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A Comparative Study of Early Versus Delayed Emergency Open Appendectomy

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Abstract

Background: The timing of operation for acute appendicitis is still a matter of controversy. This study aims to compare the outcomes between early and delayed emergency appendectomy and assess the feasibility of delayed operation.

Methods: Patients who underwent emergency appendectomy at Victoria Hospital, Bengaluru between July 2015 and June 2016 were reviewed retrospectively. Outcome measures were clinical findings, white blood cell (WBC) count at the time of presentation, duration of surgery, intra-operative findings, complication rate, surgical site infection (SSI) rate, length of hospital stay and re-admission rates.

Results: A total of 178 patients underwent emergency open appendectomies out of which 156 patients were included. Patients were divided into two groups based on time from onset of first symptom to incision: 73(46.7%) in group A and 83(53.2%) in group B. There were no significant differences in age, sex ratio and comorbidities between the two groups. However there was significant difference in WBC count and differential neutrophil count with Group A showing higher leukocytosis and neutrophilia. Group A showed higher intra-operative complication 32(43.83%) when compared to Group B 35(42.16%) p=0.013. There were no significant differences in wound infection, length of postoperative hospital stay and readmission rate between two groups.

Conclusions: This study reveals that delayed appendectomy is safe and feasible in adults, not worsening the intra-operative or post-operative complications. The surgeon can decide the appropriate timing of appendectomy based on the available hospital resources and perform the surgery in a semi-elective manner.

Keywords: Appendicitis; Appendectomy; Emergency.

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Introduction

Appendicitis remains one of the commonest intra-abdominal emergencies requiring surgical intervention [1]. Emergency appendectomy at the time of diagnosis has been the time honoured mode for treatment of acute appendicitis during last century, fearing any delay in surgery could progress to perforated appendicitis or appendicular abscess [1, 2].The recent studies suggest that acute appendicitis could be managed in a semi-elective manner after initiating antibiotic therapy, or delaying surgery did not show any increasing morbidity[3-9]. However, there are other studies showing increased complication rates with delaying of appendectomy [10-16]. The timing of surgery for acute appendicitis is still a controversy and hence this study was taken up. This study aims to compare pre-operative, intra-operative and post-operative findings and complications among early and delayed appendectomies.

Materials and Methods

This study was a retrospective, observational study

conducted at Victoria hospital, Bengaluru. The medical records of patients with acute appendicitis who underwent emergency open appendectomy between July 1, 2015 and June 30, 2016, were included in the study and retrospectively reviewed. The exclusion criteria were (1) patients below 16 years or over 65 years, (2) patients who underwent interval, incidental and negative appendectomies, (4) those who underwent other surgical procedures along with appendectomy(4) patients with severe medical diseases/ co-morbidities, (5) pregnant women.

The data was collected from the case files in medical records section. From the data collected the patients were divided into two groups: Group A, those with a time of onset of first symptom to incision less than or equal to 24 hours and Group B, those with a time of onset of first symptom to incision more than 24 hours. The following parameters were included: patient demographics, duration from onset of symptoms, clinical findings, pre-operative investigations, intra-operative findings, intra-operative complications, duration of surgery, postoperative complications, length ofhospital stay and readmission within 30 days of surgery. The data from both groups were compared.

Demographicsand clinical characteristics were expressed asmeans for continuous variables or proportions for categoricalvariables. The chi-square test was used to comparedifferences in categorical variables. Student's t testor the Wilcoxon rank sum test was used to compare differencesin continuous variables. The p value of less than 0.05 was considered statistically significant.

Results

A total of 178 patients underwent emergency open appendectomies from July 2015 to June 2016.Out of these 22 patients were excluded. 156patients were included who met inclusion criteria. Demographics and clinical data of all the cases are tabulated in Table 1. The mean age of patients was 30.6 years. There were 106 males (67.9%) and 50 females (32.1%). The average time from onset of first symptom to incision was 48.9 hours. Patients were divided into two groups based on time from onset of first symptom to incision: 73(46.7%) in group A and 83(53.2%) in group B. Comparison of demographics and preoperative characteristics between two groups are shown in Table 2. There were no significant differences in age, sex ratio and comorbidities between the two groups. However there was significant difference in WBC count and differential neutrophil count with Group A showing higher leukocytosis and neutrophilia. Group A had mean WBC count of $12.5X10^3$±2.4 while Group B had mean WBC count of $9.6X10^3$±2.8 ($p<0.001$), Group A had mean differential neutrophil count of 76.3±10.1 while Group B had 68.1±7.3 ($p<0.0001$). There was significant difference in time parameter (onset of first symptom to incision) due to study design. Comparison of intra-operative difficulties/complications between two groups are

