Safety of Colorado Microdissection Needle (Stryker) for Skin Opening in Craniomaxillofacial Surgery

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Abstract

Purpose Diathermy is used widely in surgical procedures, mainly for subcutaneous and deeper layers dissection. The use on craniomaxillofacial skin has been precluded by the fear of scar formation, alopecia and wound dehiscence. The aim of this study was to clinically evaluate the safety of Colorado Microdissection needle (Stryker) for skin opening in craniomaxillofacial surgery. **Materials and Methods** 117 skin incisions for craniomaxillofacial procedures were performed using the Stryker Colorado microdissection needle (CMN). The incisions included Coronal, Hemicoronal, Preauricular, Subciliary, Lateral brow's, Submandibular, Retromandibular, Risdon's, Modified Blair's and Schoebinger's incision. The reason for the craniomaxillofacial operative intervention included: Craniofacial trauma, removal of benign and malignant pathology, craniofacial reconstruction and Temporomandibular joint surgeries. 115 incisions were performed in patients in the adult age group and 02 in the pediatric age group.

Results All the patients tolerated the procedures well, with no increased risk from the use of the CMN. Only one incision had wound infection and dehiscence. All other patients had usual wound healing. At 6 months follow-up postoperative scar and alopecia was evaluated. Only on close up inspection minimal area of alopecia was noticed along the incision line. The postoperative scar was healthy in all the cases.

Conclusion The findings of this study recommend the use of the CMN in all craniomaxillofacial procedures.

Keywords Colorado microdissection needle · Craniomaxillofacial · Subcutaneous

Introduction

The application of electrocautery in surgical procedures for skin incisions has received a varied spectrum of response from surgeons over the years. Introduced in 1909 to fulgurate tumors [1], its use was extended to neurosurgical procedures by Cushing in 1926 [2]. The skepticism against regular use of electrocautery is primarily because of fear of complications like delayed wound healing and surgical site infections [3]. The concept of electrocautery incisions is fast gaining acceptance not only amongst the neurosurgeons, but also the general surgeons for thoracic and abdominal incisions and the myths behind its complications are soon fading with excellent results. The present study is about the safety of CMN (Stryker) for skin opening in craniomaxillofacial surgery.

Materials and Methods

The CMN was used to perform 117 skin incisions during craniomaxillofacial surgical procedures. The generator unit was set on cutting mode, power of 5 W, and 390 kHz sinusoid waveform. The N103 A (3 cm length straight, 3/32 in. sleeve diameter), N110 A (2 cm length straight, 3/32 in. sleeve diameter) CMN were utilized as the electrocautery scalpels (Fig. 1). No: N103 A CMN were used for coronal, hemicoronal and preauricular, submandibular, Risdon's retromandibular, modified Blair's, Schoebinger's incision and No: N110 A CMN were used for subciliary and lateral brow's incision (Table 1). Only the tip of the

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Fig. 1 N 103 A, N 110 A Colorado microdissection needles

Table 1 Incisions

S. No.	Incisions	Type of needle used	No. of cases
1	Coronal	N103 A	03
2	Hemicoronal	N103 A	07
3	Preauricular	N103 A	32
4	Subciliary	N110 A	05
5	Lateral brow's	N110 A	32
6	Submandibular	N103 A	12
7	Retromandibular	N103 A	07
8	Risdon's	N103 A	05
9	Modified Blair's	N103 A	11
10	Schoebinger	N103 A	03
Total			117

micro-needle was allowed to come in contact with the proposed incision line, the sides were not allowed to touch the skin edges at any time. To avert the skin edges away as cutting proceeds, the surgeon and assistant applied mild traction pressure on either sides of the skin incision. On completing total skin incision, the wound edges were inspected for any macroscopic change. Each wound was inspected on postoperative days 1, 3 and 14 for wound healing. At six months follow-up postoperative scar and alopecia was evaluated in all the cases. The postoperative scar was evaluated under following heads: level with surrounding skin, color match, softness and width of scar [1]. Alopecia was evaluated subjectively and objectively.

Results

All 117 skin incisions were performed by the author using the CMN. The incisions included coronal, hemicoronal, preauricular, subciliary, lateral brow's, submandibular, retromandibular, Risdon's, modified Blair's and Schoebinger's

incision. The reason for the craniomaxillofacial operative intervention included: craniofacial trauma, removal of benign and malignant pathology, craniofacial reconstruction and temporomandibular joint surgeries. 115 incisions were performed in patients in the adult age group and 02 in the pediatric age group. The wound was inspected in each case immediately after completing skin incision for viability, colour, presence of charcoaling effect and dermal peeling. There was no macroscopic change (Fig. 2). Postoperative inspection on days 1, 3 and 14 did not reveal wound infection or dehiscence. At 6 months follow-up visit the patients were questioned for any subjective notice of hair loss at the operative site. This was denied by both male and female adults, and by parents. Physical examination was performed to look for evidence of alopecia. On close up inspection a minimal area of alopecia was noticed on the side performed by the CMN (Fig. 3). The level of the scar with surrounding skin, color match, consistency and width were normal in all the cases (Fig. 4a, b). One patient had wound infection resulting in wound discharge and delay in wound healing in the preauricular region (Table 2). The case was treated successfully with appropriate antibiotics.

