

## To compare and contrast different surgical procedures in treatment of complicated appendicitis in the adult population, at a tertiary care hospital in Karachi, Pakistan

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### Abstract

**Object:** The aim of our study is to compare and contrast primary closure and delayed primary closure in terms of its complications, post operative pain (patient satisfaction), and length of hospital stay in patients with complicated appendicitis at a tertiary care hospital in Karachi Pakistan.

**Method:** The type of study is a randomized control trial conducted for a period of 2 years from April 2014 to April 2016, at a large tertiary care centre in Karachi Pakistan. The patient population consisted of all the patients of complicated appendicitis (as observed during the surgical procedure) who presented to us via emergency or outpatient department. All the patients underwent the appendectomy via the Lanz incision of grid iron incision. The patient demographics including age, marital status, gender, co morbid conditions, symptoms etc were taken in a pre designed proforma. The surgical procedure was performed under general anesthesia, using a standard surgical technique of appendectomy giving special attention to minimal wound contamination, and making sure that the appendicular stump is not invaginated. Patient satisfaction was also recorded for all the patients on a scale from 0 to 100. Data was analyzed using SPSS version 23.

**Results:** The patient population consisted of 120 patients (after calculating for a ratio of 1:5 cases of appendicitis to be complicated, and the total number of appendicitis patients initially was 400, of which 120 were selected, the rest were excluded as they did not have complicated appendicitis), divided into two groups using a random number generator, group P consisted of 60 patients who underwent primary closure for complicated appendicitis and group D consisted 60 patients who underwent delayed primary closure. The mean ages, gender distribution and other demographic variables were found to be similar in both the groups. Statistically significant differences were found between the length of hospital stay (lower of primary closure group) and patient satisfaction (higher in primary closure group) in the two groups. While no statistically significant difference was found when it comes to surgical wound infections in the two groups.

**Conclusion:** According to the results of our study we conclude that complicated appendicitis treated with primary closure procedure is superior when compared with delayed primary closure, in terms of cost effectiveness and higher patient satisfaction with no significant increase in morbidity.

**Keywords:** Acute appendicitis, primary closure, complication appendicitis, delayed primary closure, surgical wound infection, patient satisfaction.

### Introduction:

Appendicitis is defined as a condition of inflammation and damage to the vermiform appendix. It is one of the most common causes of acute abdomen presentation in the emergency depart-

ments. Its incidence is from 1.5-1.9 per 100,000 with an increased incidence in the male population. Appendectomy is one of the most commonly performed surgical procedures around the globe. Among the complications of the pro-

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cedure post operative wound infection is among the top, despite the advances in methods of sterile surgeries and appropriate administration of intra pre and post operative antibiotics.<sup>1</sup> In cases of complicated acute appendicitis delayed primary closure has been the cause for most appendectomy wound.<sup>2,3</sup> While on the other hand primary closure is a method that is preferred widely among the surgeons as method of choice for pediatric population for both simple and complicated appendicitis.<sup>4,5,6</sup> But recently several surgeons have been advocating primary closure for adults too, in light of the decreased morbidity, mortality and cost of the procedure.<sup>7,8,9</sup> But its use has faced some criticism among the surgical community in light of a perceived increased wound infection in primary closure as compared to delayed primary closure especially in cases of complicated appendicitis.<sup>3</sup> Hence the aim of our study is to compare primary closure and delayed primary closure in cases of complicated appendicitis, so as to make a definitive comparison in the adult population, and determine the differences when it comes to complication, length of hospital stay, surgical wound infection and post-operative pain (patient satisfaction) along with other characteristics.

#### **Materials and methods:**

The type of study is a randomized control trial conducted for a period of 2 years from April 2014 to April 2016, at a large tertiary care centre in Karachi Pakistan. The patient population consisted of all the patients of complicated appendicitis (as observed during the surgical procedure) who presented to us via emergency or outpatient department. The inclusion criteria was all the patients above 16 years of age, who gave full informed consent for the surgical procedure and also the participation in the study, and underwent appendectomy at our setup. The patients of appendicitis were enrolled in the study upon finding that their case of appendicitis is a complication one as observed during the surgery by observing a grossly inflamed, perforation of gangrenous appendix. All the patients underwent the appendectomy via the Lanz incision or grid iron incision. Patients who have

per operative findings of a normal appendix, appendicular mass or any other pathology other than complicated appendicitis were excluded in the study, along with all the underage and non consenting patients. The patient demographics including age, marital status, gender, co morbid conditions, symptoms etc were taken in a pre designed proforma. The surgical procedure was performed under general anesthesia, using a standard surgical technique of appendectomy giving special attention to minimal wound contamination, and making sure that the appendicular stump is not invaginated. The approximation of the abdominal musculature was done with interrupted chromic sutures 2/0. The surgical wound site was cleaned with normal saline alone. Patients dressing was changed on the 7th post-operative day, unless otherwise a need for its changing arose (soaked dressing, discharge, pain). In delayed primary closure group, the dressing was changed daily or twice daily as per need, until wound closure. In this group the wound was typically closed after a period of 3 to 5 days or as the infection subsided. Each patient received injectable antibiotics as 500mg Metronidazole thrice daily, 80mg Gentamicin thrice daily and 1.2gram of Ampicillin/Clavulanic acid twice daily, from admission to discharge from the unit. Patient satisfaction was also recorded for all the patients on a scale from 0 to 100, where 0 is completely unsatisfied and 100 is completely satisfied, the various parameters that were asked to measure on the satisfaction scale were inconvenience, anxiety and pain experienced during dressing. Data was analyzed using SPSS version 23, frequency and percentages along with mean and standard deviations were calculated as per data required. Independent t test was utilized to analyze the differences in the groups regarding the surgical wound infection, length of hospital stay and the patient satisfaction. A p-value of less than 0.05 was considered to be statistically significant.

