*Original Article*

# Clinical Outcome of Surgical Diathermy in Elective Surgery

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## Abstract

***Background:*** *Recent studies suggest that surgical diathermy shows better clinical outcome in the context of incision time, wound related postoperative pain, postoperative wound infections, and length of postoperative hospital stay and cosmetic outcome of scar in cases of elective surgical patients.* ***Objectives:*** *Compare the efficacy and safety of surgical diathermy versus conventional surgical blade for making skin incisions in elective mid-line laparotomy and to evaluate weather cutting diathermy is an effective and better alternative to surgical blade incision.* ***Materials and Methods:*** *This prospective study was carried out in the department of surgery at BSMMU, Dhaka over a period of one year. Sample size was 64 with a follow up duration for 6 month. In Group I (D), skin incision was taken with diathermy, and in Group II (S), incision was taken with surgical blade.* ***Results:*** *Compared with a scalpel incision, cutting diathermy resulted in significantly shorter incision times and reduced post operative wound related pain (P = <0·001), shorter duration of postoperative hospital stay (P = 0.003) with no differences in the wound complication rate and cosmetic outcome of scar.* ***Conclusions:*** *The study has demonstrated that surgical cutting diathermy is a safe and effective method to make skin incisions in elective surgery*

***Keywords:*** *Wound, Scar, Diathermy*

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## Introduction

Surgical diathermy is used for tissue dissection, cutting and haemostasis.[1] With advantages of modern electrosurgical units capable of delivering pure sinusoidal current. The pure sinusoidal current allows tissue cleavage without damage to surrounding area and healing wound with minimal scarring.[2] Cutting diathermy is used for skin incision now becoming extremely popular because of reduced incision time, rapid haemostasis, early wound-related post-operative pain relieve and lower analgesic requirements.[3] On the basis of this study it is suggested that there is no basic difference between the cutting diathermy groups and scalpel groups in clinical outcome. The hypothesis tested in this study was that the cutting diathermy incisions would be better than scalpel incisions in terms of incision time, wound-related postoperative pain, postoperative wound infections and length of postoperative hospital stay and cosmetic assessment of scar tissue. Patients selected for elective laparotomy by mid-line incision only and age more than 18 years irrespective of gender were included in this study but we excluded the patients who was lost during follow-up, emergency laparotomy, patients on drugs (anticoagulants, corticosteroids) or alcohol abuse, having previous surgery at same site, immunocompromised patients, patients with diabetes, coagulopathy, cancer patients who received neo-adjuvant chemotherapy or radiotherapy.

## Materials and Methods

This prospective study was conducted in the department of surgery at Bangabandhu Sheikh Mujib Medical University,

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(1st February 2017 to 31th January 2018). A total of 64 patients were included in the study. They are divided into two groups and 32 patients were included for each group. Group I for diathermy and group II for surgical blade group. The patients who underwent elective surgery by mid-line laparotomy were included in the study. Patients were randomized by using random number table. Surgical incision was given by the senior most consultant of particular unit. In Group I (D) skin incisions were given with electrocautery needle in pure cutting mode was set at reading 30 and haemostasis was achieved with coagulation diathermy was set at 35. In Group II (S) skin incisions was given with surgical blade and bleeding was controlled by coagulation of diathermy. All the patients were operated under general anesthesia. Prophylactic antibiotics were given according to the merit of surgery. The incision time was considered as the time taken for the completion of proposed skin incisions. Time was recorded using a stopwatch. The length of incision was measured by a sterile tape. Valley lab Force FX™ electrocautery machine was used for all the cases. Closure of the skin was done with skin stapler. Incision pain was measured by using Numerical rating scale (NRS) on the first 5 days after operation. Wound was checked at 4th POD. Wound condition was graded according to Southampton wound scoring system: Normal healing (Grade 0), Normal healing with mild bruising and erythema (Grade I), erythema plus other signs of inflammation (Grade II), Pus (Grade III), deep or severe wound infection (Grade IV).It was checked earlier if the dressing of the patient became soaked or if the patient developed signs of wound infection. Wound infections within 30 days were recorded. When the patients were able to tolerate oral feeds and become ambulant they were discharged home. Duration of hospital stay was recorded in data sheet. Patients were advised to attend outpatient clinics for removal of stitches on the 8th-10th postoperative day who discharged earlier. Patients were advised for follow up as per follow up schedule (after 3 months and after 6 months). After 6 months cosmetic outcome of scars were measured clinically. Events related to the study were recorded in a data sheet and were analyzed after completion of data collection.

