



A COMPARATIVE STUDY OF TISSUE GLUE WITH SUTURES FOR WOUND CLOSURE IN RURAL COMMUNITIES OF NORTH COASTAL ANDHRA PRADESH

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ABSTRACT **INTRODUCTION:** Tissue glue is newer, safer alternative to sutures. To date, tissue glue was familiar amongst the urban population, in this study, we have introduced the tissue glue to the rural farming population in North Andhra Pradesh. Studies have proved benefits of tissue glue are decreased procedure time and less pain compared to sutures.

AIMS AND OBJECTIVES: To compare tissue glue with sutures for skin closure in wounds for the following characters in the farming communities of North Andhra to compare cost-effectiveness, pain, and cosmetic outcome.

MATERIALS AND METHODS: A total of 50 patients attending ANH casualty and surgery OPD from October 2020 to August 2021 with traumatic wounds were included in the study.

RESULTS: 24 (96%) cases are cosmetically good in cases in which tissue glue was applied and 1(4%) in which suturing was done (p-value= < 0.05). 1(4% p< 0.05) case had pain with glue application and 25(100%) cases had pain post suturing(p-value=0.000). 15(60%) cases readily affordable for glue whereas 20(80%) cases chose suturing (p-value > 0.05).

CONCLUSION: Tissue glue applications have been preferred more among children compared to adults, probably due to lesser pain. The cosmetic outcome is very good with tissue glue with minimal scar compared to sutures. Pain with tissue glue is less before and after the procedure as there was no local anesthesia and no bites were taken. Tissue glue was costly compared with sutures which some patients couldn't afford. There is no need to revisit for tissue glue, unlike sutures where the patient has to come for removal.

KEYWORDS : Tissue, Glue, Sutures, Wound, and Scar.

1.INTRODUCTION:

Wound healing is a mechanism whereby the body attempts to restore the injured part. It involves several factors and phases in the process of wound healing. Inflammatory phase, Proliferative phase, and remodeling phase are the phases involved in wound healing. Factors such as contamination (foreign bodies/ bacteria), loss of tissue including vascular insufficiency, previous radiation, malnutrition, diabetes mellitus, medications such as steroids, immune deficiencies and smoking influence wound healing. The wounds encounter different infections during the process of surgery and post-surgery; wound healing is significant for surgeons, despite major improvements in antibiotics, better anesthesia, superior instruments, early diagnosis of the problem, and improved techniques of postoperative vigilance. The ideal surgical wound would be as strong as normal tissue the moment it is closed. Douglas and Forester found that the maximum strength in the tissue that could be regained after wound closure is 80% even on one-year follow-up.(1)

Wound closure techniques have evolved from early developments in suturing material to advanced resources that include skin staplers, skin glue, and adhesive tapes. The most commonly used technique after suturing is adhesives. The first adhesive used for skin closure is cyanoacrylate, which polymerizes with human tissues. **Two** which originally gained fame in 1958 as a super-strong, fast-drying glue, marketed(3). Several other compounds from the same family of cyanoacrylate have been developed, such as methyl cyanoacrylate, ethyl cyanoacrylate, isobutyl cyanoacrylate, and butyl cyanoacrylate. Other tissue glues involve fibrin and work on the principles of converting fibrinogen to fibrin by thrombin with cross-linking by factor 13 and the addition of aprotinin to slow the breaking up of the fibrin network by plasmin(4). The essence of modern surgeons nowadays depends on the performance of the surgery and the quality of the material used in the surgery. Based on the efficacy of advanced suturing techniques, the patient may be benefited from better cosmesis, lesser postoperative pain, less wound infection, lesser hospital stay. When a surgeon sutures a clean incision, healing takes place with minimal Loss of tissue and without significant bacterial infection with minimal scarring, whereas the usage of glue showed better results in comparison with suture material.

The combination of n-butyl-2- cyanoacrylate and a blue dye may be bacteriostatic for pyogenic gram-positive cocci(5). Tissue adhesives

offer a barrier to microorganisms to the site of healing and therefore reduce the infections to a larger extent. Time taken for skin closure and cosmesis achieved in glue treatment is appreciable when compared to sutures. Majority of the surgeons in the urban shift to the application of glue for the quick recovery economic and psychological benefit of the patients. To date, tissue glue was familiar amongst the urban population. In this study, the tissue glue was introduced to the rural farming population of North Andhra. Considering all the above aspects of glue over sutures, the present study is performed to compare the efficacy of glue with the suture material in rural communities of North Coastal Andhra Pradesh.

