

## Comparative study between delayed absorbable and non-absorbable sutures in cases of abdominal fascia closure for laparotomy

Nirav Mehta<sup>1\*</sup>, Asif Meman<sup>2</sup>, Harish Chauhan<sup>3</sup>

<sup>1</sup>resident, <sup>2</sup>senior resident, <sup>3</sup>additional professor, \*corresponding author

Surat Municipal Institute Of Medical Education And Research, Surat (SMIMER-SURAT)

### Abstract

For abdominal fascial closure various suture material and techniques has been used .the aim of this study was to compare the post operative wound complication by using mass closure technique with Polydioxanone and polypropylene suture. Patients admitted in department of surgery , SMIMER hospital, Surat were included in this study. Total 100 patients included 50 in each group. the patients were followed-up 01, 02 weeks and then one month after surgery. People around 36-45 years age group formed the maximum numbers in this study. Male to Female ratio was 1.94:1.there was two burst abdomen (out of 50 cases, 4%) in Polypropylene group and none (out of 25 cases) in Polydioxanone group. Incidence of wound infection was 12%( 6 out of 50 cases) in Polypropylene group compared to 6% ( 3 out of 50 cases) in Polydioxanone group.the relative risk of wound infection was 0.50.the complications like burst abdomen, wound infection and suture sinus. incidence of suture sinus was 12% (6 out of 50 cases) in Polypropylene group as compared to 4% (2 out of 50 cases) in Polydioxanone group. Infection rate was 12% (6 cases) in Polypropylene group and 6% (3 cases) in Polydioxanone group. Hence interrupted suture technique using No.1 Polydioxanone (PDS) for closure of midline laparotomy incision, is superior to no. 1 Polypropylene (PPL) suture material. Also PDS is superior in preventing major post-operative wound.

**Keywords:** Delayed absorbable sutures, Non-absorbable sutures, Abdominal fascia closure for laparotomy

Date of Submission: 20-09-2020

Date of Acceptance: 04-10-2020

### I. Introduction

every wound needs approximation either due to trauma or surgical intervention. Although the skill and technique of the surgeon is important, so is the choice of wound closure material [1,2]. Every surgeon's dream is to close the abdominal incisions securely, so as to prevent complications, such as wound infection, dehiscence, incisional hernia, suture sinuses[3]. Among all complications wound dehiscence is most common complications in emergency laparotomies. It carries mortality and morbidity as well as cost to the patients. So its prevention is important especially in Indian population where poor nutrition and delayed presentation is common. Incidence of dehiscence depends on suture techniques as well as suture material used. There are numerous studies has been conducted to evaluate the best techniques and choice of suture material[4]. A new interrupted X technique was introduced to circumvent the problem of cutting out effect of continuous sutures which showed reduced incidence of wound dehiscence [5] While the choice may not be so important in elective patients who are nutritionally adequate, do not have any risk factor for dehiscence and are well prepared for surgery, however it may prove crucial in emergency patients who often have multiple risk factors for developing dehiscence [6] and strangulation of sheath is the proverbial last straw in precipitating wound failure. A new suture material Polydioxanone (PDS) was introduced to reduce the morbidity and mortality rate of laparotomies by its newer properties. Polydioxanone (PDS) is monofilament. It absorbs slowly, approximately 70% remains at 2 weeks, approximately 50% remains at 4 weeks, approximately 14% remains at 8 weeks and there is minimal absorption until about 90 days[7]. Tensile strength of Polypropylene is Infinite (lasts>1 year)[7].

### II. Material and method

Study was conducted at department of surgery SMIMER hospital Surat between Jan 2019 to Jun 2020. Patients underwent both elective and emergency laparotomy with midline incision. Equal number of cases (50 each for PDS and PPL group) were studied for closure with these two suture materials; Polydioxanone (PDS)

and Polypropylene (PPL) suture material. The patients were followed-up 01, 02 weeks and then one month after surgery. Data was collected, based on post-operative wound complications including post-operative wound pain, wound infection, wound dehiscence, suture sinus formation, stitch granuloma and incisional hernia.

**Inclusion criteria –**

- Both male and female patients.
- Patients older than 14 years.
- Consent to participate in study.
- Study included both emergency and elective laparotomies.

**Exclusion criteria –**

- Frank purulent peritonitis.
- Any perforation of gut which was more than 12 hours old.
- Patients with raised intra-abdominal pressure, which required tension suture closure.
- Patients with Pre- or Post-operative diagnosis of malignant involvement of peritoneum.
- Patients in whom there was a pre-existing cause of raised intra-abdominal pressure.
- Ascites

Suture technique- in both groups interrupted X sutures mass closure technique is used for fascial closure.