## Results

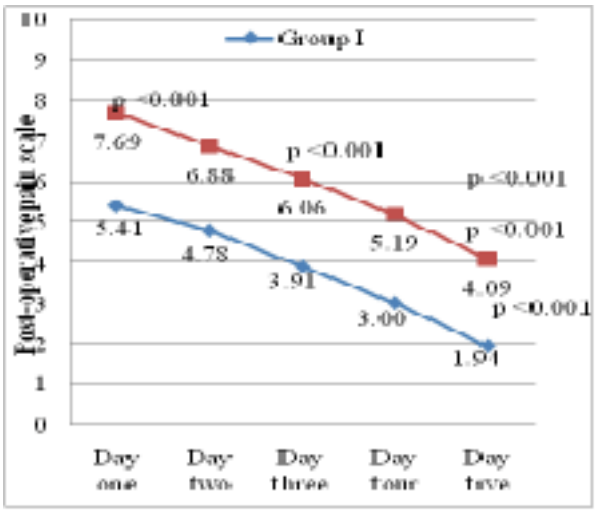
The total sample size of 64 patients, the mean age in Group I (D) was 48.78 (± SD14.54), compared to the mean age in Group II(S) which was 44.28 (± SD 15.29). In this study 17 (53 %) patients were male and 15 (46.9 %) patients were female in Group I (D). In Group II(S) 19 (59.4 %) patients were male and 13 (40.6 %) patients were female. The mean BMI, in Group I (D) was 21.03 (±SD 2.45), compared to 20.42 (± SD 2.90) in group II (S) and mean Hb (gm/dl) was 11.46 (± SD 1.00) in group I (D) and 11.51 (± SD 0.98) in group II (S). The time of incision was recorded in both the groups and analyzed and is shown in table -I. The duration of hospital stay in group I (D) and group II(S) were recorded and shown in table -I.

**Table I:** Incision time and hospital stay

| Variables | Groups | | p value* |
|---|---|---|---|
| | Group I (n=32) | Group II (n=32) | |
| Incision time (cm/sec) (Min -Max) | 2.34 ± 0.35 (1.50 – 3.00) | 4.36 ± 0.58 (2.94 – 5.67) | <0.001 |
| Length of hospital stay (days) (Min -Max) | 11.06 ± 1.78 (7.0 -15.0) | 12.41 ± 1.66 (8.0 -16.0) | 0.003 |

The mean values of pain score of each day that is from day one to day five for Group I (S) were 5.41, 4.78, 3.91, 3.00, and 1.94 in comparison to 7.69, 6.88, 6.06, 5.19, and 4.09 for GroupII (D). Mean pain score in total five day was 3.81 ± 0.87 in Group I (D) and 5.98 ± 1.20 in GroupII (S).This showed that the Numerical rating scale (NRS) pain score was significantly reduced in Group I (D) than in GroupII (S) patients on postoperative day 1 (p= < 0.001), day 2 (p= < 0.001), day 3 (p= <0.001), day 4 (p= < 0.001), day 5 (p= < 0.001) respectively. The rates of pain was recorded from 0 (no pain) to 10 (severe pain) on NRS scale. Line chart of the patients according to postoperative pain scale by groups shown in figure -1.

**Figure -1:** Post operative pain scale



Wound condition was graded according to Southampton wound scoring system:
Normal healing (Grade 0) was found 24 (75.0 %) in Group I (D) and 19 (59.4 %) in Group II (S) , Normal healing with mild bruising and erythema (Grade I) was found 2 (6.3 %) in Group I (D) and 5 (15.6%) in Group II (S) , erythema plus other signs of inflammation (Grade II) was found 3 (9.4 %) in both Group I (D) and Group II (S) , Pus (Grade III) was found 2 (6.3 %) in Group I (D) and 3 (9.4 %) in Group II (S) , deep or severe wound infection (Grade IV) was found 1 (3.1 %) in Group I (D) and 2 (6.3 %) in Group I I (S).Wound infections rates of both groups were shown in table -II.

**Table II:** Wound infection rate

| Wound infection | Groups | | p value* |
|---|---|---|---|
| | Group I (D) (n=32) | Group II (S) (n=32) | |
| Present | 3 (9.4) | 5 (15.6) | 0.708 |
| Absent | 29 (90.6) | 27 (84.4) | |

Cosmetic assessment of scars among 64 patients was done and results shown in table -III.

