

Comparative Study on Cutting Diathermy Versus Scalpel Incision in Elective Midline Abdominal Surgeries

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Abstract: Nowadays there are numerous energy devices available for surgeon. Diathermy is widely available in all Surgical Theatres and are less frequently used for Skin incision due to fear of tissue damage.

This study aims to compare the Efficacy of Diathermy compared to Scalpel in patients undergoing Elective Midline Abdominal Surgeries.

Methods: This is a prospective study on 90 patients who are all admitted in Govt. Rajaji Hospital in General Surgery Department to undergo various abdominal surgeries through midline opening. All patients are randomized into two groups according to which they undergo skin incision either by Scalpel or Diathermy. The variable taken into account for this study are incision line, incision related blood loss, post-operative pain, post-operative wound complications and the results were analysed.

Results: Patients underwent skin incision through diathermy have shorter incision time and less incision related blood loss and there is no

Difference in the post-operative pain and post-operative wound complications.

Conclusions: After the study, it is concluded that the Diathermy can be used as an effective alternative to the Scalpel for skin incision. It does not affect wound healing while using mono-polar diathermy in power settings of 30Watts.

Keywords: Scalpel, Diathermy, Post-operative Pain, Post-operative Wound complications, incisional time, incisional related blood loss.

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I. Introduction

For many years skin incisions are usually made with disposable knives. But nowadays short wave diathermy is proved most valuable and versatile aid to surgical technique. It is most commonly used to achieving hemostasis by means of coagulation by varying the strength of the current it results in cutting effect. These effects are used in both open surgery and laparoscopic surgery. Electro-cautery which is widely available in all surgical theatres and are less frequently used for skin incisions for the fear of tissue damage. Recently many studies have shown that electro-cautery can be used for skin incision without any postoperative complications like wound infection, and less post-operative pain.

II. Aims and Objectives

The aim of the present study is to compare cutting diathermy versus scalpel for skin incisions from all elective midline abdominal surgeries using randomized data with following primary endpoints: Wound complication rate, Incision time, incision- related blood loss and post-operative pain.

Methodology data sources:

Every patients admitted in government Rajaji hospital in department of general surgery undergoing laparotomy in elective settings.

Study design:

This is an randomized control study in which the patients are divided into two groups based on the random number. The observer will be blinded to the type of incision used.

The surgeon will be informed about the type of incision using either scalpel or diathermy just before the surgery.

Sample Size:

90 cases

Duration :

1 year

Aim Of The Study

The aim of this study is to compare the efficacy and safety of surgical diathermy versus conventional scalpel incision for midline laparotomy.

Primary objectives:

To evaluate diathermy as an effective alternative to scalpel incision.

Study Population

All patients undergo elective midline laparotomy during the period of study.

Inclusion Criteria

All patients undergoing elective midline laparotomy of age >13 years are eligible for the study. Only clean and clean contaminated cases are included.

Exclusion Criteria

Patients who had previous mid-line laparotomy. Those on anticoagulant and corticosteroid therapy were excluded from the study.

Selection Of Patients To Undergo Diathermy Or Scalpel Incision

All patients of age > 13 years include Diabetic or Non-diabetic Hypertensive or normo-tensive Obese or non-obese

Study Protocol

The patients included in the study are all who met the inclusion criteria after informed and written consent are enrolled in the study. Randomized into two groups according to whether the diathermy or scalpel used in making skin incision. The Surgeon was informed of the type of skin incision to be used just before the start of the skin incision.

Instrument Used

Covidien Force FXE electrosurgical Generator 8CS in Monopolar Cutting Mode (Blend) with power settings of 30 watts.

Design Of Study

Prospective Study

Period Of Study

1 Year

Selection Of Study Subjects

All patients undergoing midline laparotomy of age greater than 13 years.

Methods

Prospective randomized clinical study.

Consent :

Informed and written consent from all patients

Analysis

Using CHI SQUARE test – ‘p’ value

Study Variables

Study variables to be analyzed are :

1. Incisional Time,
2. Incision related blood-loss
3. Post-operative Pain
4. Post-operative wound complications.

Incision Time

The time from the start of the skin incision to completion of peritoneal incision with complete hemostasis was recorded

Incisional Blood Loss

Blood loss during skin incision was calculated by weighing the swab used exclusively in making the incision and during hemostasis with each gram taken as equal to one ml of blood (1 gm = 1 ml).

