ORIGINAL ARTICLE

Comparison between Polydioxanone and Polypropylene Sutures for Incisional Hernia during Midline Incisional Laprotomy Procedure among Pakistani patients

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ABSTRACT

Background: Midline incisional laprotomy is a very common surgical procedure adopted during general surgeries. Material employed for wound closure has a strong effect on the post-surgical outcomes including complications.
Aim: To determine the superior suture material for abdominal wall closure after surgery among polydioxanone and polypropylene based on the post-operative length of hospital stay and development of incisional hernia.
Study design: It was a randomized controlled trial.
Methodology: All patients underwent midline incisional laparotomy for both emergency and elective surgical procedures. In current study sample size calculated was 188. group-A (n=94) and group-B (n=94). In group-A, incisional wound was closed by polydioxanone suture whereas in group-B, incisional wound was closed by polypropylene suture. The two groups were compared for superior suture material in terms of post-operative complication and hospital stay. All the data was processed by using SPSS v23.0.
Results: The mean± SD age (years) of patients in group-A was 45.8 ± 14.6 and in group-B was 47.8 ± 12.6 with *p*-value of 0.157 which is statistically insignificant. There was significant difference between groups with *p*-value <0.05 in terms of hospital stay as well as development of incisional hernia.
Conclusion: We concluded that development of incisional hernia and length of hospital stay post-operatively due to wound closure was considerably reduced in the polydioxanone group.
Key words: Midline incisional laprotomy, Incisional hernia, Polydioxanone and Polypropylene.

INTRODUCTION

The most common procedure in general surgery is midline incisional laprotomy. Material employed for wound closure has a strong effect on the post-surgical outcomes including complications. Closing of wound incisions is commonly done by either absorbable (Polydioxanone) or non-absorbable (Polypropylene) sutures. Generally, hemostasis is secured by using ties and sutures although it is time consuming.[1,2]

Complications related with its wound closure due to different sutures used today include post-operative pain, wound infection, incisional harnias, scar formation and burst abdomen. They are the major causes of deaths among surgically treated patients in our setups as well as globally. Most common complication of abdominal surgical procedure is the development of incisional hernia with a documented incidence of 3-13% of patients following laparotomy[3].

Few studies estimated the number of laprotomies with development of incisional hernias worldwide. It has been reported that in the US, 4-5 million laparotomies are done per year. Around 4-5 lac midline abdominal laprotomies end up in development of incisional hernia in US, of which approximately 200,000 repairs are performed.(4) In another study, it was reported that 1 lac laparotomies end up in incisional hernia repairs (3900) annually among Dutchs[5]. In a year, more than 124,000 laparotomies were performed and 7000 incisional hernia repairs were done among Britishers as reported by literature review[6]. Thus approximately 4% patients having laparotomy require additional surgery to repair an incisional hernia. Incisional hernia repair adds not only morbidity but also the tremendous costs to the patients. There is no best, safe and established technique for closing the midline abdominal wound after laparotomy generally without the development of post-operative complications[7]

Effective preventive treatment options for reducing the development of incisional hernia post operatively is the need of hour due to huge work load of midline incisional laparotomies in our tertiary healthcare setups.(8,9) In our country, due to the lack of registered data for deaths due to its complications, this health issue remained undiscovered. In the light of this increasing burden, we planned the current study to determine the superior suture material for abdominal wall closure after surgery among polydioxanone and polypropylene based on the post-operative length of hospital stay and development of incisional hernia.

METHODOLOGY

A sample of 188 patients (94 per group) was required to have a 90% power of study to detect the difference between both groups in the current study from October 2019 to March 2020 in the Department of General Surgery, Allama Iqbal Memorial Teaching Hospital, Sialkot. The study design was randomized controlled trial**.** Only patients fulfilling the inclusion criteria i.e acute as well as chronic abdominal pain, both genders (16-70years) were enrolled

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throughout project following approval from hospital's ethical committee. Written informed consent was taken from all the patients. In group-A, incisional wound was closed by polydioxanone suture whereas in group-B, was done by polypropylene suture respectively. The two groups were compared for superior suture material in terms of post-operative complication and hospital stay.(10)

Statistical Analysis: All the data was processed by using SPSS v23.0. Frequency and percentages were given for age groups, gender and type of operation. Chi square was used to determine the association of postoperative development of incisional hernia with sutures among two groups. Independent sample t test was used to compare the mean age and hospital stay between both groups. A p-value ≤ 0.05 was considered significant.

RESULTS

Patients (n=188) were equally distributed in two groups i.e. group-A (polydioxanone suture) and group-B (polypropylene suture). Gender distribution shown below (table-1).

The age and length of hospital stay post-operatively of all the enrolled patients (n=188) throughout the current study was summarized as mean ± SD in table-2.

