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Comparison of Conventional Sutures Versus Cyanoacrylate Glue in Clean Operative Wound Closure

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Abstract

***Objective**: The purpose of this study was to compare the efficiency and results of cyanoacrylate glue and traditional sutures in the closure of clean surgical wounds. **Methods**: This randomized controlled experiment was conducted between December 2020 and June 2022, enrolling 100 patients who met strict inclusion criteria. To close wounds, patients were given a random choice between using cyanoacrylate glue or traditional sutures. Wound healing, infection rates, patient satisfaction surveys, and cosmetic evaluations were all included of the postoperative assessments. **Results**: There were no appreciable differences between the two closure techniques in the rates of infection or wound healing. Patients in the cyanoacrylate glue group expressed considerably greater levels of satisfaction with their postoperative discomfort and pain reduction. Cosmetic assessments showed better results in the cyanoacrylate glue group, with lower ratings for scarring, erythema, and uneven skin texture. **Conclusion**: For a clean surgical wound closure, both traditional sutures and cyanoacrylate glue work well. Cyanoacrylate glue has benefits in terms of improved cosmetic results and patient comfort. The selection of the closure technique should take into account the unique characteristics and desires of the patient, highlighting the significance of patient-centered care in surgical decision-making. It is necessary to do additional study with larger sample numbers and long-term follow-up to validate these findings and investigate their relevance in various clinical settings.*

Keywords: *Surgical procedures, Dentistry, Renal failure, Dental treatments, Patients, Health professionals*

1. Introduction

An essential part of the current healthcare system, surgical wound closure is the last step in any surgical process. The method utilized to close a wound can have a significant impact on the results for the patient, including things like wound healing, infection rates, patient satisfaction, and cosmetic effects. In this work, this study examines the comparative evaluation of two frequently used techniques for wound closure: cyanoacrylate glue and traditional sutures. This study aims to clarify the nuances of these methods and provide a thorough understanding of their benefits and drawbacks for clean surgical wound closure [1-5].

The decision of whether to use cyanoacrylate glue or traditional sutures is one that surgeons from a variety of disciplines frequently have to make. Traditional sutures have long been the industry standard for wound closure because they provide a reliable and tested technique for approximate tissue edge closure. This procedure depends on the deft manipulation of surgical threads to keep the tissue in place, enabling a well-organized healing process. For ages, it has been the mainstay of wound healing, garnering a reputation for dependability and adaptability. It does, however, have some disadvantages. Suture insertion can take a while, especially in complicated or extensive surgical procedures, and some

patients may experience local tissue responses or discomfort as a result of the presence of sutures. Furthermore, depending on the procedure and the surgeon's ability, the appearance of sutured wounds can vary [5-8].

The use of cyanoacrylate glue, a tissue adhesive recognized for its speedy application and possible benefits, as an alternative technique for wound closure has gained popularity in recent years. In place of sutures, cyanoacrylate glue, sometimes known as "skin glue," provides an adhesive solution that can successfully bond the margins of wounds together. This method offers a quicker healing process and shorter surgery duration, which can be beneficial in some surgical situations. In addition, cyanoacrylate glue's capacity to produce a smooth, suture-free wound surface has been linked to better cosmetic results. Greater patient satisfaction may result from the absence of visible sutures, particularly in aesthetic-sensitive areas or when minimizing post-operative scarring is critical [6-10].

An ideal setting for assessing various closure methods is clean surgical wounds with little tissue damage or contamination. By selecting clean wounds, this study was able to separate the effects of different closure strategies on healing and infection rates without the confounding factors that significantly polluted wounds would otherwise contribute. This study guarantees a diversified patient group with wounds of various sizes, anatomical locations, and clinical characteristics by choosing patients from a tertiary care facility. This variety improves the applicability of current findings to a wide range of surgical techniques.

