

## An Observational Study of Outcome of the Absorbable Suture and Non-Absorbable Suture in Laparotomy Wound Closure in Tertiary Care Hospital in South Gujrat

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### Abstract

**Background:** Whether inflicted by chance or sustained during a surgical procedure, every wound is simply a disruption of the normal continuity of tissue. Although the skill and technique of the surgeon is important, so is the choice of wound closure material. Every surgeon aims to close the abdominal incisions securely, so as to prevent complications, such as wound infection, dehiscence, incisional hernia, and suture sinuses. Since decades Polypropylene has been widely used for the closure of laparotomy wounds. Another suture material Polydioxanone is also used for the closure of laparotomy wound.

**Aim:** To document the efficacy of absorbable and non-absorbable sutures in LAPAROTOMY wound and to observe the early post-operative complications.

**Material and methods:** The present clinical study was carried out at the surgical wards of NCHS from September 2019 to September 2020. Patients underwent emergency laparotomies through midline vertical incisions. In all patients, mass closure of abdomen was employed. Continuous interlocking sutures were taken in all patients. 40 Patients underwent emergency laparotomy. Equal numbers of cases (20 each for Polydioxanone and Polypropylene group) were studied for closure with these two suture materials; Polypropylene and Polydioxanone.

**Observation & Results:** The male to female ratio was 4.71:1. Patients with age group of 18 - 29 years formed the maximum number of this study. The mean age was 33 years. The youngest patient was 18 years old and oldest patient was 60 years old. There were 5 cases of burst abdomen in the present study, out of which 3 (8%) cases were in Polypropylene group and 2(5%) were in Polydioxanone group. The incidence of wound infection was higher in Polypropylene (Prolene) (15%) compared to Polydioxanone (PDS) (12%). There was no incidence of incisional hernia and stitch granuloma in any group after 3 months of follow-up. Most patients in the present study stays for 7 days in hospital, Maximum number of patients (30) stays in hospital for 7 days. 6 patients stays for 10 to 15 days and 4 patients stays more than 15 days.

**Conclusion:** Polydioxanone has slightly upper edge over Polypropylene as far as burst abdomen is concerned. Polydioxanone has slightly upper edge over Polypropylene in wound infection. There is no significant difference between two suture materials in the development of incisional hernia. Overall, Polydioxanone has higher merits over Polypropylene for laparotomy present study. Although ideal suture material for closure of laparotomy wound depends upon the surgeon's choice.

**Keywords:** Laparotomy Wound Closure, PDS, Prolene, Wound Dehiscence

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**Introduction**

Whether inflicted by chance or sustained during a surgical procedure, every wound is simply a disruption of the normal continuity of tissue. When tissue has been disrupted so severely that it cannot heal naturally (without complications or possible disfiguration) it must be held in apposition until the healing process provides the wound with sufficient strength to withstand stress without mechanical support.

Although the skill and technique of the surgeon are important, so is the choice of wound closure material [1,2]. Every surgeon aims to close the abdominal incisions securely, so as to prevent complications, such as wound infection, dehiscence, incisional hernia, and suture sinuses [3].

Abdominal wound dehiscence is a common complication of emergency laparotomy in Indian setup. Wound dehiscence carries with it substantial morbidity and mortality, in addition, to an increase in the cost of care. Its prevention is important to reduce postoperative morbidity and mortality.[4] Many patients have a poor nutritional status and the presentation of patients is often delayed. This makes the problem of wound dehiscence more common and grave.[5]

Wound dehiscence is related to the technique of closure of abdomen and the suture used [6]. While the choice may not be so important in elective patients who are fairly nourished, 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 and strangulation of sheath is the proverbial last straw in precipitating wound failure [7].

Since decades Polypropylene has been widely used for closure of laparotomy

wounds. It is a monofilament, non-absorbable suture. Tensile strength of Polypropylene lasts >1 year [8].

Another suture material Polydioxanone is also used for closure of laparotomy wound. It is monofilament, absorbable suture. Tensile strength of Polydioxanone lasts for 128-210 days.

So this is the study interned to compare the outcome of laparotomy incision closure with Polydioxanone and polypropylene in cases operated at New Civil Hospital, Surat.

