

ORIGINAL ARTICLE

Comparison Between Diathermy & Stainless Steel Scalpel in Vestibular Incision for Anterior Mandibular Fracture

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ABSTRACT

Objective: To compare efficacy of the diathermy versus stainless steel scalpel vestibular incision for anterior mandibular fracture.

Methodology: Eighty patients having age between 18 to 50 years, irrespective of gender and with mandibular symphysis and parasymphyseal fractures were included and divided into two groups. Group A (diathermy group) and group B (stainless steel scalpel group) included 40 patients each. After selection of patient into either group, the standard protocol of preparation and draping was done and all surgeries were performed under the supervision of supervisor under general anesthesia. The duration of each operation, pain, edema and healing of tissues was noted on the proforma.

Results: Male patients were 39 (97.5%) and 37 (92.5%) and female patients were 1 (2.5%) and 3 (7.5%) with mean age of 31.5± 10.7 (18-50) years and 34.6± 10.1 (18-50) years in group A (diathermy group) and group B (stainless steel scalpel) respectively. Mean score of pain, edema and healing on Day 7 was significantly higher in Group B as compared to Group A.

Conclusion: Diathermy method is more effective in post-operative pain management, edema control (superoinferiorly and mediolaterally) and healing of tissue as vestibular incision for anterior mandibular fracture as compared to stainless steel scalpel method.

Keywords: Efficacy, Diathermy, Scalpel, Vestibular incision, Anterior Mandibular fracture.

INTRODUCTION

Scalpel is the most commonly used cutting instrument in surgery, it is also known as cold knife and till date it has been considered as gold standard cutting instrument.¹ As it is easy to use, good accuracy and as it causes less trauma to neighboring tissues, it has been used for many decades, however scalpel incisions are vulnerable to bleeding which covers the operative field.¹

In the past decades, significant amount of blood loss and collateral injuries have been reported in the assistant staff. Dr William Bovie, an eccentric scientist, devised the electrocautery system in the early 1900s, and Dr. Harvey Cushing was the first to employ it in the operating room on October 1, 1926. Diathermy/electrocautery employs an alternating current to produce cleavage and coagulation without causing damage to nearby tissues. It is utilized to cut fascia and muscle layers as well as ensure hemostasis, and it's become an indispensable tool in modern surgery.² Electrocautery is a system that uses the high current thermal energy to make surgical cuts and/ or provide hemostasis.³ It might be monopolar or bipolar in nature. The use of monopolar electrocautery is more common than bipolar electrocautery.⁴ When electrical impulses flow through tissues and encounter resistance, they create heat. Intracellular water boils as a result of the heat, creating intracellular pressure and rupturing cell membranes.⁵

Electrocautery has the advantage of better hemostasis and reduced operative time, while scalpel produce less thermal damage and is therefore thought to cause less postoperative pain and dehydration.⁶ Though

electrocautery is widely utilised for separating subcutaneous tissue, muscle, facial layers, and intraoperative hemostasis, it is still not widely accepted as a substitute for a scalpel in making skin incisions due to concerns about burns and unintended harm to deeper structures.⁷ In highly vascular areas the need for hemostasis such as the head and neck region led to the widespread use of electrosurgery. Electrosurgery wounds, on the other hand, appear to take longer to heal and have lower wound strength than scalpel wounds, according to research.⁸

Fractures of the anterior mandible are those that include an area limited bilaterally by vertical lines immediately distal to the canine teeth. The anterior mandible (symphysis and parasymphysis) is the second most common location for mandibular fractures, according to several studies.⁹ According to one study which was previously conducted at Liaquat University of Medical and Health Sciences, a data of around 228 patients were retrospectively reviewed to analyze the frequency, gender distribution, age groups, mechanism of accident and site involvement of mandibular fractures the results have shown that parasymphyseal fractures (51%) are the most commonly involved site followed by angle fracture (49%) among the mandibular fractures. The main focus of surgeon is proper reduction and early return to work of the patient with fracture of mandible; however, they are associated with incision design and handling of the tissue in fracture area.¹⁰

Mucosal incisions in major surgical procedures in the craniofacial area have been the subject of very few

investigations. The goal of this research is to compare standard scalpel blade incisions to diathermy incisions.

MATERIAL AND METHODS

This Comparative cross sectional study with non probability consecutive sampling technique was conducted at Department of Oral and Maxillofacial surgery of Liaquat University Hospital Hyderabad, Sindh Pakistan. Sample size was calculated as per Open. Epi sample size calculator, total sample size was 80 (40 in each group). Group division was done as mentioned below:

- Group A(n=40): Patients were treated with diathermy
- Group B (n=40): Patients were treated with stainless steel scalpel.

Patients with either gender having age range of 18 to 50 years and those who sustained mandibular symphysis and parasymphysis (Anterior Mandible) fracture were recruited in the study. While patients with any known systemic disease, history of smoking and tobacco, patients with other skeletal fractures, comminuted and infected fractures, patients with contaminated wounds in fracture area were set as an exclusion criteria.