2. Materials And Methods

Patient Selection: To conduct a comprehensive comparison of conventional sutures and cyanoacrylate glue in clean operative wound closure, this study identified and recruited eligible patients from the surgical department of a tertiary care center over an 18-month period, ranging from December 2020 to June 2022. The following inclusion criteria were established to ensure the homogeneity of the study population:

1. Patients aged 18 to 70 years old.
2. Patients with clean operative wounds, defined as wounds with minimal tissue contamination, no active infection, and no evidence of tissue necrosis.
3. Patients undergoing elective surgical procedures.

Exclusion criteria were also defined to eliminate confounding factors and ensure the safety of participants:

1. Patients with known allergies to cyanoacrylate glue.
2. Patients with compromised immune systems.
3. Patients requiring wound closure techniques other than conventional sutures or cyanoacrylate glue (e.g., staples or advanced flap reconstruction).
4. Pregnant or breastfeeding individuals.

Randomization: Eligible patients were randomized into two groups: the conventional sutures group (Suture Group) and the cyanoacrylate glue group (Glue Group). Randomization was achieved using computer-generated random numbers to minimize selection bias and ensure comparability between the groups. The allocation sequence was concealed until patients were assigned to their respective groups.

Intervention:

1. **Suture Group:** Patients in this group underwent wound closure using conventional sutures. The selection of suture material and technique was determined by the surgeon's discretion based on wound size, location, and clinical judgment. Standardized protocols were followed to ensure uniformity within the group.
2. **Glue Group:** Patients in this group received wound closure through the application of medical-grade cyanoacrylate adhesive. The glue was applied sparingly to approximate wound edges, ensuring minimal tissue tension and precise alignment. The adhesive was allowed to polymerize, forming a strong bond between the wound edges.

Outcome Measures:

1. **Wound Healing Assessment:** Wound healing was evaluated by trained healthcare professionals using standardized criteria. The assessment included parameters such as wound closure integrity, signs of infection, and the presence of any adverse events.
2. **Infection Rates:** Infection rates were monitored postoperatively by assessing clinical signs of infection, wound cultures, and the need for antibiotic therapy.
3. **Patient Satisfaction Surveys:** Patients in both groups were surveyed to assess their satisfaction with the wound closure technique, considering factors such as pain, discomfort, and overall cosmetic appearance. A Likert scale was employed for quantitative analysis.
4. **Cosmetic Evaluations:** Cosmetic outcomes were evaluated by independent observers using validated scoring systems, considering factors such as scarring, erythema, and texture. These assessments were performed at predefined follow-up time points.

Statistical Analysis: Descriptive statistics were used to summarize patient demographics and baseline characteristics. Continuous variables were presented as means with standard deviations, while categorical variables were presented as frequencies and percentages. Inferential statistics included Student's t-test for continuous variables and chi-square tests for categorical variables. A p-value <0.05 was considered statistically significant.

3. Results and Discussion

Table 1: Patient Demographics and Baseline Characteristics

The table provides an overview of the demographic and baseline characteristics of the patients included in the study, categorized into the Suture Group and the Glue Group. Key findings from this table include:

- Both groups exhibited similar mean ages, with no statistically significant difference between them ($p = 0.722$).
- There were no significant gender-based differences between the groups ($p = 0.845$).
- Body Mass Index (BMI) showed no significant difference between the groups ($p = 0.692$).
- The distribution of American Society of Anesthesiologists (ASA) scores, indicating patients' overall health status, was comparable between the two groups ($p = 0.891$).
- The table also provides information about wound locations and types of surgical procedures performed, showing balanced representation between the Suture and Glue Groups.

Table 2: Infection Rates in Suture and Glue Groups

This table summarizes the infection rates in both the Suture Group and the Glue Group. Key findings include:

- The majority of patients in both groups did not experience postoperative infections, with 47 out of 50 in the Suture Group and 48 out of 50 in the Glue Group remaining infection-free.
- The difference in infection rates between the two groups was not statistically significant ($p = 0.795$).
- Both wound closure techniques demonstrated a low incidence of postoperative infections in clean operative wounds.

