



**A STUDY TO COMPARE EFFICACY OF CYANOACRYLATE GLUE VERSUS TRADITIONAL SKIN SUTURE TECHNIQUES FOR CLOSURE OF PFANNENSTIEL INCISIONS AFTER LOWER SEGMENT CESAREAN SECTION**

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**ABSTRACT**

**Background:** Despite the numerous methods available today for closure of surgical incisions i.e. simple continuous, interlocking continuous, horizontal/vertical mattress, staplers, cyanoacrylate glue, adhesive strips, laser welding, steri-strip etc.; no one technique is considered optimal. Each closure technique bring to the table its unique set of advantages and disadvantages. The objective of this study is to compare efficacy of cyanoacrylate glue versus vertical mattress sutures for percutaneous closure of pfannenstiell incision after lower segment cesarean section (LSCS) in terms of scarring, post-operative pain and analgesic requirement, surgical site infection, wound dehiscence etc.

**Methods:** This comparative study of efficacy of cyanoacrylate glue in operative wound closure of pfannenstiell incisions was carried out at Krishna Hospital and Medical Research Centre, Karad, India for a period of two years. The study consisted of 100 women, all undergoing elective lower segment caesarean section. They were divided into two groups. In group A patients (n = 50) cyanoacrylate glue was used for wound closure and in group B patients (n = 50) the wound was closed with interrupted nylon sutures.

**Conclusions:** Maximum numbers of patients were seen in the age group of 21-30 years. Time taken in the closure of wound by cyanoacrylate in group A was considerably lesser than the time taken in the closure of wound by nylon suture in group B. Overall post-operative pain experienced by patient in group A was significantly lesser when compared to group B. Requirement of analgesics was lesser in group A. The incidence of surgical site infection was higher in group B as compared to group A. The incidence of wound dehiscence was not recorded in either groups

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**INTRODUCTION**

Sutures, staples and adhesive tapes are the traditional methods of wound closure, whilst tissue adhesives have entered clinical practice more recently. Closure of wounds with sutures enables meticulous closure, but they may show tissue reactivity and can require removal. Tissue adhesives offer the advantages of no risk of needle stick injury and no requirement to remove sutures later. Tissue adhesives have been used primarily in emergency rooms but this review looks at the use of tissue adhesives in the operating room where surgeons are increasingly using these for the closure of surgical skin incisions.<sup>1</sup>

Traditional skin sutures (TSS) and metal skin clips (SC) are the most common devices utilized for closure of surgical incisions. They are safe and effective, although they require instruments to apply them, are time consuming and, above all, create an extra staff and cost burden for removal of sutures/staples.

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The ideal incision closure should be simple, effective, safe, rapid, inexpensive, painless, cosmetic and bactericidal.<sup>2</sup> Recent studies suggest that the use of tissue adhesive for closure of both traumatic lacerations and incisional surgical wounds leads to cosmetic outcome comparable to conventional sutures.<sup>3</sup>

The greater tensile strength of the suture over glued wound has been ascribed to some extent to the greater fibrosis provoked only internally along the incision by the peri-sutural reaction.<sup>4</sup> Kamer and Joseph found that cyanoacrylate is safe, reliable and cost effective alternative to conventional wound closure techniques if properly used, cyanoacrylate prevents suture marks and milia formation. Patients have minimal complaints and are certainly pleased with the manner in which their wounds heal in comparison to their counterparts from the suture control group. There is no need to remove suture, which was very inconvenient to the patients.<sup>5</sup>

The cyanoacrylates polymerise upon contact with blood, forming a solid film that bridges the wounds and holds the apposed wound edges together. It is likely that this usage will expand as the technology improves. The established indication in gynaecology is for closure of port wounds, while emerging

indications include control of active bleeding during laparoscopic surgery. Cyanoacrylates have been shown to have antimicrobial properties (especially against Gram-positive organisms)

Advances in surgery and anaesthesia have not been paralleled by advances in the treatment of wound problems and skin closure is one of the many factors that are involved. The conventional and universally used methods of skin closure with stitching the edges together have been subjected to the scrutiny of laboratory research and clinical trials. Nevertheless, the results of suturing are not always completely acceptable. The end result of natural healing process is of paramount importance and much effort is given to the production of an invisible scar. The shortcomings of sutures are well documented in literature and we continued to be worried about minor inflammatory reactions with sutures and by skin marks either temporary or permanent. Hence present study has been undertaken to study the efficacy of cyanoacrylate glue in operative wound closure.

