

## Comparative study of non-absorbable versus delayed absorbable suture material and suturing technique in midline abdominal closure

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### Abstract

**Introduction:** Closure of the abdominal wall is a routine procedure and one of the first things a surgeon is taught in his career. Secure wound closure is an essential requirement for an uncomplicated and expedient recovery after an abdominal operation. **Methodology:** We assessed, wound infection rates in 320 patients in the four randomized groups according to the suture and technique of closure used. Patients were followed for a period of 2 weeks and using well set definition were placed in infected, uninfected and burst abdomen. **Results:** Older age, male sex, diabetes, anemia malnutrition and sepsis were found to be highly significant risk factor for wound infection. Suture material (Prolene vs Vicryl) and technique (continuous vs interrupted) arms did not showed statistically significant differences outcomes in regard to wound infection rates, however there appears to be less incidences of wound sinus formation with delayed absorbable sutures (Vicryl). **Conclusion:** Closure of a mid-line laparotomy wound can be done by using either Prolene or Vicryl suture material, with either continuous or an interrupted fashion. Continuous technique is time saving and delayed absorbable suture (Vicryl) results in less wound sinus formation.

**Keywords:** Suture, Absorbable, Delayed Absorbable, Interrupted, Continuous.

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### Introduction

Abdominal surgery is one of the oldest and commonest major surgical procedure. [1, 2]. The use of sutures for tissue approximation is the oldest and still the most common form of wound closure. Although the outcomes of surgical skin closure may be influenced by the indication for the procedure, the location of the surgical site, and associated intraoperative and postoperative complications, the goal of any skin closure technique is to produce appropriate skin approximation and adequate healing with minimal wound complications, scarring, pain, and cost [3]. The subsequent apposition is important for wound healing by primary intention and to reduce postoperative morbidities. The wound closure materials have evolved

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over the years, varying in caliber, biochemical composition, constituent, knot security, elasticity and absorption, tensile strength, and tissue reactivity [4]. Until recently, catgut and silk were the two main natural sutures used in majority. It is an absorbable suture but has been withdrawn from use in UK due to the risk of cross infection with slow viruses.

Polyglactin 910 sutures are absorbable, synthetic, usually braided and are degraded by slow hydrolysis and are absorbed at a reliable and constant rate for approximately two to three weeks [5]. 90% Glycolide + 10% L-lactid is an absorbable, synthetic suture material made of a copolymer 90% Glycolide and 10% L-lactid. The absorption time varies in between 7 to 10 days post-operatively [5]. Non absorbable nylon suture is a monofilament composed of the long-chain aliphatic polymers Nylon 6 and Nylon 66. While nylon is not absorbed, progressive hydrolysis of the nylon in vivo may result in gradual loss of tensile strength over time, hence it should not be used where permanent retention of tensile strength is required. Wound complications following surgeries is common and ranges from 3% to 15%, with an average of about 6%. These cases translate into a substantial portion of the population, and hence there is a load on the financial resources of health-care system due to prolonged. Thus, the present study was conducted to study the efficacy of different types of suture materials used in the wound closure.

### Material and methods

The present study was conducted at Department of Surgery, at U.C.M.S., New Delhi, on 100 patients during the period of Nov 2011 to Dec 2012 in whom mid line incision laparotomy was carried out. The aim of the above study was to compare

the incidence of wound infection and burst abdomen between non-absorbable like Prolene and delayed absorbable like Vicryl suture material and concurrently continuous versus interrupted suture technique. Age of patients ranged from 16-75 years. Overall, nearly 50% of patients were in 16-35 years age group in both suture material and suture technique group. Total male to female ratio was found to be 70:30 (3:1), indicating a male predominance in the study. The occurrence of various risk factors such as diabetes mellitus, anemia, malnutrition, jaundice, uremia, sepsis, cough, other pulmonary complications and also the duration of surgery

and the suturing technique were identical ( $p > 0.05$ ) for the two groups in both study and was attributed to an adequate randomization process.

**Result**

The rate of wound complications in suture material study such as wound infection (A1 = 20 ; A2 = 19); Burst abdomen (A1 = 11 ; A2 = 10) were not statistically significant ( $p > 0.05$ ) but 25 cases developed sinus formation with prolene suture in contrary, no patient with vicryl group develop such complication. (Table-1)

**Table 1: Rate of wound complications (suture material)**

	Non -absorbable(A 1)	Delayed absorbable (A2)
wound infection	20	19
Burst abdomen	11	10
sinus formation	10	0

The rate of wound complication in suture technique study such as wound infection (B1 = 20 ; B2 = 20); Burst abdomen (B1 = 11 ; B2 = 11) were not statistically significant ( $P > 0.05$ ) but 2 cases of continuous technique with prolene suture had

sinus formation (1.39%) while in interrupted technique with prolene suture 20 pts. develop sinus formation (11.37%). (Table -2)

**Table 2: Rate of wound complications (suture technique):**

	Continuous (B 1)	Interrupted (B 2)
wound infection	20	20
Burst abdomen	11	11

In infected cases the rate of wound complications in the suture material, study group such as wound infection (A1 = 28 ; A2 = 25); Burst abdomen (A1 = 19 ; A2 = 17) were not

statistically significant ( $p > 0.05$ ) but 12 cases develop sinus formation with Prolene suture in contrary, no case with Vicryl group develop such complication.

**Table 3: Rate of wound complications in infected case (suture material)**

	Non -absorbable(A 1)	Delayed absorbable (A2)
wound infection	28	25
Burst abdomen	19	17
sinus formation	12	0

In infected cases the rate of wound complications in suture technique study such as wound infection (B1 = 26 ; B2 = 28); Burst abdomen (B1 = 16 ; B2 = 16) were not statistically significant ( $p > 0.05$ ) but 1 case of continuous technique with

Prolene suture had sinus formation while in interrupted technique with Prolene suture 9 patients develop sinus formation .

**Table 4: Rate of wound complications in infected case (suture technique)**

	Continuous (B 1)	Interrupted (B 2)
wound infection	26	28
Burst abdomen	16	16

Older age (>55 years), male sex, diabetes, anemia, malnutrition and sepsis were found to be a highly significant risk factor for wound infection ( $p < 0.001$ ). Older age (>55 years), male sex, malnutrition and cough were found to be a highly significant risk factor for burst abdomen. ( $P < 0.001$ )

**Discussion**

We found no statistical difference in wound infection and burst abdomen in either of suture material or suturing technique. Since the presence of infection is associated with higher incidence of dehiscence, emphasis to reduce

dehiscence should be placed on prevention of infection rather than a method of closure. If infection develops, both methods of closure are insecure. The suture material or the suturing technique does not play a significant role because both methods have been shown to resist and retard the development of infection. However, since Prolene is non absorbable, it may serve as a foreign body that maintains a superficial sinus tract until it is removed. Many factors other than suture material and surgical technique influence the occurrence of burst abdomen, which includes the age of the patient, sex of the patient, anemia, diabetes, nutrition status of

the port., sepsis, cough and pulmonary complications and so on. So it can be concluded that closure of a mid-line laparotomy wound is safe, whether using Prolene or Vicryl suture material, with either a continuous or an interrupted for the fascial closure.

### Conclusion

As the continuous technique is time saving, reducing the length of time under anesthesia, and as there appear to be fewer cases of wound sinus formation when using delayed absorbable sutures (Vicryl), we recommend continuous delayed absorbable suture in the closure of the fascial layer.

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