

Comparison of Cosmetic Outcome of Various Suture Materials in Extra-Oral Maxillofacial Incisions - A Randomized Controlled Study

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Abstract

Introduction: The goal of surgical procedures on the skin and soft tissues is to return the skin as close to normal as possible. Sutures applied in the maxillofacial surgery behave as per the quality of the dental tissues present, the existence of saliva, and specified microbiota. **Materials and Methods:** In the present study included thirty participants with clinical and radiographic diagnosis of facial fractures, bone pathologies, facial lacerations, abrasions who require procedures like open reduction and internal fixation, maxillectomy or simple closure of the wound. Modified hollender wound cosmesis scale was used for comparison. The chi square test is conducted to determine the association involved between difference between groups and within groups respectively and significance of the association was held at $p < 0.05$. **Results:** comparison about modified Hollander wound cosmesis scales between two groups at each interval. Wound index score between two groups at baseline showed non-significant difference; however, there was a presence of a noticeable difference in the wound healing index between 2 groups after 1 week and after 1 month. **Conclusion:** From our study we conclude that, there was some very noticeable differences in wound cosmetic based index between 2 groups after 1 week and after 1 month.

1. Introduction

Repair of wound is a well-staged and very coordinated procedure including a overlapping series resulting in phases: cell proliferation, inflammation, deposition of matrix, and remodelling of the tissues present¹. The goal of surgical procedures on the skin and soft tissues is to return the skin as close to normal as possible. Sutures applied in the procedures of *maxillofacial surgery* depend on the quality of the tissue present, the

existence of saliva in tissues, and specific types of microbiota. They project a path making communication between the external and internal places of the tissues making and impact on the quality of healing of the wound.^{2,3} A oral wound can be approximated by the use of sutures, skin closure strips, clips, staples, or topical based adhesives⁶⁵⁷

Non-absorbable and monofilament (Prolene and nylon/ethinol) kind of sutures encourage a subtle

inflaming reaction, can slide well, and cabability of easy removing,resulting in providing proper running intradermal kind of stitches.Prolene has a better tensile strength than the nylon, resulting in loosing approximately 15%-20% each year. Of all the non-absorbable suture materials monofilament nylon (Dermalon, Ethilon) is the most used for the case of superficial closure of the skin. Tensile strengths in the nylon ensures the safety of the wound.⁹ On the other hand nylon has the disadvantage of failing to provide a good wound security knot.

Constructed as a monofilament suture, Prolene easily passes through the tissue and creates minimal tissue reaction as it does.¹⁰ As compared with other nonabsorbable sutures, Prolene does not lose tensile strength over time and is therefore very well suited for areas where maximal strength is necessary, such as the abdominal fascia. Because of its smooth surface and high plasticity, it has a tendency to unravel more than other suture types, and additional knot throws are necessary to ensure knot integrity.

2. Materials and Methods

Study design: controlled trial with a randomized approach

Study setting: The project was developed in the outpatient department of oral and maxillofacial surgery in a private dental college in Chennai during October 2021 to September 2022.

Study population:

This study included thirty participants with clinical and radiographic diagnosis of facial fractures, bone pathologies, facial lacerations, abrasions who require many procedures such as Open reduction and internal fixation , maxillectomy or simple closure of the wound. Selection of sample size was based on the patient pool, who reported to the corresponding department, and who were able to satisfy the criteria of exclusion and inclusion.

Inclusion criteria:

The patient age group was selected between 18 and 70 years. Both of the genders were involed in the conducting of the study. Patients that agreed to come for post-operation based evaluation.

Exclusion criteria:

Any patient unable to fulfill the criteria of inclusion criteria was excluded from the study. Incision which required tension closure are removed. Wound created by an animal bite or a human bite. crush based wounds & *decubitus ulcers*. Patients containing uncontrollable diabetes mellitus. Previously noted family or personal history of formation of keloid or hypertrophic of scars.

Ethical clearance:

- At the beginning of conducting the study, clearance of an ethical study was acquired by the Scientific review board, *Saveetha University*.
- Detailed consent , on a written format was secured from participants helped in conducting the study.
- The anonymity of the participated people was kept securely.

Scheduling:

Details regarding specific cases were kept in the pro formation. For all the patients, procedure of panoramic radiographs were applied. Explanation abot the patients were based on their mother tongue regarding the procedured of the treatment.

Surgical technique:

All procedures were done under general anesthesia, twelve patients were selected for the case group (ethilon), and twelve patients were selected for the control group (prolene). Extraoral incisions were made in the desired maxillofacial region for various surgical procedures as per inclusion criteria. Incision lengths in the range of 8-10cm were closed in both groups by sutures. In both case and control groups, 3.0 vicryl was used to approximate the underlying muscles and tissues. The skin was closed with 5.0 nylon sutures and 5-0 prolene with a simple interrupted suture technique. An antiseptic dressing (povidone-iodine) was applied immediately after the closure of the wounds and changed intermittently for the first 24 h only.

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Sampling:

Simple random sampling was done by block randomization to select the study participants. Allocation ratio was kept at 1:1 into two groups. Blinding and allocation concealment were not applicable.

Follow up:

The cosmetic outcome, wound management by the patients, complication rate, and patient satisfaction were also recorded and interpreted using a multivariate analysis of the data, considering the final scores of each parameter evaluated for groups A and B. For the purpose of the study, only two surgeons performed all of the procedures, in order to reduce the possible bias. The patients and surgeons assessed their satisfaction rates using a scale from 1 to 10¹¹.