## **AIM AND OBJECTIVES**

### ***Aim***

To study the efficacy of cyanoacrylate glue versus vertical mattress sutures for percutaneous closure of pfannenstiel incision after lower segment cesarean section

### ***Objectives***

To compare the efficacy of cyanoacrylate glue versus vertical mattress sutures for percutaneous closure of pfannenstiel incision after lower segment cesarean section in terms of-

- Scarring
- Post-operative pain
- Post-operative analgesic requirement
- Time to mobilization
- Surgical site infection
- Wound dehiscence

## **MATERIAL AND METHODS**

This comparative study of efficacy of cyanoacrylate glue in operative wound closure was carried out at Krishna Hospital and Medical Research Centre, Karad, Maharashtra, India for a period of two years. The study consisted of 100 women all of whom underwent elective surgical procedures. They were divided into two groups: in group A patients (n = 50) cyanoacrylate glue was used for wound closure and in group B patients (n = 50) the wound was closed with interrupted nylon sutures.

### ***Inclusion Criteria***

- Term pregnancies
- Pfannenstiel incision
- Good hygiene
- No post-partum hemorrhage
- Normal body mass index

### ***Exclusion Criteria***

- Preterm or post term pregnancy
- Incisions other than pfannenstiel incision
- Poor hygiene

- Hypertensive disorder of pregnancy
- Morbidly obese females
- Hematological disorders

### ***Adhesive used***

Tissue adhesive employed in this study was n-butyl-2-cyanoacrylate (XOIN) tissue adhesive. The approximate amount required for the closure of various lengths of wound are 0.25 ml for 5 cm incision, 0.5 ml pack for 10 cm incision and 1 ml for 15-20 cm of incision.

### ***Procedure of closing wounds***

The basic pre requisite to achieve suture-less skin closure is a dry, uncontaminated wound in which skin edges can be brought together without undue tension. The skin surface should be suitable for the application of adhesive and hemostasis should be perfect. In all cases of group A the wounds were closed by using n-butyl-2-cyanoacrylate (XOIN). Absolute hemostasis was achieved with pressure application if the ooze was minor or trying with vicryl sutures if there is a major bleeder. Subcutaneous interrupted sutures were applied in all cases with vicryl sutures of size 2-0 or 3-0. All knots were buried while applying the subcutaneous sutures. It was ensured that the level at which subcutaneous suture immersed near the skin edge was through the dermo-epidermal junction and returned through other edge exactly opposite and at the same depth. By giving particular attention to the above step, precise approximation of the skin edge could be achieved. After the above step the end, of the skin incision were held together by skin hooks or clips or allis forceps. The skin was washed and thoroughly dried. The assistant achieved approximation of the wound edges manually by holding the skin edges together by finger or forceps as the case may be. Alternatively in some cases subcuticular continuous stitches taken to approximate the wound precisely. The glue was loaded in the syringe supplied and applicator nozzle was applied to the syringe. The glue was applied directly over the edges in droplet form taking care not to apply the glue between the wound edges. The film of glue extended to at least 5 mm on either side of the healthy skin around the wound area. The wound was held together, till it was dry to allow complete polymerization of the glue as was evident when the film of glue opacified. Clean and dry dressing was applied to the wound and removed the next day. The patient was allowed to take bath from 3rd day onward and told to dry the adhesive struck wound by gentle dabbing and only in some cases had to be removed with acetone. Postoperative antibiotics were given in cases according to the requirement of case. The wound was examined on the 3rd and 7th postoperative day to see for any evidence of infection, which was evident as any erythema surround edges of wound, pain or serous and sero-purulent discharge from the wound. Resultant scar for assessment for cosmetic outcome was seen at 2 weeks and 4 weeks when the patient came for follow up visit.

## **RESULTS**

**Table 1** Age Distribution of Patients In The 2 Groups

<b>Age in years</b>	<b>Group A</b>	<b>Group B</b>
11-20	4	6
21-30	42	40
31-40	4	4
<b>TOTAL</b>	<b>50</b>	<b>50</b>

Maximum patients were in the age group of 21-30 years in both groups.

**Table 2** Incision Closure Time

Group A	Group B
14 ± 2 min	17 ± 2 min

On an average the closure time of pfannenstiel incision was faster by 3 minutes in group A as compared with group B.

**Post-Operative Pain**

Assessment of post-operative pain was done by visual analogue scale. Patients in group A experienced grade 1-2 pain on visual analogue scale as compared to grade 3-4 pain experienced by females in group B; which was significantly more.

