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EARLY VS DELAYED CLOSURE IN GANGRENOUS PERFORATED APPENDICITIS: A COMPARISON OF WOUND INFECTION INCIDENCE.

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ABSTRACT

BACKGROUND: The preferred method of treatment for gangrenous or perforated appendicitis is an open appendectomy. Perforated appendicitis is associated with a 15–20% risk of developing post-operative wound infection, which increases the risk of morbidity by increasing post-operative pain, longer hospital stays, suppurative wounds, patient's dissatisfaction and increase treatment costs. **OBJECTIVE:** To assess the risk of wound infection following gangrenous/perforated appendicitis between primary and delayed primary closure. **MATERIAL & METHODS:** From January to December 2020, this prospective comparative study was carried out in the General Surgery Department of the Hayatabad Medical Complex Peshawar. The research comprised 120 adult patients who had appendectomy for gangrenous/perforated appendicitis. Two groups of 60 patients each were formed. Primary wound closure was carried out in Group-A & delayed primary wound closure in Group-B. The primary outcome measure was the rate of wound infection in the two groups. At P0.05, statistical significance was deemed to exist. **RESULTS:** Total 120 Patients were included in the study. Out of 120 patients, 75(62.5%) were males and 45(37.5%) were females. Male patients were 41(68.3%) in Group A, and 39(65%) in Group B, whereas the female patients were 19(31.7%) in group A and 21(35%) in group B respectively**.** Age ranged between 15-60 years. There were no significant differences between both groups regarding gender and age distribution. **CONCLUSION:** Primary wound closure in gangreneous/perforated appendicitis is convenient and satisfying, and it also lowers treatment costs without increasing the risk of surgical wound infection.

KEY WORDS: Wound infection, Primary closure, delayed primary closure, perforated appendicitis.

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INTRODUCTION

The most prevalent cause of "acute abdomen" in young people is acute appendicitis, and the most common urgent abdominal procedure is an appendectomy. It is usually the first major surgery a trainee surgeon performs.[1] The most frequent post-operative complication is wound infection, which increases treatment costs overall, lengthens hospitalization and leads in poor cosmetic

outcomes. Less than 10% of patients with simple appendicitis have wound infections, but increases to more than 40% in cases of perforated or gangrenous appendix.[2,3]

An important risk factor that affects postoperative wound infection is the type of wound closure. In cases of acute appendicitis, the wound is generally closed during surgery in layers that include subcutaneous tissue and skin. Different views exist on the appropriate method of wound closure in cases of gangrenous/perforated appendix.[4,5]

Wounds associated to perforated/gangrenous appendicitis have long been used to treat with delayed primary closure to reduce the risk of infection at the surgical site. In this instance, closure is carried out after the appearance of a healthy wound, often 3 to 7 days following surgery.[6] It may cause more pain, a longer hospital stay, and more hospital expenses.

Recent research suggests that primary wound closure following an appendectomy for severe appendicitis does not enhance the risk of wound infection.[7,8]

This study was designed to compare the rate of wound infection in primary and delayed primary wound closure after an appendectomy for a gangrenous or perforated appendix.

MATERIAL & METHODS

After receiving approval from the institution review board, this prospective study was carried out in the General Surgery Department of the Hayatabad Medical Complex Peshawar from January to December 2020. Patients with perforated or gangrenous appendices of either sex between the ages of 15 and 60 years were included in the study. A thorough history and examination were performed. Patients were informed of the procedure's details and their permission was acquired. In the emergency operating room, patients were operated for appendicitis (open appendectomy). Patients who had cancer or were pregnant were excluded from the study. Depending on the primary and delayed primary wound closure, patients were split equally into two groups i.e. A and B.

Vicryl 2/0 was used to close the peritoneum in group A following appendicectomy. The wound was cleaned with 500ml of normal saline after the peritoneum was closed. Vicryl 2/0 interrupted sutures were used to close the muscles, and vicryl 1 continuous sutures to close the external oblique aponeurosis. Vicryl 2/0 was used to approximate subcutaneous fat when necessary, and prolene 2/0 interrupted sutures were predominantly used to close the skin.

In group B, the skin was left open, and the wound was cleaned and stitched as in primary closure. Pyodine-soaked gauze was used to pack the wound. Both groups' wounds were checked daily in ward and patients were discharged on the third post-operative day. According to body weight, antibiotics (cefotaxime and metronidazole) were given to all patients for seven days (3 intravenous doses and then oral antibiotics). On days 5, 7, 14 and 30 postoperatively the patients were observed in OPD. Depending on the state of wound, patients in group B underwent skin closure (delayed primary closure) using prolene 2/0 under local anaesthetic on days 5 or 7. In group A stitches were removed seven days after surgery and on the seventh day after application of stitches in group B.

If pus is coming out of the incision site, the wound is considered infected. The consultant surgeon noticed a wound infection and information was entered into a Performa.

