ORIGINAL ARTICLE

Comparison of Use of Polypropylene with Polydioxanon E for Closure of Midline Abdominal Incisions

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ABSTRACT

Aim: To compare the outcome of use of polypropylene with polydioxanone for closure of midline abdominal incisions.

Methods: This randomized control trial was carried out in the Department of surgery, D.H.Q teaching hospital and ghazi khan medical college for the period 1year from 15 December 2014 to 15 December 2015. A total of 250 patients divided in two equal groups were included in the study.

Results: In this study, out of 250 cases (125 in each group), 43(34.4%) in Group-A and 48(38.4%) in Group-B were between 12-30 years of age while 82(65.6%) in Group-A and 77(61.6%) in Group-B were between 31-60 years of age, mean±sd was calculated as 39.50±13.01 and 39.45±13.74 years respectively, 72(57.6%) in Group-A and 68(54.4%) in Group-B were male while 53(42.4%) in Group-A and 57(45.6%) in Group-B were females. Suture sinus was recorded as 24(19.2%) in Group-A and 4(3.2%) in Group-B, p value was calculated as 0.000 which shows a significant difference. Wound infection was recorded as 34(27.2%) in Group-A and 19(15.2%) in Group-B, p value was calculated as 0.03 which shows a significant difference.

Conclusion: We concluded that the outcome of Polydiaxanone is significantly better than polypropylene for closure of midline abdominal incisions in terms of less wound infection and suture sinus.

Keywords: Midline abdominal incisions, closure, polypropylene**.**

INTRODUCTION

Whether inflicted by chance or sustained during a surgical procedure, every wound is simply a disruption of the normal continuity of tissue. The rate at which wounds regain strength during the wound healing process must be understood as a basis for selecting the most appropriate wound closure material[1]. In patients undergoing midline incisions, the abdominal fascia can be closed with various suturing materials to comprise resources that include synthetic sutures, staples, tapes, and adhesive compounds[2].

General classification of sutures includes natural and synthetics, absorbable and non absorbable, monofilament and multifilament. Polydioxanone (PDS) is monofilament synthetic absorbable suture. Approximately 70% of its original strength remains two weeks after implantation. After four weeks post-implantation, approximately 50% of its original strength is retained, and at six weeks, approximately 25% of the original strength is retained. Data obtained from implantation studies in rats show that the absorption of these sutures is minimal until about the 90th post- implantation day. Absorption is completed within six months. Polypropylene (prolene) suture is a non absorbable, monofilament suture that retains its tensile strength in vivo long term[1].

For all wound closures, the dilemma arises that the foreign material, namely, the suture used to close the wound, constitutes a substantive risk factor for the development of wound infections[3]. Suture materials might serve as a vehicle for mechanical transport of bacteria into the surgical wound[4]. Poor wound healing, the development of infection and formation of sinus in incisional wounds continue to be among the most common complications of open abdominal surgery[5].

In a study suture sinus with polypropylene was 16% and with polydioxanone it was 2% while recurrent wound infection with polypropylene suture was 24%[1] and with polydioxanone was 11.9%[3].

Locally we use polypropylene suture for closure of midline abdominal incision but in this study appliance of polydioxanone may prevent complications due to its absorbable quality. The outcome of this study in form of wound infection and suture sinus may provide a reliable background data and create awareness among the surgeons for the use of better suture for closure of midline abdominal incisions.

MATERIAL AND METHODS

This randomized control trial was conducted in the Department of Surgery, DHQ Teaching Hospital and

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Ghazi Khan Medical College D.G.KHAN over a period of 1 year from December 2014 to November 2015. A total of 250 cases (125 in each group), patient's age ranges from 12-60 years of both gender and patients undergoing laparotomy by vertical midline abdominal incision, divided in two equal groups were included in the study.

RESULTS

Gender distribution of the patients was done which showed that 72(57.6%) in group A and 68(54.4%) in group B were males while 53(42.4%) in Group A and 57(45.6%) in Group B were females. Suture sinus was recorded as 24(19.2%) in Group-A and 4(3.2%) in Group-B while remaining 101(80.8%) in Group-A and 121(96.8%) in Group-B had no suture sinus, p value was calculated as 0.000 which shows a significant difference. Wound infection was recorded as 34(27.2%) in Group-A and 19 (15.2%) in Group-B while remaining 91(72.8%) in Group-A and 106(84.8%) in Group-B had no wound infection, statistically the difference was significant (P<0.05).

The age distribution showed that 43(34.4%) in Group-A and 48(38.4%) in Group-B were between 12-30 years of age while 82 (65.6%) in Group-A and 77(61.6%) were between 31-60 years of age, mean±sd was calculated as 39.50±13.01 and 39.45±13.74 years respectively (Table 1).

When the suture sinus was stratified with respect to age which showed that 9 cases in Group-A and 1 case in Group-B were between 12-30 years of age, p value was calculated as 0.00 while 15 cases in Group-A and 3 cases of Group-B were between 31-60 years of age, p value was calculated as 0.004 (Table 2).

Stratification for suture sinus in the two groups with regards to gender was done which shows that 11 cases in Group-A and 2 cases in Group-B were male (Table 3).