Table 1: Demographic and clinical data

Total number of cases	156
Age	30.6±12.5
Male: Female	99(63.46%): 57(36.53%)
Co-morbidities	25(16.02%)
Initial white blood cell (WBC) count ($X10^3$cells/mm^3)	11.6±2.6
Initial neutrophil count (%)	70.89±10.31
Initial lymphocyte count (%)	19.05±8.2
Time from onset of earliest symptom to incision (hours)	48.9±1.6
Intra-operative complication/ difficulty	67(42.9%)
Post-operative complications	5(3.2%)
Number of days of hospital stay	5.2±1.1
Number of re-admissions within 30 days	2

Table 2: Comparison of demographics and preoperative characteristics between the two groups

	Group A	Group B	P value
Total number of cases	73	83	
Age	30.6±11.6	30.1±12.8	0.27236
Male: Female	41:32	58:25	0.07589
Co-morbidities	12	13	0.12075
Initial white blood cell (WBC) count ($X10^3$cells/mm^3)	12.5±2.4	9.6±2.8	<0.001
Initial neutrophil count (%)	76.3±10.1	68.1±7.3	<0.0001
Initial lymphocyte count (%)	18.1±8.1	22.1±8.2	<0.0001
Time from onset of earliest symptom to incision (hours)	14.66±4.8	57.1±12.3	<0.0001

Table 3: Comparison of intra-operative characteristics between the two groups

	Group A	Group B	P value
Intra-operative complication/ difficulty	32(43.83%)	35(42.16%)	0.013292
Adhesions	21(28.76%)	22(26.5%)	0.00162
Gangrenous appendix	7(9.58%)	9(10.84%)	0.01015
Perforated appendix	4(5.47%)	4(4.81%)	<0.0001
Duration of surgery	53.7 ± 22.9	56.5 ± 22.3	0.21232

Table 4: Comparison of postoperative outcomes between the two groups

	Group A	Group B	P value
Post-operative complications	2(2.73%)	3(3.61%)	0.36131
Wound infection	2(2.73%)	3(3.61%)	0.36131
Number of days of hospital stay	5.2±1.2	5.2±1.1	0.27236
Number of re-admissions within 30 days	1	1	1

shown in Table 3. Group A showed higher intra-operative complication 32(43.83%) when compared to Group B 35(42.16%) p=0.013. Comparisons of postoperative outcomes between two groups are shown in Table 4. There were no significant differencesin wound infection, length of postoperative hospitalstay and readmission rate between twogroups.

Discussion

Appendectomy isone among of the commonest emergencysurgical procedure performed by surgeons [10, 11]. Controversies regarding the timing of operation in patients needed operation still exist.Recently, more and more evidence has shown a conservative attitude toward urgent but not emergency surgery for acute appendicitis [3]. Some studies stillsupported that the outcomes of immediate or prompt appendectomy were better than those of delayed appendectomy [12-16]. They advocated that delayed appendectomyproduced more postoperative complicationsuch as surgical site infection. On the other hand, somestudies suggested that there was no significant differenceof outcomes between early and delayed appendectomy [17, 18]. In addition, several studies showednegative impact of prolonged working hours for residentsor sleep deprivation on clinical performance and cognitiveabilities [21, 22].

In this study, the demographic and clinical parameters were similar in both groups. Pre-operative clinical parameters were also similar except for Group A showing more leukocytosis and neutrophilia compared to Group B. The intra-operative complications were slightly more in Group A compared to Group B, showing that delaying appendectomy did not increase the intra-operative complications. Operative time too was similar in both groups. Post-operative characteristics showed almost no difference in post-operative outcomes between the two groups.

The present study has few limitations. Firstly, it is a retrospective observational study. Secondly, although we have taken the time duration of onset of first symptom to incision, which is better than taking time duration from arrival at hospital or diagnosis to incision (as used in several studies), the duration of symptoms is subjective to the patient and exact onset of the pathology is difficult to elucidate. Although a prospective-design studymay reduce the shortcomings of this study, our study did not find that delayedappendectomy had a negative impact on patients.

Conclusion

We still consider that acute appendicitis is a surgical emergency. This study reveals that delayedappendectomy is safe and feasible in adults, not worsening the intra-operative or post-operative complications. We would like to conclude that the surgeon can decide the appropriate timing of appendectomy based on the available hospital resources and perform the surgery in a semi-elective manner.

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