No suction evacuation of blood were done while making the skin incision. The length and depth of incision at the end of the procedure were measured in centimeter using sterile inch tape.

Incisional area was calculated as a product of the length and width of skin incision. The amount of blood was calculated as ml/cm².

Post-Operative Pain

Post-operative pain was assessed according to pain verbal rating scale (VRS).

No Pain	Mild Pain	Moderate Pain	Severe Pain
0	1	2	3

Post-Operative Wound Complication

Wound complication includes

1. Hematoma
2. Seroma
3. Wound infection
4. Wound dehiscence.

Wound infection was graded according to **Southampton Wound Grading System**

G1 Normal healing with mil- bruising or Erythema. G2 Erythema plus other signs of Inflammation.

G3 Clear or Serosanguineous discharge. G4 Purulent discharge

All patients were operated under GA/RA. Antibiotic prophylaxis

was done using I.V cefotaxime at about 30 minutes prior to induction of anesthesia.

Subcutaneous tissue sutured using 2-0 chromiccatgut. Skin sutured using 2-0 silk in vertical mattress.

Skin sutures were removed between 10 to 12 post- operatively ,after checking the tensile strength of wound by gradual lateral traction. Wound left open for secondary healing were keptondaily dressing.

III. Results

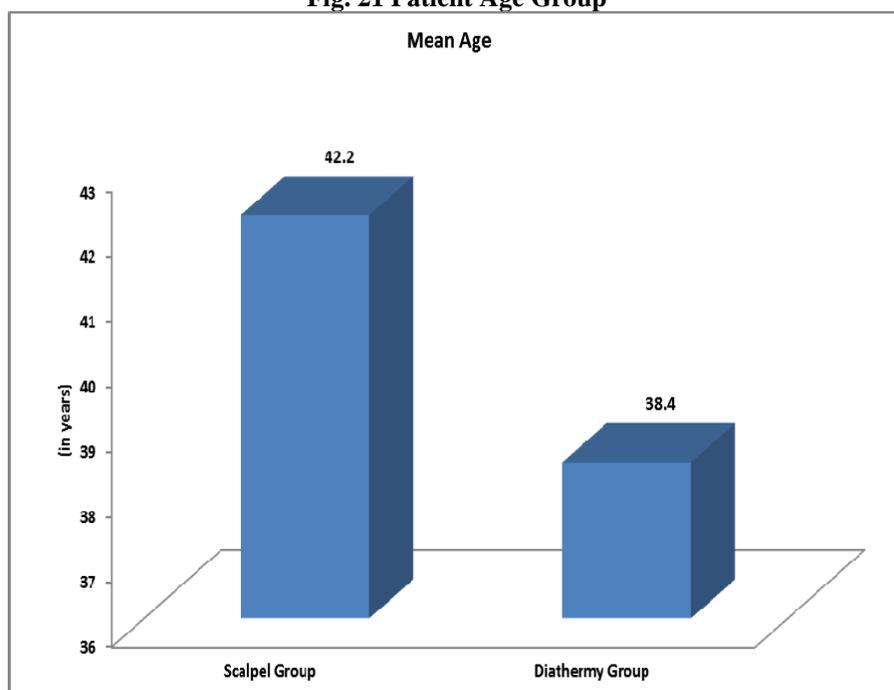
Patient Demograph

90 patients are randomized prospectively to either scalpel group or diathermy group for skin incision .

Age (in yrs)	Scalpel Group (N=45)	Diathermy Group (N=45)
Mean ± SD	42.2 ± 11.4	38.4 ± 11.2
Min, Max	23, 62	19, 68
P - Value	0.118	

The mean age of patients in scalpel group is 42.2 ± 11.4 and in diathermy group is 38.4 ± 11.2

Fig. 21 Patient Age Group



There were no significant differences between two groups with respect to patient demography.