2.AIMS AND OBJECTIVES :

To compare tissue glue with suture for skin closure in wounds for following characters in the rural communities of North Coastal Andhra Pradesh .

- Cosmetic outlook after closure.
- Pain
- cost effectiveness.

3.MATERIAL AND METHODS:

The present study is a comparative cohort prospective study which consists of a total of 50 patients. All the patients were recruited from the Department of General Surgery in NRI Institute of Medical Sciences, Vishakhapatnam, Andhra Pradesh, during the period of OCTOBER 2020 to August 2021. The study was approved by Institutional Ethics Committee.

4.inclusion Criteria

Patients presenting to the Dept of General Surgery in the OPD and casualty with traumatic wounds.

5.exclusion Criteria

- Traumatic wounds require to be closed under tension.
- Known personal or family history of keloid formation or scar hypertrophy.
- A known allergy to tissue glue.

6.data Collection:

Detailed history and thorough examination of the patients, routine blood investigations like complete hemogram, BT, CT, HIV, HBsAg, blood sugars, blood urea, and serum creatinine (other relevant

investigations if required) of all the recruited 50 patients of traumatic wounds were taken before any procedure of suturing or gluing. The patients were then randomly selected and subjected to the wound closure either with non-absorbable suture using prolene or ethilon or n-butyl-2- cyanoacrylate. After the procedures, the patients were divided into two groups of 25 each and named Group A (patients who received n-butyl-2- cyanoacrylate) and Group B (patients who received non-absorbable suture). The adhesive shall be applied in a single layer while keeping the two ends of the incised wound stretched using forceps. After the application of glue and closure of the wound, the approximated time to hold the wound is 1 min for proper approximation till a strong bond is formed. Following the procedure, the patients were kept under observation for ½ an hr to one hour and discharged with some oral antibiotic protocol for five days. The amount of pain during the procedure that a patient feels ranges across a continuum from none to an extreme amount of pain which was analyzed by the Visual Analogue Scale (VAS). From the patient's perspective, this spectrum categorized as none, mild, moderate and severe would suggest(6).

Wound healing of the patients will be checked during their visits to the hospital at certain intervals of 6 months period depending upon their improvement. The cosmetic appearance of all wounds will be assessed three months after closure by an independent examiner. Modified Hollander ordinal cosmesis scale of 6 variables including Step off the borders, Contour irregularities – puckering, Wound margin separation, Wound edge inversion, Excessive wound distortion, and Good overall appearance were used to determine the wound appearance for cosmesis on the 7th Postoperative day. A score of 6 was considered optimal, while five or less as suboptimal. Surgeons' and patients' satisfaction, pain relief, or pain management will be recorded during the patient's visits.

7.statistical Analysis:

The results were averaged (mean ±standard deviation) for continuous data and are presented in Tables and Figures.

The student's t-test was used to determine whether there was a statistical difference between study groups in the parameters measured.

8.RESULTS:

Table 1 - Comparison of Cosmetic outcome after closure among Study Group

Modified Hollander Scale	INDEPENDENT T-TEST				p- value
	Type of Treatment	N	Mean	Std Dev	
Glue	25	5.347	1.01	0.0001**	
Sutures	25	3.173	1.304		

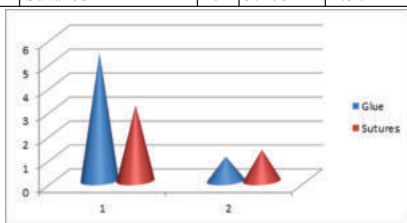


Figure 1. Comparison of Cosmetic outcome after closure among Study Group

Above table depicts the wound cosmesis score for both glue and suture group with mean value of 5.347 and 3.173 respectively. The p value is of significant being <0.01 and the outcome is good with adhesive group.