**Materials and Methods**

The present clinical study was carried out at the surgical wards of NCHS From September 2019 to September 2020. Patients underwent emergency laparotomies through midline vertical incisions. In all patients, mass closure of abdomen was employed. Continuous interlocking sutures were taken in all patients. [9]

40 Patients underwent emergency laparotomy. Equal numbers of cases (20 each for polydioxanone and polypropylene group) were studied for closure with these two suture materials; Polypropylene and Polydioxanone.

A predesigned proforma was used to collect the information for individual cases. The patients were followed-up at 10 days, 1 month, and 3 months 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**

1. Both Male and female
2. Age >18 years
3. Emergency LAPAROTOMY surgeries

4. For sheath closure Prolene 1-0 and PDS 1-0 are used.

#### Exclusion criteria

1. Non-willing participants.
2. Age < 18 years
3. Participants with pre-operative or post-operatively involving malignancy of peritoneum
4. Elective LAPAROTOMY surgery, those participants not willing for follow up after two and three months (due to migration or any other reasons) and documented on case papers

#### Observation and Results

In our case study, the highest number of cases among patients was noted in the age group of 18-29 years. The mean age was 33 years. The youngest patient was 18 years old and the oldest patient was 60 years old.

In our study, 33 male patients operated for laparotomy are more as compared to 7 females. Here Male to female ratio is 4.71: 1.

In this study 20 (50%) patients were operated on for visceral perforation, 5 (12.5%) patients were operated on for intestinal obstruction, 5 (12.5%) patients were operated on for traumatic abdominal injury, 3 (8%) were operated for Appendicitis and OTHER were operated for pathologies which include Necrotizing

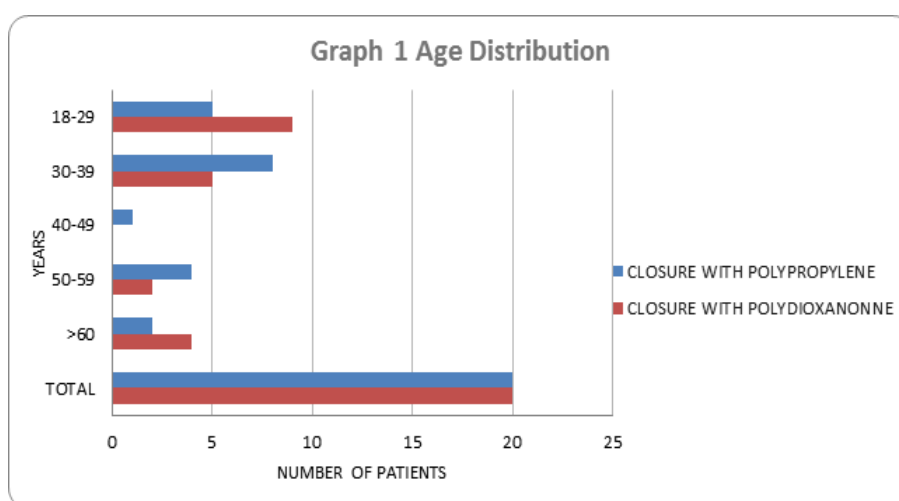
pancreatitis, corrosive ingestion and Ruptured liver abscess.