Incision Time

Incision Time (Secs/Cm ²)	Scalpel Group	Diathermy Group
Mean ± SD	9.13 ± 0.37	8.27 ± 0.34
Min, Max	7.52, 9.52	7.48, 9.02
'P' value	< 0.001	

The mean incision time in scalpel group is 9.13 ± 0.37 and the mean incision time in diathermy group is 8.27 ± 0.34

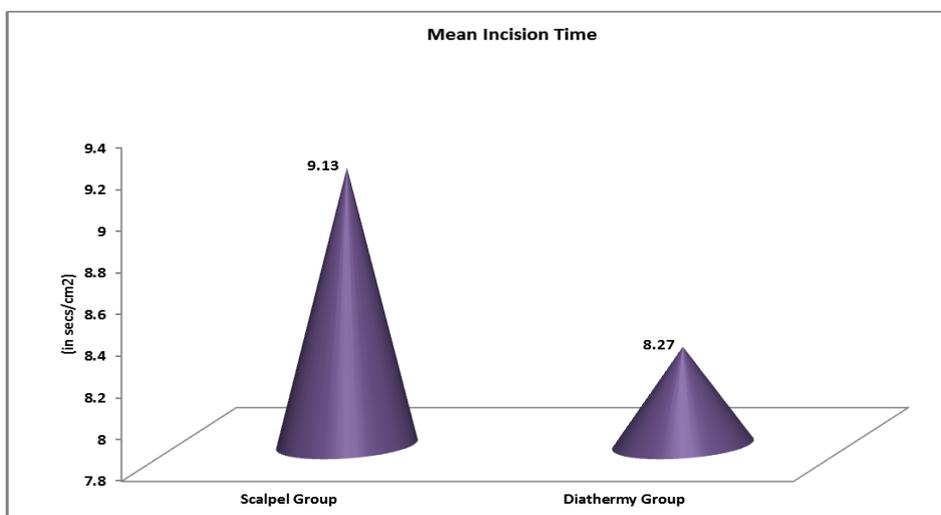


Fig. 22 Incision Time

The incision time is less in diathermy group when compared to scalpel group P- value is <0.001, it denotes that there is a significant difference between two groups.

Incision Related Blood Loss

Incision Related Blood Loss (ml/cm ²)	Scalpel Group	Diathermy Group
Mean ± SD	2.48 ± 0.29	1.76 ± 0.14
Min, Max	1.7, 2.9	1.5, 2.0
'P' value	< 0.001	

The mean value of scalpel group is 2.48 ± 0.29 and the mean value of diathermy group is 1.76 ± 0.1

