

Journal of Nobel Medical College

Available Online: www.nepjol.info, www.nobelmedicalcollege.com.np
 Volume 7, Number 2, Issue 13, July-December 2018, 39-43

Original Article**Surgical site infection in Laparoscopic versus Open appendicectomy**

Ashok Koirala^{1*}, Dipendra Thakur¹, Sunit Agrawal², Bhuwan Lal Chaudhary¹ and Sagar Poudel¹

¹Department of General and Minimally Invasive Surgery, NMCTH, Biratnagar

²Department of Surgery, B.P. Koirala Institute of Health Science, Dharan

Received: 11th November, 2018; Revised after peer-review: 13th December, 2018; Accepted: 25th December, 2018

DOI: <https://doi.org/10.3126/jonmc.v7i2.22306>

Abstract**Background**

Acute appendicitis is very common surgical cause of acute abdomen and needs surgical removal either by laparoscopic or open appendicectomy. The aim of this study is to compare frequency of surgical site infection (SSI) in patients undergoing laparoscopic and open appendicectomy.

Materials and Methods

The study was prospective study conducted in NMCTH, Biratnagar. Total 200 patients with diagnosis of acute appendicitis admitted through the emergency department of our hospital were included in the study. The patients were randomly allocated in two groups: Laparoscopic appendicectomy group (LA) and Open appendicectomy group (OA). Both groups underwent successful emergency appendicectomy. Wound infections in terms of surgical site infection (SSI) if present were recorded. All age groups and both sexes were included.

Results

Two hundred patients underwent appendicectomy, one hundred Laparoscopic appendicectomy (LA) and another hundred open appendicectomy (OA). The mean age of patients with acute appendicitis was 30.63 ± 16.14 years with minimum of 6 years and maximum of 77 years. The highest number of patients were in age group of 10 to 20 years (29.5%). In LA group SSI noted in 3 patients (3%) whereas in OA group it was found in 12 patients (12%).

Conclusion

Laparoscopic appendicectomy is better and offers great advantages in terms of SSI as compared to Open appendicectomy.

Key words: *Surgical site infections (SSI), Laparoscopic appendicectomy (LA), Open appendicectomy (OA).*

Introduction

The term acute appendicitis was coined by Reginald Harvard Fitz in 1886 and proposed for early removal of appendix to save the life [1]. Open appendicectomy (OA) was described by McBurney in 1894 and remained treatment of choice for acute appendicitis [2]. But in 1983 the German gynecologist Kurt Semm performed first

laparoscopic appendicectomy, since then LA had got acceptance [3]. Surgical site infection (SSI) is the most common complications following appendicectomy and seen in 5-10% of all patients [4]. SSI leads to increase pain, discomfort, prolong hospital stay and delay in recovery [5]. So, aim should always be focused to reduce SSI. SSI means infections within 30 days

of surgery or within one year in case of implants according to CDC.SSI may be superficial, deep or organ space infections [6]. This study aims to evaluate surgical site infections (SSI) in patients who underwent Laparoscopic as well as Open appendicectomy for acute appendicitis.

Materials and Methods

A prospective, comparative, randomized study was conducted in the patients, diagnosed as acute appendicitis who underwent emergency appendicectomy. Patients admitted through Emergency Department of Nobel Medical College and Teaching Hospital, Biratnagar, Nepal from June, 2017 to September, 2018, were included in the study after taking ethical clearance from Institutional Review Committee. The diagnosis of acute appendicitis was made on the basis of history, clinical examinations, laboratory investigations and by ultrasonography of abdomen and pelvis.

A total of 200 patients of all age group and both sexes were included in the study excluding those who were not able to return for follow up. Informed written consent was obtained from all the patients who were enrolled in this study.

Pregnant women and patients with medical diseases like hemodynamic instability, chronic medical or psychiatric illness cirrhosis and coagulation disorders, metabolic disorder patients like malnutrition, diabetes, uremia, jaundice patients were excluded from the study.

The enrolled 200 patients were divided into two groups LA group (Laparoscopic appendicectomy) and OA group (Open appendicectomy) with 100 patients in each group. Each group of patients received 1gm ceftriaxone and 500mg metronidazole at the time of induction of anesthesia.

All patients were observed till 3rd postoperative day and were discharged and were asked to follow up after one week in

Surgical Outpatient Department. During follow up suture removal and wound inspections was done. Patients were further followed up on 2nd and 4th weeks of operation. Parameters used for assessment of wound infection are shown in Table 1.

Table 1: Grades of Wound Infection

Grade I infection	I	Slight reddening and induration of wound edges requiring no intervention.
Grade II infection	II	Slight serous discharge from wound, requiring no intervention
Grade III infection	III	Obvious infection or purulent discharge from wound, requiring repeated change of dressings and institution of antibiotics

These types of wounds were managed with suture removal, wound swab for culture and sensitivity, analgesics, antipyretics and antibiotic treatments.

