

Surgical Site Infection in Open Versus Laparoscopic Appendectomy

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ABSTRACT

Objective: To compare the frequency of wound infection in open and laparoscopic appendectomy.

Materials and Methods: This randomized control trial study was conducted in the Department of Surgery, Jinnah Hospital, Lahore from 4th April 2012 to 4th October, 2012. Two hundred patients of appendicitis were admitted through emergency department. Patients were randomly allocated to two groups; group LA (laparoscopic appendectomy) and group OA (open appendectomy). Both groups underwent appendectomy under general anesthesia. Wound was inspected on 1st, 2nd and 3rd postoperative day followed by wound inspection on 7th and 14th postoperative day and scored according to Wound Asepsis Score. Total score was then calculated and SSI was classified accordingly.

Results: This study includes a total of 200 patients of appendectomy. The mean age in laparoscopic appendectomy (LA) was 21.0±8.32 years and mean age in open appendectomy (OA) was 23.49±8.68 years. In group LA, 65 were males and 35 were females while in group OA, 46 were males and 54 were females. Male to female ratio in LA group was 1.9:1 while in group OA, it was 1:1.2. Ninety nine patients healed uneventfully and 1 patient had surgical site infection in group LA while in OA group, 90 patients healed uneventfully and 10 patients had surgical site infection.

Conclusion: Laparoscopic appendectomy is a better and safe option as compared to open appendectomy. It significantly reduces post operative complications like wound infection.

Key words: Laparoscopic appendectomy, Open appendectomy, Surgical site infection, Acute appendicitis

INTRODUCTION

Wound infections acquired in hospital are recognized to be associated with significant morbidity. Post-operative wound infection also called surgical site infection (SSI) delays recovery and results in extended length of hospital stay, pain, discomfort and sometimes prolonged or permanent disability.¹ Therefore its prevention and reduction is relevant to quality patient care.

According to CDC, SSI is infection occurring within 30 days of surgery (or within a year in the case of implants) and it is further split into superficial and deep incisional SSIs and organ-space SSIs.²

Approximately 20% to 30% of surgical site infections are caused by Staphylococcus aureus and over half of these arise from the endogenous flora. Skin is an important reservoir not only for Staphylococcus aureus but also for other organism implicated in postoperative infections.³ It can cause exogenous suppuration in wounds and implanted prosthesis. Strains resistant to antibiotics (e.g. methicillin resistant Staphylococcus aureus) can cause epidemics and more severe infection.⁴

Acute appendicitis is the most common surgical abdominal emergency occurring in 7-12% of the

general population with peak incidence between ages of 10-30 years and appendectomy is most frequently performed abdominal operation.⁵ For centuries, appendectomy has been performed by open method until 1983 when first laparoscopic appendectomy was performed.⁶ The advent of minimally invasive or laparoscopic techniques has replaced old open method but laparoscopic appendectomy has yet to achieve such popularity. Considerable benefits have been shown for laparoscopic appendectomy (LA) over open appendectomy (OA), as shorter hospital stay, less postoperative pain, earlier postoperative recovery, and lower wound infection.⁷ The risk of wound infection is variable in laparoscopic appendectomy compared to the open procedure.

As appendectomy is a clean-contaminated procedure, following surgery, the wound infection may occur in up to one quarter of patients with perforation and in one third of those who develop a periappendiceal abscess.⁸

In laparoscopic surgery, appendix is removed through a trocar, compared to open method in which appendix is removed through open wound, so it has theoretical advantage of less wound contamination and thus less chances of SSI. Surgical Site Infection (SSI) is a troublesome complication of surgery and can be associated with serious morbidities, mortalities and increased resource utilization. Decreasing the incidence of SSI is the main goal of study. New

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modalities and approaches like Laparoscopic surgery provide promising results in this respect.

Paucities of literature for laparoscopic surgery specifically for wound infection with quite variable results, prompted me to compare laparoscopic appendectomy to open appendectomy for postoperative SSI, so local recommendation for better technique with less wound infection can be evaluated.

MATERIAL AND METHODS

This study was conducted in the Department of Surgery, Jinnah Hospital, Lahore from 4th April 2012 to 4th October, 2012. 200 patients between 10 to 50 years of age of both sexes, diagnosed with acute appendicitis were included in the study. Diagnosis of acute appendicitis was confirmed by history, physical examination, complete blood picture, urinalysis and ultrasound of abdomen/pelvis. Patients with Alvarado score >5 were included in study. Patients with clinically un-established diagnosis of appendicitis, palpable mass in the right lower quadrant and in whom laparoscopic surgery is contraindicated were excluded from the study.

Patients were admitted through emergency department, written informed consent was taken and they were randomly allocated to two groups; group LA (laparoscopic appendectomy) and group OA (open appendectomy) with 100 patients in each group. All patients received a single dose of antibiotic preoperatively followed by two doses in post op period. In open appendectomy, an incision was given in the right iliac fossa and after opening the abdominal muscle layers, appendix was delivered out tying it at its base. Care was taken to avoid spilling purulent material from the appendix while being removed. The incision was then closed. In laparoscopic appendectomy, after creating pneumoperitoneum, three ports, two 5 mm and one 10 mm were inserted in the abdominal wall. Appendix was mobilized and tied off at its base and was withdrawn into the trocar and extracted from the abdomen through one of the ports.