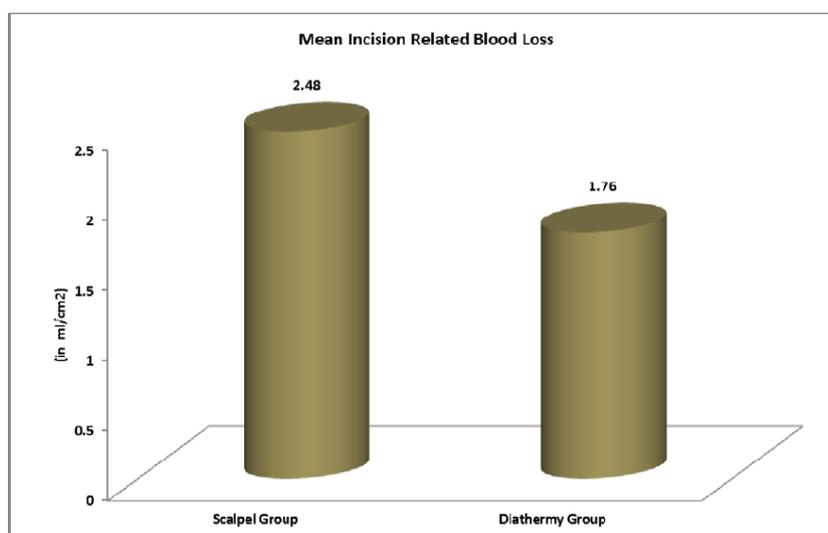


Fig. 23 Incision Related Blood Loss

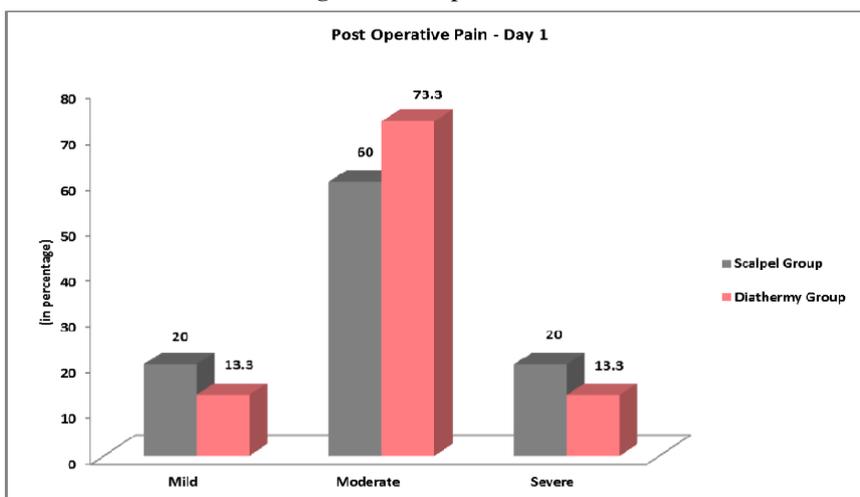
Since the 'P' value is less than .001 there is a significant difference between diathermy and scalpel group.

Post-Operative Pain Day - 1

Post-operative pain is assessed by means of verbal rating scale (VRS) up to fifth post-operative day.

Pain Score – Day1	Scalpel Group (N=45)	Diathermy Group (N=45)
Mild	9 (20.0%)	6 (13.3%)
Moderate	27 (60.0%)	33 (73.3%)
Severe	9 (20.0%)	6 (13.3%)
'P' value	0.407	

Fig. 24 Post-Operative Pain



Post-Operative Pain Day -2

Post-operative pain was treated by injection Diclofenac 50mg intra-muscular will be given.

Pain Score Day2	Scalpel Group (N=45)	Diathermy Group (N=45)
Mild	31 (68.9%)	33 (73.3%)
Moderate	12 (26.7%)	10 (22.2%)
Severe	2 (4.4%)	2 (4.4%)
'P' value	0.885	

