1% had gangrenous, 8% had perforated and 3% had normal appendicitis in Group I. In Group II 79% had inflamed 5% had phlegmonous, 2% had gangrenous, 10% had perforated and 4% had normal

**Table No.1: Demographic information of the patients**

Variable	Group I	Group II	Total
Mean age (yrs)	24.3±7.45	25.2±8.2	
<b>Gender</b>			
Male	52 (52%)	58 (58%)	110 (55%)
Female	48 (48%)	42 (42%)	90 (45%)
BMI	24.5±4.2	24.3±3.6	
<b>Histopathology</b>			
Inflamed	85 (85%)	79 (79%)	164 (82%)
Phlegmonous	3 (3%)	5 (5%)	8 (4%)
Gangrenous	1 (1%)	2 (2%)	3 (1.5%)
Perforated	8 (8%)	10 (10%)	18 (9%)
Normal	3 (3%)	4 (4%)	7 (3.5%)

P-value >0.05

in term of surgery time duration between both groups  $45.42 \pm 10.95$  minutes Vs  $30.48 \pm 9.68$  minutes;  $P=0.001$ . appendicitis (Table 1). There was a significant difference No significant difference observed in term of hospital stay between both groups  $2.01 \pm 1.12$  vs  $2.32 \pm 1.05$  days. 10 (10%) patients in Group II in which 7% had Superficial SSI and 3% had Deep SSI. 6 (6%) patients

4% superficial and 2% Deep SSI in Group I had developed surgical site infection with no significant difference ( $p=0.41$ ) (Table 2).

**Table No.2: Comparison of outcomes**

Outcome	Group I	Group II	P value
Operative time	45.42±10.95	30.48±9.68	0.001
Hospital stay	2.01±1.12	2.32±1.05	0.89
<b>Surgical site infection</b>			
Superficial	4 (4%)	7 (7%)	0.41
Deep	2 (2%)	3 (3%)	

## DISCUSSION

Surgical Site Infection (SSI) is the most common complication after all the performing surgeries whether it is laparoscopic or open technique.<sup>12</sup> We found that 110 (55%) patients (52 Group I, 58 Group II) were male with mean age  $24.3 \pm 7.45$  years while 90 (45%) patients (48 Group I, 42 Group II) were females with mean age  $25.2 \pm 8.2$  years. These results were similar to some previous studies in which male patients were high in numbers as 52 to 75% as compared to females and majority of patients were ages 20 to 35 years.<sup>13,14</sup> Some of studies reported female patients population was high as compared to males.<sup>15</sup> In present study we found no significant difference regarding Body Mass Index (BMI) between both groups. We found that 85%, 3%, 1%, 8%, 3% patients had inflamed phlegmonous, gangrenous, perforated and normal appendicitis in laparoscopic treated patients according to the histopathology findings. In Group II 79% had inflamed, 5% had phlegmonous, 2% had gangrenous, 10% had perforated and 4% had normal appendicitis. These results were comparable to some other studies.<sup>16,17</sup> In our study significant difference in term of surgery time duration between both groups  $45.42 \pm 10.95$  minutes vs  $30.48 \pm 9.68$  minutes;  $P=0.001$ . A study conducted by Jawad et al<sup>18</sup> reported laparoscopic appendectomy take more time to perform as compared to open appendectomy ( $47.54 \pm 12.82$  minutes versus  $31.36 \pm 11.43$  minutes;  $< 0.001$ ). In present study we found no significant difference observed in term of hospital stay between both groups  $2.01 \pm 1.12$  vs  $2.32 \pm 1.05$  days. Many of studies showed similar results to our study in term of hospital stay and demonstrated no difference between both open and laparoscopic procedures.<sup>19,20</sup> We found in our study that 10 patients in open appendectomy group develop surgical site infection in which 7% patients had superficial and 3% patients had deep SSI. 6% patients develop SSI in patients received laparoscopic technique in which 4% had superficial and 2% had deep SSI. Between both groups no significant difference was observed ( $p=>0.05$ ). These results were similar to many other studies in which no significant difference reported in term of SSI between laparoscopic and open technique.<sup>21,22</sup> Khan et al<sup>23</sup> reported 11% intra-abdominal infection in laparoscopic group and 3% in

open group. Some other studies reported that laparoscopic technique had increase incidence of intra-abdominal abscess as compared to open appendectomy.<sup>24-26</sup>

## CONCLUSION

Surgical site infection is one of the most common complication resulted after surgical treatment. We concluded that there is no significant difference found between open and laparoscopic technique in term of surgical site infection while open appendectomy is better in term of operative time as compared to laparoscopic appendectomy.

