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Categorizing comparative influence of effectiveness of scalpel VS Electrocautery for corticotomy in orthodontic cases

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Abstract
Objective: Comprison of scalpel vs Electrocautery for corticotomy in facilitated orthodontic cases in terms of post opertive pain, healing, size of scar and post-operative complications.
Study Design: Descriptive case series.
Place and duration of study: The study will be conducted at General Hospital Dental Department from April 2018 to January 2019.
Material and Methods: Sixty consecutive patients requiring intraoral incisions for corticotomy shall be randomly divided into two groups using split mouth technique of which all patients received scalpel incisions on one side whereas electrocautery incisions on the other side. Patients will be followed up for next 1 year at monthly intervals to check for pain levels, healing status evaluation, size of final scaring with both procedures and post-operative complications.
Data will be recorded in specially made pro forma and analyzed using SPSS 20.0. Analysis included frequencies, mean ±standard deviation (SD) and Paired t test for comparing both groups. P-value <0.05 will be considered significant.
Results: Results have established positive impact of Electrocautery incision in achieving better analgesic control, healing promotion, reduced scarring as well as decreased number of post-operative complications as compared to conventional scalpel method.

Keywords: Electrocautery incision, analgesic control, conventional scalpel method

Introduction

Wound healing and repair are considered as the most integral and constitutive components of any surgical procedure and are of prime importance when considering maxillofacial surgeries. It is mainly influenced by revascularization rate, preservation and reconstruction of microvasculature. Revascularization of the wound area generally tends to follow the pattern of new connective tissue formation.

Our results are in agreement with Almas and Sadig, who reported that healing was faster with a scalpel than other techniques. The only disadvantage of the scalpel technique was unpleasant bleeding during and after the operation.

Furthermore in a comparative study of electrosurgical and scalpel wounds carried out by Nixon *et al*., it was observed that healing of electrosurgical wounds were delayed. If only the preceding reports are taken into account, then electro surgery has no place in dentistry. There are as many reports that have shown that there is no difference in the clinical healing of electro surgery and scalpel wounds. The inconsistency of reports on healing of electrosurgical wounds may be attributed to the lack of standardization of factors such as power setting, cutting stroke, surface condition of the tissue, thickness and shape of the active electrodes and depth of incision. The advantages of scalpel Technique include less amount of damage to adjacent tissue and Comparatively faster wound healing. However, it is time consuming and allows more bleeding at the operative site. On the other end of the balance, the advantages of using electrosurgical procedures include [3].

- Clean tissue separation, with little or no bleeding
- Clear view of the surgical site
- Planning of soft-tissue is possible
- Access to, difficult-to-reach areas is increased
- Chair time and operator fatigue are reduced
- The technique is pressure less and precise.

However, this technique has certain disadvantages [6]. such as

- The initial cost of the equipment is far greater than the scalpel
- Odor of burning tissue is present if high volume suction is not used
- Although electrosurgical units are compatible with most modern pacemakers, it cannot be used on patients with older pacemakers that are not shielded against external interference
- It cannot be used near inflammable gases.

The main objectives of any orthodontic surgical procedures are an improvement of prognosis and improvement of esthetics. While surgical entry relies mainly on scalpel, it can be approached by other means also that includes electrodes, lasers or chemicals. In all cases, however certain technical goals are essential, including control of hemorrhage, visibility, absence of harmful effects to the surgical site and adjacent tissues, post-operative comfort and rapid healing. Successful wound healing following corticotomy is strongly influenced by the revascularization rate as well as by the preservation and reconstruction of the microvasculature of the tissues. Repair of connective tissue also depends on the development of a new vascular system, which can supply blood and nutrients to the wound area. The nutritional demands of the wound are greater than those of the non-wounded connective tissue and they are the greatest at the time when the local
circulation is least capable of complying with the demand. Furthermore, an improved healing process would also imply less post-operative complications and improved post-operative comfort for the patients [7].

Material and Methods

It will be a descriptive case series study to be conducted in the Orthodontic Department of General Hospital, Islamabad after the approval from Institutional Review and Ethics Committee for a period of ten months, from April 2018 till January 2019. Fifty patients will be included using Non-Probability Consecutive sampling technique. Sample size will be calculated on the basis of prevalence and duration of study period using WHO calculator [3].