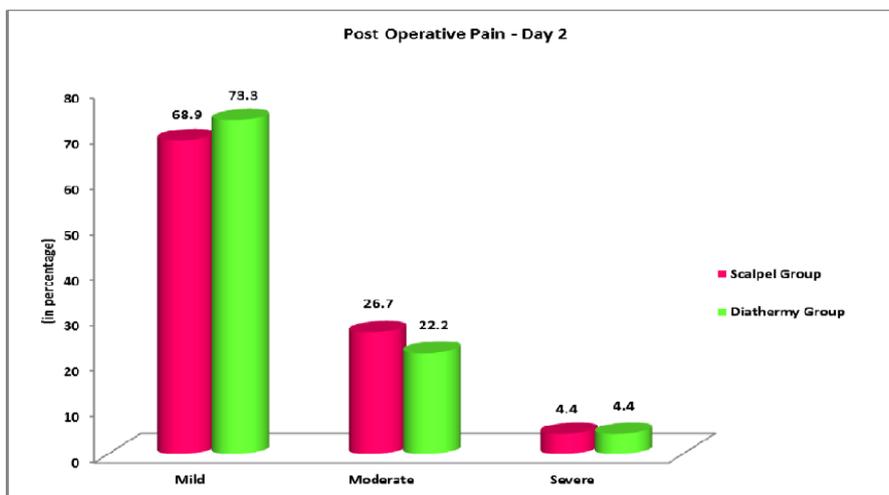


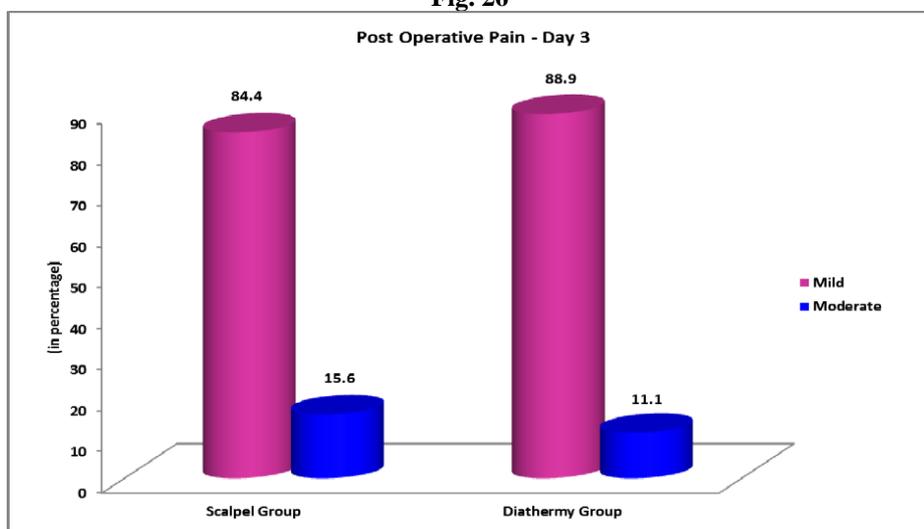
Fig.25

In second post-operative period patient have only mild pain in both diathermy and scalpel groups.

Post-Operative Pain Day - 3

Pain Score Day3	Scalpel Group (N=45)	Diathermy Group (N=45)
Mild	38 (84.4%)	40 (88.9%)
Moderate	7 (15.6%)	5 (11.1%)
'P' value	0.535	

Fig. 26



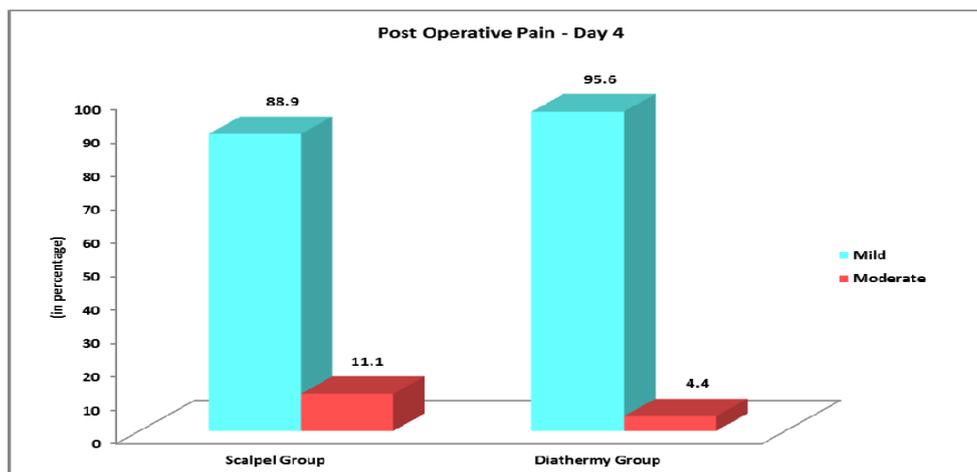
In post-operative day 3, there is apparent difference in post-operative pain as shown in the figure above.

Post-Operative Pain Day-4

Pain Score Day4	Scalpel Group (N=45)	Diathermy Group (N=45)
Mild	40 (88.9%)	43 (95.6%)
Moderate	5 (11.1%)	2 (4.4%)
'P' value	0.434	

Fig.27

As the P-value is greater than 0.05, there is no significant difference in both groups with respect to post-operative pain.



Post-Operative Pain Day-5

Pain Score Day 5	Scalpel Group (N=45)	Diathermy Group (N=45)
Mild	44 (97.8%)	43 (95.6%)
Moderate	1 (2.2%)	2 (4.4%)
'P' value	1.000	

