

Comparison of Absorbable with non Absorbable sutures in closure of Laparotomy incisions

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Abstract:

Objective: To compare the absorbable with non absorbable sutures in wound dehiscence after closure of Laparotomy incisions. **Methodology:** This randomized control trial was conducted in the department of general surgery, Bahawal Victoria Hospital, Bahawalpur in seven months duration from June 2016 to January 2017. Data was entered in statistical software SPSS version 23 and analyzed for desired variable analysis. Mean and SD was calculated for numerical data like age and Body Mass Index, and frequency percentages were calculated categorical data like gender, Anemia etc. Chi square test was applied for effect modification or association of outcome variables with effect modifiers. P value < 0.05 was considered as significant. **Results:** In this study, a total number of 100% (n=130) patients were included, divided into two equal groups, 65 in each i.e. group Prolene and group Vicryl. In our study, wound dehiscence occurred in 6.2% (n=4) cases in whom Prolene was used whereas 21.5% (n=14) had wound dehiscence with the use of Vicryl suture. Vicryl was followed by significantly higher incidence of wound dehiscence than closure by Prolene ($\chi^2 = 6.448$ DF = 1, P value=0.011). **Conclusion:** Observation of our study concluded that non absorbable Prolene has better outcome and less wound dehiscence and other complication as compared to absorbable Vicryl suture. **Keywords:** Absorbable suture, non absorbable suture, wound dehiscence, laparotomy.

Introduction:

Wound dehiscence in post operative period is an undesirable condition with high risk complications which may lead to morbidity and mortality (1). From a long time surgeons are in continuous struggle to overcome postoperative complications relevant to wound closure with different methods and suturing materials (2). Many studies have been conducted on closing abdominal fascia with different Sutures used, but no definite suggestions were made for better outcomes (3).

Many factors should be kept in mind while choosing suture, like knot tying, handling of suture, cost effectiveness, strengthening and susceptibility (4, 5). Durability of tensile strength is also a factor and most important to be considered. Classification of available Sutures done on three categories; non Absorbable or permanent suture, slowly absorbable and third one is rapidly absorbable suture (6). Another criterion that surgeons mostly used to choose a suture is early and wound dehiscence. Prolene is a non absorbable clear blue colored suture made up of isotactic crystalline polypropylene used for soft tissue closure or ligation. It seems to be little less desirable for surgeons because of extra time on its removal and revisiting problems for patients (7).

Vicryl suture is world's best known absorbable suture due to its better handling easy to tie and smooth glide through fascia (8). Vicryl was supported by different trials and clinical studies but problem is still lying there that it does not support fascia more than 15 days which is required in some cases (9). Surgeons are still curious about suturing material which fully fills all necessities of post operative period. In 2012 Pandey S et al (10) conducted a study on this topic and found 6 % wound dehiscence in Prolene group and 17% in Vicryl group.

No local study available on this topic before we want to conduct this study in south Punjab, so that our study will be used as a local reference for research interest in this region.

Methodology:

This randomized control trial was conducted in the department of general surgery, Bahawal Victoria Hospital, Bahawalpur in seven months duration from June 2016 to January 2017. Study was started after ethical approval from hospital ethical board; consent was taken from patients after complete information and ensured about confidentiality. Sample size was calculated with WHO sample size calculator using following figures: CI 95%, Power of study 80% proportion of outcome variable (p1) wound dehiscence with Prolene 6% (10) patients and wound dehiscence with Vicryl (p2) was 17% (10). Patients with abdominal hernia, less than 18 years age and history of previous laparotomy were excluded from the study. All patients were divided into two groups by lottery method (group P and group V). In group P fascia were closed with Prolene and in group V fascia were closed with Vicryl. Clinical history was obtained for special risk factors of wound dehiscence like anemia, malnutrition, malignancy, diabetes and obesity. Investigations; complete blood count, urine examination, random blood sugar, renal parameters, Liver function tests, chest X ray ultrasound abdomen, CT scan, echocardiogram and serum electrolytes were done. Fascia was closed after surgery with same size suture (prolene 1.0 and vicryl 1.0) in both groups by using continuous suturing technique. Length of suture in both groups was constant 4:1 and preoperative and post operative management was same. Follow ups done for observation of infection at 3rd, 5th, 7th and 9th post operative days. Patients hospital stay, duration of surgery was noted on a pre design performance.