- **Closure using Polydioxanone (PDS):** An Interrupted X sutures were performed using No.1 Polydioxanone (PDS II) suture. All layers of abdominal wall except skin and subcutaneous tissue were included in single layer. A bite was taken outside in 2cm from cut edge of linea alba. The needle emerged on other side from inside out diagonally 2cm from edge and 4cm above or below first bite. This strand was crossed or looped around free end of suture and continued outside-in diagonally at 90° to first diagonal. A bite is taken inside out and the end is tied with free end of suture just tight enough to approximate linea alba. This creates two 'X' like crosses one on surface and another deep to linea alba. Next X suture is placed 1 cm away from previous one [8-9]. Closure using Polypropylene (Prolene): Similar interrupted X sutures were performed using No.1 Polypropylene (prolene) suture.

**Age distribution –**

Age group	No of cases	
	PDS	PPL
14-25	4	10
26-35	8	8
36-45	16	12
46-55	10	2
56-65	2	12
66-75	8	4
76-85	2	2

**Sex distribution**

Sex ratio	No of cases	
	PDS	PPL
Male	30	20
female	36	14

**Case distribution according to Nature of surgery and type of suture material used –**

Nature of surgery	No of cases	
	PDS	PPL
elective	24	26
emergency	26	24

**Incidence of burst abdomen –**

Incidence of burst abdomen	No of cases	
	PDS	PPL
Elective	0	0
Emergency	0	2

**Wound infection in relation to nature of surgery and suture used --**

Wound infection	No of cases	
	PDS	PPL
Elective	0	2
Emergency	6	6

**Incidence of stitch abscess -**

Stitch abscess	No of cases
PDS	2
PPL	6

**III. Result**

100 cases of laparotomy closure of midline incisions were studied to compare the results of Polydioxanone (PDS II) and Polypropylene (Prolene) suture material. Equal number of cases (50 each) were randomly selected and divided in both the Polydioxanone (PDS II) and Polypropylene (Prolene) suture materials. Both elective and emergency cases were included in the study, out of which elective cases were 50 and emergency cases were 50. The male to female ratio was 1.94: 1 (table 2). Patients aged 36-45 years formed the maximum number of this study (table1). The early and late wound complications encountered in both the suture materials used were as follows. There were 2 cases of burst abdomen in the present study (table 4) which was done on an emergency basis in the Polypropylene (Prolene) and it was associated with wound infection. There was no case of burst abdomen in Polydioxanone (PDS II) group and p-value was 1.0. The use of Polydioxanone (PDS II) was better in emergency cases with no case of burst abdomen as compared to Polypropylene (Prolene) suture material technique with incidence of burst abdomen of 4.0%. The incidence of wound infection was higher in Polypropylene (Prolene) (12.0%) compared to Polydioxanone (PDS II) (06%). The use of Polydioxanone (PDS II) was better in emergency cases with low infection rate of 8% as compared to Polypropylene (Prolene) suture material with infection rate of 12% (graph 5). The incidence of suture sinus (graph 6) was 2 in 50 cases (4%) in Polydioxanone (PDS II) and 6 in Polypropylene (Prolene) sutures (12)

**IV. Conclusion**

Based on the observations made in this study, it has been concluded that interrupted x suture technique using no.1 Polydioxanone (PDS) for closure of midline laparotomy incision is superior to no.1 Polypropylene (PPL) suture material and PDS is , superior in preventing major post-operative wound complications like burst abdomen, wound infection and suture sinus.

**Reference**

- [1]. Orr JW, Orr PF, Barret JM. Continuous or interrupted fascialclosure: a prospective evaluation of no. 1 Maxon suture in 402 gynecologic procedures. Am J ObstetGynecol(1990; 163: 1485-89)
- [2]. Chana RS, Sexena YC, Agarwal A. A prospective study of closure technique of abdominal incisions in infants and children. J Indian Med Assoc (1980; 88:359-69)
- [3]. Carlson MA: Acute wound failure. SurgClin North Am (1997;77:607-636)
- [4]. Shukla HS, Kumar S, Misra MC, Naithani YP. Burst abdomen and suture material: a comparison of abdominal wound closure with monofilament nylon and chromic catgut. Indian J surg (1981 ;43:487-91)
- [5]. SrivastavaA,RoyS,ShayaKB,KumarA,ChumbarS,etal.Preventionofburstabdominal wound by a new technique: A randomized trial comparing continuous versus interruptedXsutures.IndJSurg(2004;66:19-27)
- [6]. Niggebrugge AH, HansenBE, Trimbos JB, Van de Velde CJ, Zwaveling A, Mechanical Factors influencing the incidence of burst abdomen. Eur J SurgI (995;161:655-61)
- [7]. Russel RCG, Norman SW, Christopher JKB. Basic surgical skills and anastomoses. In: Bailey and love's Short practice of surgery. zs" ed. London: Arnold Hodder: (2008: P- 237-8)
- [8]. NiggebruggeAHP,TrimbosJB,HermansJ,KnippenbergB,VeldeCJHVD.Continuous double loop closure: a new technique forrepair of laparotomy wound. BrJSurg (1997 ;84:258-61)
- [9]. Israelsson LA, Jonsson T. Suture length to wound length ratio and healing of midlinelaparotomy incisions. Br J of Surg (1993;80: 1284-86)