



## A COMPARATIVE STUDY OF ELECTROSURGERY AND SCALPEL SURGERY IN MINOR ORAL SURGERY

**Dr. Jyotsna**

BDS, MDS (oral and maxillofacial surgery) Reader, Dept of oral and maxillofacial surgery, Uttaranchal dental and medical research Institute, Dehradun

**Dr. Sanjeev kumar Jha\***

MBBS, DCh, DNB (Pediatrics) Doon medical college and hospital, Dehradun  
\*Corresponding Author

### ABSTRACT

**Background :** A prospective clinical study was conducted to compare the efficacy of electrosurgery and scalpel surgery in minor oral surgical procedures.

**Materials and methods :** Thirty patients underwent incision with electrosurgery and steel scalpel for bilateral pre-prosthetic surgeries and bilaterally symmetrical impacted lower third molar surgeries under local anesthesia. All the cases were evaluated for - bleeding and incisional time intra-operatively as well as pain and healing of the surgical site post-operatively.

**Result :** The bleeding was significantly less ( $p < 0.001$ ) for electrosurgery than that of scalpel surgery. The mean time taken was less for electrosurgery than that of scalpel surgery and this difference was statistically significant ( $p=0.015$ ).

**Conclusion :** The bleeding and time taken for incision were significantly less in electrosurgery as compared to scalpel surgery. The pain and healing were comparable in both the groups

**KEYWORDS :** electrosurgery in oral surgery, healing in electrosurgery, bloodless surgical field

### INTRODUCTION

Electrosurgery (ES) has been defined as the intentional passage of high-frequency waveforms, or currents, through the tissues of the body to achieve a controllable surgical effect. By varying the mode of application of this type of current, the clinician can use ES for cutting or coagulating soft tissues.<sup>3</sup>

Conventionally a scalpel has been used to make a surgical incision because of its ease of use, accuracy, and minimal damage to adjacent tissue. The need for hemostasis in highly vascular areas such as the head and neck region led to the widespread use of electrosurgery.<sup>4,5</sup>

After reviewing the advantages and limitations of electrosurgery over scalpel surgery, a sincere effort has been made in the form of a prospective clinical study to compare electrosurgery and scalpel surgery in minor oral surgical procedures and the efficacy of both these methods are evaluated in the larger interest of the patients.

### AIM :

The aim of this prospective clinical study was to compare the efficacy of electrosurgery and scalpel surgery in minor oral surgical procedures.

### OBJECTIVES:

The objectives were to compare the efficacy of electrosurgery and scalpel surgery in minor oral surgical procedures, taking certain parameters into consideration, namely:

1. Bleeding : intra-operatively.
2. Time taken: intra-operatively from the time of incision till the elevation of flap.
3. Pain : post-operatively ( 2<sup>nd</sup> post operative day ,1<sup>st</sup> and 4<sup>th</sup> post operative week).
4. Healing of the surgical site : post-operatively ( 1<sup>st</sup> and 4<sup>th</sup> post operative week).

### METHODOLOGY

Thirty individuals with age group 15-65 years who reported to the Department of Oral and Maxillofacial Surgery, K.V.G. Dental College, Sullia, for pre-prosthetic surgeries and lower third molar surgery were the study subjects. Thirty patients requiring minor oral surgical procedures were examined and clinical diagnosis were decided. All subjects underwent incision with electrosurgery or steel scalpel for pre-prosthetic surgeries and lower third molar surgery at two different sites under local anesthesia.

**1. Experimental site A** - performed by electrosurgery.

**2. Experimental site B** - performed by steel scalpel.

The following minor oral surgical procedures were studied in the same patient at two different sites (one site operated by electrosurgery whereas another site operated by scalpel surgery) –

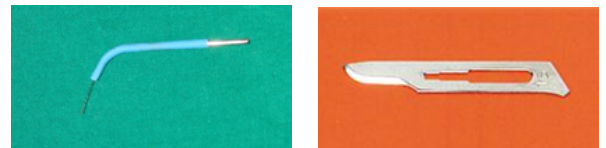
- a) Bilateral lower third molar impactions.
- b) Bilateral Pre-prosthetic surgeries having similar clinical presentation at two different sites were studied:
  - alveoloplasty
  - soft tissue excisions

A standard performa was used to collect necessary information regarding each case after inclusion. The patients were informed about the study and necessary consent was taken from them. All necessary preoperative, intraoperative and postoperative photographic records were maintained for these patients. And all treatments were performed on an outpatient basis under local anaesthesia.