The study will include patients of either sex with need for corticotomy which will require them to undergo surgery. These candidates will be randomly put into two groups. In Group A patients incision will be made with a scalpel and in group B with diathermy. Data will be analyzed for age, sex, comorbid illness, incisional time, blood loss during incision making and postoperative pain and wound complications.

All cases will be critically evaluated and followed for 4 months. Wound healing will be reviewed at varying intervals and patients will be questioned about any postop complications.

All the acquired data will then be entered in SPSS 20 for data processing. Analysis included frequencies, mean ±standard deviation (SD) and Paired t test. A *p*-value <0.05 will be considered significant.

Results

In this research a total of 60 patients undergoing orthodontic treatment were observed. Two groups, electro-surgery and scalpel group, were made and 30 patients (50%) were placed in each. Of the total patients included in the study 45% (27) were male while 55% (33) were female.

If we look into the mean age or gender distribution, no statistical significance was observed in both groups.

Table 1

Operative Parameters	Electro-surgery	Steel Scalpel	t	p
Mean Blood Loss (g)	17.7±10.1	34.9±16.5	4.2	0.0001
Mean incison time (min)	5.1±1.6	6.3±2.8	2.5	0.006
Wound Infection	2	3	-	1

Table 2

Operative Parameters	Electro surgery	Steel Scalpel	U(z score)	p
Post-operative Pain Score				
6 hours	5.1±1.2	7.2±1.0	177(4)	<0.00001
12 hours	2.2±1.7	4.7±1.8	116(4.9)	<0.00001
24 hours	1.5±0.9	3.5±1.4	173.5(4.1)	<0.00001

Results showed significantly lesser blood loss (17.7±10.1 vs 34.9±16.5) as well as decreased incision time (5.1±1.6 vs 6.3±2.8) in electro-surgery group as compared to the scalpel incision group. When post-operative pain was considered, electrosurgery group again had an upper hand at 6, 12 and 24 hours.

There were 2 cases of wound infection in electrosurgery while 3 in scalpel incions but this was not considered significant as it is a proven fact that infection is directly proportional to the amount of contamination and not the type of incision.

Discussion

In previous studies, various methods such as conventional scalpel, electrosurgery, radiosurgery, and lasers have been used in order to obtain better hemostasis with minimal tissue injury.

Nixon *et al.* performed gingival incisions on 25 adult male guinea pigs. For every animal, an electrosurgical scalpel was used on one side and a conventional scalpel was used on the other. However, in this study, only one surgical method was applied to each rat in order not to affect wound healing [7].

Rathofer *et al*. compared electrosurgery with scalpel for the excision of inflammatory papillary hyperplasia using questionnaires to assess pain and patients' perception of the postoperative period. Most patients did not feel pain during either technique, but the pain and discomfort after the application of Electrosurgery lasted longer than with the conventional scalpel [9].

Some studies have found that conventional scalpels have deficiencies such as maneuverability and bleeding control, although electrosurgery and radiosurgery denature cell proteins and heat energy provides buffering and hemostasis of blood vessels [5] Liboon *et al*. examined the histologic effects of scalpel, CO2 laser, and electrosurgical incisions on the mucosal tissue in pigs. They suggested that tissue damage was lower with scalpel, while electrosurgery and CO2 laser provided better hemostasis [8]. Electrosurgical devices are reported to be successful in hemostasis, but they are not suitable for some muscle tissues for anatomical reasons.

Sinha *et al*. reported that limited hemostasis was obtained with the use of conventional scalpel, but buffering with gauze was needed. They also suggested that use of an electrosurgical device provided better hemostasis compared to CO2 laser and conventional scalpel [7].

Manivannan *et al*. reported that scalpel caused more bleeding at the operative site when compared to electrosurgery. However, less damage to adjacent tissues and faster wound healing was observed with scalpel [4].

Conclusion

Results concluded from data of this study shows that when the mortality and morbidity of the corticotomy procedures are

compared to those of scalpel surgery and electrosurgery, have different advantages over other surgical methods regarding wound healing in orthodontic patients. When compared to scalpel method, electrosurgery has a superior performance regarding hemostasis. Conventional scalpel is superior when evaluated against the other regarding wound healing tendency. In a nutshell electrosurgery performed better regarding hemostasis, whereas a scalpel was superior in terms of tissue sticking and tissue coagulation.

Conflict of Interest

This study has no conflict of interest to be declared by any author.

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