Analysis

The results of the study were statistically analyzed using SPSS version 25, using chi-square test and independent sample t-test. Results on continuous measurements are presented on mean \pm SD (min-max) and results on categorical measurement are presented in numbers (%). A p-value of <0.05 was considered statistically significant.

Results

A total of 200 patients with acute appendicitis were studied, of which 100 were in LA group and another 100 in OA Group. Out of 200 patients, 107 were female (53.5%) and 93 were male (46.5%). Therefore, female to male ratio was 1.15:1. The mean age of patients with acute appendicitis was 30.63 ± 16.14 years with minimum of 6 years and maximum of 77 years. The highest incidence of acute appendicitis was observed in the patients of age group 10 to 20 years (29.5%) as shown in Table 2.

Table 2: Distribution of patients according to different age groups

Age Group (Year)	No. of Patients				Total (n = 200)
	Laparoscopic Appendectomy (n = 100)		Open Appendectomy (n = 100)		
	Male	Female	Male	Female	
0-10	3 (3%)	2 (2%)	2 (2%)	3 (3%)	10 (5%)
10-20	10 (10%)	18 (18%)	17 (17%)	14 (14%)	59 (29.5%)
20-30	11 (11%)	12 (12%)	8 (8%)	9 (9%)	40 (20%)
30-40	10 (10%)	13 (13%)	12 (12%)	11 (11%)	46 (23%)
40-50	4 (4%)	5 (5%)	3 (3%)	6 (6%)	18 (9%)
50-60	6 (6%)	3 (3%)	5 (5%)	5 (5%)	19 (9.5%)
> 60	1 (1%)	2 (2%)	1 (1%)	4 (4%)	8 (4%)
Total	45 (45%)	55 (55%)	48 (48%)	52 (52%)	200 (100%)

Out of 200 patients, 100 underwent Laparoscopic appendectomy and another 100 underwent Open appendectomy. On evaluation of the intraoperative findings of laparoscopic appendectomy, 84 were uncomplicated appendicitis, 5 were gangrenous appendix, 7 appendicular abscess and 4 perforation peritonitis whereas in open appendectomy 73 were uncomplicated appendicitis, 7 gangrenous

appendicitis, 12 appendicular abscess and 8 perforation peritonitis. The surgical findings between two groups was not statistically significant ($p=0.289$) but the rate of surgical site infections was found to be higher in complicated appendicitis both in laparoscopic appendectomy ($P<0.001$) and open appendectomy ($p<0.001$) as shown in Table 3.

Table 3: Comparison of intraoperative finding between Laparoscopic Appendectomy and Open Appendectomy

Groups	Post-operative infection	Surgical Finding				p value	
		Uncomplicated appendicitis	Gangrenous appendix	Appendicular abscess	Peritonitis		
Group LA	Infection	0	0	1	2	<0.001*	0.289
	No infection	84	5	6	2		
	Total	84	5	7	4		
Group OA	Infection	1	1	4	6	<0.001*	
	No infection	72	6	8	2		
	Total	73	7	12	8		

***statistically significant**

During follow up in outpatient department (OPD), Three patients (3%) developed surgical site infections in Laparoscopic group whereas twelve (12%) developed SSI in Open appendectomy group which is statistically significant ($p=0.029$) as shown in Table 4. In Laparoscopic appendectomy group, two patients had grade one and one patient had grade two types SSI. Whereas, in Open appendectomy group, six patients had grade three, four had grade two and two

had grade one type of SSI. All these wounds were managed successfully.

Table 4: Comparison of wound infection between two groups (LA versus OA)

	Wound infection, n (%)	No wound infection, n (%)	p-value
Laparoscopic appendectomy	3 (3%)	97 (97%)	0.029*
Open appendectomy	12 (12%)	88 (88%)	

* statistically significant

Discussion

Laparoscopic appendectomy is very common surgical procedure in General surgical practice nowadays where expertise and equipment are available. Moreover, it offers the complete visualizations of peritoneal cavity so that there is less chance of diagnostic error.

Different series has reported 8 to 33 % of negative appendectomy, which is more common in female patients of child bearing age. Therefore laparoscopic technique aids diagnostic accuracy as well as avoids unnecessary negative appendectomy and also helps to find out the cause of abdominal pain [7, 8].

In the present study altogether there were 107(53.5%) female patients whereas male patients were 93(46.5%). The female to male ratio was 1.15:1. Therefore female predominance was seen in our study. Similar finding was observed in the study conducted earlier in our institute [9]. However, the study conducted by Williams et al showed male predominance in their study [4]. The mean age of the patients with acute appendicitis was 30.63 + 16.14 years with minimum of 6 years and maximum of 77 years. The highest number of the patients was observed in between 10 to 20 years (29.5%). Similar finding was observed in our study conducted earlier [9] but another study showed peak incidence between 15-25 years [4] and the study of Kumar et al showed peak incidence between 10-30 years [10]. Both are almost comparable with our study.