### Color Plate 1: Armamentarium Used For Incision



**Fig.1 :ART-E1 Electrosurgery Unit ( Unicorn Denmart)**



**Fig. 2 : Monopolar T4-Fine Wire Electrode ( for electrosurgery)**

**Fig.3: No. 15 B.P. blade ( for scalpel surgery)**

### Inclusion criteria:

1. Subjects with unremarkable health history.
2. Age group 15-65 years.
3. Subject willingness.
4. Subjects requiring study procedures at bilateral sites.

### Exclusion criteria:

1. Subject having electric pacemaker.
2. Patients with hematological parameters not within normal limits.

- Subject with concomitant cardiac or neurological disease or hypertension or relevant systemic disease.
- Subject on immunosuppressive drugs

**Intraoperative assessment :**

All thirty patients were evaluated for the following :

- Time taken** to complete the flap elevation (in minutes) from the time of incision till the elevation of mucoperiosteal flap with the help of a stopwatch.
- Bleeding** evaluated by weighing blood soaked gauzes with the help of a digital weighing machine from the time of incision till the elevation of the mucoperiosteal flap.

**Post operative assessment :**

The subjects were clinically examined post operatively for the following :

- Pain assessments:** Patients were evaluated for pain with the help of Visual Analog Scale (VAS), with 0 = no pain and 10 = worst pain possible on 2<sup>nd</sup> post-operative day, 1<sup>st</sup> week and 4th week).
- Healing assessment :** on 1<sup>st</sup> week and 4<sup>th</sup> week post-operatively using Healing scoring system.

**Healing scoring system**

3	<b>Good</b>	- No inflammation present . - No signs of infection ,no wound gaping present. - Colour of scar matches the surrounding mucosa
2	<b>Satisfactory</b>	- Mild to moderate inflammation - No signs of infection, no wound gaping
1	<b>Bad</b>	- Severe inflammation . - wound gaping present . - Other signs of infection present (pus, slough , fever , lymphadenopathy ).

**RESULTS**

Patients from S.No. 1 to 15 underwent pre-posthetic surgeries whereas patients from S.No. 16 to 30 underwent surgical removal of impacted teeth.

**EVALUATION AFTER DATA ACQUISITION :**

**Pre-operative Data Evaluation :**

Mean age :

**Table 1 – Mean age of patients**

GROUPS	MEAN AGE
Pre-prosthetic surgery group	46.8
Impacted third molar group	23.46

**Gender Distribution :**

**Table 2 –Gender distribution in both groups**

GROUPS	MALE	FEMALE
Pre-prosthetic surgery group (N= 15)	6	9
Impacted third molar group (N = 15 )	7	8

**Intra-operative Data Evaluation :**

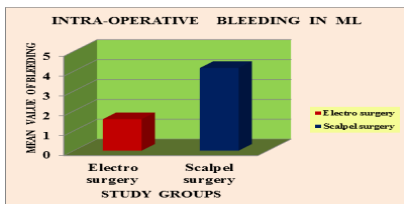
**Bleeding evaluation :**

**Table 3 - Comparing the bleeding in electro surgery and scalpel surgery using Mann- Whitney U test.**

**Bleeding intraoperatively(in ml)**

GROUP	N	Mean	Std. Deviation	Z
Electro Surgery	30	4.1619	1.6801	5.05600
Scalpel surgery	30	1.5858	1.95516	p<0.001 vhs

The mean blood loss for electro surgery was very less (1.5858 ml) as compared with scalpel surgery (4.1619 ml). This difference in blood loss was statistically highly significant (p<0.001) when comparing both of them.