Stratification for wound infection in the two groups with regards to gender was done which shows that 13 cases in Group-A and 7 cases in Group-B were between 12-30 years, p value was calculated as 0.07 while 21 cases in Group-A and 12 cases of Group-B were between 31-60 years, p value was calculated as 0.11 (Table 4).

Stratification for wound infection in the two groups with regards to gender was done which shows that 15 cases in Group-A and 9 cases in Group-B were male, p value was calculated as 0.23 while 19 cases in Group-A and 10 cases of Group-B were females, p value was calculated as 0.02 (Table 5).

Table 1: Age distribution (n=250)

Age (years)	Group-A (n=125)		Group-B (n=125)	
	No.	%age	No.	%age
12-30	43	34.4	48	38.4
31-60	82	65.6	77	61.6
Total	125	100.0	125	100.0
Mean ±SD	39.50±13.01		39.45±13.74	

Table-2: Stratification for suture sinus in the two groups with regards to age (n=150)

Age (years)	Suture line				P value
	Group A		Group B		
	Yes	No	Yes	No	
15- 30	9	12	1	47	0.00
31 - 60	15	67	3	74	0.004

Table 3: Stratification for suture sinus in the two groups with regards to gender (n=150)

Gender	Suture line				P value
	Group A		Group B		
	Yes	No	Yes	No	
Male	11	61	2	66	0.01
Female	13	40	2	55	0.00

Table-4: Stratification for wound infection in the two groups with regards to age(n=150)

Age (years)	Wound infection				P value
	Group A		Group B		
	Yes	No	Yes	No	
15 – 30	13	30	7	41	0.07
31 - 60	21	61	12	65	0.11

Table-5: Stratification for wound infection in the two groups with regards to gender (n=150)

Gender	Wound infection				P value
	Group A		Group B		
	Yes	No	Yes	No	
Male	15	57	9	59	0.23
Female	19	34	10	47	0.02

DISCUSSION

Both the techniques of abdominal closure, and the materials to be used, continue to excite debate. Like many others we employ interrupted mass closure, but the best suture material to use is debatable. Materials such as polyglycolic acid may be associated with a higher rate of late wound failure than non-absorbable materials such as Nylon, but the latter may cause wound pain and sinuses. Polydioxanone (PDS) is a synthetic monofilament which retains its strength for a considerable time but is eventually absorbed. This combination of properties might be of value for laparotomy closure and we have therefore compared PDS with polypropylene (Prolene) in this randomized trial.

In this study, out of 150 cases (125 in each group), 43(34.4%) in Group-A and 48(38.4%) in Group-B were between 12-30 years of age while 82(65.6%) in Group-A and 77(61.6%) were between 31-60 years of age, mean±sd was calculated as 39.50±13.01 and 39.45±13.74 years respectively, 72(57.6%) in Group-A and 68(54.4%) in Group-B were male while 53(42.4%) in Group-A and 57(45.6%) in Group-B were females. Suture sinus was recorded as 24(19.2%) in Group-A and 4(3.2%) in Group-B, p value was calculated as 0.000 which shows a significant difference. Wound infection was recorded as 34(27.2%) in Group-A and 19(15.2%) in Group-B, p value was calculated as 0.03 which shows a significant difference.

The findings of this study are in agreement with a study suture sinus with polypropylene was 16% and with polydioxanone it was 2% while recurrent wound infection with polypropylene suture was 24%[1] and with polydioxanone was 11.9%[3].

Cameron[6] studied the 284 patients undergoing laparotomy by vertical incision were randomly allocated to closure with interrupted mass sutures of No. 1 polydioxanone (PDS(R) or No. I polypropylene (Prolene(R). Dehiscence occurred in 0.7% of the PDS group but in 6.4% of the Prolene group (P=0.018). Wound infection occurred in 8.6% of the PDS group and 15.4% of the Prolene group (P=0. 1). One hundred and ninety patients attended for review a minimum of one year. Incisional herniation, usually asymptomatic, was present in 11% of each group. Knots were palpable in 2% of the PDS patients but in 12% of the Prolene: wound pain occurred in 12% of the PDS group but in 23% of the Prolene group (P=0.06). These results suggest that PDS may be useful for abdominal closure.

Taylor found that PDS was better than Nylon for a two layer continuous closure of midline wounds[7]. In a small series Leese and Ellis had no dehiscence with either PDS or Nylon. Similarly[8], Leaper el al reported no significant differences in the dehiscence rate when PDS or Nylon was used for continuous mass closure of midline and transverse incisions[9]. Our overall rate of infection was 11% which is similar to that in Lcaper's study, but we found less infection with PDS than Prolene.

In light of the results of the current study and other mentioned studies, the hypothesis of the study "Polydiaxanone is better than polypropylene for closure of midline abdominal incisions in terms of less wound infection and suture sinus" is justified.

Locally we use polypropylene suture for closure of midline abdominal incision but in this study appliance of polydioxanone prevented the complications due to its absorbable quality. The outcome of this study in form of wound infection and suture sinus has provided a reliable background data and evidence for awareness among the surgeons for the use of better suture for closure of midline abdominal incisions.

CONCLUSION

The outcome of polydiaxanone is significantly better than polypropylene for closure of midline abdominal incisions in terms of less wound infection and suture sinus.

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