

To Compare the Incidence of Complications on using Delayed Absorbable Suture (PDS-Polydioxane) and Non Absorbable Polyethelene Glycol (Nylon) for Abdominal Wall Closure

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Abstract: Introduction: Laparotomy is a common surgical procedure performed in a tertiary care centre for various surgical conditions. Healing of these laparotomy wounds depends on various local and systemic factors including selection of proper suture material. This present study was undertaken to compare complications between usage of PDS and Nylon for abdominal wall closure. Methods: 60 patients undergoing laparotomy with vertical midline incision were included in the study. The incidence of complications including post operative pain, surgical site infection and incisional hernia were compared and data represented in the form of percentages with bar diagrams and pie charts. Results: The incidence of post operative pain on POD 1 was same for both the groups, however only 13 out of 30 cases operated with PDS reported of pain on POD 7 while 18 out of 30 had pain on Pod 7. The incidence of pain further reduced on POD 14 when only 2 out of 30 patients in group A had pain whereas 7 out of 30 patients complained of pain in Group B. On POD 30, there was no pain reported in group A and 3 patients had pain in group B. 5 out of 30 patients who had closure with PDS had superficial surgical site infection whereas 12 patients had surgical site infection with Nylon. Wound dehiscence was seen in only 1 out of 30 patients who had closure with PDS whereas 5 out of 30 patients had wound dehiscence whose closure was done with nylon. There was only 1 incidence of incisional hernia reported in a case operated with nylon. Conclusion: Based on the observations made in this study, it has been concluded that continuous mass closure technique using Polydioxanone (PDS) for closure of vertical midline laparotomy incision is better than Nylon in preventing the wound Complications

Keywords: PDS, nylon, post operative pain, incisional hernia

1. Introduction

Laparotomy wounds heal by primary intention. The healing of these wounds depends on many factors which can be local or systemic.[1] One of the important local factor is usage of proper suture material. The ideal suture for closure should be easy to use, provide adequate tensile strength and resist infection.[2] It also has impact on the post operative complications such as post operative pain, wound dehiscence and incisional hernias. The common suture material in use for wound closure are Nylon and Polydioxanone.

Polydioxanone sutures are strong, delayed absorbable, retain their strength after implantation, are inert, cause minimal tissue reaction and technically has a better handling during the closure. The only disadvantage is their slipping quality in handling and in tying. Nylon is a non-absorbable suture material. It has a property of non-adherent to tissue and so a good suture material, but known to cause palpable knots, wound pain, wound sepsis, wound dehiscence, suture sinus formation, stitch granuloma and incisional hernia.[3]

This is an observational study done in our institute to compare the incidence of post operative wound complications observed with usage of the two suture materials.

1.1 Aim

To Compare the Incidence of Complications on using Delayed Absorbable Suture(PDS- Polydioxane) and Non

absorbable Polyethelene glycol (nylon) for abdominal wall closure in laparotomies.

2. Materials and methods

An observational study conducted at MGM Medical college and Hospital, Navi Mumbai during time period of 6months (May 2019 – October 2019) with a sample size of 60 (30 in Group A and 30 in Group B).

All abdominal laparotomies, both elective and emergency with vertical midline incision were included in the study. All paediatric patients, patients who had previous abdominal surgeries, and pregnant ladies were excluded from the study.

The patients were randomly selected regarding the suture material used for abdominal wall closure. All patients had vertical midline incision. The continuous mass closure technique was used for closure in all patients followed by skin closure by nylon. All cases were done by surgeons of equivalent competency. All the patients were given antibiotics as per the hospital antibiotic policy.

In 30 patients, non absorbable sutures (nylon) were used and delayed absorbable sutures (PDS) were used for other 30 cases. Wound drains were not used. Patients were followed up on post operative day 01, 07, 14 and 30. All sutures were removed on post operative day 10.