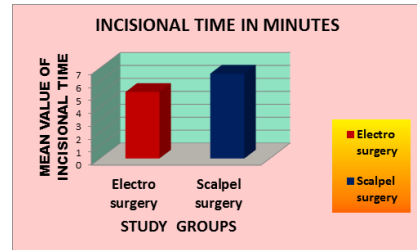
**Graph 1 - Intra-operative Bleeding For Electrosurgery And Scalpel Surgery**

**Incisional time evaluation :**

**Table 4 - Comparing incisional time for electro surgery and scalpel surgery using Mann- Whitney U test.**

Incisional time				
GROUP	N	Mean	Std. Deviation	Z
Electro surgery	30	5.1373	1.40995	2.44100 p=0.015 sig
Scalpel surgery	30	6.5578	2.05070	

The mean time taken for incision and elevation of mucoperiosteal flap was less for electro surgery (5.1373 minutes) than that of scalpel surgery (6.5578 minutes) and this difference was statistically significant (p=0.015). It can be attributed to better visibility provided by electro surgery by achieving adequate hemostasis.



**Graph 2 - Incisional Time For Electrosurgery And Scalpel Surgery**

**Post-operative Data Evaluation :**

**Pain evaluation :**

Pain was evaluated with the help of Visual Analog Scale (VAS), with 0 = no pain and 10 = worst pain possible on 2<sup>nd</sup> post-operative day, 1<sup>st</sup> week and 4th week.

**Table 5.1 - Comparing pain for electro surgery and scalpel surgery using Chi- square Test on 2<sup>nd</sup> post-op day.**

		GROUP		Total
		Electro surgery	Scalpel surgery	
.00	Count	2	2	4
	%	6.7%	6.7%	6.7%
1.00	Count	1	1	2
	%	3.3%	3.3%	3.3%
2.00	Count	12	10	22
	%	40.0%	33.3%	36.7%
3.00	Count	11	12	23
	%	36.7%	40.0%	38.3%
4.00	Count	4	5	9
	%	13.3%	16.7%	15.0%
Total	Count	30	30	60
	%	100.0%	100.0%	100.0%

a. X2=0.336 p=0.987 ns

**Table 5.2 - Comparing pain for electro surgery and scalpel surgery using Chi-square Test on 1<sup>st</sup> post-op week.**

		GROUP		Total
		Electro surgery	Scalpel surgery	
.00	Count	10	8	18
	%	33.3%	26.7%	30.0%
2.00	Count	16	17	33
	%	53.3%	56.7%	55.0%
3.00	Count	4	5	9
	%	13.3%	16.7%	15.0%
Total	Count	30	30	60
	%	100.0%	100.0%	100.0%

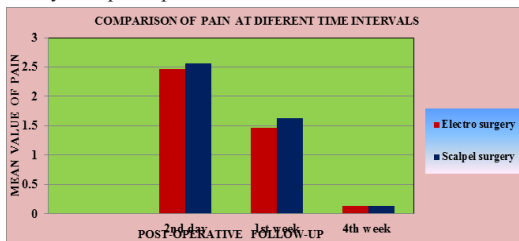
a. x2=0.364 p=0.834 ns

**Table 5.3 - Comparing pain for electro surgery and scalpel surgery using Chi-square Test on 4th post-op week.**

		GROUP		Total
		Electro surgery	Scalpel surgery	
.00	Count	25	26	51
	%	83.3%	86.7%	85.0%
1.00	Count	4	4	8
	%	13.3%	13.3%	13.3%
3.00	Count	1	0	1
	%	3.3%	.0%	1.7%
Total	Count	30	30	60
	%	100.0%	100.0%	100.0%

a. X<sup>2</sup>=1.02 p=0.601 ns

The post-operative pain values in all the three post-operative visits were almost same in both electro surgery and scalpel surgery sites. The difference in pain in both the sites was not significant statistically at all post-operative visits.