**Table III:** Cosmetic assessment of scars

| Cosmetic assessment of scar | Groups | | p value* |
|---|---|---|---|
| | Group I (D) (n=32) | Group II (S) (n=32) | |
| Linear scar | 27 (84.4) | 24 (75.0) | |
| Hypertrophic scar | 4 (12.5) | 7 (21.9) | 0.608 |
| Keloid | 1 (3.1) | 1 (3.1) | |

# Discussion

Surgical diathermy is very important equipment during operation now-a-days. It is used increasingly for homeostasis and tissue dissection. Some surgeons were reluctant in using cutting diathermy for making skin incision. Their thinking is, it leaves devitalized tissue within the wound which consequently lead to wound infection, delayed wound healing and ugly scar formation. However, these concerns have not been substantiated by recent several randomized clinical trials of skin incision which have shown faster incision time, reduced wound-related postoperative pain and lower analgesic requirement with cutting diathermy incision compared with surgical blade incision. Similarly, there was no significant difference in terms of postoperative wound infection and cosmetic outcome of scar between two groups as reported by the present study.

The length of incision was recorded in both group intra operatively. The mean length (cm) of incision in Group I is 8.15 ± 3.75 and Group II is 9.04 ± 4.44. The time of incision was recorded in both the groups and analyzed. The mean time of incision in Group I is 6.45 ± 3.36 and in Group II is 8.83 ± 5.55.This differences was statistically significant.[4] In our study the mean incision time in group I (D) was 2.34 ± 0.35 and the mean incision time in group II (S) was 4.36 ± 0.58. The difference between the two groups in terms of mean incision time was statistically significant (p= <0.001).The duration of hospital stay of patients with mean value was 8.24 ± 4.96 in diathermy group (Group I) and 10.54 ± 9.56 in Scalpel (Group II). The difference between the two groups in terms of duration of hospital stay was not significant (p=0.43).[5] The duration of hospital stay in our study was 11.06 (± SD 1.78) in group I (D) and in group II (S) was 12.41 (± SD 1.66). The difference between the two groups in terms of mean hospital stay was significant (p=0.003). Pain scores on day 1 after operation were significantly lower in the diathermy group (mean 1·68 versus 3·13; *P*=0·018), but were not significantly different on days 2-5.[6] In our study mean pain score was 3.81 ± 0.87 in Group I (D) and 5.98 ± 1.20 in GroupII (S). This showed that the NRS pain score was significantly reduced in Group I (D) than in GroupII (S) patients on postoperative day 1 (p= < 0.001), day 2 (p= < 0.001), day 3 (p= <0.001), day 4 (p= < 0.001), day 5 (p= < 0.001) respectively which was statistically significant. In case of wound complications, 22 (15.71%) patients from Group I developed wound infections and in GroupII 26 (18.18%) patients developed wound complications. Erythema of wound margin (G: 1) was found four (2.9%) patients for Group I and in eight (5.6%) patients of Group II. Overall no statistically significant differences were seen regarding wound complications for the two groups. There were no significant differences in wound infection rates between the groups (5 of 30 versus 5 of 32; *P*=1·000).[7] In our study wound infections were found in 3 patients (9.4 %) in Group I (D) and 5 patients (15.6 %) in Group II (S). The difference between the two groups in terms of wound infection was not significant (p=0.708). In reviewed the respective cosmetic grading of wounds between two groups, linear scar was found 86.67 % in diathermy group and 69.23 % in scalpel group, hypertrophic scar was found 0 % in diathermy group and 15.38 % in scalpel group, keloid was found 6.67 % in diathermy group and 7.69 %

in scalpel group. Comparable trends were seen in both the groups and the difference between these groups was not statistically significant.[8] A total of 66 patients were randomized to cutting diathermy (31) or scalpel (35). At 6 months, there was no significant difference between the diathermy and scalpel groups.[9] In our study the respective cosmetic grading of scar between two groups was done. Linear scar was found 84.40 % in Group I (D) and 75.0 % in Group II (S), hypertrophic scar was found 12.5 % in Group I (D) and 21.90 % in Group II (S), keloid was found 3.1 % in both Group I (D) and Group II (S). Comparable trends were seen in both the groups and the difference between these groups was not statistically significant.

## Conclusion

This present study showed that surgical diathermy was a safe and effective method to make skin incision in elective surgery. It had significant advantages over surgical blade skin incision in terms of shorter incision time, reduced postoperative pain and reduced duration of postoperative hospital stay but no significant difference in the rate of wound complications and cosmetic outcome of scar between two groups.

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