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ORIGINAL ARTICLE

Comparison of Laparoscopic Appendectomy with Open Appendectomy with Respect to Surgical Site Infection

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ABSTRACT

Aim: The purpose of this study is to compare the incidence of wound infection in laparoscopic and open appendectomy.
Study Design: A randomized, controlled study
Place and Duration: In the Surgical department of Khalifa Gul Nawaz Medical Teaching Institute, Bannu and Ayub Teaching Hospital, Abbottabad for the duration from January 2021 to June 2021.
Methods: In this study, 220 patients with the diagnosis of acute appendicitis were selected and divided randomly into two groups; OA group (open appendectomy) and LA group (laparoscopic) appendectomy. In both groups, the general anesthesia was given for appendectomy. The wound was examined on the 1st, 2nd and 3rd postoperative day, and then on the 7th and 14th day postoperatively and was scored conferring to the wound asepsis Score. The SSI and total wound asepsis score was calculated subsequently.
Results: Total of 200 patients with acute appendicitis were selected. In laparoscopic appendectomy (LA); 22.0±7.85 years was the mean age and 24.12±9.08 years was the mean age in open appendectomy (OA) group. There were 70 men and 40 women in the LA group, and 50 men and 60 women in the OA group. The LA group has M:F ratio of 1.9: 1 in the and 1: 1.3 in the OA group. While 108 patients had no complications and surgical site infection were noticed in two patients only in the LA group, 98 patients in the OA group recovered and surgical site infection were seen in 12 patients.
Conclusion: Laparoscopic appendectomy is a safer and better choice than open appendectomy which decreases postoperative complications significantly such as wound infections.
Keywords: Open appendectomy, Laparoscopic appendectomy, Acute appendicitis and Surgical site infection.

INTRODUCTION

Hospital acquired wound infections are thought to be significantly cause more morbidity than other wound infections[1-2]. A post-operative wound infection, commonly known as a surgical site infection (SSI), causes a prolonged hospital stay, pain, discomfort, and perhaps a lifelong impairment and also slows wound healing[3]. As a result, the quality of patient care has an impact on the prevention of SSI. The SSI is categorised into superficial and deep incisional SSI, organ-space SSIs, and it develops within 30 days of surgical procedure (or within a year for implants). Approximately 20–30% of SSIs are instigated by Staphylococcus aureus, and endogenous flora is responsible for more than half of these infections[4]. In addition to staphylococcus aureus, the skin serves as an essential reservoir for various microorganisms that might cause postoperative infections. It may lead to exogenous suppuration in implanted prosthesis and wounds[5]. Methicillin-resistant staphylococcus aureus is one example of an antibiotic-resistant strain that can lead to outbreaks and more severe infections. With appendectomy being the most frequent abdominal surgery, acute appendicitis affects 7–12% of the general population and most frequently affects people between the ages of 10 and 30[6-7]. The first laparoscopic appendectomy was done in 1983 and prior to that open appendectomy was performed using the open technique[8-9]. The outdated open method has been replaced by minimally invasive or laparoscopic techniques, but the laparoscopic appendectomy has not yet attained such popularity. Laparoscopic appendectomy (LA) has been shown to have significant advantages over open appendix (OA), including reduced postoperative pain, quicker postoperative healing, and fewer wound infections. Comparing a laparoscopic appendectomy to an open procedure, the risk of wound infections varies[10]. The appendectomy is a clean contamination procedure, up to 25% of patients develop wound infection with perforation and among 1/3rd of patients who had periappendiceal abscess may experience wound infection[11]. In contrast to the open method, which involves removing the appendix with an open method, the appendix in laparoscopically appendectomy is removed using a trocar. This has the hypothetical benefit of reducing wound infections and, consequently, the risk of SSI. The surgical site infection (SSI) can result in significant morbidity, mortality, and increased utilization of resources. The study's primary goal is to lower the prevalence of SSI[12]. Laparoscopic surgery, for example, has shown encouraging outcomes in this respect. Laparoscopic appendectomy and open appendectomy were compared in terms of postoperative SSI to assess recommendations for better technique with less wound infection[13]. The aim of this study is to compare the incidence of wound infection in laparoscopic and open appendectomy.