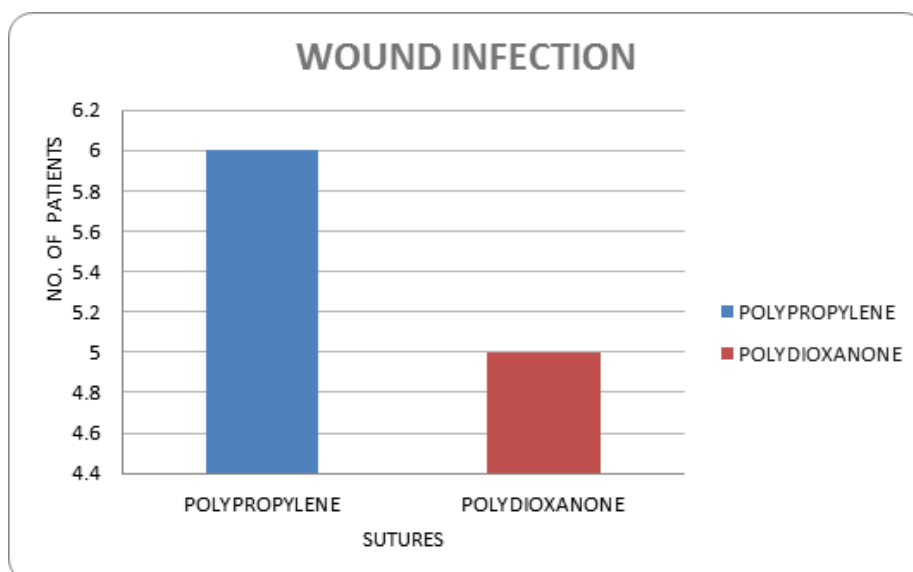
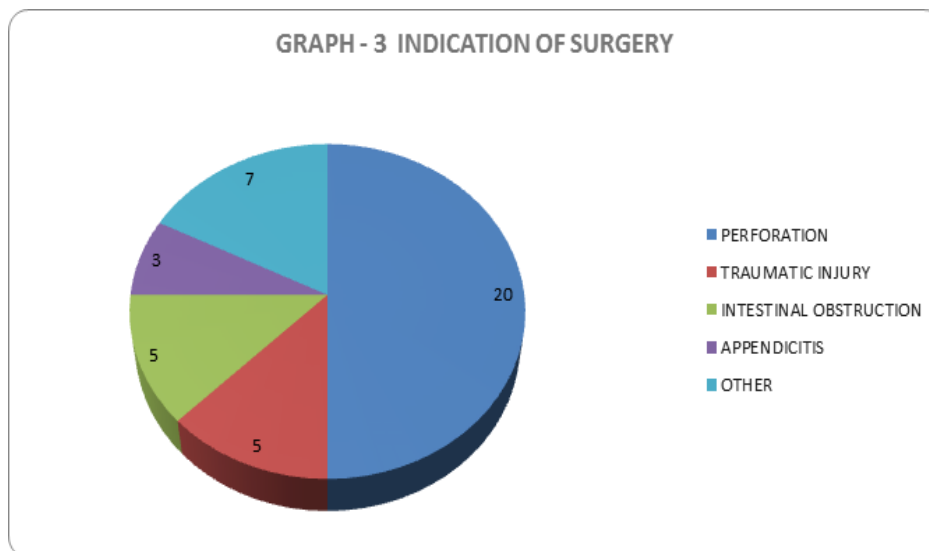
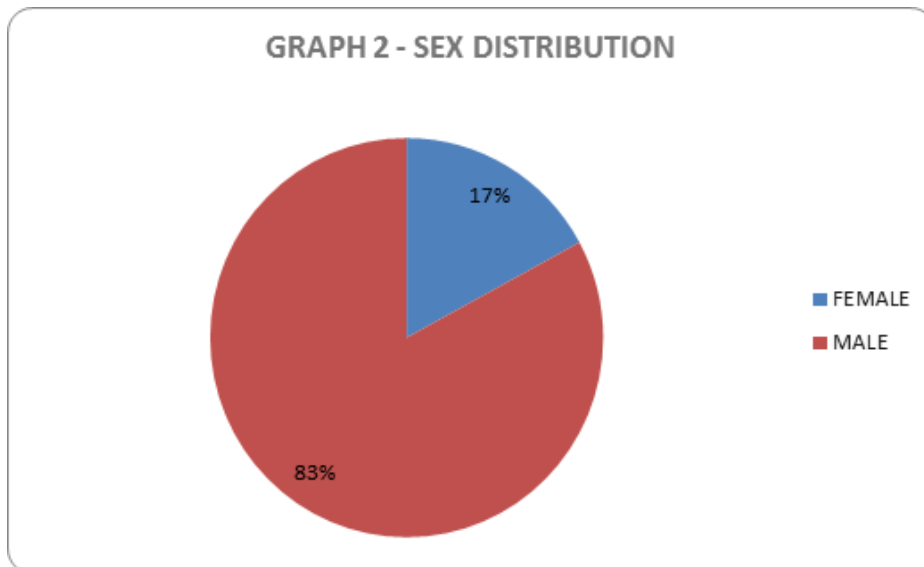
The incidence of wound infection was higher in Polydioxanone (PDS) (12%) compared to Polypropylene (Prolene) (8%). According to the Chi-square test of significance, the Chi square statistic is 0.003226 and the p-value is 0.9547. This result is not significant at  $p < 0.05$ .