**Graph 3 - Post-operative Pain Evaluation For Electro surgery And Scalpel Surgery**

**Healing evaluation :**

**Table 6.1 - Comparing healing for electro surgery and scalpel surgery using Chi- square Test on 1st post-op week.**

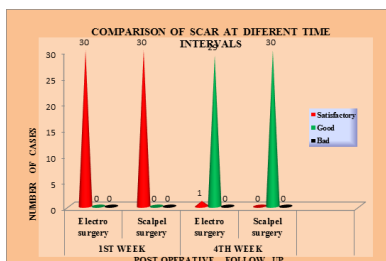
		GROUP		Total
		Electro surgery	Scalpel surgery	
Satisfactory	Count	30	30	60
	%	100.0%	100.0%	100.0%
Total	Count	30	30	60
	%	100.0%	100.0%	100.0%

**Table 6.2 - Comparing healing for electro surgery and scalpel surgery using Chi-square Test on 4th post-op week.**

		GROUP		Total
		Electro surgery	Scalpel surgery	
Satisfactory	Count	0	1	1
	%	3.3%	.0%	1.7%
Good	Count	29	30	59
	%	96.7%	100.0%	98.3%
Total	Count	30	30	60
	%	100.0%	100.0%	100.0%

a. p=1 ns

The difference in healing in both 1st week and 4th week post-operatively was statistically not significant for both the sites. Although there was slightly more inflammation at the electro surgical site as compared to scalpel surgical site in the 1st post-op week; by the end of 4 weeks, healing was good at both the sites. Only one patient out of thirty had delayed healing at the electro surgical site which can be attributed to excess use of electrocautery to achieve hemostasis in that particular case.



**Graph 4 - Post-operative Healing Evaluation For Electro surgery And Scalpel Surgery**

**SUMMARY AND CONCLUSION**

The scalpel has been used in minor oral surgeries for many years because of its ease of use, accuracy, and minimal damage to adjacent tissue. The need for hemostasis in highly vascular areas such as the head and neck region led to the widespread use of electro surgery. Electro surgery provides enhanced hemostasis by sealing blood vessels before cutting.<sup>4b</sup> However, the presence of some conflicting reports on the healing of electro surgical wounds may deter some oral and maxillofacial surgeons from using it.<sup>3</sup>

We conducted a prospective clinical study to compare the efficacy of electro surgery and scalpel surgery in minor oral surgical procedures. Thirty patients underwent incision with electro surgery and steel scalpel for bilateral pre-prosthetic surgeries having similar clinical presentations and bilaterally symmetrical impacted lower third molar surgeries under local anesthesia. On site A – incision and elevation of mucoperiosteal flap was performed by electro surgery while on site B - incision and elevation of flap was performed by No. 15 stainless steel scalpel. All the cases were evaluated for - bleeding and incisional time intra-operatively, pain post-operatively ( 2<sup>nd</sup> post operative day, 1<sup>st</sup> and 4<sup>th</sup> post operative week) and healing of the surgical site post-operatively ( 1<sup>st</sup> and 4<sup>th</sup> post operative week).

In the present study, although electro surgery could not provide complete hemostasis, the bleeding was significantly less (p < 0.001) for electro surgery than that of scalpel surgery. We observed that the bleeding and time taken for incision were significantly less in electro surgery as compared to scalpel surgery. The pain and healing were comparable in both the groups. The inconsistency of reports on the healing of electro surgical wounds may be attributed to the lack of standardization of the factors involved in ES. Just as preparation of a tooth with a high-speed turbine without adequate cooling spray can devitalize the pulp, use of ES without optimal control of the relevant factors can produce adverse effects. The factors to be controlled during ES are waveform, power setting, cutting stroke and surface condition of the tissue. The thickness and shape of the active electrodes and the depth of the incision are other factors that can also affect outcome. When those factors are controlled, no clinical or significant histologic difference can be seen between the healing of electro surgical wounds and that of scalpel wounds.

Hence, it can be concluded that although electro surgery will never completely replace the cold blade, its benefits outnumber its shortcomings especially in highly vascular areas such as the head and neck region. If the clinical electro surgical procedures are applied in accordance with the recommended principles, electro surgery is certainly of great value in minor oral surgery.

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