METHODS

This randomized, controlled study was held in the surgical department of Khalifa Gul Nawaz Medical Teaching Institute, Bannu and Ayub Teaching Hospital, Abbottabad for the duration from January 2021 to June 2021. Total of 220 patients with the diagnosis of acute appendicitis were selected for this study and were divided randomly into two groups; OA group (open appendectomy) and LA group (laparoscopic) appendectomy. There were 70 men and 40 women in the LA group, and 50 men and 60 women in the OA group. Based on the patient's physical examination, medical history, urine tests, blood counts and abdominal/pelvic ultrasound, the diagnosis of acute appendicitis was established. Patients who had an Alvarado score of greater than five were included in the study; those who could not be clinically diagnosed with appendicitis, had a palpable mass in the right inferior quadrant, or who were contraindicated for laparoscopy, were eliminated.

Before surgery, each patient received one dose of antibiotics, and two further doses were given post-operatively. In the right iliac fossa; incision was given in open appendectomy, and after the splitting of abdominal muscles, the appendix was ligated from the base and removed. When the appendix was removed, spilling of any purulent material was avoided with proper care. In laparoscopic appendectomy, 3 ports—one-10 mm and two-5-mm—were introduced on the abdominal wall after the creating the pneumothorax. Through one of the ports, the appendix was

extracted from the abdomen after being mobilised, tied at the base, and withdrawn to the trocar. In both groups, the general anesthesia was given for appendectomy. The wound was examined on the 1st, 2nd and 3rd postoperative day, and then on the 7th and 14th day postoperatively and was scored conferring to the wound asepsis Score. The total wound asepsis score was calculated and surgical site infection was categorised as follows: total score ranging from 0 to 20, no wound infection, and total score exceeding 20 exhibited surgical site infection. SPSS version 13 was used for analysis of data. The standard deviation and mean were determined for age. The percentage and frequency were presented for surgical site infection and gender. The proportion of SSI in both groups was compared with Chi-square test. A p-value of 0.05 or above was considered statistically significant.

RESULTS

200 acute appendicitis patients were selected. In laparoscopic appendectomy (LA); 22.0±7.85 years was the mean age and 24.12±9.08 years was the mean age in open appendectomy (OA) group. (Table 1).

Table-1: shows the patients distribution with reference to age

Age (Years)	Group LA (n = 110)		Group OA (n = 110)	
	No.	%	No.	%
10-20	65	59.1	53	48.2
21-30	29	26.4	37	33.6
31-40	9	8.2	15	13.6
41-50	7	6.3	5	3.6
Mean± SD	22.0±7.85		24.12±9.08	

There were 70 men and 40 women in the LA group, and 50 men and 60 women in the OA group. The LA group has M:F ratio of 1.9: 1 in the and 1: 1.3 in the OA group. (Table 2).

Table-2: shows the patients distribution with reference to gender

Gender	Group LA (n = 100)		Group OA (n = 100)	
	No.	%	No.	%
Male	70	63.6	50	45.5
Female	40	36.4	60	54.5
M:F ratio	1.9:1		1:1.3	

While 108 patients had no complications and surgical site infection were noticed in two patients only in the LA group, 98 patients in the OA group recovered and surgical site infection were seen in 12 patients. There was a statistically significant difference among the OA and LA groups (P <0.05) (Table 3).

Table-3: shows the patients distribution with reference to surgical site infections

Surgical site infection	Group LA (n = 100)		Group OA (n = 100)	
	No.	%	No.	%
Yes	2	1.8	12	10.9
No	108	98.2	98	89.1

