

Comparison of Skin Staples Versus Prolene Sutures for Closure of Neck Dissection Incisions in Terms of Aesthetics and Wound Healing

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ABSTRACT

Objective: To compare skin staples with prolene for closure of neck dissection incisions in terms of time for wound closure, pain on removal and aesthetic outcome.

Study design and setting: Single blinded, prospective clinical study carried out at Sharif Medical and Dental College, Lahore from 19.04.2021 to 18.04.2022.

Materials and methods: All healthy (ASA-I/II) patients requiring neck dissection were enrolled in the study. The patients were divided into two groups, incision in group A was closed with 3/0 vicryl and 5/0 prolene while incision in group B was closed using 3/0 vicryl and stainless-steel staples.

Results: Total 140 patients were enrolled in the study with 70 patients in each group. In group A, 37 were males and 33 females while in group B, 43 were males and 27 females. The age in group A was 52.69±8.1 years while in group B, the age was 51.93±8.2 years. The mean time for wound closure in group A was 35.2±2.7 minutes while in group B it was 3.5±0.4 minutes. Pain on removal using VAS was 22.1±6.3 in group A while it was 21.8±5.5 in group B. In group A, 23 were excellent, 37 moderate and 10 poor while in group B, 27 were excellent, 38 moderate and 05 poor aesthetically. Overall, the results were statistically significant in terms of time of placement while they were statistically insignificant in terms of pain on removal and aesthetic outcome.

Conclusion: The results of the study conclude that staples are a better modality for closing neck incisions after neck dissection as they are quicker to apply and yield similar outcomes as sutures.

Keywords: Neck dissection, incision, closure, suturing.

INTRODUCTION

Global surgical fraternity has been faced with an ongoing challenge to search for the most appropriate method for wound closure. The goal of wound closure during surgery is to achieve healing with minimal edema, least amount of scar formation, minimal to no post-operative discharge or infection and good approximation of wound edges.¹ The first documented wound closure with suture material was reported in 1500 BC in Egypt with a linen thread using thorns. Human and animal hair, quill pen, and catgut strings were used until 1930.²

In the past, there weren't many surgical alternatives for healing wounds. From catgut, silk, and cotton, there is now an ever-increasing array of sutures, approximately 5269 different types, including antibiotic-coated and knotless sutures.³ Despite changing and newer methods for closure, the basic principles of skin closure have remained the same, primarily to approximate the skin edges in an everted position and minimize tension on the wound.² The ideal method of wound closure should be straightforward, safe, quick, inexpensive, and painless and produce optimal cosmetic results.⁴ Innovation in wound management would lead to a forthright procedure of wound closure that would shorten treatment time, be pain free, be cost effective, and allow good cosmetic results.⁵

Topical adhesives and skin staples are the recent closure methods which are developed to use either alone or in combination with traditional suturing techniques.⁶ The notion for the invention of staple wound repair originated

with the old Hindus, who originally utilised insect mandibles to repair soft tissue. Mechanical suture devices were pioneered in the Soviet Union and introduced into the United States by Steichen and Ravitch in 1973.⁷ Stapling method of wound closure has been shown to be an excellent option in many situations.⁸ Rapid and aesthetic healing of skin incisions requires accurate re-approximation of wound margins.⁹ No technique can supersede standard suturing methods for closing wounds requiring the most meticulous repair. Staples have indeed been discovered to possess the benefits of becoming quicker, less harmful to host defenses, and helpful in the treatment of highly infectious injuries for the majority of linear, non-facial wounds.¹⁰ As staples are being commonly used for incision wound closure in head and neck cancer surgery, there is a need to validate their efficacy in this specialty. So, a prospective trial was carried out to investigate the merits and demerits of stapled skin closure when compared with conventional sutures. With this clinical trial we have compared the efficacy of staples with that of monofilament nonabsorbable sutures for application time, pain and esthetic outcome of skin closure, hypothesizing that surgical staples would shorten operative time and provide better closure with a minimal scar.

Since there is little to no local data available on closure of neck incisions, Rationale of this study is to come to conclusion regarding effective and time efficient closure technique in local setting.

MATERIALS AND METHODS

This single-blinded prospective clinical study was conducted in the department of oral and maxillofacial surgery from 19.04.2021 to 18.04.2022. Prior approval to conduct the study was sought from the Ethical review committee of the hospital. All patients presenting with squamous cell carcinoma of the oral cavity requiring excision along with neck dissection irrespective of age and gender, willing to take part in the study were enrolled. The health status of the patients was evaluated and categorized according to American Society of Anesthesiologists (ASA) classification. Only the patients with ASA-I (healthy status) and ASA-II (mild and controlled systemic disease) were included in the study. Patients with ASA-III or IV status, patients on steroid or immunomodulator therapy and patients who have previously undergone neck exploration were excluded from the study.