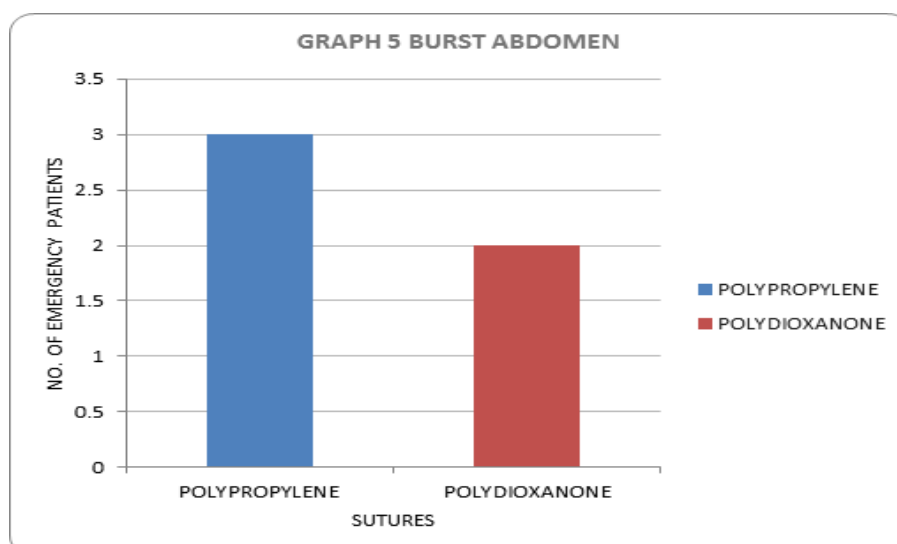
There was 3 patient of burst abdomen in the present study that was operated on an emergency basis in the Polypropylene (Prolene) group. There were 2 cases of burst abdomen in Polydioxanone (PDS) group. The Chi-square statistic is 0.003596. Here p-value is 0.9522 which is statistically not significant at  $p < 0.05$ .

There were 5 cases of burst abdomen in the present study, out of which 3 (8%) cases were in Polypropylene group and 2(5%) were in Polydioxanone group. The incidence of wound infection was higher in Polypropylene (Prolene) 6 (15%). compared to Polydioxanone (PDS) 5 (12%). There was no incidence of incisional hernia and stitch granuloma in any group after 3 months of follow-up.

Most patients in the present study stays for 7 days in the hospital, Maximum number of patients (30) stays in the hospital for 7 days. 6 patients stays for 10 to 15 days and 4 patients stays for more than 15 days.







**Table 7: Comparison of burst abdomen rate with other studies**

SUTURE	PRESENT STUDY	PANDEY et al[21]	PATEL et al[31]
	POLYPROPYLENE	8%	8%
POLYDIOXANONE	5%	5%	2.60%

**Table 8: Incidence of complications**

Complications	Polypropylene	Polydioxanone	Total	Percentage
Wound	6	5	11	28%
Infection				
Burst Abdomen	3	2	5	13%
Stitch	0	0	0	
Granuloma				
Incisional	0	0	0	
Hernia				

**Table 9: Duration of hospital stay**

Days	Polypropylene	Polydioxanone	Total
<7	0	0	0
7 to 10	15	15	30
10 to 15	2	4	6
>15	3	1	4

## Discussion

This Observational study has demonstrated that PDS and Prolene are equally effective for abdominal fascial closure. The risk of incisional hernia, wound dehiscence, peri-operative complications, suture sinus formation, and surgical site infection do not differ significantly for different suture materials.

There is a lack of agreement within the surgical fraternity about the ideal abdominal

fascial closure technique. Several meta-analyses of variable quality have reported confusing and conflicting recommendations. Studies have compared the use of absorbable versus non-absorbable, delayed-absorbable versus nonabsorbable, monofilament versus multifilament and the use of steel wires for laparotomy closure but without any solid conclusion.

The debate for the ideal suture material for the closure of a laparotomy wound still continues. Previous randomized controlled

trials of abdominal fascial closure have failed to determine the ideal suture. Many of these trials had a small sample size and lacked sufficient power to show significant treatment differences. Results were often conflicting and have left many surgeons uncertain about the ideal suture for abdominal fascial closure. Mass closure is the preferred technique of many surgeons, including those at our centre.