DISCUSSION

The classic open technique has been used for appendectomy for many years. 33% of women of reproductive age who are not pregnant get an incorrect diagnosis of appendicitis, however laparoscopic surgery is now widely regarded as being superior in many ways[13]. Because the peritoneal cavity may be seen in its entirety, LA is preferable to OA. Gynaecological issues and female functional abnormalities lead to high incidence of misdiagnosis in women[14]. Therefore, LA increases diagnostic precision in patients with suspected appendicitis and also helps to avoid needless appendectomy. For more than a century, OA has been the 1st line treatment for acute appendicitis[15]. Contrary to LA, it is not regarded as the "gold standard" in cholecystectomy. The optimal course of treatment is early diagnosis followed by prompt surgery to avoid complications like perforation that can increase morbidity[16]. A wide range of abilities and technical knowledge are needed for minimally invasive surgery. As a result, several studies' findings were influenced by the expertise and skill of surgeons[17]. For many treatments, including cholecystectomy, laparoscopic surgery has lately acquired widespread acceptability because it provides advantages like reduced scarring, less pain, and an earlier return to normal activities[18]. The first LA was carried out by German gynaecologist Semm in 1981[19]. In 1982, he discussed the procedure at a surgery conference. Since then, numerous studies have demonstrated that the laparoscopic method as the high success ratio and less rate of complications in the majority of instances with appendicitis. LA has less wound infection risk than OA[20]. Pre-operative intravenous antibiotics have been found to lower the incidence of post-operative SSIs, regardless of the surgical strategy adopted. Results from meta-analysis of 2877 patients enrolled in 28 trials provided the comparable results[21]. The overall complication rate was comparable, however following laparoscopy, wound infections were markedly decreased (2.3% from 6.1%). Surgical site infections were also observed to be 1.2% in LA and 9.2% in OA, according to Khan et al[22]. Similar to this, Yagnik found that the laparoscopic appendectomy had a considerably lower SSI rate than the open appendectomy (10.63% in OA vs 1.92% in LA)[23]. Laparoscopic appendectomy had rate of wound infection that was much lower than open appendectomy in this study (10.9% in the OA group vs 1.8% in the LA group)[24]. The outcomes are equivalent to those of earlier research. Additionally, the findings of other studies can be compared to the disease's distribution by sex and age[25]. This study demonstrates the safety and efficacy of LA as a treatment option for individuals with acute appendicitis. Although laparoscopic appendectomy has greater hospital charges, patients can save a lot of money because of the speedy recovery and extremely low infection rate.

CONCLUSION

In cases of acute appendicitis, laparoscopic appendectomy is a better surgical option than open appendectomy because it causes less postoperative wound infection. When there is a doubt about the diagnosis, it also provides the added advantage of diagnostic laparoscopy. Since laparoscopic surgery is now incorporated into resident training, there is commutating learning curve. A graduating surgeon can do this surgery. Given that LA is better than OA for treating acute appendicitis surgically, LA should be the method of choice.

REFERENCES

1. Beg MA, Faridi S, Qazi AR, Siddiqui F. Laparoscopic appendectomy-comparison with open appendectomy with respect to surgical site infection. Pak J Surg. 2017;33(2):115-8.
2. Pogorelic Z, Buljubasic M, Susnjar T, Jukic M, Pericic TP, Juric I. Comparison of open and laparoscopic appendectomy in children: a 5-year single center experience. Indian pediatrics. 2019 Apr;56(4):299-303.
3. Antoniou SA, Mavridis D, Hajibandeh S, Hajibandeh S, Antoniou GA, Gorter R, Tenhagen M, Koutras C, Pointner R, Chalkiadakis GE, Granderath FA. Optimal stump management in laparoscopic appendectomy: A network meta-analysis by the Minimally Invasive Surgery Synthesis of Interventions and Outcomes Network. Surgery. 2017 Nov 1;162(5):994-1005.
4. Garcell HG, Arias AV, Sandoval CA, García EG, Gamboa ME, Sado AB, Serrano RN. Incidence and etiology of surgical site infections in appendectomies: a 3-year prospective study. Oman Medical Journal. 2017 Jan;32(1):31.
5. Danwang C, Bigna JJ, Tochie JN, Mbonda A, Mbanga CM, Nzalie RN, Guifo ML, Essomba A. Global incidence of surgical site infection after appendectomy: a systematic review and meta-analysis. BMJ open. 2020 Feb 1;10(2):e034266.
6. Alsoueni H, Mohammed M, Nawar A. Laparoscopic Appendectomy Versus Open Appendectomy in Young Female Patients. Benha medical journal. 2020 May 1;37(1):271-84.
7. Athanasiou C, Lockwood S, Markides GA. Systematic review and meta-analysis of laparoscopic versus open appendicectomy in adults with complicated appendicitis: an update of the literature. World journal of surgery. 2017 Dec;41(12):3083-99.