Collected data was entered in statistical software SPSS version 23 and analyzed for desired variable analysis. Mean and SD was calculated for numerical data like age and Body Mass Index, and frequency percentages were calculated for categorical data like gender, Anemia, smokers, Diabetes Mellitus Diagnosis, Intestinal perforation, intestinal obstruction, Hemoperitoneum, Blunt trauma abdomen, Mass abdomen, Gut gangrene, Obstructed umbilical hernia, Emergency cases, Elective cases, wound dehiscence. Chi square test was applied for effect modification or association of outcome variables with effect modifiers. P value < 0.05 was considered as significant.

Results:

In this study, a total number of 100% (n=130) patients were included, divided into two equal groups, 65 in each i.e. group Prolene and group Vicryl. The mean age and BMI of the patients of group Prolene was 52.67±1.7 years and 28.80±1.93kg/m² respectively while the mean age and BMI of the patients of group Vicryl was 56.95±1.94 years and 26.90±1.16 kg/m² respectively (table 1). It was observed that, in our study, wound dehiscence occurred in 6.2% (n=4) cases in whom Prolene was used whereas 21.5% (n=14) had wound

dehiscence with the use of Vicryl suture. Vicryl was followed by significantly higher incidence of wound dehiscence than closure by Prolene ($\chi^2 = 6.448$ DF = 1, P value=0.011) (table 2).

It was observed that there were 61.5% (n=40) males and 38.5% (n=25) females in group Prolene, 64.6% (n=42) males and 35.4% (n=23) females in group Vicryl. Anemia was noted as 7.7% (n=5) and 4.6% (n=3) in group Prolene and Vicryl respectively. There were 36.9% (n=24) and 27.7% (n=18) smokers in group Prolene and Vicryl respectively. Diabetes mellitus diagnosis noted as 13.8% (n=9) and 9.2% (n=6) in group Prolene and Vicryl respectively. Intestinal perforation noted as 53.8% (n=35) and 40% (n=26) in group Prolene and Vicryl respectively. Intestinal obstruction noted as 20% (n=13) and 24.6% (n=16) in group Prolene and Vicryl respectively. Hemoperitoneum was observed as 6.2% (n=4) and 10.8% (n=7) in group Prolene and Vicryl respectively. Blunt trauma abdomen noted as 12.3% (n=8) and 10.8% (n=7) in group Prolene and Vicryl respectively. Mass abdomen noted as 12.3% (n=8) and 9.2% (n=6) in group Prolene and Vicryl respectively. Gut gangrene noted as 3.1% (n=2) and 6.2% (n=4) in group Prolene and Vicryl respectively. Obstructed umbilical hernia Settings observed as 4.6% (n=3) and 3.1% (n=2) in group Prolene and Vicryl respectively. Elective noted as 24.6% (n=16) and 15.4% (n=10) in group Prolene and Vicryl respectively. Emergency observed as 83.1% (n=54) and 89.2% (n=58) in group Prolene and Vicryl respectively.

No association was found of wound dehiscence with age (p=0.128), gender (p=0.476), anaemia (p=0.909), BMI (p=0.531), smokers (p=0.324), diabetes mellitus diagnosis(p=0.463), intestinal perforation (p=0.213), intestinal obstruction (p=0.226), hemoperitoneum (p=0.178), blunt trauma abdomen (p=0.463), mass abdomen (p=0.960), gut gangrene(p=0.315), obstructed umbilical hernia settings (p=0.685), elective (p=0.800), and emergency (p=0.273), after applying the chi-square (table 1).

