



THE EFFECTIVENESS OF THE HAIR APPPOSITION TECHNIQUE IN COMPARISON TO THE TRADITIONAL SUTURING AND STAPLING FOR SCALP LACERATIONS- AN OBSERVATIONAL STUDY AT A TEACHING HOSPITAL IN RURAL INDIA

Surgery

**Yashashwini
sudina***

SVS Medical College, Yenugonda, Mahbubnagar, Telangana, 509001 *Corresponding
Author

**Vamshi Surya
Diviti**

SVS Medical College, Yenugonda, Mahbubnagar, Telangana, 509001

Ananth saripalli

SVS Medical College, Yenugonda, Mahbubnagar, Telangana, 509001

Vikram S

SVS Medical College, Yenugonda, Mahbubnagar, Telangana, 509001

ABSTRACT

Aim: Scalp lacerations are commonly found in patients presenting with road traffic accidents to the casualty. These lacerations can be repaired with suturing, stapling, adhesive tapes, or tissue adhesives. In this study, we tried to compare the effectiveness of suturing, stapling, and hair apposition techniques in repairing scalp lacerations of patients who presented to casualty. **Materials and Methods:** After obtaining approval from the institutional ethics committee, we examined the effects of the techniques in repairing scalp lacerations on wound healing, complication rate, and patient satisfaction by recording data. **Results:** Out of the 150 patients observed in our study, there was a significant difference between the scalp repair technique on the 7th and 15th-day patient satisfaction rates in favour of the hair apposition technique ($p < 0.05$). There was a significant difference between the scalp repair technique and cosmetic problems after 15 days ($p < 0.05$). Cosmetic problems 15 days after the procedure were significantly lower in the hair apposition technique. **Conclusion:** In patients presenting to emergency departments with linear scalp laceration, suturing, stapling, and hair apposition techniques can be safely applied. However, the hair apposition technique has the advantages of being more satisfying and having lower cosmetic problems and complication rates than other techniques.

KEYWORDS

Hair apposition, Suturing, Stapling, Scalp lacerations.

INTRODUCTION

The main objective of wound repair is to restore skin integrity and, while doing this, to reduce the rate of infection, scarring, and functional impairment [1].

Lacerations are repaired with sutures, staples, adhesive tapes, and tissue adhesives. Each method has its own advantages and disadvantages [2]. Suturing is the most used method in laceration repair [3]. It is the strongest of all wound closure materials and allows the best approximation of wound edges irrespective of wound shape. However, it is also the most time-consuming and user-dependent among all techniques available.

Repair via stapling is another method used for scalp lacerations. It is preferable to suturing in emergency services because it is a quicker and less painful procedure associated with a lower cost and risk of needle stick injury to the operator. It is also preferred in pediatric age groups owing to the above-mentioned properties [4-6].

The hair apposition technique (HAT) is an alternative technique in scalp lacerations. The hair apposition technique was first defined by Hock et al. in 2002. In this technique, 4–5 strands of hair are grasped on each side of the wound. These strands are crossed once, and a drop of glue is placed where the strands cross to secure the wound. [6,7]

There are very few studies assessing the effectiveness of different techniques in the outcomes of the repair of scalp lacerations. Our study was designed with the aim of retrospectively comparing the effectiveness of three techniques i.e., suturing, stapling, and hair apposition techniques (HAT), which were used for the repair of scalp lacerations in patients who presented to the casualty with scalp lacerations with respect to patient satisfaction, aesthetic outcome, and complication rates.

MATERIALS AND METHODS

This was a retrospective observational study conducted in SVS Medical College, Mahbubnagar, over 2 years (November 2020–2022) after the approval from the Institutional ethical committee and consent from the patients regarding the study purpose, procedures, risks, and benefits. The inclusion and exclusion criteria are mentioned in table 1. The patients were divided into Group 1: those who applied tissue adhesives; Group 2: those who applied the suture technique; Group 3: those who applied stapling technique. Cosmetic problems, patient satisfaction, wound healing status, and complications were determined

from the files of the patients who returned for a follow-up examination on the 7th & 15th days of suturing. The method of wound closure was made to the physician's preference. The applied technique, satisfaction of the patient and complication parameters were recorded on study forms. Patient satisfaction was assessed by the degree of pain in patients, which was evaluated with a visual analogue scale (VAS). Complications were assessed by redness and purulent wound drainage. Cosmetic problems were defined objectively by using the modified Hollander cosmesis scale. Data were analyzed with MS Excel and SPSS 23.0. Comparison between groups for all continuous/ ordinal data was made by using student t-test and ANOVA. Categorical data were analyzed using F-test and Chi-square test. A P value of < 0.05 was considered significant.