Patients fulfilling the inclusion criteria and those who willing to get participate were included in the study and reason for the study and the participation was informed. An informed written consent was taken before enrollment of study. The history, clinical examination and radiographs (whichever is suitable for every case) were performed by principal investigator or supervisor and recorded on proforma. A Port (chit) method was used for selection criteria, in which two types of slips (slip A=diathermy; Slip B=stainless steel scalpel) were present and every patient was asked to take only one slip. After selection of patient into either group, the standard protocol of preparation and draping was done, and all surgeries were performed under the supervision of supervisor under general anesthesia.

The patient was on NPO (nothing by mouth) for 5-6 hours before operation; consent was taken for all procedures, on the day of operation. standard protocols of draping and aseptic technique were performed under general anesthesia. An incision was applied with the help of diathermy in group A patients and in group B incision was made with stainless steel scalpel by using the sterile carbon steel surgical blade No: 15. Fracture site was exposed; reduced and suitable miniplates and screws were applied for fixation. At the end site was sutured with Vicryl 3.0. The incision used for the fracture exposure, the duration of each operation in minutes, pain (Visual Analogue Scale), edema (Superioinferiorly and mediolaterally) and healing of tissue of surgery as per healing scoring system (Good: No inflammation present, no wound gaping Color of scar matches the surrounding mucosa, Satisfactory: Mild-to-moderate inflammation No signs of infection and no wound gaping, Bad: Severe inflammation and wound gaping present) was noted on the proforma. Every patient was called for follow up on the 1st, 3rd day and 7th day.

RESULTS

Distribution of gender in group A (diathermy group) and group B (stainless steel scalpel) was done; in this study 39 (97.5%) and 37 (92.5%) patients were male and 1 (2.5%)

and 3 (7.5%) patients were female in group A (diathermy group) and group B (stainless steel scalpel) respectively. On applying chi-square test p-value was 0.305 (non-significant), as shown in Table 1.

Table: 1. Patients distribution according to gender (n=80)

Gender	Group A	Group B	P-Value
	Frequency (%)	Frequency (%)	
Male	39 (97.5%)	37 (92.5%)	0.305
Female	1 (2.5%)	3 (7.5%)	
Total	40 (100.0%)	40 (100.0%)	

Table: 2. Descriptive statistics of age, pain, edema and time of surgery

Variable	Group A			Group B		
	Mean	SD	P Value	Mean	SD	P Value
Age of Patient	31.5	10.7	0.189	34.6	10.1	0.189
Postoperative Pain Day 1	5.5	1.8	<0.001	7.6	1.6	<0.001
Postoperative Pain Day 3	3.6	2.2	<0.001	5.3	2.1	<0.001
Postoperative Pain Day 7	0.7	0.8	0.001	1.3	0.7	0.001
Edema Superioinferiorly Day 1	20.3	5.9	<0.001	25.2	5.6	<0.001
Edema Superioinferiorly Day 3	19.1	5.7	<0.001	24.1	5.2	<0.001
Edema Superioinferiorly Day 7	18.3	5.9	<0.001	23.1	4.9	<0.001
Edema Mediolaterally Day 1	24.2	8.3	0.035	28.0	7.2	0.035
Edema Mediolaterally Day 3	23.3	7.6	0.037	26.7	6.7	0.037
Edema Mediolaterally Day 7	22.3	7.4	0.046	25.4	6.4	0.046
Time of Surgery (Minutes)	58.5	15.6	0.039	67.0	20.0	0.039

Mean and standard deviation of age was 31.5± 10.7 (18-50) years and 34.6± 10.1 (18-50) years in group A (diathermy group) and group B (stainless steel scalpel) respectively. Mean and standard deviation of post-operative pain on day 1 was 5.5± 1.8 (3-9) and 7.6±1.6 (3-9) in group A (diathermy group) and group B (stainless steel scalpel) respectively, on day 3 it was 3.6± 2.2 (0-8) and 6.3± 2.1 (2-9) in group A and group B and on day 7 it became 0.7± 1.8 (0-2) and 1.3± 0.7 (0-2). Descriptive statistics of continuous variable of post-operative edema (superioinferiorly) on day 1 was done, where mean and standard deviation of post-operative superioinferiorly was 20.3± 5.9 (12-32) mm and 25.2± 5.6 (13-37) mm in group A (diathermy group) and group B (stainless steel scalpel) respectively, on day 3 it was 19.1± 5.7 (10-30) mm and 24.1±5.2 (12-33) mm and on day 7 it came as 18.3± 5.9 (8-31) mm and 23.1±4.9 (11-31) mm. Edema on mediolateral findings on day 1, 3 and 7 was 24.2± 8.3 (12-44) mm and 28.0±7.2 (18-47) mm, 23.3± 7.6 (11-40) mm and 26.7±6.7

(17-44) mm and 22.3± 7.4 (6-38) mm and 25.4±6.4 (15-42) mm respectively for Group A and Group B. Mean and standard deviation of time of surgery was 58.5± 15.6 (30-95) min and 67.0±20.2 (15-95) min in group A (diathermy group) and group B (stainless steel scalpel) respectively. Detailed findings of descriptive statistics are shown in Table 2.

