Original Article

Comparison of rate of surgical wound infection, length of hospital stay and patient convenience in complicated appendicitis between primary closure and delayed primary closure

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Abstract

Objective: To compare the difference in the rate of surgical wound infection, patient's convenience and length of hospital stay between Primary Closure and Delayed Primary Closure in cases of complicated appendicitis in adults.

Methods: This randomised control trial was conducted at the Combined Military Hospital, Kharian and Malir from June 5, 2006, to September 10, 2009. Patients ≥ 15 years of both gender who underwent appendectomy through grid iron or Lanz incision and having complicated appendicitis were included. The 100 patients who were included in the study out of the initial size of 393, were randomised into two equal groups of 50 each (Group A: Primary Closure; Group B: Delayed Primary Closure) using a computer-generated table. All the surgeries were done by the same surgeon and the operative steps and antibiotic coverage were standardised. The rate of surgical wound infection, patient's convenience (on visual analogue scale in mm) and the length of hospital stay were recorded. Data was analysed using SPSS version 11, and p value was calculated.

Results: Demographic data, comorbids and medication of both the groups was comparable. There was no significant difference in rate of surgical wound infection ($p > 0.05$). The difference in patient's convenience and length of hospital stay were significant ($p < 0.05$), showing superiority of Primary Closure over Delayed Primary Closure with no added morbidity/mortality.

Conclusion: Primary Closure in complicated appendicitis not only reduces the cost of treatment, but is also more convenient and satisfying for the patients, with no added risk of surgical wound infection.

Keywords: Appendicitis, Primary closure, Delayed primary closure (JPMA 62: 596; 2012).

Introduction

Appendectomy is still one of the most commonly performed emergency surgical procedures worldwide. Despite the use of antibiotics and peri-operative care, post-operative surgical wound infection (SWI) remains the most common post-operative complication.[1] Delayed Primary Closure (DPC) had been advocated for most of appendectomy wounds, especially in cases of complicated appendicitis.[2,3] Primary Closure (PC) has been in use by many surgeons for both simple and complicated appendicitis and has more or less developed as a consensus in paediatric cases.[4-6]

Although PC for complicated appendicitis in adults has been advocated recently to reduce morbidity and cost (mainly due to the daily change of dressing and hospital care),[7-9] yet it has to gain the status of a consensus because of previous perception of increased rate of SWI in cases of PC as compared to DPC in cases of complicated appendicitis.[3]

In this study we compared the rate of SWI after appendectomy in complicated appendicitis, the length of stay (LOS) in the hospital (indirectly depicting the cost of treatment) and patient's convenience on 100 mm Visual Analogue Scale (VAS).

Methods

The randomised control, multi-centre trial was done at CMH, Kharian, and CMH, Malir, from 5th June, 2006 to 10th September 2009. All the surgeries were done by the same surgeon (posted first at CMH Kharian and then at CMH, Malir). Inclusion criteria involved patients of both genders, older than 15 years undergoing appendectomy through grid iron or Lanz incision and having per-operative findings of complicated appendicitis (grossly inflamed, gangrenous or perforated appendix). Patients undergoing incidental appendectomies, having per-operative findings of normal appendix, appendicular mass or any other pathology with or without appendicitis were excluded. After taking informed consent, a detailed proforma regarding comorbids and any

other medication was filled. All the surgeries were done under general anaesthesia by the same surgeon through a standardised technique. Special emphasis was taken to minimise wound contamination. Appendectomy was performed in the conventional manner and the appendicular stump was not invaginated in any of the cases. Muscles were approximated with interrupted 2/0 chromic. External oblique was closed by continuous suture using chromic 2/0. The wound was thoroughly cleansed with normal saline only. Dressing was not changed till the removal of the stitches i.e. 7th post-operative day except in patients who reported with localised pain, soakage of dressing or any discharge from the wound. In patients undergoing DPC, daily dressing was changed and in case of the presence of infection it was changed twice daily when required, till the closure of the wound. Wound was closed after refreshing the edges after 3-5 days or once the infection was settled in cases of infected wounds. Injectable antibiotics, including 1.2 gram of Ampicillin + Clavulinic acid twice daily, Gentamicin 80 mg thrice daily and Metronidazole 500 mg thrice daily, were given to each patient starting from the time of admission till discharge. Patients' convenience was recorded regarding the management, especially inconvenience and pain experienced during the change of dressing, and their satisfaction at the time of discharge using the visual analogue scale of 100mm with 00 for maximum inconvenience and 100 for complete satisfaction. Those who reported for wound infection after PC, their scores were taken after complete wound healing and secondary closure of the wound. Total duration of hospital stay was also noted. All the patients undergoing appendectomies were initially included in the study. The aim was to have 50 patients each of PC and DPC. Keeping in mind a ratio of 1:5 of complicated appendicitis, 500 patients were randomised using a computer generated table and the target of 100 patients (50 in each group) was achieved after 393 patients, out of which 293 patients were dropped from the study as they were not having complicated appendicitis.