Both groups underwent the allocated procedure under general anesthesia. All procedures were performed by consultant surgeons well experienced in the procedures to avoid bias. Wound was inspected on 1st, 2nd and 3rd postoperative day followed by wound inspection on 7th and 14th postoperative day and scored according to Wound Asepsis Score. Total score was then calculated and SSI was classified accordingly: Total score 0-20, No wound infection and Total score >20 Surgical site infection

All data was entered and analyzed using SPSS version 13. Mean and standard deviation was presented for age. Frequency and percentage was presented for gender and surgical site infection. For comparison of two proportions, Chi square test was

used, to compare the SSI in both groups. P value of ≤0.05 was considered statistically significant.

RESULTS

A total of 200 patients diagnosed with acute appendicitis were included in the study. The mean age in group laparoscopic appendectomy (LA) was 21.0±8.32 years and mean age in group open appendectomy (OA) was 23.49±8.68 years. The majority of patients were in the age range of 10-20 years, 63 (63%) patients in group LA and 49 (49%) patients in group OA (Table 1). In group LA, 65 (65%) were males and 35 (35%) were females while in group OA, 46 (46%) were males and 54 (54%) were females. Male to female ratio in LA group was 1.9:1 while in group OA was 1:1.2 (Table 2). In group LA, 99 (99%) patients healed satisfactorily and 1 patient had surgical site infection while in OA group, 90 (90%) patients healed satisfactorily and 10 (10%) patients developed surgical site infection. Statistically there is significant (P<0.05) difference between the two groups (Table 3).

Table 1: Distribution of patients by age

Age (Years)	Group LA (n = 100)		Group OA (n = 100)	
	No.	%	No.	%
10-20	63	63.0	49	49.0
21-30	26	26.0	34	34.0
31-40	7	7.0	13	13.0
41-50	4	4.0	4	4.0
Mean±SD	21.0±8.32		23.49±8.68	

Table 2: Distribution of patients by gender

Gender	Group LA (n = 100)		Group OA (n = 100)	
	No.	%	No.	%
Male	65	65.0	46	46.0
Female	35	35.0	54	54.0
Male to female ratio	1.9:1		1:1.2	

Table 3: Distribution of patients by surgical site infection

Surgical site infection	Group LA (n = 100)		Group OA (n = 100)	
	No.	%	No.	%
Yes	1	1.0	10	10.0
No	99	99.0	90	90.0

Key: $\chi^2 = 7.79$, df = 1, P = 0.05

DISCUSSION

For years appendectomy has been done by conventional open technique. The percentage of normal appendices removed in different series varies from 8% to 33%. Appendicitis is misdiagnosed in 33% of non-pregnant women of child bearing age but now laparoscopic technique is being considered better in many aspects.⁹

LA is superior to OA because the peritoneal cavity can be completely visualized. The high rate of

misdiagnosis in females may be due to gynaecological problems and the female functional abnormalities. So, in a patient with suspected appendicitis, LA improves the diagnostic accuracy and also avoids unnecessary appendectomy.¹⁰ Open appendectomy (OA) has remained the gold standard for the treatment of acute appendicitis for more than a century. Unlike laparoscopic cholecystectomy, LA is not regarded as "Gold standard".

An early diagnosis with prompt surgery is the preferred treatment option for preventing complications such as perforation, that can lead to an increase in the morbidity. Minimal invasive surgery requires different skills and technical knowledge. So, the results of many studies were influenced by the experience and technique of the surgeons.¹¹

Recently laparoscopic surgery has gained wide acceptance for many types of procedures, such as cholecystectomy because it offers the advantages of smaller wound, less pain and early return to normal activities. In 1981 Semm, a German gynaecologist performed the first LA. He described this technique in 1982 in a surgical conference. Since then various trials have shown that laparoscopic approach could be applied to most cases of appendicitis with high degree of success and low complication rate.

The risk of wound infection is less in laparoscopic appendectomy compared to the open procedure. Whatever surgical approach is chosen, preoperative intravenous antibiotics have been shown to decrease the postoperative rate of SSI.¹²

A meta-analysis of randomized controlled trials has been reported with outcomes of 2877 patients included in 28 trials. Overall complication rates were comparable, but wound infections were definitely reduced after laparoscopy (2.3% to 6.1%).¹³ Khan et al¹⁴ also reported that surgical site infection is 1.2% in LA and 9.2% in OA. Similarly Yagnik¹⁵ also reported significantly lower SSI rate in laparoscopic appendectomy as compared to open appendectomy (1.92% in LA vs 10.63% in OA). Whereas in the present study, the rate of wound infection in laparoscopic appendectomy is considerably significantly low as compared to open appendectomy (1% LA group vs 10% in OA group). The results are comparable with the previous studies. The age and gender distribution of disease is also comparable with other study results.

This study demonstrates that LA is a safe and effective treatment alternative for patients with acute appendicitis, and is recommended where laparoscopic expertise and equipment are available. The hospital costs of laparoscopic appendectomy are higher; however, laparoscopic appendectomy offers significant savings to patients due to quick recovery time and very low infection rate.

CONCLUSION

Laparoscopic appendectomy is a better surgical option for acute appendicitis as compared to open appendectomy with less post operative wound infection. It also offers the additional benefit of diagnostic laparoscopy when there is diagnostic uncertainty. There is no longer a concern for the learning curve in laparoscopic surgery as it is now integrated into resident training. The graduating surgeon is proficient in this procedure. Given the superiority of LA over OA, LA should be the procedure of choice in the surgical treatment of appendicitis.

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