### Author's Contribution:

Concept & Design of Study: Ahmad Shah  
 Drafting: Samina Khan  
 Data Analysis: Nazir Ahmad Sasoli  
 Revisiting Critically: Ahmad Shah, Samina Karim  
 Final Approval of version: Ahmad Shah

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

## REFERENCES

1. Mc Burney C. The incision made in the abdominal wall in cases of appendicitis, with a description of a new method of operating. *Ann Surg* 1894;20:38.
2. Peiser JG, Greenberg D. Laparoscopic versus open appendectomy: results of a retrospective comparison in an Israeli Hospital. *Isr Med Assoc J* 2002;4(2):91-4.
3. Editorial. A sound approach to the diagnosis of acute appendicitis. *Lancet* 1987;1: 198-200.
4. Aziz O, Athanasiou T, Tekkis PP, Purkayastha S, Haddow J, Malinowski V, et al. Laparoscopic versus open appendectomy in children: a meta-analysis. *Ann Surg* 2006;243(1):17-27.
5. Gupta R, Sample C, Bamehriz F, Daniel W, Birch DW. Infectious complications following laparoscopic appendectomy. *Can J Surg* 2006; 49(6): 397-400.
6. Dai L, Shuai J. Laparoscopic versus open appendectomy in adults and children: a meta-analysis of randomized controlled trials. *United European Gastroenterol J* 2017;5(4):542-53.
7. D'Souza N, Nugent K: Appendicitis. *BMJ Clin Evid* 2014;2014:408.
8. Schellekens DH, Hulsewe KW, van Acker BA, et al. Evaluation of the diagnostic accuracy of plasma markers for early diagnosis in patients suspected for acute appendicitis. *Acad Emerg Med* 2013;20:703-10.
9. Smink DS, Finkelstein JA, Garcia Peña BM, Shannon MW, Taylor GA, Fishman SJ. Diagnosis of acute appendicitis in children using a clinical practice guideline. *J Pediatr Surg* 2004; 39:458-63.
10. Tang E, Ortega AE, Anthonie GJ, Beart RW Jr: Intra-abdominal abscesses following laparoscopic and open appendectomies. *Surg Endosc* 1996;10:327-8.
11. Ortega AE, Hunter JG, Peters JH, Swanstrom LL, Schirmer B. A prospective, randomized comparison of laparoscopic appendectomy with open appendectomy. *Am J Surg* 1995;169: 208-12.
12. Mohamed AA, Mahran KM: Laparoscopic appendectomy in complicated appendicitis: is it safe? *J Minim Access Surg* 2013;9:55-58.
13. Tiwari MM, Reynoso JF, Tsang AW, Oleynikov D: Comparison of outcomes of laparoscopic and open appendectomy in management of uncomplicated and complicated appendicitis. *Ann Surg* 2011;254:927-32.
14. Muqim R, Khan M, Zarin M. Experience of laparoscopic appendectomies versus open appendectomies. *Pak J Med Sci* 2010;26(2): 324-8.
15. Kehagias I, Karamanacos SN, Panagiotopoulos S, Panagopoulos K, Kalfarentzos F. Laparoscopic versus open appendectomy. Which way to go? *World J Gastroenterol* 2008; 14(31): 4909-14.
16. Kolhar BA, Lamani YP, Shekhar RM, Shankar G. Outcomes of laparoscopic versus open appendectomy: a comparative study. *Int Surg J* 2017;4:2185-8.
17. Ioannis V, Constantinou F. Comparison between Open and laparoscopic appendectomy: a systematic review. *World J Surg Surgical Res* 2018;1:1004.
18. Khalil J, Iqbal T. Compare laparoscopic and open appendectomy in terms of surgical site infection. *Pak J Surg* 2017; 33(3):174-80.
19. Ping LI, Zong-Hui C, Qing-Guo Li, Tang Q, You-Yong T, Dao-Rong W. Safety and efficacy of single-incision laparoscopic surgery for appendectomies: a meta-analysis. *World J Gastroenterol* 2013;19(25):4072-82.
20. Stylianos S, Nichols L, Ventura N, Malvezzi L, Knight C, Burnweit C. The "all-in-one" appendectomy: quick, scarless, and less costly. *J Pediatr Surg* 2011;46(12):2336-41.
21. Clerveus M, Morandeira-Rivas A, Moreno-Sanz C, Herrero-Bogajo ML, Picazo-Yeste JS, Tadeo-Ruiz G. Systematic review and meta-analysis of randomized controlled trials comparing single incision versus conventional laparoscopic appendectomy. *World J Surg* 2014;38(8): 1937-46.

22. Zhao L, Liao Z, Feng S, Wu P, Chen G. Single-incision versus conventional laparoscopic appendectomy in children: a systematic review and meta-analysis. *Pediatr Surg Int* 2015;31(4): 347-53.
23. Khan JS, Hassan H, Farooq U. Appendectomy; laparoscopic vs open. *Professional Med J* 2012; 19:1-5.
24. Masoomi H, Nguyen NT, Dolich MO, Mills S, Carmichael JC, Stamos MJ. Laparoscopic appendectomy trends and outcomes in the United States: data from the Nationwide Inpatient Sample (NIS), 2004-2011. *Am Surg* 2014;80 (10):1074-7.
25. Adams ML. The medical management of acute appendicitis in a nonsurgical environment: a retrospective case review. *Mil Med* 2015;155(8): 345-347.
26. Nazir A, Farooqi SA, Chaudhary NA, Bhatti HW, Waqar M, Sadiq A. Comparison of open appendectomy and laparoscopic appendectomy in perforated appendicitis. *Cureus* 2019; 11(7): e5105.