

Comparison between stainless steel staples and silk sutures for primary closure of skin in patients undergoing neck dissection: A comparative clinical study

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Abstract

Introduction: Comparison between stainless steel staples and silk sutures for primary closure of skin in patients undergoing neck dissection, in context of rapid application, approximation of the skin edges, economy and aesthetics of the resultant scar. **Aim:** (1) To compare surgical stainless steel staples and silk sutures for primary wound closure, with respect to presence/absence of wound infection and dehiscence (2) To compare the resultant scar following the two different methods of the closure at 3rd month postoperatively with the help of visual analog scale and analyze the result statistically **Design:** This study was designed to compare skin closure using staples and silk sutures in patients undergoing neck dissection, using both methods in one-half of the same wound; thus each wound affording its own control. **Materials and Methods:** The study was conducted on patients requiring collar line incision (high submandibular incision) with or without a cephalad extension of midline lower lip split incision for surgical access, who presented to the Department of Oral and Maxillo-Facial Surgery. (1) Sample size: 10 (2) Study design: Prospective Comparative study (3) Study duration: One and half years (4) Surgical stainless steel staples: Proximate Plus MD 35 W, Ethicon Endo Surgery (5) Sutures: 3-0 Ethiprime NW 5003, Non-Absorbable Surgical Suture, Mersilk-90 cm, Ethicon, (16 mm 3/8 circle cutting needle). **Conclusion:** It was concluded that there is no significant difference between the scars observed in the regions of incision which underwent primary closure by two different methods, that is surgical stainless steel staples and 3-0 Mersilk Sutures.

Keywords: Neck incisions, silk, staples

Introduction

In India, on the basis of the national cancer registry data, it is estimated that annually 75,000–80,000 new oral squamous cell carcinoma cases develop. More than 50% of patients with squamous cell carcinoma of the oral cavity have lymph node metastases, and histological confirmation of metastatic disease is the most important prognostic factor. The high incidence rate of occult cervical metastases (>20%) in tumors of the lower part of the oral cavity is the main argument in favor of elective treatment of the clinically negative neck. The use of

selective supraomohyoid neck dissection for the treatment of the neck, in oral cancer patients, is now well-established.^[1]

In our study, neck dissection was performed in conjunction with the resection of the primary tumor. The surgical specimen was excised in toto with the metastatic cervical nodes. The access to the surgical site was gained through submandibular incision in conjunction with a midline lip split incision, to develop a lower cheek flap. The average length of the incision was measured to be 30 cm. Postsurgical, skin closure technique varies widely in the reported literature and choice largely lies with the surgeon, basing it on his experience. Critical to the choice of method is the need for rapid application, an accurate skin apposition, economy, and reproducibility.^[2] However, of paramount importance is the need to achieve excellent cosmesis and postoperative neck mobility given the conspicuous site and considerable morbidity associated with the poor result.

The principal aims of tissue repair of surgical incision are rapid acquisition of strength, minimum tissue damage, with minimum inflammation and good scar. Many factors including the skin closure technique influence these aims, but of particular importance are accurate coaptation of the dermal margins, eversion or inversion leads to suboptimal healing.^[3] The importance of primary skin healing in the avoidance of infection cannot be overemphasized.

Complications such as wound dehiscence or infection have considerable impact on the recovery of the patient,

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causing increased morbidity, delayed discharge, increased cost and reduced satisfaction. There is also a hypothesized link between postsurgical superficial wound infection and infection of the deeper tissue spaces.^[4]

The most commonly used methods for skin closure are surgical staples or sutures. Both the methods act to hold the skin edges together while healing occurs. Staples are said to be superior as they are regarded as quicker and easier than sutures; however, some authors have suggested increased risk of infection, and scarring with their use. The use of staples has also been associated with increased tension along the incision line making them unsuitable for reconstructive flap surgery.^[5]

Need for the study

Although several workers have compared the use of staples and silk sutures in primary closure of skin in clean surgical wounds, very few of them actually did the study on the same wound; with both staples and silk sutures being used to close the same wound.^[6-8]

This study was designed to compare skin closure using staples and silk sutures in patients undergoing neck dissection, using both methods in one-half of the same wound; thus each wound affording its own control [Figure 1].

Objectives of the study

- To compare surgical stainless steel staples and silk sutures for primary wound closure, with respect to presence/absence of wound infection and dehiscence
- To compare the resultant scar following the two different methods of the closure at 3rd month postoperatively with the help of visual analog scale and analyze the result statistically.