Sample size calculation:

The sample size was calculated by G Power based on the study conducted by Ganguli et al in 2021¹² with p value 0.05 and 95 power with effect size 0.636. Our calculated sample size was calculated to be 30.

Statistical Analysis:

Data was entered in Microsoft excel spreadsheet and analyzed using SPSS software (version 23.0). Data was analyzed by descriptive statistics which

included frequency, percentages, mean and standard deviation with 95% confidence interval. The Shapiro Wilk test was used for assessing the normality of distribution of all parameters. Analytical statistics included Fisher exact for determination of the assess of the association between variables based on categories and a T test was used independently to determination of the differences between means of constant variable between two groups at p<0.05.

3. Result

In suture removal times, patients from two groups were tracked usually under four weeks and seven days, and for Cosmesis wound case was assessed. In the case of wound of the 7th postoperative day, six clinical states such as edge inversion, step-off borders, contour irregularities, wound separation margin, information excess and overall good appearance are involved with associated with "Modified Hollander Cosmesis Scale".¹³

Variables scores are added to find out the total score of cosmetics. For an individual variable score of 1 is given under the presence of wound, in the case of 1 and more than 1 suboptimal, 0 score is approached. Any kinds of infection or compliance are examined among the groups in case it is present on the fourth week. An independent observer who is blinded assess case of wound cosmesis and score of Hollander Wound modified cond cosmesis scale is used for score.

Comparison of modified Hollander wound cosmesis scale within each group

Group	Interval	0	1	2	3	4	5	6	p value
Test	Baseline	0	0	0	1 (6.7)	3 (20)	10 (66.7)	1 (6.7)	<0.001*
	1week	0	0	1 (6.7)	3 (20)	8 (53.3)	3 (20)	0	
	1 month	0	0	3 (20)	7 (46.7)	5 (33.3)	0	0	
Control	Baseline	0	0	0	3 (20)	7 (46.7)	5 (33.3)	0	<0.001*
	1week	0	0	3 (20)	11 (73.3)	1 (6.7)	0	0	

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	1 month	4 (26.7)	9 (60)	2 (13.3)	0	0	0	0	
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Test of Chi-square; * indicates importance difference at $p \leq 0.05$

It is shown by the table that the Comparison of modified Hollander wound cosmesis scale within

each group. Change in wound index score within the test group showed a significant difference from baseline to 1 month. Also, change in wound index score within the control group showed a significant difference from baseline to 1 month.

Comparison of modified Hollander wound cosmesis scale between two groups at each interval

	Interval	0	1	2	3	4	5	6	p value
Baseline	Test	0	0	0	1 (6.7)	3 (20)	10 (66.7)	1 (6.7)	0.153
	Control	0	0	0	3 (20)	7 (46.7)	5 (33.3)	0	
1 week	Test	0	0	1 (6.7)	3 (20)	8 (53.3)	3 (20)	0	0.003*
	Control	0	0	3 (20)	11 (73.3)	1 (6.7)	0	0	
1 month	Test	0	0	3 (20)	7 (46.7)	5 (33.3)	0	0	<0.001*
	Control	4 (26.7)	9 (60)	2 (13.3)	0	0	0	0	

Chi-square test; * indicates important difference at $p \leq 0.05$

The above table shows the comparison of modified Hollander wound cosmesis scales between two groups at each interval. Wound index score between two groups at baseline showed non-significant difference; however, there was a significant difference in wound index between two groups after 1 week and after 1 month.

4. Discussion

A scar is considered as an index of performance of surgical method for a surgeon thus Fitz Gibbon stated, "By your scars you will be judged." ¹⁴ Different kinds of factors which are present in it have the ability to affect scars outcomes for cosmetics.

The necessity of this paper was to ascertain in case the use of tissue adhesive for the closure incision of

surgical in the maxillofacial region would speed up wound closure with equal or superior cosmesis and without morbidity. ²

The below factors are significant in the compassion with several methods which are accessible for skin closure: -

- For closing wounds, time is taken.
- Pain of post-operative
- Complications incidents such as erythema, seroma, wound dehiscence
- Results of cosmetic

Complications have been dealt with easily that must have occurred. A total number of 24 patients were taken and 12 among the taken patients were included

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in ethilon group and remaining 12 were included in prolene group. Extraoral incisions have been performed for open reduction and internal fixation, Weber Ferguson's incision, for the current research. The two groups were compared in relationship to Cosmetic outcomes.

In our study, the cosmetic outcome was measured using a modified Hollender wound score, revealing that there was no significant difference on day 1 in both the groups. But in the course of time, at the end of one month there is no statistically significant cosmetic outcome between ethilon and prolene group, however, there was a significant difference in wound index between two groups after 1 week and after 1 month.

5. Conclusion:

Wound infection prevention is considered of utmost significance as this infection is responsible for surgery failure and occurring morbidity of patients. In the study of us, extraoral closure skin comparison was made between prolene and ethilon. Any kind of significant difference was not found by us between prolene and ethilon in cosmesis. Impactful enhancement is not found by us in infection in wound posts for either ethilon or prolene. Hence, we conclude that both prolene and ethilon can be used for wound closure based on the availability and cost effectiveness and surgeons' choice.

CONFLICT OF INTEREST

Nil

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