

Comparative Study Of Laparotomy Incision Closure With Absorbable (Polyglactin) And Non-Absorbable (Polypropylene) Suture Materials : A Study Of 50 Cases

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Abstract: Background: Laparotomy incision closure can be done using different suture materials and techniques. These factors affect the incidence of post operative wound complications such as wound dehiscence, surgical site infection, stitch granuloma, incisional hernia. Material & Methods: Study included 50 patients who underwent laparotomy from January 2019 to October 2019. Equal number of cases (25 each) were studied for closure with two suture materials; Polyglactin and Polypropylene. The patients were followed-up at 1 week, 2 weeks, 1 month and then 3 months after surgery. Result: The incidence of wound infection was higher in Polyglactin (12%) compared to Polypropylene (8%) whereas incidence of stitch granuloma is 3 (12%) in Polypropylene as compared to 1 (4%) in Polyglactin group. Wound dehiscence incidence was more in polyglactin (12%) as compared to polypropylene (4%) group. None of patients developed incisional hernia upto 3 months of follow up visits. Conclusion: Suture materials like polypropylene, polyglactin, PDS, nylon can be used for laparotomy incision closure. Use of absorbable suture material is more related to development of post operative surgical site infection, wound dehiscence, incisional hernia whereas stitch granuloma is more related to use of non-absorbable suture material. Overall, polypropylene has higher merits over polyglactin for laparotomy mass closure in present study. [Rabari M Natl J Integr Res Med, 2020; 11(2):47-50]

Key Words: Wound dehiscence, Mass closure, Suture materials

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Introduction: Laparotomy incision closure can be done using different techniques and different types of suture materials. Although the skill and technique of the surgeon is 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, stitch granulomas.

Wound dehiscence is related to the technique of closure of abdomen and the suture used. 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^{4,9}.

Laparotomy incision closure can be done using absorbable as well as non-absorbable suture material and its use is related to differences in incidence of post operative wound related complications^{2,10}. This study intends to compare the outcome of laparotomy incision closure with polyglactin (absorbable) and polypropylene (non-absorbable) in cases operated at SVP Hospital, Ahmedabad.

Material and Methods: The present clinical study was carried out at the surgical wards of SVP hospital from January 2019 to October 2019. Patients underwent both elective and emergency laparotomies through midline vertical incisions. In all patients, mass closure of abdomen was employed. Continuous interlocking sutures were taken in all patients.

Equal number of cases (25 each for Polyglactin and PPL group) were studied for closure with these two suture materials; Polyglactin (vicryl) and Polypropylene (PPL). The patients were followed-up at 1 week, 2 weeks, 1 month and then 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. Informed and written consent was obtained from all the patients for participation in this study. Due permissions were taken from ethics committee for conductance of this study.

Exclusion Criteria:

- Age < 15 years
- Patients who required retention suture closure.

- Patients with Pre or Postoperative diagnosis of malignant involvement of peritoneum.
- Presence of ascites - pre or postoperatively

Results: A total of 50 patients were included in the study from January 2019 to October 2019. After midline incisions, closure was performed with Polyglactin no1 and Polypropylene no 1 in 25 patients each. Preference to mass closure was given to all patients.

Table 1: Age

Age In Years	Number Of Patients	Closure With Polypropylene	Closure With Polyglactin
15-25	13(26%)	10	03
26-35	07(14%)	03	04
36-45	10(20%)	01	09
46-55	10(20%)	07	03
56-65	04(08%)	03	01
66-75	06(12%)	01	05
Total	50 (100%)	25	25

The mean age is 36.1 years and ranges from 15 to 75 years. Majority of the study population participants are in the age group of 15-25 years constituting 26%

Table 2: Distribution According To Sex

Sex	Patients	Percentage
Female	11	22%
Male	39	78%
Total	50	100%

In our study, no. of male patients operated for laparotomy are more as compared to no. of females. Here Male to female ratio 3.54 : 1

Table 3: Distribution According To Nature Of Operation

Nature Of Operation	Patients	Percentage
Emergency	33	66%
Planned	17	34%
Total	50	100%

In our study no of emergency laparotomies are more as compared to planned laparotomies. Here emergency to planned ratio is 1.94:1.

Table 4: Distribution According To Nature Of Operation And Suture Material

	Emergency	Planned
Polypropylene	17	08
Polyglactin	16	09
Total	33	17

Polypropylene was used in 08 planned & 17 emergency laparotomies. Polyglactin (vicryl) was used in 09 planned & 16 emergency laparotomies.

Table 5: Indications Of Operation

Indication	No of Patients	Percentage
Peritonitis	21	42%
Blunt trauma	11	22%
Intestinal obstruction	12	24%
Other	06	12%
Total	50	100%

In this study 21(42%) patients were operated for peritonitis , 12(24%) patients were operated for intestinal obstruction , 11(22%) patients were operated for blunt abdominal injury and 6(12%) were operated for other pathologies which includes ovarian cyst, SMA syndrome ,pancreatic tumor, hydatid cyst, gastric outlet obstruction and pancreatic abscess.

Table 6: Wound Infection In Relation To Suture Material And Nature Of Operation

Suture	Emergency	Planned	Percentage
Polypropylene	1	1	08%
Polyglactin	2	1	12%

The incidence of wound infection was higher in Polyglactin (vicryl) (12%) compared to Polypropylene (Prolene) (8%). According to the Chi –square test of significance, the Chi square statistic is 0.2222 and p-value is 0.637. This result is not significant at p<0.05.