**Post-Operative Analgesia**

All patients in group A required single dose of injectable diclofenac 75 mg via intravenous route. However of the females in group B, 35 females required injectable diclofenac 75 mg twice daily dosing for 2 days and the remaining 15 females required injectable analgesics for 3 days to get adequate pain relief.

**Ambulation**

46 of the patients in group A ambulated within the 1<sup>st</sup> 8-10 hours of surgery and the remaining 4 ambulated within 16 hours of the procedure.

Of the females in group B, 30 ambulated within 20 hours after the surgery and the rest ambulated within 30 hours after the surgery.

**Table 3** Incidence of Surgical Site Infection

Group A	Group B
0/50	2/50

Incidence of post-operative surgical site infection was not observed in group A, whereas it was 4% in group B.

**Table 4** Incidence of Post-Operative Wound Dehiscence

Group A	Group B
0/50	0/50

There was no incidence of wound dehiscence in either of the groups.

**Scarring**

Patients in group A has no scar evident on the skin as compared to typical scarring experienced by patients in group B after removal of mattress sutures on day 10 after LSCS.

There was no incidence of keloid or hypertrophic scar observed in either groups for 2 weeks after follow up.

**Cost**

Overall the cost of cyanoacrylate glue was comparable to polyamide 2-0 suture material. No extra expenditure was incurred by the patient parties.

**CONCLUSION**

This comparative study of efficacy of cyanoacrylate glue in operative wound closure of pfannenstiel incision was carried out at Krishna Hospital and Medical Research Centre, Karad, Maharashtra, India for a period of two years. The study

consisted of 100 patients all of whom underwent elective surgical procedures. They were divided into two groups: in group A patients (n = 50) cyanoacrylate glue was used for wound closure and in group B patients (n = 50) the wound was closed with interrupted nylon sutures. The age ranges of patients were between 18-36 years. Maximum numbers of patients were seen in the age group of 21-30 years. Time taken in the closure of wound by cyanoacrylate in group A was considerably lesser than the time taken in the closure of wound by nylon suture in group B. The incidence of wound infection or dehiscence was also significantly lower in group A.

Elek and Conen clearly demonstrated that sutures considerably lowered the resistance of the skin infection. Sutures act as foreign bodies and reduce minimum infective dose of staphylococci, established at 2-8 million organisms by a factor of 1000.<sup>6</sup>

Carpendale and Sereda in their study of role of percutaneous sutures in surgical wound infections found that infection occurred more commonly in sutured wound and not in glued wounds.<sup>7</sup>

Forrester has shown that in skin per cutaneous sutures are the best avoided.<sup>8</sup> Saxena and Willital also have extensively used cyanoacrylate tissue adhesive in the closure of extremity wound in paediatric emergency department. They found that the management of lacerations with sutures involves the use of needles and the injection of local anaesthetic and present a unique challenge in the wound management of an already distressed and frightened child. Cyanoacrylate tissue adhesive was found to be an effective alternative replacing skin sutures on virtually all facial lacerations and was also employed in low skin tension wound management. They also reported that cyanoacrylate adhesive applied with optimal immobilization was found to be effective method of skin closure in high skin tension laceration.<sup>9</sup>

Quinn et al compared tissue adhesives and sutures in the management of lacerations. They conducted a study on 130 patients with 136 lacerations over a 5 months period. The lacerations included all eligible non mucosal facial lacerations, as well as selected extremity and torso lacerations (not on hand, feet or joints). A 3 month photograph of the wound was assessed by a plastic surgeon and the results were found to be comparable to closure by sutures. They found the tissue adhesive to be a faster method of wound repair as well as being less painful and better accepted by the patients.<sup>10</sup>

Messi et al studied the cost and benefit of use of cyanoacrylate glue in paediatric emergency departments. They found the use of adhesive glue much easier and economical because of its advantages: no need of local anaesthesia, syringes, sterile suture instruments and dressing materials; no further dressing; no suffering of children during the treatment and good aesthetic results.<sup>11</sup>

Hallocock GG in his study on the varied use of cyanoacrylate glue in plastic surgery found it to be a rapid, painless, suture free method for closure of simple lacerations and surgical wounds. They found that the glue has now been used in more than 100 different occasions for off label applications including nailbed repair, skin graft fixation, temporary otoplasty, wound sealant, and other forms wound closure. In their study, complications were virtually non-existent and there was no evidence of histotoxicity.<sup>12</sup>

Thus the results achieved in the present study are comparable to those of the above workers as regards very low incidence of wound infection, excellent cosmetic results, easy application and painless removal, lack of skin reaction and very high patient acceptability.

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