Discussion

The principle of electrocautery involves generation of high frequency current up to 500 mA delivered to an active

Fig. 2 Post incision inspection for macroscopic changes

Fig. 3 Area of alopecia along the line of incision

electrode held by the surgeon. The current generated results in either cutting or coagulation when applied to tissues. Both cutting and coagulation based electrocauteries of variable intensities have been used in surgeries. The passage of current into tissues causes damage to the cell wall and disruption of cell structure in the cutting mode. Coagulation of tissues is produced by heat generated when the current is locally concentrated in an area. A continuous output by the generator results in a cutting mode, whereas pulsed output causes coagulation of tissues. Simultaneous cutting and coagulation can only be achieved in the cutting mode. The combined cutting and coagulation mode also offers the advantage of achieving better haemostasis. Most of the studies done to evaluate electrocauteries pertain to general surgeries in the region of abdomen and thorax [2–5]. These studies did not show an increase in incidence of wound dehiscence when compared to conventional scalpels. In clinical studies, Kearns et al. [6] found significant improvements in incision time, amount of blood loss, early postoperative pain and the requirement of analgesia when using electrocautery in contrast to steel scalpels. In another study by Allan et al. [3] no significant difference was found in the mechanical strength of surgically incised wounds by either method. Evaluation at cellular level by electron microscope also showed no significant differences in the healing of wounds generated by scalpel or electrocautery [4]. Review of literature on electrocauteries lacks a standardized information database

Fig. 4 **a** Imperceptible postoperative scar of modified Blair's incision. **b** Imperceptible postoperative scar of low subciliary incision

pertaining to the generator type and waveform, type of electrode and the speed of electrode when making the incision. These points have been addressed by Sheikh et al. [7] in evaluating skin incisions by electrocauteries for neurosurgical procedures in comparison to steel scalpels. The detailed methodology given therein can form a basis to enable uniformity of comparison with studies in the past and future. Sozio et al. [8] compared the size and speed of the electrode tip while incising, whereas David et al. [9] compared the degree of haemostasis achieved with

Table 2 Complications

S. No.	Complications	No. of cases
1	Scar	
a	Uneven level with surrounding skin	Nil
b	Color mismatch	Nil
c	Hard consistency	Nil
d	Wide width	Nil
2	Alopecia	
	Subjective assessment	Nil
	Objective assessment	On a close inspection minimal area of alopecia along the incision line in all the cases
3	Wound dehiscence	01 (Preauricular region)

electrocautery vis-à-vis the Shaw scalpel. The study conducted by them showed better haemostasis by Shaw scalpel. The difference in the findings from other studies is perhaps because of the cautery effect produced by the sides of the Shaw scalpel as well resulting in more tissue cauterization. Smaller electrodes have shown improved wound healing in experimental animals in independent studies conducted by Butler et al. [10] and Farnworth et al. [11]. In comparison to the Shaw scalpel and standard size needle, micro needle electrocautery was shown to cause less tissue necrosis [11]. Papay et al. [12] in their study evaluated the occurrence of alopecia along the incision line with the electrocautery and the cold scalpel, reporting an adverse outcome with the electrocautery. This result however has not been substantiated in other studies [ref]. No increase in wound infection rates have been reported with the electrocauteries in abdominal and thoracic wounds by Groot et al. [5] and also by Sheikh in neurosurgical cases [7]. The infection rate of wounds was noted to be well within the acceptable range.

Conclusion

The findings of this study recommend the use of the CMN in all craniomaxillofacial procedures.

References

1. Batra RS (2005) Surgical techniques for scar revision. *Skin Ther Lett* 10(4):4–7
2. Ulmer BC (2001) Electrosurgical generator with instant response technology, Users guide. Valleylab Co, Colorado
3. Allan SN, Spitz L, van Noort R, Black MM (1982) A comparative study of scalpel and electrosurgical incision on subsequent wound healing. *J Pediatr Surg* 17(1):52–54
4. Eisenmann D, Malone WF, Kusek J (1970) Electrone microscopic evaluation of electrosurgery. *Oral Surg* 29:660–665
5. Groot G, Chappell EW (1994) Electrocautery used to create incisions does not increase wound infection rate. *Am J Surg* 167:601–603
6. Kearns SR, Connolly EM, McNally S, McNamara DA, Deasy J (2001) Randomized clinical trial of diathermy versus scalpel incision in elective midline laparotomy. *Br J Surg* 88:41–44
7. Shiekh B (2004) Safety and efficacy of electrocautery scalpel utilization for skin opening in neurosurgery. *Br J Neurosurg* 18(3):268–272
8. Sozio RB, Riley EJ, Shklar GA (1976) A controlled study of electrosurgical currents and wound healing. *Oral Surg* 41(6):709–717
9. Sowa DE, Masterson BJ, Nealon N, von Fraunhofer A (1985) Effects of thermal knives on wounds healing. *Obstet Gynecol* 66:436–439
10. Butler PEM, Barry-Walsh C, Curren B, Grace PA, Leader M, Bouchier-Hayes D (1991) Improved wound healing with a modified electrosurgical electrode. *Br J Plast Surg* 44:495–499
11. Farnworth TK, Beals SP, Manwaring KH, Trepeta RW (1993) Comparison of skin necrosis in rats by using a new microneedle electrocautery, standard-size needle electrocautery, and the Shaw hemostatic scalpel. *Ann Plast Surg* 31(2):164–167
12. Papay FA, Stein J, Luciano M, Zins JE (1998) The microdissection cautery needle versus the cold scalpel in bicoronal incisions. *J Craniofac Surg* 9(4):344–347