Post operative complications studied were- immediate and late post operative pain as stated by Numerical Pain

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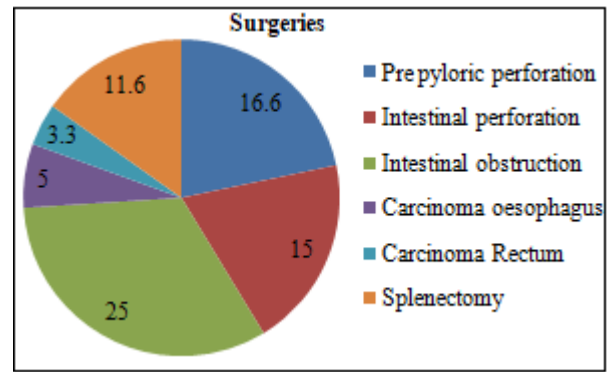
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Score(NPS), surgical site infection including superficial infection and wound dehiscence and incisional hernia.

Comparative study in terms of post operative complications was done between the two groups in terms of percentage and represented in the form of bar diagrams and pie charts.

3. Results

Total of 60 patients were included in the study, as per the inclusion criteria wherein 30 patients had closure with absorbable and 30 patients had closure with non absorbable suture materials. Out of 10 cases of pre-pyloric perforation 4 had closure with PDS while for 6 cases closure was done with nylon. In cases of intestinal obstruction including duodenal perforation and caecal perforation PDS was used in 5 cases while nylon was used in 4 cases. In total of 15 cases operated for intestinal obstruction closure with PDS was done in 7 patients and with nylon in 8 patients. In total, 3 cases of carcinoma oesophagus out of which 2 patients had closure with PDS and 1 had with nylon. Out of 2 patients who were operated for carcinoma rectum, 1 had closure with PDS and 1 with nylon. In cases of splenectomy including both elective and emergency, 4 patients had closure with PDS and 3 had closure with nylon. 3 patients who underwent laparotomy for excision of intraabdominal cysts- 2 had closure with PDS and 1 had closure with nylon. In cases who underwent emergency laparotomy for haemoperitoneum for causes other than splenic injury, 5 patients had closure with PDS and 6 patients had closure with nylon.



Out of total 60 cases 49 patients underwent emergency laparotomy, out of which, 23 closures were done with PDS and 26 with nylon. Out of 11 cases who were taken up for elective laparotomy, 7 had closure with PDS while 4 had closure with nylon.

Type of surgery	PDS	Nylon	Total	%
Emergency	23(76.67%)	26(86.67%)	49	81.67
Elective	7(23.33%)	4(13.33%)	11	18.33
Total	30	30	60	

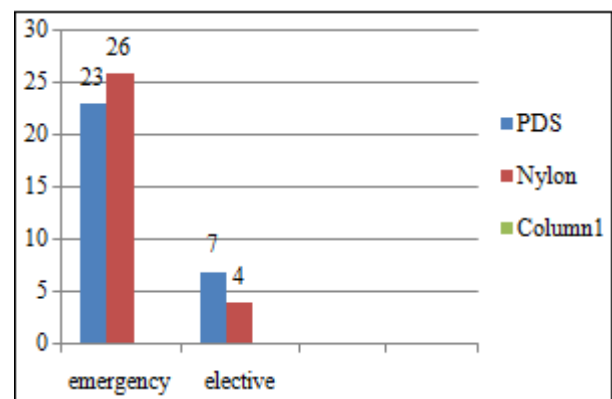
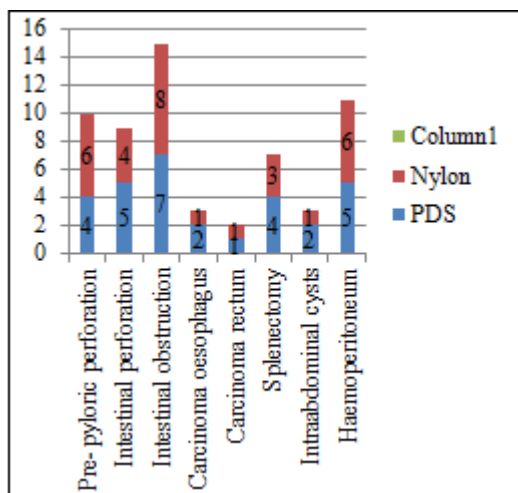