Patients were enrolled using non-probability consecutive sampling and were allocated randomly into two groups. Sample size of 140 patients (70 in each group) was calculated using WHO calculator with the confidence level 95% at acceptable difference 0.05 with assumed proportion of 0.9⁵. Group A was the control group where the neck incision was closed in layers using 3/0 vicryl for subcutaneous tissue and 5/0 prolene for the overlying skin employing the standard suturing protocol. Group B was the study group where neck incision was closed using 3/0 vicryl for the subcutaneous layer and stainless-steel staples for the skin tissue using a disposable skin stapler with arrow/mark on its head pointing along the incision line/wound edges while the assistant had everted the wound edges using Adson’s tissue holding forceps. Following the completion of closure, an antiseptic medicated cream was applied in both groups followed with a protective dressing for the first 24–72 h. Drains were placed in all the cases and were removed until the drain content became minimal. All patients were given IV antibiotics (amoxicillin1g and Metronidazole500mg) TDS for 5–7 days postoperatively.

The outcomes that were assessed included:

1. Time taken for closure (in minutes) from the placement of the first skin suture/staple till completion.
2. Pain on removal of staples/sutures using visual analogue scale (VAS) using a 0-100mm line with ‘0’ being no pain and ‘100’ being worst imaginable pain.
3. Aesthetic outcome of the final wound after 30 days using Manchester Scar Scale (MSS) using parameters like color match, contour, distortion and texture and the results were rated as excellent, moderate and poor.¹¹

The sutures were removed after an interval of 10–14 days, first removing the alternate sutures and then the remaining sutures after few days and pain on removal was recorded using VAS. Staples were removed using a staple remover while sutures were removed in the conventional manner. Patients were followed-up for 30 days and evaluated for wound cosmesis, by an independent observer using the MSS mentioned above. Two groups, one for each type of research-used wound closure materials, were allocated to the data collected during the research.

Data was analyzed by SPSS version 23.0. Results were presented as Mean ± SD for quantitative data and as numbers and percentages for categorical data. Student’s unpaired t-test was used for group wise comparisons. Categorical data was analyzed by Chi square test. Statistical significance was defined as a “P” value of 0.05 or less.

RESULTS

A total of 140 patients were enrolled in the study with 70 patients in group A and 70 in group B. Out of these 140 patients, 80 were males and 60 females with an overall male to female ratio of 1.3:1. In group A, there were 37 males and 33 females while in group B there were 43 males and 27 females. The age in group A ranged from 38 to 67 years with a mean and standard deviation of 52.69+8.1 years while in group B, the age ranged from 35 to 65 years with a mean and standard deviation of 51.93+8.2 years.

The mean time for wound closure in group A was 35.2+2.7 minutes while in group B it was 3.5+0.4 minutes. Pain on removal using VAS was 22.1+6.3 in group A while it was observed to be 21.8+5.5 in group B. When aesthetic outcome was assessed, it was found that in group A, 23 were excellent, 37 moderate and 10 poor results while in group B, 27 were assessed as excellent, 38 moderate and 05 as poor. Overall, the results were statistically significant in terms of time of placement while they were statistically insignificant in terms of pain of removal and aesthetic outcome. These results are presented in Table 1.

Table 1: Showing results of study parameters for both groups

Clinical Parameters		Group A (Prolene) N= 70	Group B (Staples) N=70	p-value
Time for Closure (min)		35.2+2.7	3.5+0.4	0.000
Pain on Removal (VAS score)		22.1+6.3	21.8+5.5	0.776
Aesthetic outcome	Excellent	23	27	0.368
	Moderate	37	38	
	Poor	10	05	

DISCUSSION

Cancer is a leading cause of death in the developing and the developed world and is considered as a major epidemiological problem. Head and neck cancer is the seventh most common cancer worldwide accounting for 800,000 new cases annually worldwide.¹² Elective and therapeutic management of neck in head and neck cancer treatment is an important treatment decision and majority of studies now tend to favor performing neck dissection instead of ‘wait and watch’ as the prognosis with performing neck dissection is better for the patients. Therefore, neck dissection, either radical or selective, is a commonly carried out procedure in head and neck oncology.¹³