Distribution of patients as per postoperative tissue healing on day 1 was good 8 (20.0%) and 1 (2.5%) patients, satisfactory 24 (60.0%) and 27 (67.5%) patients

and bad 8 (20.0%) and 12 (30.0%) patients in group A (diathermy group) and group B (stainless steel scalpel) respectively. On day 2 it was good 0 (0.0%) and 0 (0.0%) patients, satisfactory 25 (62.5%) and 23 (57.5%) patients and bad 15 (37.5%) and 17 (42.5%) patients. On day 7 we noted good 4 (10.0%) and 7 (17.5%) patients, satisfactory 7 (17.5%) and 5 (12.5%) patients and bad 29 (72.5%) and 28 (70.0%). Tissue healing on all postoperative days is shown in Table 3.

Table 3. Patients distribution according to healing of tissue (n=80)

Healing of Soft Tissues	Group A			Group B			P Value
	Good	Satisfactory	Bad	Good	Satisfactory	Bad	
Postoperative Day 1	8 (20.0%)	24 (60.0%)	8 (20.0%)	1 (2.5%)	27 (67.5%)	12 (30.0%)	0.040
Postoperative Day 3	12 (30.0%)	21 (52.5%)	7 (17.5%)	8 (20.0%)	24 (60.0%)	8 (20.0%)	0.648
Postoperative Day 7	22 (55.0%)	14 (35.0%)	4 (10.0%)	13 (32.5%)	20 (50.0%)	7 (17.5%)	0.557

DISCUSSION

Scalpel is the most commonly used cutting instrument in surgery but are vulnerable to bleeding which covers the operative field. Diathermy is an alternative approach associated with better hemostasis and reduced operative time, while scalpel produce less thermal damage and is therefore thought to cause less postoperative pain and dehydration.¹¹⁻¹²

In current study, efficacy of the diathermy versus stainless steel scalpel vestibular incision was compared for anterior mandibular fracture. The study focused on finding best method of vestibular incision in terms of operative time, pain, edema and tissue healing.

In the current investigation, the mean operating time from incision to reflection of the mucoperiosteal flap in diathermy group patients was substantially shorter (p=0.039) than in stainless steel scalpel group patients. Other researchers, such as Sharma N¹³, Bhatsange A et al¹, Kearns SR¹⁴, and Nagargoje GL⁴, have observed shorter mean operational times. All similar studies are reporting that time taken to complete the incision was significantly faster with the diathermy than with the scalpel.

In current study edema was measured mediolaterally and superoinferiorly. Post-operative edema (superoinferiorly) was significantly low (p=<0.001, <0.001 and <0.001) at day 1, 3 and 7 respectively in diathermy group patients as compared to stainless steel scalpel group patients. Similarly, post-operative edema (mediolaterally) was significantly low (p=0.035, 0.037 and 0.046) at day 1, 3 and 7 respectively in diathermy group patients as compared to stainless steel scalpel group patients. Similarly, Priya N et al¹⁵ found that the diathermy group had less wound healing issues than the stainless steel knife group, but Nagargoje GL⁴ Chhabda TS¹⁶ and Chau JK¹⁷ found that the diathermy and stainless steel scalpel groups had equal complication rates. In current study post-operative pain was significantly low (p=<0.001, <0.001 and 0.001) at day 1, 3 and 7 respectively in diathermy group patients as compared to stainless steel scalpel group patients. Other investigators, such as Nagargoje GL⁴ and Priya N¹⁵, reported significantly lower postoperative pain in the diathermy group compared to the scalpel group, whereas Kearns SR¹⁴ reported significantly lower

postoperative pain in the diathermy group compared to the scalpel group in the first two visits and non-significant in the third visit. All similar studies are reporting that post-operative pain was significantly low in diathermy than with the scalpel.

In current study healing of tissue was significantly better (p=0.040) at day 1 and non-significant (p=0.648 and 0.557) at day 3 and 7 respectively in diathermy group patients as compared to stainless steel scalpel group patients. Similar result was reported by Nagargoje GL⁴ that significant difference between first 48 hours and the non-significant difference at first week and first month in diathermy group and stainless steel scalpel group, whereas Sharma N¹³ and Pearlman NW¹⁸ reported the non-significant difference between both diathermy group and stainless steel scalpel group.

CONCLUSION

The study found that diathermy is more efficient than stainless steel scalpel in post-operative pain control, post-operative edema (superoinferiorly and mediolaterally), and post-operative tissue healing in vestibular incision for anterior mandibular fracture. On day 1, day 3, and day 7, diathermy method is significantly associated with post-operative pain management, post-operative edema (superoinferiorly and mediolaterally) on day 1, day 3, and day 7, and post-operative tissue healing on day 1, whereas there is no substantial difference between diathermy method and stainless steel scalpel technique on day 3 and day 7.

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