Materials and Methods

Source of data

The study was conducted on patients requiring collar line incision (high submandibular incision) with or without a cephalad extension of midline lower lip split incision for surgical access, who presented to the Department of Oral and Maxillo-Facial Surgery [Figure 2].

- Sample size: 10
- Study design: Comparative study
- Study duration: One and half years
- Surgical stainless steel staples: Proximate Plus MD 35 W, Ethicon Endo Surgery
- Sutures: 3-0 Ethiprime NW 5003, Non-Absorbable Surgical Suture, Mersilk-90 cm, Ethicon, (16 mm 3/8 circle cutting needle).

Inclusion criteria

- All the patients who presented to the Department of Oral and Maxillo-Facial Surgery, with the diagnosis of



Figure 1: Wound closure as described in the text



Figure 2: Extraoral incision marking

a malignancy requiring supraomohyoid neck dissection as a surgical modality of treatment with or without hemimandibulectomy

- The patients on whom the high submandibular neck incision with or without cephalad extension for midline lower lip split for surgical access was used.

Exclusion criteria

- Patients who had undergone radiation therapy prior to surgery
- Patients who required comprehensive neck dissection
- Patients with evidence of metastasis of the lesion.

Procedure

The patients after inclusion in the study underwent routine preoperative investigations and physician fitness for the surgery was obtained. The patients then underwent surgery under general anesthesia with nasotracheal intubation under strict aseptic conditions, antibiotic coverage and preoperative steroids. After the surgery, the closure was done in layers with the deeper layers closed by buried 3-0 vicryl single

interrupted sutures after the placement of a surgical drain so as to avoid the formation of dead space, hematoma, and subsequent infection. The skin was subsequently closed with surgical staples for one-half of the wound and the other half being closed by 3-0 mersilk while stapling, the assistant elevated, minimally everted and subsequently approximated the skin edges with two pairs of Toothed-Adson tissue forceps, to try and prevent inversion of the skin edges. The operator then lightly placed the stapler onto skin and fired the staple. All the surgeries were performed by the same surgeons.

Postoperatively, the patients were prescribed dexona/8 m.g/i.v. dosages, which were tapered over a period of 4 days, the patients were kept under i.v. antibiotic coverage for a period of 5 days and then were prescribed oral antibiotics for a period of 2 days. The surgical drains were retrieved 48 h postoperatively. Every 24 h postoperatively, the surgical wounds were dressed, and closed dressing placed after application of Povidone Iodine ointment. On 11th day, alternate surgical staples and sutures were removed and on 13th day complete removal of sutures and staples was done.

Evaluation criteria

The patients were evaluated for the following in the first 2 weeks [Figures 3 and 4]:

- The presence or absence of wound dehiscence - Wound dehiscence was judged to be present, if the surgical layers opened up, or if the wound lips did not unite
- The presence or absence of wound infection - Wound infection was judged to be present by observing any discharge from the surgical site extra-orally.

The patients' scar line was evaluated in the 3rd postoperative month during follow-up visits, with the help of Visual Analog Scale by a single observer for all the patients, with separate scores between 1-10 adjudged for both the halves, the one closed by surgical staples and the other by 3-0 silk sutures.

- The lowest score of one being given to esthetically unacceptable scar
- The highest score of 10 being given to esthetically pleasing scar.

Result

The values thus obtained from Visual Analog Scale were statistically analyzed by paired *t*-test.

Null hypothesis

There is no significant difference between the scar in the region of the incision closed by surgical stainless steel staples and the scar in the region of the incision closed by 3-0 Mersilk Sutures.

Alternate hypothesis

There is a significant difference between the scar in the region of the incision closed by surgical stainless steel staples and the scar in the region of the incision closed by 3-0 Mersilk Sutures.

Conclusion

Since $P > 0.05$, it is concluded that there is no significant difference between the scars observed in the regions of incision which underwent primary closure by two different methods, that is surgical stainless steel staples and 3-0 Mersilk Sutures [Table 1].

Discussion

The principal aim of tissue repair of surgical skin incisions are:

- Rapid acquisition of strength
- Minimum tissue damage and subsequent inflammation
- Good scar.