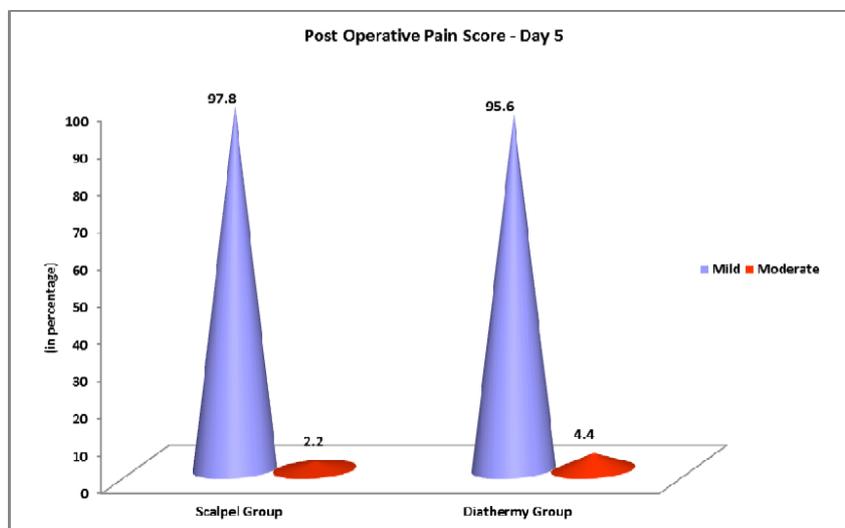


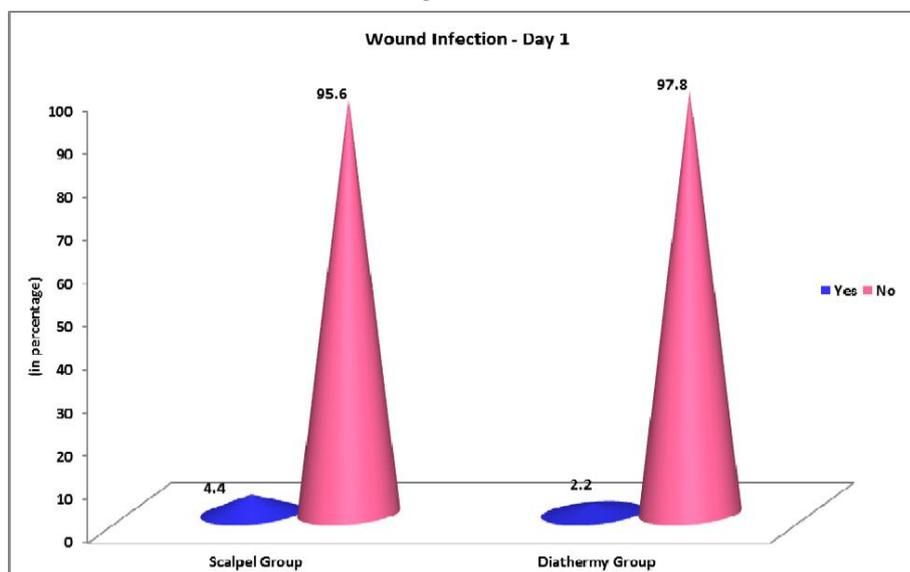
Fig.28

In post-operative day 5 , patients in both groups experience only mild and moderate pain. Even though ,in 2nd post-operative day there is an apparent increase in pain in diathermy group ,which is statistically insignificant.

Wound Complication Day - 1

Wound Infection Day1	Scalpel Group (N = 45)	Diathermy Group (N = 45)
Yes	2 (4.4%)	1 (2.2%)
No	43 (95.6%)	44 (97.8%)
'P' value	1.000	

Fig. 29



Wound complications in post-operative day 1. Both groups appears to have similar wound infection rate.

Wound Complication Day - 2

Wound Infection Day2	Scalpel Group (N=45)	Diathermy Group (N=45)
Yes	1 (2.2%)	-
No	44 (97.8%)	45 (100.0)
'P' value	1.000	