Using SPSS 25.0, every statistical analysis was done. For numerical data, the mean, Standard Deviation (SD), and range were used; for categorical data, number and percentage were used. The Chi-square test (x2) and Fisher Exact Test (FET), when necessary, were used to compare proportions across the various study groups. Statistical significance was considered at $P<0.05$.

RESULTS

Total 120 Patients were included in the study. Out of 120 patients, 75 (62.5%) were males and 45(37.5%) were females. Male patients were 41(68.3%) in Group A, and 39(65%) in Group B, whereas the female patients were 19(31.7%) in group A and 21(35%) in group B respectively **(Table-i).** Age ranged between 15-60 years. There were no significant differences between both groups regarding gender and age distribution.

Gender	Frequency	Percentage
Male	75	62.5%
Female	45	37.5%
Group A		
Male	41	68.3%
Female	19	31.7%
Group B		
Male	39	65%
Female	21	35%

Overall wound infection was noted in 19(15.8%) patients, amongst which

9(7.5%) were noted in Group A while 10(8.3%) were noted in group B (P value 0.99). These differences were statistically non-significant. (Table 2)

None of the patients in both groups needs re admission or re-opening. Overall no mortality was noted amongst both groups.

Table 2: Comparison of wound infection (n=19)

Wound infection	Group A		Group B		P-value
	f	%	f	%	
Yes	9	7.5%	10	8.3%	0.99
No	51	42.5 %	50	41.7 %	

DISCUSSION

The most frequent cause of "acute abdomen" in young people is acute appendicitis and the most frequent post-operative complication is wound infection, which is more likely to occur in cases with gangrenous and perforated appendicitis.[9,10] There is continuous discussion over whether the wound should be treated with primary closure or delayed primary closure in cases of complicated appendicitis. Hepburn was the first to report delayed primary closure of polluted and filthy wounds during World War 1 in 1919 and this method quickly rose to the status of standard of care for decades.[11]

The primary cause of a post-operative wound infection is bacterial contamination of the wound during surgery. Despite the fact that contaminated wounds have a greater chance of wound infection, perioperative antibiotic treatment enables primary closure of all appendectomy wounds.

In a 2014 analysis of perforated appendiceal wounds, Yousaf J et al found that the wound infection rate was 9% for delayed closure and 20% for primary closure.[12] These results, however, were made prior to the usage of antibiotics. In a research of Bahar MM et al who including 400 patients compared the wound infection rates for uncomplicated appendicitis (50 %) and gangrenous or perforated wounds (50%).[13] Both groups had primary wound closure, 15(3.7%) patients had wound infections, including 6 with simple and 9 with gangrenous or perforated appendicitis, which were not statistically significant. They came to the conclusion that there is no difference in the wound infection rate between the groups with uncomplicated and gangrenous or perforated appendicitis.

Our research was done to prove that in cases of complicated appendicitis there is no appreciable difference in the rate of wound infection between primary closure and delayed primary closure. The majority of the patients in our research were men (62.5%). Nineteen (15.8%) patients in total had wound infections. Infection rates for wounds were 9(7.5)% in group A after primary closure and 10(8.3%) in group B after delayed primary closure, which is not statistically significant (p=0.99). Additionally, neither group A nor B's patients with wound infections nor those without had any appreciable variations in gender or age.

In a recent randomised controlled trial by Khizar IK et al, patients were randomly assigned to PC and DPC groups, respectively.[14] Compared to delayed primary closure, the rate of wound infection was increased in the primary closure (10%) then of (8%), however these results were not statistically significant which were in comparison to ours. Postoperative pain, hospitalisation duration, recovery times and quality of life did not differ significantly between the two groups. However, primary closure expenses were less than DPC.

A previous research by Meka M. et al. used a sample size comparable to our investigation. They came to the conclusion that in perforated appendicitis, the risk of wound infection is lower during primary wound closure as opposed to delayed primary closure.[15] Nevertheless, there are several new studies that support postponing the primary wound closure in perforated appendicitis. According to these research delayed closure of the wound had a lower rate of wound infection than primary wound closure.[16,17]

The method of wound closure in complex appendicitis affects the cost of treatment, which is another important element. Numerous overseas studies that detailed the expense of treating complicated appendicitis have also favoured primary closure.[18,19]

Given the prevalence of acute appendicitis and the frequency of appendicectomies, primary wound closure is cost-effectiveness and lower the strain on medical resources.[20]

CONCLUSION

In contrast to the conventional delayed primary closure in gangrenous/perforated appendicitis, we determined that primary closure of wound following appendicectomy with adequate saline wash of the abdomen and drain placement is safe and may be performed without increasing

risk of wound infection.

ETHICS APPROVAL: The ERC gave ethical review approval.

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin.

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CONFLICT OF INTEREST: No competing interest declared.

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