Table 1: Showing The Inclusion And Exclusion Criteria

INCLUSION CRITERIA	EXCLUSION CRITERIA
1. Linear lacerations	1. Nonlinear lacerations
2. Laceration length shorter than 10 cm	2. Contaminated wounds
3. Laceration repair was performed with simple spaced percutaneous suturing using 4/0 monofilament suture material.	3. Active arterial bleeding
4. Laceration repair was carried out with stapling.	4. Unstable vital signs or shock
5. Laceration repair was carried out with tissue adhesive.	5. Altered consciousness
	6. Irregular wound edges and associated tissue loss
	7. Immunocompromised patients
	8. Comorbidity patients

RESULTS

A total of 150 patients were divided into three groups based on the technique of scalp laceration repair: Group 1: Suturing (N=50); Group 2: Stapling (N=50); Group 3: Tissue adhesives (N=50).

The distribution of the technique according to patient demographics is given in table 2.

Table 2: Demographic Characteristics of the Three Study Groups (1, 2 & 3)

Demographic Characteristics	Group1 N=50	Group 2 N=50	Group 3 N=50	P Value
Age (M+-Sd)	34.22 (+13.05)	39.42 (+12.43)	37.98 (+13.33)	> 0.05
Gender (M/F)	37/13	39/11	33/17	

Regarding patient satisfaction, group 3 [Tissue adhesives] was found

to be most effective on both days 7 & 15 and found to be statistically significant. ($p < 0.05$)

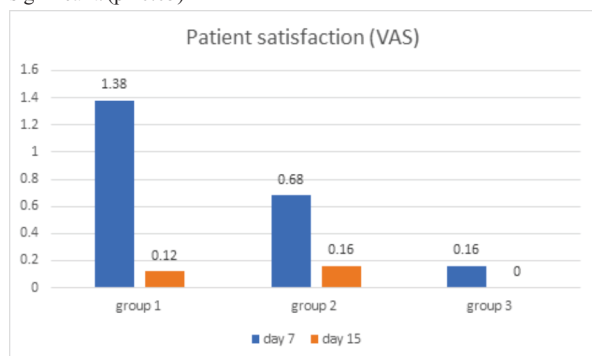


Fig: 1 Comparison of Patient Satisfaction (VAS) In the Three Study Groups (1,2 & 3)

In terms of complications, Group 2 [Stapling] and Group 3 [Tissue adhesives] were found to be equally more effective than group 1 [Suturing] in terms of complications on both days 7 & 15.

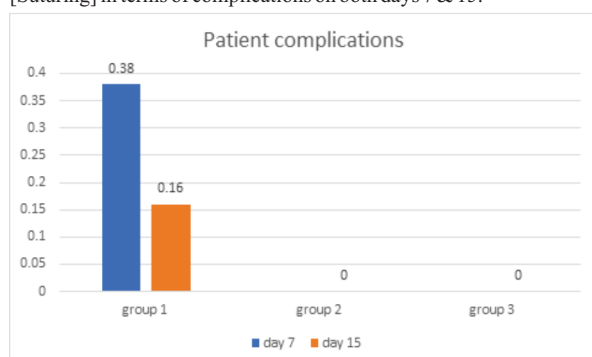


Fig 2: Comparison of Patient Complications in the Three Study Groups (1,2 & 3)

As regards aesthetic outcome, group 3 [Tissue adhesives] was observed to be most effective, followed by group 2 [Stapling] and then group 1 [Suturing].