The data was analysed using SPSS version 11.0. Frequency (percentage) was computed for measurement variables, and mean ± standard deviation was computed for categorical variables. The p value was calculated by applying independent t-test for SWI, LOS and patients' convenience.

Results

The mean age of the patients in Group A (Primary Closure) was 35.3 ± 14.55 years, and 31.38 ± 11.07 years in Group B (Delayed Primary Closure). The male patients were 27(54%) in Group A, and 42(84%) in Group B, whereas the female patients were 23(46%) and 8(16%) in the two groups respectively (Table-1). Of the total, 13 patients, 10 in Group A and 3 in Group B, had diabetes mellitus though all of them had well-controlled blood sugar levels in the peri-operative period; 5 patients, all in Group A, had chronic hepatitis B/C with 3 of them having deranged Alanine Luriuotransferase (ALT), 3 patients (1 in Group A and 2 in Group B) had systemic infection, pneumonia and gross urinary tract infection, and were already on systemic indoor therapy at the time of appendectomy. Besides, a 61-year-old female was malnourished as depicted by her weight and albuminglobulin ratio, at the time of surgery but had smooth uncomplicated recovery. One patient in Group A and 2 in Group B were taking oral steroids for bronchial asthma pre-operatively, but none had SWI. Only 1 patient undergoing PC had to be re-admitted on the 5th post-operative day due to gross wound infection without any systemic signs. He was also subjected to local wound management only. The difference

Table-1: Demographics, duration of symptoms and duration of surgery (n=100)

S No	Variable	Group A	Group B	Total
1	Age*	35.3 ±14.55	31.38± 11.07	33.34 ±13.01
2	Male**	27(54)	42(84)	69 (69)
3	Female**	23(46)	8(16)	31 (31)
4	Duration of symptoms+	2.80 ± 1.11	2.76 ± 1.17	
5	Duration of surgery ++	35.98 ± 12.48	34.32 ± 12.01	

* Mean ± SD
** Frequency (Percentage)
+ In days
++ In minutes.

Table-2: Comparison of SWI, LOS and patient's convenience (n=100).

Variable	Group A (primary closure)	Group B (delayed primary closure)	p value*
SWI (percentage)	5 (10)	4 (8)	0.699
LOS (in days) **	2.30 ± 0.51	3.94 ± 0.84	< 0.05
Convenience (in mm) **	76 ± 24.85	23.70 ± 10.54	< 0.05

*p value < 0.05 is taken as significant. **Mean ± SD.
SWI: Surgical Wound Infection. LOS: Length of Stay.

between the two groups in terms of LOS and VAS were found to be significant (Table-2).

Discussion

One of the most common surgical causes of abdominal pain leading to surgical intervention is acute appendicitis. Although morbidity and mortality have decreased to a great extent due to advances in the peri-operative care, yet keeping in view the incidence of appendicitis, this low rate of surgical wound infection still accounts for significant morbidity and consumes a major part of health budgets.[10]

This study was conducted firstly to prove that there is no significant difference in the rate of SWI between PC and DPC, in complicated appendicitis, and secondly, the cost of overall treatment comes down with PC without any additional risk of morbidity/mortality.

Male-to-female ratio as well as age group of appendicitis in the study were comparable with other studies.[12] Rate of SWI was 10% (5 patients) and 8% (4 patients) in Group A and B respectively. These were also comparable to previous studies.[9,11,12] None of the patients having SWI in both the groups required systemic therapy. All the 5 patients having SWI after PC were managed as outdoor cases with daily change of dressings. It was quite evident from these results that the patients undergoing DPC were over-treated, causing not only wastage of hospital resources, but also adding inconvenience to the patients.

The study had also taken into consideration the convenience of the patient, which was represented on 100 mm VAS. On literature search, no study was found to be comparing/measuring this point in case of acute appendicitis. In our study there was a significant difference in patients' convenience in the two groups. The main factor behind this was the daily change of dressing that was quite troublesome for the patient. At times, it was painful. The length of stay was also prolonged in DPC cases which also added to the inconvenience factor.

Last, but the most important variable, was the length of hospital stay which we took as the indirect predictor of the cost of overall treatment. The difference of LOS between both the groups was significant and this became extremely important once the incidence of appendicitis was taken into consideration. Approximately 400,000 appendectomies are done annually in Pakistan.[12] Out of which 20-30% fall in the category of complicated appendicitis,[13] resulting in an average of 100000 appendectomies being performed for complicated appendicitis. So the patient hospital year which can be saved by following PC in all such cases can reach up to 160,000 per year.

A number of foreign studies using more advanced statistical softwares and taking advantage of their better documentation and cost management have also been in the favour of PC.[8,14,15]

Although multiple other factors including concomitant disease leading to immunocompromised state and use of any other medication were also recorded and no significant difference in the two groups was found, but as this was not our primary objective so another study is required to assess any association of these factors with the SWI rate.

Conclusion

Primary Closure in case of complicated appendicitis not only reduces the cost of treatment significantly, but is also more convenient and satisfying for the patient, with no added risk of Surgical Wound Infection.

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