We attempted to compare two suture materials, absorbable - Polydioxanone (PDS) and non-absorbable - Polypropylene (Prolene), to determine which one is superior for abdominal closure. To determine the superiority, we compared the occurrence of specific post-operative complications.

The two groups (prolene and PDS) were well matched with respect to the age of the patient, sex distribution, and comorbidities. The only variable where there was a significant difference between the two groups was duration of surgery, which was significantly longer in the prolene group.

The objectives of this study were to compare the incidence of specific postoperative complications after a laparotomy among two groups in which different suture materials were used for abdominal fascial closure.

40 cases of emergency laparotomy closure of midline incisions were studied to compare the results of Polypropylene (prolene) and Polydioxanone (PDS) suture material with regard to postoperative wound complications. Equal numbers of cases (20 each) were randomly selected and divided into both the Polypropylene and Polydioxanone suture material groups. All the patients were followed on 10 days, 1 month, 2 months and 3 months after surgery.

Only Emergency cases were included in the study. The male to female ratio was 4.71:1. Patients with age group of 18 - 29 years formed the maximum number of this study. The mean age was 33 years. Youngest

patient was 18 years old and the oldest patient was 60 years old.

In this study 20 (50%) patients were operated for visceral perforation, 5 (12.5%) patients were operated for intestinal obstruction, 5 (12.5%) patients were operated for traumatic abdominal injury, 3 (8%) were operated for Appendicitis and OTHER were operated for pathologies which includes Necrotizing pancreatitis, corrosive ingestion and Ruptured liver abscess.

The early and late wound complications encountered in both the suture materials used were as follows.

There were 5 cases of burst abdomen in present study, out of which 3 (8%) cases were in Polypropylene group and 2 (5%) was in Polydioxanone group. Incidence in the present study is close to the other study series. As compared to Patel et al[4] Study, Incidence of burst abdomen in Polypropylene group is 3.30% and in Polydioxanone is 2.60%. Incidence of burst abdomen in Pandey et al[5] study, is the same as the present study.

The incidence of wound infection was higher in Polypropylene (Prolene) (15%). compared to Polydioxanone (PDS) (12%). As compared to Patel et al[4] Study, the incidence of wound infection in Polypropylene group is 10.70% and in Polydioxanone group is 10.50%.

There was no incidence of incisional hernia and stitch granuloma in any group after 3 months of follow-up.

Most patients in present study stays for 7 days in the hospital, Maximum number of patients (30) stays in the hospital for 7 days. 6 patients stays for 10 to 15 days and 4 patients stays more than 15 days.

### Conclusion

Based on the observations made in this study, it has been concluded that: Polydioxanone has slightly upper edge over Polypropylene as far as burst abdomen is concerned. Polydioxanone has slightly

upper edge over Polypropylene in wound infection. There is no significant difference between two suture materials in the development of incisional hernia. Overall, Polydioxanone has higher merits over Polypropylene for laparotomy present study. Although ideal suture material for closure of laparotomy wound depend upon the surgeon's choice

### References

1. Schwartz's principles of surgery, 9th edition
2. Mastery of surgery, 6th edition, surgical anatomy of hernia rings and editor's comment.
3. Eillis H. Maingot's Abdominal Operations. New York, NT: McGraw-Hill; 1997:395
4. Patel S V, Paskar D D, Nelson R L. Closure Method for Laparotomy incisions for preventing incisional hernias and other wound complications  
Cochrane Database Systemic Review, 2017.
5. Pandey et al, (IJS 2013 August .75c4) 306-310.
6. Robbins, pathological basis of diseases, 8th edition, pg 111
7. Hodgson NC, Malthaner RA, Ostbye T. The search for an ideal method of abdominal fascial closure: a meta-analysis. Ann Surg. 2000; 231:436–442.
8. Bedside clinics in surgery, 2nd edition, Page – 943. suture materials
9. Lechheb Khadija, Berdi Fadoua, Ennafah Wafaa, & Lamsaouru Jamal. Analyse Des Risques a Priori En Unite De Retrocession Au Sein De L' unite De Gestion Des Produits a Statuts Particuliers a L'hmimv De Rabat: Processus De Dispensation. Journal of Medical Research and Health Sciences, 2022; 5(10): 2307–2316.