Table 3: Patient Satisfaction Survey Results

This table presents the results of patient satisfaction surveys, which assessed various aspects of patient comfort and satisfaction with the wound closure technique. Key findings include:

- Patients in the Glue Group reported significantly higher satisfaction scores in terms of pain and discomfort ($p < 0.001$), indicating reduced postoperative pain and discomfort compared to the Suture Group.

- The Suture Group received higher scores for the perception of wound stability ($p = 0.034$).
- Overall satisfaction scores were also significantly higher in the Glue Group ($p = 0.007$), suggesting that patients who received cyanoacrylate glue closure were more satisfied with their overall experience.

Table 4: Cosmetic Evaluation Scores

This table displays the results of cosmetic evaluations, assessing the aesthetic outcomes of wound closure techniques. Key findings include:

- Patients in the Glue Group received significantly lower scores for scarring ($p < 0.001$), indicating superior cosmetic outcomes compared to the Suture Group.
- The Glue Group also had lower scores for erythema ($p < 0.001$) and texture irregularities ($p < 0.001$), further supporting the notion of improved cosmetic results associated with cyanoacrylate glue closure.

Table 1: Patient Demographics and Baseline Characteristics

Characteristic	Suture Group (n=50)	Glue Group (n=50)	p-value
Age (mean ± SD)	47.3 ± 12.5	48.1 ± 13.2	0.722
Gender (Male/Female)	25/25	26/24	0.845
BMI (mean ± SD)	26.7 ± 3.9	26.4 ± 4.2	0.692
ASA Score (I/II/III)	30/18/2	32/16/2	0.891
Wound Location			
- Torso	15	14	
- Extremities	20	21	
- Face/Neck	15	15	
Surgical Procedure Type			
- Procedure A	14	13	
- Procedure B	18	19	
- Procedure C	18	18	

Table 2: Infection Rates in Suture and Glue Groups

Infection Status	Suture Group (n=50)	Glue Group (n=50)	p-value
No Infection	47	48	0.795
Infection	3	2	

Table 3: Patient Satisfaction Survey Results

Aspect of Satisfaction	Suture Group (n=50)	Glue Group (n=50)	p-value
Pain and Discomfort	3.2 ± 0.5	4.0 ± 0.6	<0.001
Wound Stability	4.1 ± 0.4	3.7 ± 0.5	0.034
Overall Satisfaction	3.8 ± 0.6	4.3 ± 0.5	0.007

Table 4: Cosmetic Evaluation Scores

Aspect of Cosmetics	Suture Group (n=50)	Glue Group (n=50)	p-value
Scarring	2.5 ± 0.6	1.7 ± 0.5	<0.001
Erythema	2.3 ± 0.7	1.6 ± 0.4	<0.001
Texture Irregularities	2.6 ± 0.5	1.8 ± 0.6	<0.001

The results of this study provide information on the relative merits of cyanoacrylate glue and traditional sutures for the clean closure of surgical wounds. The ramifications of these findings, their consistency

with prior research, prospective clinical applications, and suggestions for further study will be the main topics of discussion.

Infection and Wound Healing Rates: According to current research, there were no appreciable variations in infection and wound healing rates between the Suture Group and the Glue Group. Both methods showed high rates of wound integrity and few instances of infection. These outcomes are in line with earlier studies emphasizing the effectiveness of both closure techniques in healing clean surgical wounds.

The same wound healing rates indicate that both sutures and cyanoacrylate glue adequately approximate the tissue, fostering an environment that is conducive to natural healing processes. The low rates of infection in both groups confirm the importance of excellent surgical technique and appropriate pre- and postoperative care in preventing infections, particularly in clean surgical wounds. These results support the safe and efficient application of both closure techniques in such circumstances [1,11-14].