Table 1: Various surgeries where PDS and Nylon were used for abdominal wall closure

Surgery	PDS	Nylon	Total	Percentage %
Pre- pyloric perforation	4	6	10	16.6
Intestinal perforation	5	4	9	15
Intestinal obstruction	7	8	15	25
Carcinoma oesophagus	2	1	3	5
Carcinoma rectum	1	1	2	3.3
Splenectomy	4	3	7	11.6
Intraabdominal cysts	2	1	3	5
Haemoperitoneum due to causes other than spleen	5	6	11	18.3
Total	30	30	60	

Table 2: Incidence of Post operative pain after abdominal wall closure

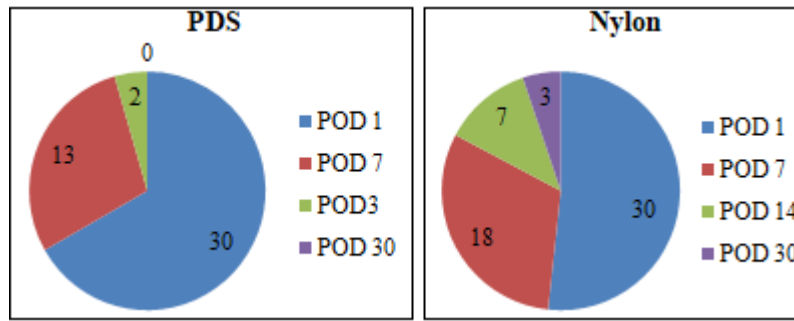
POD 1	PDS	Nylon	Total	%
Yes	30	30	60	100
No	0	0	0	
Total	30	30	60	



POD 7	PDS	Nylon	Total	%
Yes	13(43.33%)	18(60%)	31	51.67
No	17(56.67%)	12(40%)	29	48.33
Total	30	30	60	

POD 14	PDS	Nylon	Total	%
Yes	2(6.66%)	7(23.33%)	9	15
No	28(93.33%)	23(76.67%)	51	85
Total	30	30	60	

POD 30	PDS	Nylon	Total	%
Yes	0(0%)	3(10%)	3	5
No	30(100%)	27(90%)	57	95
Total	30	30	60	

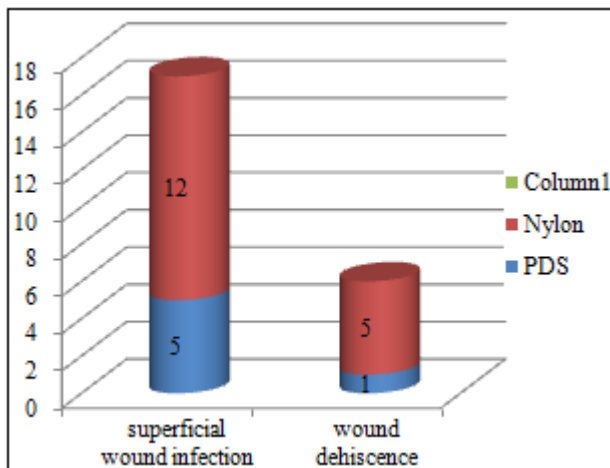


17 out of 60 cases had superficial wound gaping out of which, 5 were seen in patients who had closure with PDS and 12 were seen in patients with nylon closure. 6 patients had wound dehiscence, where only 1 had closure with PDS and other 5 had closure with nylon.