Many factors including the choice of suture material and its placement influence these aims but of particular relevance



Figure 3: Resultant scar at 1 month postoperative (area where staples were placed)

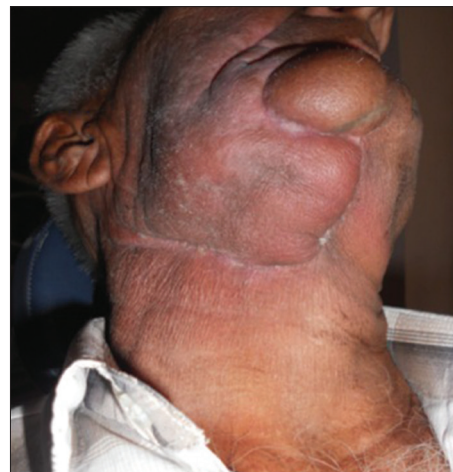


Figure 4: Resultant scar at 1 month postoperative (area where sutures were placed)

are the accurate coaptation of the dermal margins; eversion or inversion leads to sub-optimal healing. The importance of primary skin healing in the avoidance of infection is paramount.^[4]

Three commonly used methods of closure are staples, sutures, and skin adhesives [Figures 5 and 6].^[9-11] Surgical staples and sutures hold the edges of the skin together while it heals and are commonly removed between 10 and 14 days after surgery.^[12]

Suture threads are still the most common means of wound closure, because they are readily available, easy to use, and efficient and because suture material provides the mechanical support necessary to sustain the closure. A wide variety of suture materials are available, and the surgeon can choose from a list of suture threads with a range of attributes to find the one best suited to the particular needs of the wound in question.

Modern mechanical suture devices were pioneered in the USSR and later introduced into the USA. The development of mechanically satisfactory skin staplers appears to represent an important advance in rapid and effective means of closing long skin incisions. There is evidence that the method causes considerably less damage to wound defenses when compared even with the least reactive non-absorbable suture materials.

Table 1: Result of paired t-test

	Surgical suture	Mersilk
Mean	5.7	5.5
Variance	1.57	2.72
Observations	10	10
Pearson correlation	0.51	
Hypothesized mean difference	0	
df	9	
t-statistic	0.43	
P (T≤t)	0.68	
t critical	2.26	

Both suturing and stapling are technical acts requiring care, and both have to be learned, thus both the methods were attemptedly employed with appropriate accuracy by the same surgeons on the patients included in the study group. Only a single stapling device model (Proximate Plus MD 35 W, Ethicon Endo Surgery) per patient was used throughout the study to avoid any kind of bias as well as the suture material (3-0 Ethiprime NW 5003, Non-Absorbable Surgical Suture, Mersilk-90 cm, Ethicon, 16 mm 3/8 circle cutting needle).

The stapling devices have a significant advantage in its speed of execution in the primary closure of the skin wounds as compared to the conventional suturing methods. However, few authors state that this advantage is difficult to balance it out with the increased cost of the stapling device as compared with that of the suture material.

Surgical stainless steel staples: Proximate Plus MD 35 W, Ethicon Endo Surgery.

Cost in Rs: 700/-

Sutures: 3-0 Ethipramine NW 5003, Non-Absorbable Surgical Suture, Mersilk-90 cm, Ethicon, (16 mm 3/8 circle cutting needle).

Cost in Rs: 120/-

However, there is one technical aspect in the use of stapling devices which if not taken care off will lead to wound gaping. The coaptation of the dermal margins has to be accurate avoiding eversion or inversion while using the stapling device. This can be ensured by the assistant who with the help of skin hook/toothed forceps coapts the dermal margins. This technical aspect of difficulty in coaptation of dermal margins in the conventional method of suturing is avoided by strict adherence to the principles of suturing.



Figure 5: Resultant scar at 2 months postoperative (area where staples were placed)



Figure 6: Resultant scar at 2 months postoperative (area where sutures were placed)

The removal of alternate staples and sutures as a rule was carried out on 11th postoperative day, and complete removal was done on 13th postoperative day. There was no significant difference in discomfort experienced by patients during suture and staple removal, respectively.^[13] However, as mentioned in the literature, there are two methods by which staples can be removed.^[14]

- Using the staple removal provided by the manufacturing company
- In the absence of a staple remover, a Halstead artery forceps can be equally effective.

However in our experience, stapler remover was more effective in reducing the pain and discomfort during the removal of staples when compared to artery forceps. This attribute was however not a parameter for the study and thus was not measured on a pain scale.