#### **Results:**

The patient population consisted of 120 patients (after calculating for a ratio of 1:5 cases of appendicitis to be complicated, and the total num-

Table 1: Characteristics of patients belonging to the two groups

Characteristic	Group P, n=60	Group D, n=60	Total, n=120	P value
Age in years	35.2 ± 14.45	31.40 ± 11.03	33.34 ± 12.99	
Gender				
Male	32 (53.33%)	50 (83.33%)	82 (68.33%)	
Female	28 (46.66%)	10 (16.66%)	38 (31.66%)	
Time duration of symptoms in days	2.79 ± 1.09	2.76 ± 1.15		
Time duration of procedure in minutes	36.01 ± 12.45	34.33 ± 12.05		
Wound infection	6 (10%)	5 (8.33%)		0.699
Length of hospital stay	2.29±0.52	3.95±0.85		<0.05
Patient Satisfaction	76.02±24.84	23.71±10.49		<0.05
<b>Co morbid conditions</b>				
Diabetes mellitus	12 (20%)	4 (6.66%)	16 (13.33%)	
Chronic Hepatitis	3 (5%)	1 (6%)	4 (3.33%)	
Oral corticosteroid use	1 (6%)	3 (5%)	4 (3.33%)	
Systemic infection (UTI, pneumonia)	2 (3.33%)	3 (5%)	5 (4.16%)	

ber of appendicitis patients initially was 400, of which 120 were selected, the rest were excluded as they did not have complicated appendicitis), divided into two groups using a random number generator, group P consisted of 60 patients who underwent primary closure for complicated appendicitis and group D consisted 60 patients who underwent delayed primary closure. The mean ages, gender distribution and other demographic variables are listed in table-1. 16 patients had diabetes mellitus (12 in group P and 4 patients in group D, the blood sugar levels were well controlled at the time of the procedure) 5 patients had some sort of systemic infection, urinary tract infection and pneumonia, and were being treated accordingly at our facility (2 in group P, 3 in group D). 4 patients (1 in group P and 3 in group D) were taking oral corticosteroids in lieu of asthma, but none of them suffered from Surgical wound infections. 1 patient in group P had gross wound infection with signs of sepsis and was treated accordingly. For other variables see Table 1.

#### Discussion:

In a developing country like Pakistan and also worldwide one of the most common surgical procedure performed is appendectomy,

for acute appendicitis. Recent advances have decreased the morbidity and mortality of this surgical emergency, due to the betterment of the peri operative care, but despite measures by surgeons surgical infection during the procedure accounts for significant morbidity, and increases the cost for the patient and delays the discharge from the hospital.<sup>10</sup> In our study we found that there is no statistically and clinically significant difference when primary closure and delayed primary closure are compared of complicated appendicitis is compared in terms of the surgical wound infections. Also it is much more economically feasible to perform primary closure without compromising the morbidity and mortality of the patient. The demographics of the patient population in our study was comparable to the statistics around the globe.<sup>12</sup> We found the surgical wound infections to be at a rate of 10% (PC group) and 8.33% (DC group) which are similar to other similar studies done around the globe.<sup>9,11,12</sup> The patients who had surgical wound infection in the primary closure group were treated by daily washing of the wound and change of dressings, very effectively. Hence suggesting that the daily change of dressing and washing that is done in all the patients of delayed primary closure is an additional unnecessary cost and use of resources, and also causing inconvenience to the patients. Such unnecessary burden to the hospital and the economy should be reduced and avoided when possible, especially for a third world country like Pakistan, where there is already a dearth of resources. In our study we also studied the patient's satisfaction and convenience using a visual analog scale, and found a statistically significant difference in the two groups. The patient satisfaction being higher in the primary closure group, and lower in the delayed primary closure group, for the fact that daily dressings and cleaning of the wound, was troublesome and painful to the patients, combined with the increased anxiety and duration of stay in the hospital acted to increase the factor of patient inconvenience. There was also a statistically significant difference when it comes to the length of hospital stay, which is directly related to the cost of treatment as a whole. This

statistically significant difference in the length of hospital stay becomes clinically significant when the incidence of appendicitis is taken into consideration. In Pakistan four hundred thousand appendectomies are done per annum, of which 20 to 30% are cases of complicated appendicitis.<sup>12,13</sup> Resulting in an average of one hundred thousand complicated appendicitis operated in this part of the world, and if primary closure is done in all patients about 160,000 patient hospital hours can be saved, thus relieving the already choked up health system of Pakistan. Various other studies also report the same effectiveness of cost management by following the primary closure procedure.<sup>8,14,15</sup> Thus it is recommended that primary closure be made the procedure of choice unless otherwise contraindicated.

#### Conclusion:

According to the results of our study we conclude that complicated appendicitis treated with primary closure procedure is superior when compared with delayed primary closure, in terms of cost effectiveness and higher patient satisfaction with no significant increase in morbidity.

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#### Role and contribution of authors:

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