Figure 2. Wound before Closure



Figure 3. Wound after closure with Glue

Table -2 : Comparison of Post Operative pain during procedure in Study Group:

Visual Analogue Scale (VAS)	INDEPENDENT T-TEST				p- value
	Type of Treatment	N	Mean	Std Dev	
Glue	25	3.847	1.01	0.0465**	
Sutures	25	3.173	1.304		

P* - <0.001

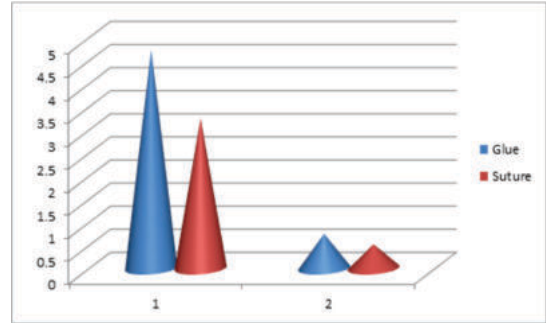


Figure 4. Comparison of Post Operative pain during procedure in Study Group:

In the present study. Post Operative pain is monitored up to 1 hr. It is observed that patient with glue have lesser pain than suture material. The visual analogue scale shows mean value for group A, it is 3.847 ±1.01 and for group B, it is 3.173 ± 1.304. This value is of great significance with p value <0.001.

Regarding the cost effectiveness, the glue appears to be costly at the first instance. But ,when the hospital visits and pain is taken into account, the glue and sutures are found to end up with the same expenses.

9.DISCUSSION:

Wound closure techniques are essential for quick recovery and good cosmetically. All these techniques mainly target proper wound approximation without disturbing the natural healing process. Suturing is a routine and gold standard technique for wound closure due to its cost-effectiveness and availability. But with the advancement of technology, both surgeons and patients are opting for faster and cosmetically better techniques. Though the suturing technique is known to retain maximum tensile strength, it is associated with postoperative pain, regular visits of patients for dressing, suture removal whose cost must be borne by the patient and causes anxiety or pain. Suturing is also more susceptible to microbial invasion, leading to surgical site infection. These flaws of suturing made to research for better material for the wound closure technique led to the discovery of cyanoacrylate tissue glue. However, the present study included different parameters in wound healing like age, gender, time taken to heal, socioeconomic status, and other demographic variables. This article mainly conferred to cosmetic outcome after closure, pain, and Cost-effectiveness. The current study assessed the cosmetic outcome using Modified Hollander and VAS Cosmesis scale. The mean cosmesis score for group A is 5.347 ± 1.01, and group B is 3.173 ± 1.304, which was numerically in favor of glue, and this difference is proved as statistically significant with P-Value - <0.001. Similar to the present study, Keng et al., in a randomized series of 43 patients whose operations involved a groin incision, found that the glued wounds had consistently better cosmetic scores (mean score 4.71 at four weeks) compared to subcuticular wounds (mean score 4.00 at four weeks) with a P<0.05(7).

After the procedure, the patient was kept under observation for up to an hour. Visual Analog Scale (VAS) was used to assess the postoperative pain, which the patients themselves filled up. This study showed a significant P <0.001 value for lesser postoperative pain with a mean score in group A 3.34 ±1.01. Unlike this study, other studies by Zempsky et al. Arunachalam et al., have compared the postoperative pain using a visual analog scale and shown less postoperative pain following adhesive glue closures but had failed statistical significance(8,9).

Comfortability, Infections, dressing, absence of suture removal, and lesser visits made the patients more satisfied with glue application than the suturing. Though the adhesives cost more than the suturing, people are willing to opt gluing procedure as the difference is meager and

affordable. Supporting our study, Christopher Jones S et al. conducted a study for the economic outcome. They found that overall, it was significantly more economical to use skin adhesive (20.3 Euros) than sutures (29.3 Euros) ($p < 0.001$) (10).

10. CONCLUSION:

The study supports the usage of glue in place of sutures for its efficacious cosmetic outcome of skin closure, reduced postoperative pain, and cost-effectiveness. Also, the study considers and encourages the technical advancements in wound healing techniques to better people's living and strongly recommends the shift from conventional suturing to adhesives.

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Conflict of interest: None declared

13. Ethical Approval: The study was approved by the Institutional Ethics Committee

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