

Comparative Evaluation of Surgical Site Infection after Laparoscopic Versus Open Appendectomy

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Abstract

Objective: to assess which of the two modalities (OA vs LA) is superior with regards to post-operative wound infection.

Material & Methods: This is a retrospective study that was conducted at surgical unit 1, Fatima Memorial hospital Lahore from June 2021 to May 2023. 140 patients were segregated in two groups; group 1 had laparoscopic appendectomy and group 2 who had open appendectomies. Primary post-operative outcome with regards to wound infection was recorded on 7th postoperative day in each group.

Results: Surgical site infection was documented in 3 (4%) patients in group 1 and 9 (13%) patients in group 2. Operation time was not found to be significant in both groups statistically ($p=0.342$). WBC count was found to be significant between both groups statistically ($p=0.003$). length of stay in hospital was also significant statistically ($p=0.001$).

Conclusion: Laparoscopic appendectomy seems superior to open appendectomy with regards to surgical site infection. Operation time is not a determinant factor for development of SSI. Pre-operative WBS count is an important predictive factor for development of SSI.

Keywords: Acute appendicitis, open and laparoscopic appendectomy, surgical site infection

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Introduction

Acute appendicitis continues to be the most prevalent cause of acute abdomen¹. Appendectomy remains the standard treatment for more than 120 years and now it is one of the most frequent operations in emergency². Early surgery eliminates risk of perforation and peritonitis which causing marked increase in morbidity and mortality. There are two types of appendectomies. Laparoscopic appendectomy (LA) and open appendectomy (OA). Open appendectomy is reported to have less operation duration but post-operative pain and wound related complications are more. However, laparoscopic appendectomy is associated with longer operation time but has less infection rate (26.67% in OA while 0% in LA),

reduced postoperative pain, early return to work, better cosmesis.³ Surgical site infection (SSI) is an alarming condition in surgery wards. It causes 20% of hospital acquired infections. There is a risk of 5% on any surgical procedure of developing SSI, mainly of superficial type. SSI cause not only increased morbidity and mortality but also longer stay in hospital with resultant increased financial burden.⁴ Data in this aspect is scanty in Pakistan. Moreover, earlier studies show no statistical difference in wound infection frequency in both groups (3% in LA vs 9% in OA).⁵

Material & Methods

This is a prospective study that was conducted at surgical unit 1, Fatima Memorial hospital Lahore from June 2021 to May 2023 with permission from IRB No FMH-16/08/2023IRB-1279. All the patients having appendectomies were considered for inclusion for the research. A quasi-experimental study was designed and purposive sampling technique was opted. Patients with

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uncontrolled chronic medical conditions (CLD, IHD, DM, HTN, COPD) and those not fit for surgery or having appendicular mass or abscess were conferred for exclusion in this research. These patients were segregated in two groups; i.e., Group 1 had laparoscopic appendectomy (LA) and group 2 who had open appendectomies (OA). Preoperative preparation (keeping Nil per oral, single dose of 3rd generation cephalosporin) and postoperative protocol (analgesia, 3rd generation cephalosporin, IV fluids) were standardized in both groups. Primary post-operative outcome with regards to wound infection was recorded on 7th postoperative day in each group in a structured proforma. SSI was defined using CDC criteria.

Data Analysis was done using SPSS version 21.0. All the numerical was reported as mean along with standard deviation. All the qualitative data was tabulated as frequency and percentage. Statistical significance was calculated using Chi square test. A p value of significance was set to be ≤ 0.05 .