This prospective trial showed no difference between the two methods of skin closure with regard to the cosmetic appearance of the scar (at the 3rd postoperative month), patient satisfaction (pain during removal of suture and staples) or complications (wound dehiscence and gaping) after surgery. There was, however, the difference in the speed and ease of closure, staples being easier to use than the conventional sutures. The primary outcome measure used was a single observer scoring of the scar at 3rd month postoperatively with the help of Visual Analog Scale. There was no significant difference in between the two groups thus evaluated with paired *t*-test and the $P = 0.68$, which > 0.05 , proving the equal efficacy of both the methods in primary closure of incisional wounds.

Summary

Surgical stainless steel staples were compared with conventional 3–0 Mersilk Sutures for the primary closure of the surgical incision (High Submandibular Incision with or without cephalad extension for the midline lip-split) for speed, convenience, effectiveness, cost, and the resultant scar at the end of 3 months postoperatively. The surgical wounds were divided into two equal halves. One-half of the incision was closed by 3–0 mersilk and the other half by the surgical stainless steel staples, thus each wound affording its own control.

This limited prospective study has revealed no higher complication rates in the wounds closed by the surgical stainless steel staples compared with those closed by the 3–0 Mersilk Sutures. Visual Analog Scale was applied by a single observer to assess the resultant scar at the end of 3rd postoperative month. The resultant scores were statistically analyzed with the help of “paired *t*-test”, with the derived result ($P > 0.05$), it is concluded that there is no significant difference between the resultant scars derived from the use of two different methods for primary closure of the surgical wound.

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Ethical committee approval

Appropriate approval and permissions were obtained from the ethical committee of the institutional review board.

Patient consent

The patients were explained about the study. Written and informed consent was obtained from all the patients regarding their participation and subsequent usage of data and photographs for the purpose of publication in the journal.

References

1. Kowalski LP, Sanabria A. Elective neck dissection in oral carcinoma: A critical review of the evidence. *Acta Otorhinolaryngol Ital* 2007;27:113-7.
2. Ridgway DM, Mahmood F, Moore L, Bramley D, Moore PJ. A blinded, randomised, controlled trial of stapled versus tissue glue closure of neck surgery incisions. *Ann R Coll Surg Engl* 2007;89:242-6.
3. Gatt D, Quick CR, Owen-Smith MS. Staples for wound closure: A controlled trial. *Ann R Coll Surg Engl* 1985;67:318-20.
4. Smith TO. Sutures versus staples for skin closure in orthopaedic surgery: Meta-analysis. *Br Med J* 2009;340:c1199.
5. Coupland RM. Sutures versus staples in skin flap operations. *Ann R Coll Surg Engl* 1986;68:2-4.
6. Stockley I, Elson RA. Skin closure using staples and nylon sutures: A comparison of results. *Ann R Coll Surg Engl* 1987;69:76-8.
7. Shuster M. Comparing skin staples to sutures. *Can Fam Physician* 1989;35:505-9.
8. dos Santos LR, Freitas CA, Hojajj FC, Araújo Filho VJ, Cernea CR, Brandão LG, *et al.* Prospective study using skin staplers in head and neck surgery. *Am J Surg* 1995;170:451-2.
9. Kanegaye JT, Vance CW, Chan L, Schonfeld N. Comparison of skin stapling devices and standard sutures for pediatric scalp lacerations: A randomized study of cost and time benefits. *J Pediatr* 1997;130:808-13.
10. Grgic M, Ivkic M. Use of skin staplers in head and neck surgery: Prospective clinical study. *J Otolaryngol* 2002;31:137-9.
11. Blondeel PN, Murphy JW, Debrosse D, Nix JC 3rd, Puls LE, Theodore N, *et al.* Closure of long surgical incisions with a new formulation of 2-octylcyanoacrylate tissue adhesive versus commercially available methods. *Am J Surg* 2004;188:307-13.
12. Livesey C, Wylde V, Descamps S, Estela CM, Bannister GC, Learmonth ID, *et al.* Skin closure after total hip replacement: A randomised controlled trial of skin adhesive versus surgical staples. *J Bone Joint Surg Br* 2009;91:725-9.
13. McClelland H, Nellis G. Surgical staple trial in accident and emergency. *Accid Emerg Nurs* 1997;5:62-4.
14. Teoh MK, Burd DA, Bucknall TE. Removal of skin staples in an emergency. *Ann R Coll Surg Engl* 1987;69:222-4.

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