Neck dissection is carried out through a variety of incisions given in the neck such as McFee incision, Schobinger’s incision, apron’s incision, utility incision and so forth.¹⁴ The length and extent of the incision is dependent on the extent of the planned dissection. Closure of these neck incisions generally employs a layered closure

using a subcuticular layer closure by vicryl followed by closure of skin through stainless steel staples, prolene or adhesive glues.¹⁰

In our study, we studied three general parameters. These were; time required to close the neck wounds after neck dissection, pain experienced by the patient upon removal of sutures or staples according to VAS pain scale and the final esthetic outcome which was graded on the basis of Manchester Scar Scale by an independent observer in order to keep the results objective and free of observer bias.

We had a total of 140 patients divided into 2 groups with 70 patients in each group. In our study there were 80 male patients and 60 females. The overall male to female ratio in our study was 1.3:1. In a similar study reported by Batra et al³, there were 42 males and 38 females with an overall male to female ratio of 1.1:1. Hence we can state that our results are in close comparison to those reported by Batra et al³. Mean age in our study group was 51.9+8.2 years and in the control group it was 52.7+8.1 years. Again, the results of our study are in close comparison to Batra et al³ as they report the mean age in their study to be 50.6+8.4 years.

The first parameter that was observed in our study was mean time for wound closure calculated in minutes starting from the placement of first suture/staple till the last one. The mean time for closing the wound using prolene was 35.2+2.7 minutes while it was 3.5+0.4 with surgical staples. Batra et al³ reports their mean closing times to be 34.2+12 and 3.3+1.2 minutes for prolene and surgical staples respectively. In another similar study by Oswal et al², the mean time taken for prolene group was 29.2+4 minutes and 5.3+1.3 minutes for surgical staples. Again, we can state that our results are in close harmony with those reported by Batra and Oswal and the difference in time was statically significant in all these studies clearly favoring staples over sutures. Feng et al¹⁵ also concluded in their meta-analysis on staples vs sutures for abdominal wound closure that staples require significantly less time than sutures for wound closure.

The second outcome measure that we analyzed in our study was the pain experienced by the patient at the time of removal of staples versus sutures. We used a VAS pain score (0-100mm line) and the mean pain score for removal of sutures was 22.1+6.3 (or 2.2) while that for staple removal was 21.8+5.5 (or 2.1). Although, the results are statistically insignificant there is still a slightly lower pain value for staples in comparison to sutures. In their study, Oswal et al² also report a similar finding. Their mean pain score for suture was 5.08+1.2 and 3.15+0.8 for staples respectively. Results from Batra et al³ also confirm our finding. In their study, although the difference between pain scores was insignificant but staple removal was slightly more painful than removal of sutures (mean pain scores 2.15+0.9 vs 2.2+0.8 for sutures and staples respectively).

The final outcome that we assessed in our study was comparison of aesthetic results between suture and staple groups. We used Manchester Scar Scale (MSS) to evaluate our results. MSS was developed in 1998 by Beausang and has been validated for scar evaluation through many studies.¹⁶ MSS takes into account physical characteristics like color, contour, texture etc. of the scar

and rates the overall result as excellent to poor.¹⁷ In our control group, 23 cases were categorized as excellent, 37 as moderate and 10 cases were labelled as poor while in our study group 27 were rated as excellent, 38 as moderate and 5 were rated as poor. There was a statistically insignificant difference between our two groups. An almost similar results have been reported by Batra et al³ in their study and they also found that statistically there was not much difference between sutures and staples. A meta-analysis conducted by Feng et al¹⁵ however tends to favor sutures over staples in terms of cosmesis.

Clinicians and scientists have been researching about the best wound closure method in terms of post op results. Journey of surgical staples is almost 100 years old now and are accepted as a quick and efficient wound closure technique for linear wounds. However, there are still not many studies which have compared staples with sutures for neck dissection incisions therefore our study aims to answer this query.¹⁸

Limitations: The limitations of the current study include a relatively smaller sample size and a smaller post op evaluation period. Ideally the results should be followed up for 3 to 6 months so that optimum scar healing and aesthetic outcome can be assessed. Nevertheless, within the confines of the study, the results are promising and in favor of using staples instead of sutures as they save considerable operating time and do not affect results significantly.

CONCLUSION

The results of the study conclude that staples are an efficient modality for closing neck incisions after neck dissection as they are quicker to apply and yield similar outcomes as sutures in terms of pain on removal and esthetic outcomes.

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