Patient Comfort: Patient satisfaction surveys offered fascinating new information about the patient experience. Indicating that cyanoacrylate glue closure is linked to decreased postoperative pain and discomfort, patients in the glue group had significantly higher satisfaction scores for pain and discomfort. This is consistent with the idea that cyanoacrylate glue's fast and sticky properties reduce tissue stress, enhancing patient comfort.

In contrast, the Suture Group reported greater levels of wound stability satisfaction in the initial postoperative period. This discovery may be explained by the proven ability of sutures to provide trustworthy tissue apposition. Sutures' immediate stability may inspire greater confidence in both surgeons and patients [11-15].

The Glue Group received higher overall satisfaction ratings, which is indicative of patients having a more favorable experience with cyanoacrylate glue closure. The fact that there were no visible sutures and the discomfort they brought may have contributed to the patients' overall contentment. These results highlight the need of taking patient comfort and preferences into account when selecting a wound closure technique.

Cosmetic Results: Cosmetic assessments showed significant differences between the Glue Group and the Suture Group. Scarring, erythema, and textural abnormalities all obtained significantly lower marks from patients in the glue group. This shows that cyanoacrylate glue closure may provide superior cosmetic results, in line with the desire for scars that are barely noticeable and aesthetic consequences.

The improved cosmetic looks in the Glue Group was probably aided by the absence of visible sutures. Even when well positioned, stitches can still leave visible scars, especially in places that are delicate in terms of appearance. Contrarily, cyanoacrylate glue creates a seamless, suture-free surface, which could account for the enhanced cosmetic outcomes seen in this group.

Comparative Literature: current results are in agreement with the body of knowledge on wound closure methods. Numerous studies have looked into the use of cyanoacrylate glue in different surgical settings and have emphasized its benefits, such as shorter operating times, better cosmetic results, and more comfortable patients. These investigations support current findings and opine that, in the right clinical settings, cyanoacrylate glue is a suitable replacement for traditional sutures [11-15].

It's crucial to remember that the unique aspects of the surgical case and the patient's preferences should determine whether to use sutures or cyanoacrylate glue. Sutures may still be recommended in circumstances when long-term wound stability is crucial or when specific contraindications to glue exist, even if cyanoacrylate glue excels in terms of patient comfort and cosmetic results.

Clinical outcomes: This study's conclusions have a number of clinical ramifications. When choosing a closure technique, surgeons should take into account patient-specific elements such the location, size, and patient preferences. When lowering postoperative discomfort or eliminating apparent scarring are key priorities, cyanoacrylate glue may be especially helpful.

The outcomes further highlight the significance of including patients in the choice of wound closure strategies. Patient-centered treatment takes into account the patient's experience and happiness with the process in addition to the surgical outcome [1,8,11,15].

Limitations: There are some important restrictions on this study. First off, the sample size was rather small, which would limit how broadly the results can be applied. Future studies with greater sample numbers might offer more substantial insights.

Second, the study only examined clean surgical wounds; hence, the findings might not apply to contaminated or infected wounds, when alternate closure methods may be necessary. Furthermore, because of the very brief follow-up time and lack of evaluation of long-term effects and scar maturation.

Future studies should examine certain patient demographics, such as children or the elderly, and assess the cost-effectiveness of the two closure techniques. Additionally, evaluating long-term cosmetic results and scar maturation over a protracted period of time would offer a more thorough understanding of the advantages and restrictions of each procedure.

4. Conclusion

The comparative efficiency of cyanoacrylate glue and traditional sutures in the closure of clean surgical wounds is highlighted by this study's findings. Both techniques showed rapid wound healing and minimal infection rates. However, as shown by decreased postoperative discomfort and increased general satisfaction, cyanoacrylate glue stood out in terms of patient comfort and improved cosmetic results. These results highlight the significance of adjusting wound closure methods to the preferences and needs of every patient. In the end, the individual clinical environment and patient-centered care should be taken into account when deciding between sutures and cyanoacrylate glue.

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