Comparison Of Wound Infection Rate With Other Studies

Suture	Present study	Patel et al ³¹
Polypropylene	08%	10.7%
Polyglactin	12%	10.5%

Table 7: Burst Abdomen In Relation To Suture Material And Nature Of Operation

Suture	Emergency	planned	Percentage
Polypropylene	1	0	4%
Polyglactin	2	1	12%

There was 1 patient of burst abdomen in the present study who was operated on an

emergency basis in the Polypropylene (Prolene) group. There were 3 cases of burst abdomen in Polyglactin (vicryl) group. The Chi-square statistic is 1.087. Here p-value is 0.2971 which is statistically not significant at $p < 0.05$.

Comparison Of Burst Abdomen Rate With Other Studies

Suture	Present Study	Pandey Et Al ²¹	Patel Et Al ³¹
Polypropylene	4%	6%	3.3%
Polyglactin	12%	17%	2.6%

The rates of burst abdomen of present study were found close to other studies like PANDEY et al²¹ and Patel et al.

Table 8: Incidence Of Stitch Granuloma In Relation To Suture Material

Suture	Stitch Granuloma	Percentage
Polypropylene	3	12%
Polyglactin	1	04%

The incidence of stitch granuloma is 3 (12%) in Polypropylene (Prolene) and 1(4%) in Polyglactin (vicryl) sutures. The chi-square statistic is 1.087. The p-value is 0.297 which is statistically not significant at $p < 0.05$.

Table 9: Incidence Of Complications

Complications	Polypropylene	Polyglactin	Total	Percentage
Wound Infection	2	3	05	10%
Burst Abdomen	1	3	04	8%
Stitch Granuloma	3	1	04	8%
Incisional Hernia	0	0	00	0%

Discussion: Closure of the laparotomy incision can be performed in a multitude of ways and methods of closure are often based on local traditions and the preferences of the surgeon.^{1,8} It should leave the patient with a reasonably aesthetic scar, and most importantly, it should minimize the frequency of wound dehiscence, incisional hernia, wound infection, and stitch granuloma formation. For closure of the midline laparotomy incision, there are many choices of suture materials like polypropylene, loop polyamide, PDS loop & polyglactin. Use of

different type of suture material is related to differences in incidence of various post operative wound related complications^{9,10}.

Polyglactin is a synthetic, polyfilament, absorbable type of suture material whereas polypropylene is a synthetic, monofilament, non-absorbable type of suture material. Multifilament sutures are easy to handle and have favourable knot-tying qualities. However, bacteria can enter the braided interstices and escape phagocytosis, potentially leading to suture infection, granulomas and sinuses. By contrast, monofilament sutures cause significantly fewer tissue reactions and glide easily through tissue. Their disadvantages include high retention of package shape, difficult handling, knot insecurity, and potentially cutting through tissue^{7,10}.

Surgical site infections (SSIs) are the most common nosocomial infections in surgical patients. One of the important risk factors in developing a wound infection is the bacterial colony count at the surgical site^{6,9}. As polyfilament suture material use provides favourable environment for bacterial growth, its use is more related to surgical site infection. Our study shows that out of 5 patient who developed surgical site infection, in 3 patients polyglactin was used for laparotomy incision closure. Other risk factors for development of wound infections include advanced age, diabetes mellitus, altered immune response, presence of infection at a remote body site, indication for operation. In our study, 3 out of 5 patients who developed surgical site infection were operated as emergency procedure.

Wound dehiscence occurs because of the distracting forces in a wound which exceed the holding forces. It is also important to acknowledge that the failures after abdominal wound closure are due to poor closure technique, deep wound infection, postoperative abdominal distension, and poor general condition of the patient^{1,4}. In our study, polyglactin was used in 3 out of 4 patients who developed wound dehiscence post-operatively. In the study conducted by PATEL et al, found no statistically significant difference between patients in whom polyglactin was used and in whom polypropylene was used for incision closure. In a study conducted by Pandey et al showed that there was an increased incidence of postoperative

wound complications in whom polyglactin was used for incision closure with a percentage of 17%^{2,3}.

Stitch granulomas are usually seen after postoperative day 10, but may occur earlier or weeks after the wound has apparently healed. Stitch granulomas may be superficial appearing as circumscribed blisters or deep appearing as indurated mass^{9,10}. The use of non-absorbable sutures such as polypropylene to close the abdominal wound has been associated with increasing incidence of deep stitch abscesses when compared to closure with a slowly absorbing suture such as polyglactin which is also seen in our study.

An incisional hernia is one that develops in the scar of a surgical incision. It usually appears 6-12 months after operation and is related to risk factors such as malnutrition, lax abdominal wall musculature, chronic constipation, persistent cough, weight lifting etc. which are responsible for increasing the intra abdominal pressure. It is seen that incision closure with absorbable suture material predisposes to development of incisional hernia^{1,5}. In our study none of the patients developed incisional hernia upto 3 months of follow up visits.

Conclusion: To conclude, Polypropylene has upper edge over polyglactin as far as burst abdomen is concerned. Polyglactin is related to more incidence of surgical site infection as compared to use of polypropylene. There is no significant difference between two suture materials in development of incisional hernia. Overall , Polypropylene has higher merits over polyglactin for laparotomy mass closure in present study.

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