Results

A total of 140 patients fulfilling inclusion criteria were incorporated in our research who had appendectomy done. These patients were segregated in two groups; group 1 patients had laparoscopic appendectomy while group 2 patients had open appendectomy. Table 1 shows the age, gender & BMI in both groups. Surgical site infection was documented in 3 (4%) patients in group 1 and 9 (13%) patients in group 2. Table 2 summarise these results and statistical significance. These results clearly show that group 2(OA) had more cases of SSI reported than group 1 (LA) as clearly evident by statistical difference ($p=0.001$). So laparoscopic appendectomy is hereby proven superior to open appendectomy with regards to surgical site infection rate. These results show that none of the above parameters contribute to SSI occurrence except preoperative WBC count more in group 2 (OA) than in group 1 (LA) showing significant statistical difference ($p=0.001$). furthermore, resultant stay in hospital is also prolonged in group 2 than in group 1 ($p=0.001$)

Table 1: Demographic characteristics among study groups

Parameter	Group 1 N=75	Group 2 N=65
Age in years	35±4.73	33±6.84
Male: Female ratio	43:32	36:29
BMI (kg/m ²)	29.5±3.78	31.02±4.11

Table 2: SSI reported in both groups with percentage

	Group 1	Group 2	Total
SSI	3 (4%)	9 (13%)	12
Non-SSI	72 (96%)	56 (87%)	128
Total	75	65	140

P value=0.001

Table 3: The statistical significance of different factors with respect to SSI

Parameter	Group 1	Group 2	P value
Age (years)	35±4.73	33±6.84	0.616
BMI (kg/m ²)	29.5±3.78	31.02±4.11	0.431
Pre-operative WBC count (/mm ³)	11.3±3.66	15.4±2.55	0.001
Duration of surgery (minutes)	40±10.30	35±7.25	0.342
Stay in hospital (Days)	4±2.5	6±2.75	0.001

Discussion

In our study, a total of 12 (8.5%) patients had SSI as a whole. If we compare our results with literature available, there is a range of supportive and contradictive articles on prevalence of SSI. In one study, Koumu et al. reported a prevalence of 7.2%.⁶ Among European literature, Petrosillo et al reported 5.2% cases of SSI while Aranda-Narvaez showed it to be 13.4%.^{7,8} A local study has showed an SSI prevalence of 2.7% in laparoscopic appendectomy and 13.4% in open appendectomy wounds⁹. These findings are in accordance with our finding of 4% and 13 % in both groups; i.e., laparoscopic and open appendectomy. Some studies have reported SSI rate to be 0% in laparoscopic appendectomy¹⁰. However, this is attributed to two factors. First is smaller sample size of the studies, secondly the seasonal & cultural variations between national & international population sample as former group are indifferent to their health condition along with financial burden. Some studies have identified certain risk factors like length of incision > 7cm, faecal contamination and operative time > 75 minutes having strong association with SSI¹¹. Some other studies also demonstrated duration of surgery to be associated with SSI^{12,13}. Our study contradict these findings as p value of 0.342 was found to be insignificant with regards to operation time. This fact is attributed to highly skilled surgeons with advanced gadgetry that help us to rule out duration of surgery not associated with SSI. There has been a considerable debate on role of preoperative WBC count in developing SSI comprising of both supportive & contradictory reports. Eitezaz et al reported no association between preoperative WBC count & SSI in a study of patients

undergoing cardiac surgery.¹⁴ Other authors reported strong association between the two.¹⁵ We also concur these reports. This leucocytosis is caused by pre-existing infection that predispose to wound infection. Other factors like malnutrition or immunosuppression contribute to increased risk of SSI. So, a high preoperative WBC count can be used to predict or detect SSI on 7th postoperative day.¹⁶ Similar results have been showed by Aktz et al.¹⁷

Conclusion

Laparoscopic appendectomy seems superior to open appendectomy with regards to surgical site infection. Operation time is not a determinant factor for development of SSI. Pre-operative WBS count is an important predictive factor for development of SSI.

Conflict of interest *None*

Funding Source *None*

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Authors Contribution

JS: Conceptualization of Project

SB, MK: Data Collection

AM: Literature Search

IS: Statistical Analysis

JKL: Drafting, Revision

JKL: Writing of Manuscript