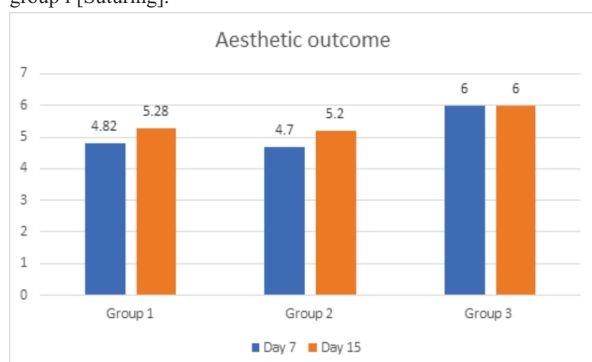


Fig 3: Comparison of Aesthetic Outcome in The Three Study Groups (1,2 & 3)

In the present study, on comparison of the effectiveness of the above three techniques of scalp laceration repair, as assessed by patient satisfaction, complications, and aesthetic outcome, group 3 [Tissue adhesives] was found to be most effective, followed by group 2 [Stapling] and then group 1 [Suturing].

DISCUSSION

This study found HAT an effective alternative treatment for patients with suitable scalp lacerations. Patients undergoing HAT were less likely to have scarring or complications (i.e., infection, scarring, bleeding, wound breakdown) and just as likely to have satisfactory wound healing. Patients also complained of less pain and seemed to accept the procedure highly.

Ozturk D et al. [7] and previous studies suggested that a hair length of

at least 1 cm is essential for applying the hair apposition technique in scalp lacerations.

Khan et al. [8] compared the cosmetic outcome of scalp wound closure with staples to traditional skin sutures in their prospective, randomised trial. The groups had no significant demographic or baseline differences, like in the present study.

The demographic characteristics were comparable, thus negating any probable confounding effect due to differences in demographic factors on the results of the present study.

As regards patient satisfaction; in the two groups; group 1 [Suturing] and group 2 [Stapling], when the difference in the mean patient satisfaction scores on day seven was compared with those on day 15; differences were found to be highly significant statistically ($P < 0.001$) and in group 3 it was found to be statistically significant. ($P < 0.05$).

Hair apposition (HAT) was equally acceptable and superior to standard suturing for closing suitable scalp lacerations. The advantages of hair apposition were fewer complications, a shorter procedure time, less pain, no need for shaving or removal of stitches, similar or superior wound healing, and high patient acceptance. Thus, it reported a higher satisfaction rate in patients treated with the hair apposition technique compared with those treated with suturing technique. This high satisfaction rate was related by the authors to the properties of the method, including quick application, less painful nature due to the need for anaesthesia, and the lack of need for shaving and suture removal.[7]

Wilson AP et al. [9] devised a method of assessing wound healing that carefully defined the characteristics to be considered and how they should be awarded points. Objective criteria are also included in the assessment. For example, points were given for the need for Additional treatment, the presence of Serous discharge, Erythema, Purulent exudate, separation of the deep tissues, the Isolation of bacteria, and the duration of inpatient Stay (ASEPSIS).

Seven days after the procedure, the most common complications were redness, pain, and hair loss, which occurred most with suturing, followed by stapling and hair apposition techniques. The highest infection rate was associated with the suturing process, followed by the stapling procedure.[10]

The findings reported by the present study are similar, where the highest incidence of infection was associated with the patients treated with suturing.

This difference could be because there was no need to shave hairs using tissue adhesives in the hair apposition technique compared to the suturing group.

Ozturk D et al. [10] observed that hair loss, an important cosmetic problem, occurred most with suturing followed by stapling technique. In contrast, the hair apposition technique was not associated with hair loss seven days after the procedure. Thus, found that cosmetic problems were most prevalent in patients treated with suturing, while they were least common in those managed with the hair apposition technique. This difference could be because there was no need to shave hairs in the hair apposition technique using tissue adhesives as compared to the suturing group, and one drop of glue was placed on the crossed strands without bringing the glue into contact with the wound. An excessive amount of glue would have resulted in hair knots, leading to a haircut, while contact of tissue adhesive with laceration would have resulted in decreased hair growth.

Thus, as regards aesthetic outcome, group 3 [Tissue adhesives] was observed to be most effective, followed by group 2 [Stapling] and then group 1 [Suturing].

Thus, in the present study, the use of tissue adhesives in the repair of scalp lacerations was found to be significantly more effective than stapling and suturing as assessed in terms of patient satisfaction, complications and cosmesis. All comparable studies have also reported similar observations as mentioned above. Observed differences could be due to differences in the site of lacerations and differing inclusion criteria, but overall, tissue adhesives and stapling are more effective when compared to suturing.