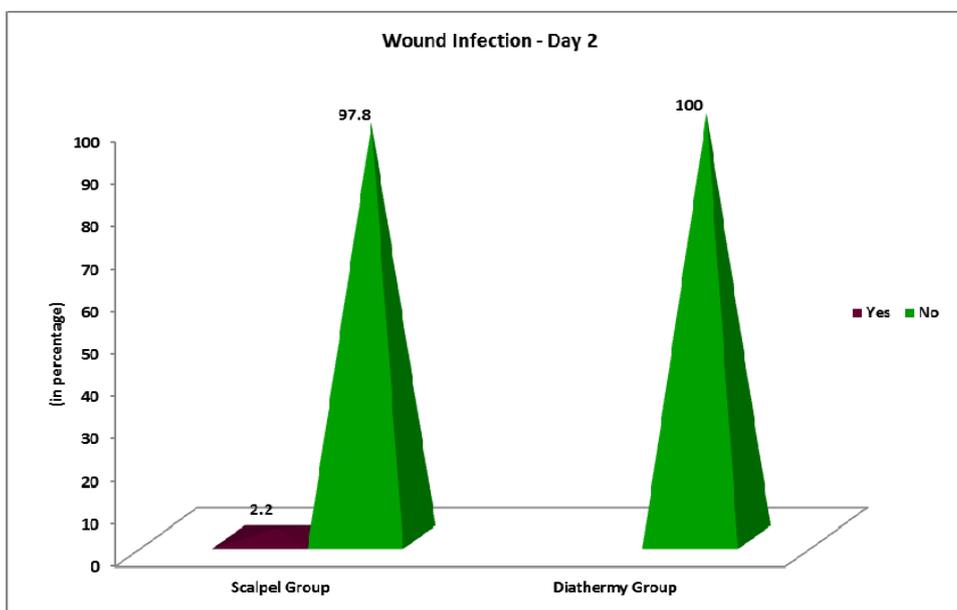


Fig. 30

Wound Complication Day - 3

Wound Infection – Day3	Scalpel Group (N=45)	Diathermy Group (N=45)
Yes	4 (8.9%)	3 (6.7%)
No	41 (91.1%)	42 (93.3%)
'P' - value	1.000	

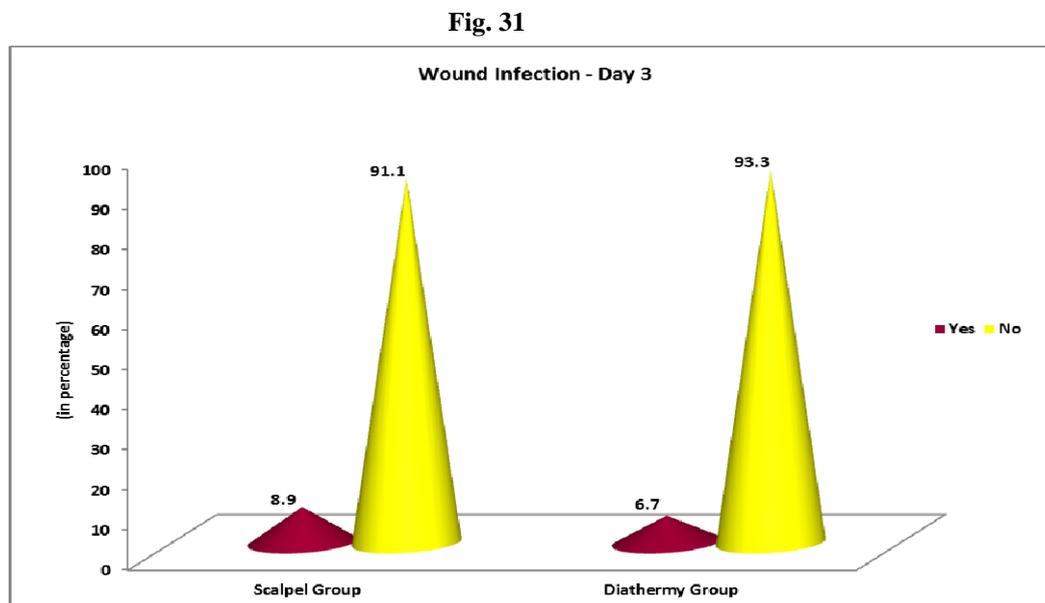


Fig. 31

Wound Complication Day - 4

Wound Infection – Day4	Scalpel Group (N=45)	Diathermy Group (N=45)
Yes	6 (13.3%)	7 (15.6%)
No	39 (86.7%)	38 (84.4%)
'P' value	0.764	