8. Nazir A, Farooqi SA, Chaudhary NA, Bhatti HW, Waqar M, Sadiq A. Comparison of open appendectomy and laparoscopic appendectomy in perforated appendicitis. Cureus. 2019 Jul 9;11(7).
9. Kumar SG, Rao DN. Open VS laparoscopic appendicectomy: A comparative Study. International J Surg Sci. 2018;2(2):19-22.
10. Sohn M, Agha A, Bremer S, Lehmann KS, Bormann M, Hochrein A. Surgical management of acute appendicitis in adults: A review of current techniques. International Journal of Surgery. 2017 Dec 1;48:232-9.
11. Ruiz-Patiño A, Rey S, Molina G, Dominguez LC, Rugeles S. Cost-effectiveness of laparoscopic versus open appendectomy in developing nations: a Colombian analysis. Journal of Surgical Research. 2018 Apr 1;224:33-7.
12. Sánchez-Santana T, del-Moral-Luque JA, Gil-Yonte P, Bañuelos-Andrío L, Durán-Poveda M, Rodríguez-Caravaca G. Effect of compliance with an antibiotic prophylaxis protocol in surgical site infections in appendectomies. Prospective cohort study. Cirugía y Cirujanos (English Edition). 2017 May 1;85(3):208-13.
13. Poprom N, Wilasrusmee C, Attia J, McEvoy M, Thakkinstian A, Rattanasiri S. Comparison of postoperative complications between open and laparoscopic appendectomy: An umbrella review of systematic reviews and meta-analyses. Journal of Trauma and Acute Care Surgery. 2020 Oct 1;89(4):813-20.
14. Dai L, Shuai J. Laparoscopic versus open appendectomy in adults and children: a meta-analysis of randomized controlled trials. United European gastroenterology journal. 2017 Jun;5(4):542-53.
15. Horvath P, Lange J, Bachmann R, Struller F, Königsrainer A, Zdichavsky M. Comparison of clinical outcome of laparoscopic versus open appendectomy for complicated appendicitis. Surgical endoscopy. 2017 Jan;31(1):199-205.
16. Wang-Chan A, Gingert C, Angst E, Hetzer FH. Clinical relevance and effect of surgical wound classification in appendicitis: Retrospective evaluation of wound classification discrepancies between surgeons, Swissnoso-trained infection control nurse, and histology as well as surgical site infection rates by wound class. Journal of Surgical Research. 2017 Jul 1;215:132-9.
17. Siribumrungwong B, Chantip A, Noorit P, Wilasrusmee C, Ungpinitpong W, Chotiya P, Leerapan B, Woratanarat P, McEvoy M, Attia J, Thakkinstian A. Comparison of superficial surgical site infection between delayed primary versus primary wound closure in complicated appendicitis: a randomized controlled trial. Annals of surgery. 2018 Apr;267(4):631.
18. Park HC, Kim MJ, Lee BH. Effect of a standardized protocol of antibiotic therapy on surgical site infection after laparoscopic surgery for complicated appendicitis. Surgical Infections. 2017 Aug 1;18(6):684-8.
19. Kolhar BA, Lamani YP, Shekhar RM, Shankar G. Outcomes of laparoscopic versus open appendectomy: a comparative study. International Surgery Journal. 2017 Jun 22;4(7):2185-8.
20. Salim M, Ahmed JU, Bhuyian NH, Rahman M, Alam M, Khan MA, Anwar MK. Comparative Study of Surgical Site Infection between Laparoscopic Appendectomy and Open Appendectomy. Medicine Today. 2017 Aug 31;29(1):6-11.
21. Jaschinski T, Mosch CG, Eikermann M, Neugebauer EA, Sauerland S. Laparoscopic versus open surgery for suspected appendicitis. Cochrane Database of Systematic Reviews. 2018(11).
22. Al-Kurd A, Mizrahi I, Siam B, Kupietzky A, Hiller N, Beglaibter N, Eid A, Mazeh H. Outcomes of interval appendectomy in comparison with appendectomy for acute appendicitis. Journal of Surgical Research. 2018 May 1;225:90-4.
23. Andert A, Alizai HP, Klink CD, Neitzke N, Fitzner C, Heidenhain C, Kroh A, Neumann UP, Binnebösel M. Risk factors for morbidity after appendectomy. Langenbeck's archives of surgery. 2017 Sep;402(6):987-93.
24. Agrawal SN, Meshram S, Dhruv K. Study of laparoscopic appendectomy: advantages, disadvantages and reasons for conversion of laparoscopic to open appendectomy. International Surgery Journal. 2017 Feb 25;4(3):993-7.
25. Yu MC, Feng YJ, Wang W, Fan W, Cheng HT, Xu J. Is laparoscopic appendectomy feasible for complicated appendicitis? A systematic review and meta-analysis. International Journal of Surgery. 2017 Apr 1;40:187-97.