Hock et al. [7] and Karaduman et al. [11] compared suturing and hair apposition techniques concerning application time and found that the hair apposition technique was applied in a shorter time than other techniques

As the present study was retrospective, information on application times could not be gathered. However, daily practice experience suggests that tissue adhesives and stapling methods can be performed relatively quickly.

Since the present study was conducted in an institution with subsidized rates for healthcare services, a cost-effectiveness analysis could not be performed. But the previous studies reported that the hair apposition technique had a significantly lower cost. They related that result to a shorter procedure time, absence of need for anaesthesia and suture removal, and low complication rates. They expressed that the rate of scalp lacerations in EDs remains high, and this technique would save considerably.[12]

Thus, the Hair apposition technique (tissue adhesives) can be used more commonly in daily practice because of its low complication and cosmetic problem rate and high patient satisfaction rate. However, although the present study has shown that the use of tissue glue is more effective in the stapling and suturing technique of scalp laceration repair, the cost would be a significant consideration in adopting this method as most of the patients belong to a lower socio-economic status. In addition, the cost of closure using tissue glue is more of closure with suturing technique.

Determination of the ideal scalp laceration repair technique requires more prospective, randomised, controlled studies with a larger sample size that investigate factors influential on wound healing and satisfaction level.

Limitations Of The Present Study

The present study was retrospective, and a cost-effectiveness analysis could not be performed.

CONCLUSION

In the present retrospective study, the use of tissue adhesives in the repair of scalp lacerations was significantly more effective than stapling and suturing, whereas stapling was more effective than suturing assessed in terms of patient satisfaction, complications and cosmesis.

REFERENCES

- Hollander JE, Singer AJ, Valentine S, Henry MC. Wound registry: development and validation. *Ann Emerg Med.* 1995; 8:675–685. [PubMed]
- Turnage B, Maull KI. Scalp laceration: an apparent occult because of shock. *South Med J.* 2000; 8:265–266. [PubMed]
- Baker MD, Lanuti M. The management and outcome of lacerations in urban children. *Ann Emerg Med.* 1990; 8:1001–1005. [PubMed]
- Hollander JE, Singer AJ, Valentine SM, Shofer FS. Risk factors for infection in patients with traumatic lacerations. *Acad Emerg Med.* 2001; 8:716–720. [PubMed]
- Berk WA, Osbourne DD, Taylor DD. Evaluation of the “golden period” for wound repair: 204 cases from a third world emergency department. *Ann Emerg Med.* 1988; 8:496–500. [PubMed]
- Hollander JE, Richman PB, Werblud M, Miller T, Huggler J, Singer AJ. Irrigation in facial and scalp lacerations: does it alter the outcome? *Ann Emerg Med.* 1998; 8:73–77. [PubMed]
- Hock MO, Ooi SB, Saw SM, Lim SH. A randomised controlled trial comparing the hair apposition technique with tissue glue to standard suturing in scalp lacerations (HAT study) *Ann Emerg Med.* 2002; 8:19–26. [PubMed]
- Khan AN, Dayan PS, Miller S, et al. Cosmetic outcome of scalp wound closure with staples in the pediatric emergency department: a prospective, randomised trial. *Pediatr Emerg Care* 2002; 18:171. [PubMed]
- Wilson AP, Treasure T, Sturridge MF, Gruneberg RN. A scoring method (ASEPSIS) for postoperative wound infections for use in clinical trials of antibiotic prophylaxis. *Lancet.* 1986; 1(8476):311–3. [PUBMED: 2868173] [PubMed]
- Ozturk D, Sonmez BM, Altinbilek E, Kavalci C, Arslan ED, Akay S. A retrospective observational study comparing hair apposition technique, suturing, and stapling for scalp lacerations. *World Journal of Emergency Surgery: WJES.* 2013; 8:27. [PubMed]
- Karaduman S, Yürüktümen A, Güryay SM, et al. Modified hair apposition technique as the primary closure method for scalp lacerations. *Am J Emerg Med* 2009; 27:1050. [PubMed]
- Ong ME, Chan YH, Teo J, et al. Hair apposition technique for scalp laceration repair: a randomised controlled trial comparing physicians and nurses (HAT 2 study). *Am J Emerg Med* 2008; 26:433. [PubMed]