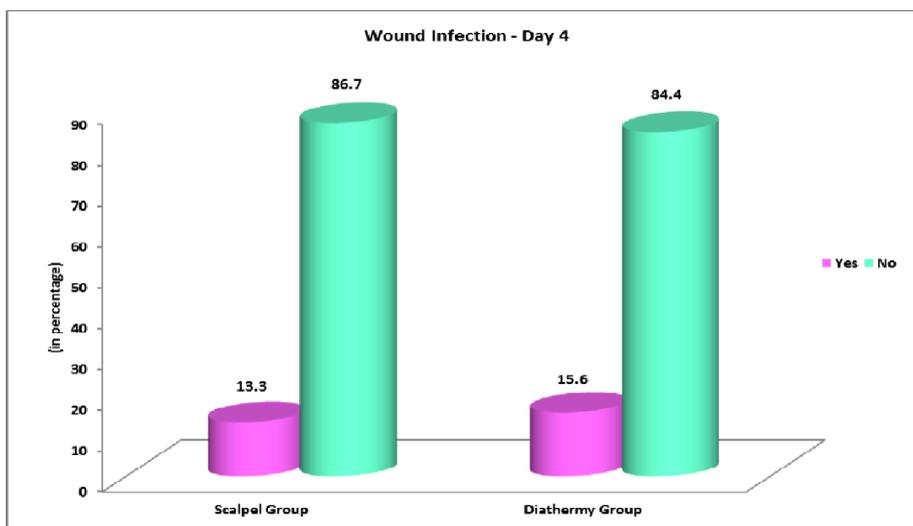
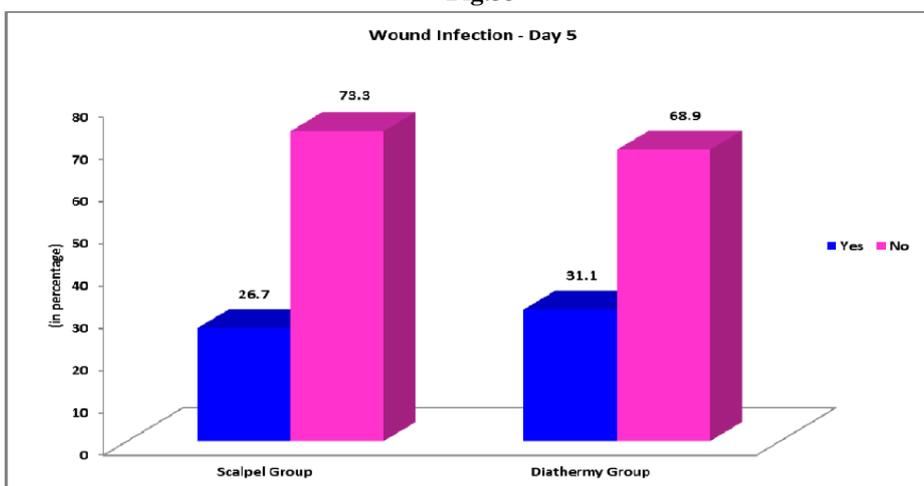


Fig.32

Wound Complication Day-5

Wound Infection – Day5	Scalpel Group (N=45)	Diathermy Group (N=45)
Yes	12 (26.7%)	14 (31.1%)
No	33 (73.3%)	31 (68.9%)
'P' value	0.642	

Fig.33



Wound complications rate found to be similar in both groups. Even though, there is apparent difference in both the groups.

IV. Conclusion

Based on the observations made in this study, it is concluded that the incision time and incision related blood loss is more in scalpel group when compared to diathermy group but post-operative pain and wound complications are similar in both diathermy and scalpel groups. Diathermy can be effectively used as an alternative to scalpel for skin incision as there is no significant difference in post-operative wound complications

in both groups. Diathermy should be used for skin incision in monopolar cutting mode with power settings of 30 Watts. In this setting, there won't be any tissue damage that affects the wound healing.

V. Summary

Patients underwent skin incision through diathermy have shorter incision time and less incision related blood loss and there is no difference in the post-operative pain and post-operative wound complications. After the study, it is concluded that the Diathermy can be used as an effective alternative to the Scalpel for skin incision. It does not affect wound healing while using mono-polar diathermy in power settings of 30Watts.

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