Surgical site infection (SSI) is the most common complications following appendectomy and seen in 5-10% of all patients [4]. In the present study ,surgical site infections was seen higher in complicated appendicitis in gangrenous appendix, appendicular abscess,

appendicular perforations peritonitis both in laparoscopic as well as open appendectomy .Therefore intraoperative findings were directly related to surgical site infections .The study conducted by Baek HN et al ,Minutolo et al, Suh YJ et al[11,12,13] too showed intraoperative findings were directly proportional to the SSI which is comparable to our study.

About intra abdominal access for appendectomy, wound infection rate in Laparoscopic appendectomy (LA) was only 3% whereas in Open appendectomy it was 12%, which was statistically significant ($P=0.029$). Similar type of findings was observed by Yagnik VD showing 1.92%in LA and 10.63%in OA and Khan et al (1.2% in LA and 9.2% in OA) which were comparable with our study [14, 15]. The large meta-analysis of randomized control trial of 2877 patients too showed wound infection rate lower in laparoscopy (2.3 to6.1%) that is comparable to our study [16]. However the study conducted by Tamjeed et al showed no significant advantage of LA over OA in terms of surgical site infections [17].

The present study showed that LA offers less chance of wound infections as such there will be less postoperative morbidity and aids quick recovery of the patient's. However, intraoperative conditions of appendix too had direct impact on outcome of SSI.

Conclusion

This study concludes that Laparoscopic appendectomy is better than Open appendectomy in terms of surgical site infections. So, laparoscopic appendectomy should be performed where expertise and facilities are available.

References

- [1] Semm, K Endoscopic appendectomy, *Endoscopy* 15 (1983) 59-64.
- [2] 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.* 20 (1894) 38-43.
- [3] Attwood SEA ,Hill DK ,Stephens RB.A prospective randomized trial of laparoscopic versus open appendectomy .*Surgery.* 112 (1992) 497-501.
- [4] Williams NS, BulstrodeCJK,O'Connell PR ,The vermiform appendix .*Baily and Love Short Practice of Surgery.*25thed.London:Arnold (2008)1204-16.
- [5] Bailey HM ,Love JM ,Wound infection :Short practice of Surgery25thEd.London: Arnold(2008)32-48.
- [6] Horan TC, GaynesRP,MartoneWJ, JarvisWR,Emori TG.CDC definitions of nosocomial surgical site infections,1992:a modifications of CDC definitions of surgical wound infections. *Infect Control HospEpidemiol* 13 (1992) 606-8.
- [7] Khan JS, HassanK, Farooq U ,Appendectomy: Laparoscopic vs open *Professional Med J* 19 (2012) 1-5.
- [8] Jamy LY,LoCY, Lam CM,A comparative study of routine laparoscopic versus open appendectomy. *JSLs* 10 (2006) 188-92.
- [9] Koirala A, Thakur D, Agrawal S, Pathak KR, Bhattarai M, Sharma A. Appendicular lump: A conservative approach. *JoNMC.* 5:2 (2016) 47-50.
- [10] Kumar B, SamadA,KhanzadaTW, LaghariMH, ShalkhAR. Superiority of laparoscopic appendectomy over open appendectomy :the Hyderabad experience. *Rawal Med* 33 (2008) 165-8.
- [11] Baek HN, Jung YH, Hwang YH .Laparoscopy versus open appendectomy for appendicitis in elderly patients. *J Korean Soc Coloproctol.*27:5 (2011) 241-5.
- [12] Minutolo V, LicciardelloA ,Di Stefano B, Arena M, AreanaG, AntonacciV. Outcomes and cost analysis of laparoscopic versus open appendectomy for treatment of acute appendicitis: 4 years' experience in s a district hospital *BMC Surg.*14:1 (2014) 14.
- [13] Suh YJ , JeongSY, ParkJG, KangSB, KimDW, etal. Comparison of surgical site infection between open and laparoscopic appendectomy. *Korean Surg Soc.*82:1 (2012) 35-9.
- [14] Yagnik VD,Rathod JB,AG. A retrospective study of two port appendectomy and its comparison with open appendectomyand three port appendectomy.*Saudi J Gastroenterol* 16 (2010) 268-71.
- [15] Khan MN, FayyadT, CecilTD, MoranBJ. Laparoscopic versus open appendectomy: the risk of postoperative infectious complications. *JSLs* 11 (2007) 363-7.
- [16] Guller U,HerveyS, PurvesH, Muhibaier LH, Peterson ED, EubanksS,etal. Laparoscopicvs Open appendectomy : Outcomes comparison based on a large administrative database. *Ann Surg.* 239 (2004) 43-52.
- [17] Tamjeed G, Muhammad B, Gul A, Sahar S, Kamran W, Akhunzada TS. Surgical site infection in open versus laparoscopic appendectomy.*J Surg Pak.* 19:1 (2014) 22-25.