Table. 1

Baseline characteristics in randomized study of vertical laparotomy wound closure

Variable	Prolene (n=65)	Vicryl (n=65)	P-value
Age (years)	52.67±1.7 years	56.95±1.94 years	0.128
Sex (%)	M= 61.5% F= 38.5%	M=64.6% F= 35.4%	0.476
Anemia (%)	7.7%	4.6%	0.909
Body Mass Index (kg/m ²)	28.80±1.93 kg/m ²	26.90±1.16 kg/m ²	0.531
Smoker (%)	36.9%	27.7%	0.324
Diabetes Mellitus Diagnosis (%)	13.8%	9.2%	0.463
Intestinal perforation (%)	53.8%	40%	0.213
Intestinal obstruction (%)	20%	24.6%	0.226
Hemoperitoneum (%)	6.2%	10.8%	0.178
Blunt trauma abdomen (%)	12.3%	10.8%	0.463
Mass abdomen (%)	12.3%	9.2%	0.960
Gut gangrene (%)	3.1%	6.2%	0.315
Obstructed umbilical hernia settings (%)	4.6%	3.1%	0.685
Elective (%)	24.6%	15.4%	0.800
Emergency (%)	83.1%	89.2%	0.273

Table. 2
Association of Wound Dehiscence within Groups

Group	Wound Dehiscence		Total	P-value
	Yes	No		
Prolene	4	61	65	0.011*
Vicryl	14	51	65	
Total	18	112	130	
*P-value is statistically significant with Pearson $\chi^2 = 6.448$, d.f=1				

Discussion:

Midline laparotomy surgeries performed electively and their incision closure without any complication like wound dehiscence, post operative site infection and pain remains a challenge for surgeons worldwide after abdominal operations (11, 12). Minimum complications possibly reduce the morbidity and mortality rate (13). For the achievement of this purpose and optimal suture material and suturing technique is under debate from last ten to twenty years and still unresolved. Ideal suture material is the most important thing to resolve this issue (14).

Pandey S et al (10) conducted a study on this topic and reported that there is a markable difference in two groups when evaluated for wound dehiscence. Prolene group has 8% wound dehiscence and Vicryl group has 17% wound dehiscence. This ratio is higher than surgeon’s expectations, but it was concluded that Prolene is a better suture material for laparotomy incision closure as compared to Vicryl. These results are identical to our results, in our trial wound dehiscence in Prolene group was 4% and in Vicryl group it was 21.5%. Our study is also in accordance with studies conducted by Niggebrugge et al (15) Penninckx et al (16), and McGinn et al (17), reporting similar higher ratio of wound dehiscence in Vicryl group.

Chalya PL (18) reported in his study that to minimize the rate of complications like wound dehiscence, incisional hernia and wound pain continuous mass closure with vicryl seems to be the optimal method of fascial closure. These results are against our results and study is counter study for our report.

Anate M (19) conducted a study on this topic in 1991 to see the appearance of the wounds and formation of scar, hospital stay and concluded that outcome is better in absorbable (Vicryl) subcuticular group than in the non-absorbable (Prolene) group. This difference is significant in both groups when concern about scar formation and appearance of incision and most importantly hospital stay. In our study we didn’t evaluate these outcomes.

A similar study was conducted by Rahbari et al(20) and concluded that prolene was significantly associated with persistent wound pain as compared to vicryl.

In our study we also observe association of wound dehiscence with other risk factors and found there was no association wound dehiscence with age (p=0.128), gender (p=0.476), anaemia (p=0.909), BMI(p=0.531), smokers (p=0.324), diabetes mellitus diagnosis (p=0.463), intestinal perforation(p=0.213), intestinal obstruction(p=0.226), hemoperitoneum(p=0.178), blunt trauma abdomen(p=0.463),mass abdomen (p=0.960), gut gangrene (p=0.315), obstructed umbilical hernia settings (p=0.685), elective (p=0.800), and emergency (p=0.273), after applying the chi-square.

Conclusion: Observation of our study concluded that non absorbable Prolene has better outcome and less wound dehiscence and other complication as compared to absorbable Vicryl suture.

Authors contributions:

1. Conceived idea, design study, proof reading----- Dr Muhammad Jawad Ahmed
2. Data collection, Manuscript writing----- Dr Maryam Shahid
3. Data collection, literature review----- Dr Muhammad Hammad Ahmed
4. Data analysis, data collection----- Dr Bilal Naraz

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