Table 3: Incidence of SSI after abdominal wall closure

Superficial infection	PDS	Nylon	Total	%
Yes	5(16.67%)	12(40%)	17	28.33
No	25(83.33%)	18(60%)	43	71.67
Total	30	30	60	

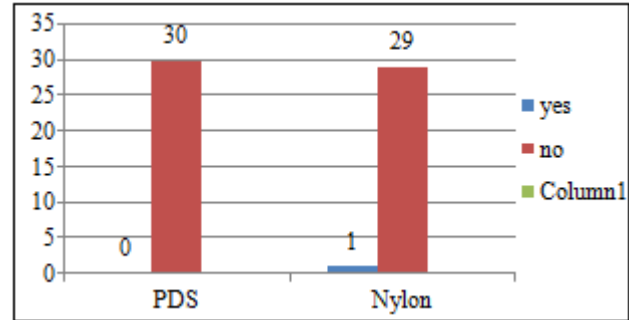
Wound dehiscence	PDS	Nylon	Total	%
Yes	1(3.33%)	5(16.67%)	6	10
No	29(96.67%)	25(83.33%)	54	90
Total	30	30	60	



Only 1 case of incisional hernia was reported in a patient who had closure with nylon.

Table 4: Incidence of Incisional Hernia in abdominal laparotomies

Incisional Hernia	PDS	Nylon	Total	%
Yes	0(0%)	1(3.33%)	1	1.67
No	30(100%)	29(96.67%)	59	98.33
Total	30	30	60	



4. Discussion

Abdominal laparotomies are one of the very common surgeries done on day to day basis in a tertiary care hospital, that is why the correct technique of abdominal wall closure becomes important to prevent infection and complications. Wound healing depends on various systemic and local factors, of which, selection of appropriate suture material forms an important part. Systemic factors involved are general condition of the patient, age, presence of co morbidities, immune suppression etc. and local factors include site of wound, hematoma formation, infection and foreign body reaction. All these factors create stressful environment for freshly sutured wound and may delay wound healing.[4]-[6]

Pain is a subjective feeling , therefore in this study Visual Analogue scale was used to assess post operative pain. On POD1 there was no significant difference in pain reported at the suture site in both groups. However, on POD 7, only 13 out of 30 patients reported of mild pain in group A where PDS was used and 18 patients reported mild to moderate pain in group B where Nylon was used. On POD 14 i.e after suture removal, only 2 patients reported of mild pain in group A whereas 7 out of 30 patients complained of mild pain and discomfort in group B. One month post operatively, there was no incidence of pain in group A , however, 3 patients complained of persisting pain in group B. on comparing the two , incidence of pain is significantly less in delayed absorbable sutures. In both the groups patients were treated with same analgesic. Post operative pain occurred more frequently with nylon suture because of its long memory, more tissue reaction and stiff nature. However, PDS is non-antigenic, non-pyrogenic and elicits only minimal tissue reactivity during the absorption process and wound pain is less with its usage.[7]

In surgical site infections, superficial wound infections were only 5 out of 30 cases in group A with PDS as suture for abdominal wall closure whereas 12 cases of SSI were

reported in case of Nylon. As far as wound dehiscence was concerned, group A had only 1 case whereas 5 cases were reported from group B. also, it was observed that majority of SSI were detected on POD3 at check dressing. Khan et al showed the postoperative wound discharge rate of 24% in the non-absorbable group (polyamide) and 16% in the absorbable group (polyglyconate). They concluded that slowly absorbable suture material appears to be superior to non-absorbable suture material in midline abdominal fascial closure .[8] Altaf et al conducted a randomized study with non-absorbable (nylon) and absorbable (PDS) sutures and found that the rate of incisional hernia which was 4.34% more with nylon than 0.73% with (PDS) .[9]

The incidence of SSI was higher in cases of Emergency Laparotomies as compared to elective surgeries. In this study there was no incidence of incisional hernia reported in group where PDS was used and 1 case was reported in group where Nylon was used for abdominal wall closure. Bloemen et al conducted a study on 456 patients to close the abdominal fascia with either non-absorbable (prolene) or absorbable (PDS) suture material and found that there was no significant difference in the incidence of incisional hernia between the groups.[10]

5. Conclusion

Based on the observations made in this study, it has been concluded that continuous mass closure technique using Polydioxanone (PDS) for closure of vertical midline laparotomy incision is better than Nylon in preventing the wound complications like post-operative wound dehiscence, wound pain, wound infection, and incisional hernia.

No funding was required for the conduct of study.

There was no conflict of interest among the authors

Institute Ethics Committee approval was obtained for this study

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