Chi square test was used to compare the incisional hernia between both groups. Results showed that 29 (30.9%) patients in Group-A developed incisional hernia whereas 48 (51.1%) patients in Group-B had incisional hernia (table-3). This difference was statistically significant with p value of 0.005.

Independent sample t test was used to compare the mean age and hospital stay between both groups. Results showed that there was no difference in mean age whereas the mean length of hospital stay was significantly higher in the Group-B as compared to Group-A with significant p value (table-4).

Table-1: Comparison of gender, type of operation and age groups distribution between groups

Genders	Group-A (n=94)	Group-B (n=94)	Total (n=188)
Males	52(55.30%)	49(51.13%)	101 (53.70%)
Females	42(44.70%)	45(47.90%)	87 (46.30%)
Elective	66(70.2%)	64(8.1%)	130 (69.1%)
Emergency	28 (29.8%)	30(31.9%)	58 (30.9%)
16-50 years	44(46.8%)	46(48.9%)	90 (47.90%)
51-70 years	50(53.2%)	48 (51.1%)	98 (52.10%)

Table 2: Age and length of hospital stay post-operatively of enrolled patients (n=188)

Variables	Mean	SD
Age (years)	45.8	± 14.6
Length of hospital stay (days)	4.47	± 2.2

Table-3: Development of incisional hernia between Group-A and Group-B

Incisional Hernia	Group-A (n=94)	Group-B (n=94)	p-value
Yes	29 (30.9%)	48(51.1%)	0.005*
No	65(69.1%)	46(48.9%)	

*statistically significant

Table 4: Comparison of patient's characteristics between Group-A and Group-B

Variable	Categories	Group-A (n=94)	Group-B (n=94)	p-value
Age (in year)	Mean ± SD	45.8 ± 14.6	47.8 ± 12.6	0.157
Length of hospital stay (days)	Mean ± SD	4.5 ± 2.2	5.6 ± 1.7	0.014*

*statistically significant

DISCUSSION

Through this study, an attempt was made to study the development of post-operative incisional hernia as well as hospital stay (days) among enrolled patients (n=188) undergoing midline incisional laparotomies due to difference in material used among groups. This study suggested that there is a significant improvement in outcomes in group treated with polydioxanone.

Method of enrollment was adopted in this research with some modifications as was adopted previously in one research (10). Patients fullfilling the inclusion criteria were admitted from October 2019 to March 2020 in the Department of General Surgery, Allama Iqbal Memorial Teaching Hospital, Sialkot to volunteer in current study. An informed written consent at the time of enrollmentm was taken from all the subjects. For traceability Identifiable codes were given to them.

In our current project, sample size was 188 patients when compared with other study where sample size practiced was 200 patients undergoing both elective as well as emergency surgical procedures.(10) In contrast, one study carried in 2017 at Federal Government Services Hospital, Islamabad included 620 patients for midline incisional laprotomies in their study[11].

In our study, both male and female patients were voluntarily enrolled. Males were 101 (53.70%) while females were 87 (46.30%) in present project. In other study, patients for midline incisional laprotomies included 333 (53.7%) men and 287(46.3%) females. Males dominated in both studies. Hence, our work was in line with previous studies[11].

Same methodology was followed but with minor modifications in our project as documented in one previous study. Patients were divided randomly into group-A and group-B. The patients in group-A (n=94), the patients received polydioxanone suture; in group-B (n=94), polypropylene suture was employed for the wound closure[10] Hence, our work was in line with previous studies.

In this study, among 94 enrolled patients per group, 29(30.9%) patients in group-A developed incisional hernia whereas 48 (51.1%) patients in group-B had incisional hernia with p value of 0.005. Our results were in line with one previous study that showed that none of the enrolled patients developed incisional hernia when treated with polydioxanone suture whereas 2 patients developed it when treated with polypropylene suture in their study.(10) Paradoxically, one study showed that 54 patients had incisional hernias in polypropylene treated group than 76 cases reported in polydioxanone group among their enrolled patients[12]

In this study, among 94 enrolled patients per group, the mean length of hospital stay (days) was significantly higher for patients in the group-B as compared to group-A with significant p value of 0.014. Our results were in line with one previous study that showed similar results.(8)

CONCLUSION

We concluded that development of incisional hernia and length of hospital stay post-operatively due to wound closure was considerably reduced in the polydioxanone group in comparison to polypropylene group.

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Limitations: We admit that our study had a number of limitations. It included small sample size, single trial centre and financial constrains with lack of resources.

Strengths: Comparison was made between absorbable (Polydioxanone) and non-absorbable (Polypropylene) sutures in-order to see the better outcomes in terms of complication due to difference in material used among groups.No similar study is available for comparison among our population.

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