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# A COMPARATIVE STUDY BETWEEN ELECTRO CAUTERY AND STEEL SCALPEL IN MAKING INCISIONS IN MESH HERNIOPLASTY FOR INGUINAL HERNIA

General Surgery

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## ABSTRACT

**Aim:** To compare the Efficacy of Diathermy compared to Scalpel in patients undergoing Elective inguinal hernia surgeries.
**Methods:** This is a prospective study on 64 patients who are all admitted in MMCH in General Surgery Department at Muzaffarnagar, Uttar Pradesh from March 2018 to February 2019 to undergo Mesh hernioplasty. 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 time, incision related blood loss, post-operative wound complications and the results were analysed.
**Results:** Patients who had incision by diathermy have shorter incision time and less incision related blood loss and there is no statistical difference in the post-operative wound complications.
**Conclusions:** Based on the finding of our study, we recommend that the electro cautery device may be accepted as an alternative modality used for surgical skin incisions.

## KEYWORDS

Scalpel, Diathermy, Post-operative Wound complications, incisional time.

## INTRODUCTION:

Incision is a "cut or slit" to gain access to the underlying structures. Traditionally, they are made with scalpel. However, there has been a continuous surge in identifying other methods of skin incision and in the recent years electro surgical instruments have achieved great attention in this regard[1].

Surgical diathermy was introduced at the beginning of the 20th century to obviate the inherent disadvantages of steel scalpel like lack of haemostasis leading to undesired blood loss, indistinct tissue planes, increased operative time , use of foreign material (ligature) in the wound, leading to infection risk, possibility of accidental injury in the operations theatre, potential for tumour metastasis through lymphatic channels however common practice that persists today involves making the initial incision with Scalpel, then switching to an electrosurgical device to cauterize blood vessels and complete the incision, this reluctance is partly attributable to the misbelief that electro surgical instruments devitalized tissue within the wound, which consequently leads to increased wound infection and delayed wound healing[2-4].

The purpose of our study is to alleviate the fear of using electro cautery for skin incisions in surgical community, particularly to observe whether they take a longer time to perform affecting overall operating time, incision blood loss and wound complications.

## MATERIALS AND METHODS:

This study was a hospital-based randomized prospective study conducted on 64 patients with diagnosis of inguinal hernia (right side 46 patients and left side 18 patients) at Muzaffarnagar Medical College and Hospital in the department of General surgery between the time duration of one year i.e. from March 2018 to February 2019 with the aim to see superiority of skin incision technique by newer modality of electro cautery against age old method of using a cold steel scalpel in inguinal hernia surgeries in terms of incision time including haemostasis, quantity of bleed from incision site and wound complications (wound discharge, SSI, keloid and hypertrophic scar formation).

### Inclusion criteria:

64 patients in the age group of 15-70 years requiring mesh hernioplasty for inguinal hernia were included in this study irrespective of sex, race, religion, place of origin or socio-economic status.

### Exclusion criteria:

1. Patients < 15 years and > 70 years.
2. Patients requiring incisions to be made over previous surgical scars.
3. Previous history of keloid or hypertrophic scar.
4. Patients on anti-coagulant therapy.
5. Uncontrolled diabetes ($HbA_1C > 7$)
6. Immuno-compromised status.
7. Emergency surgeries.
8. Severe organ dysfunctions.

64 patients admitted through surgery outpatient department were divided randomly into 2 groups (group A and group B). Randomization were done a night before surgery by an independent surgical colleague. After patient were booked for surgery, a comprehensive explanation on what the study entails and its possible outcome were discussed with respect to study objectives. During consent participants had been explained to about randomization process and its importance in study.

Skin and subcutaneous tissue were incised with a surgical blade for group A patients and with cutting mode of diathermy with blade electrode for group B patients with haemostasis secured with the coagulation mode of diathermy or with ligatures in both groups. Incisions would be standard inguinal hernia incision of varying length. A monopolar diathermy using a blade electrode which delivering 80 watt of sinusoidal current were used in the procedure. Subcutaneous tissue were closed with braided coated polyglactin 2/0 interrupted sutures and skin sutures were applied in a subcuticular pattern with monofilament polypropylene 3/0. The study subjects were evaluated clinically twice daily during the immediate postoperative period. As patients became mobile, accepting well orally, passing stools and flatus they discharged from the hospital. The wound were checked on the third postoperative day if the patient remained in the hospital. They were checked earlier if the dressing of the patient became soaked or the patient develops fever or tachycardia with no other source of fever or tachycardia.

Patients were advised to attend outpatient clinics for removal of stitches on the $7^{th}$ to $10^{th}$ postoperative day and followed for up to 3 months after discharge from the hospital to detect the occurrence of both early and late wound problems. Incision time calculated from the start of skin incision until deep fascia, aponeurosis or lump reached with complete haemostasis. Blood loss during incision measured weighing the swabs pre and postoperatively. To see wound complications wound were checked periodically for any wound dehiscence, hematoma, erythema, induration, unexpected tenderness, purulent secretions and wound culture/gram staining/ZN staining were obtained if required.

**Statistical analysis:**
Statistical data were summarised and analysed using SPPS software version 24. $P < 0.05$ was considered statistically significant.

**Results:**
Mean age of these patients was 43.71875± 17.16074 years. Patients included in scalpel group had mean age of 43.46429±15.46198 years and those who had incision with electro cautery had mean age of 43.91667±18.58936 years. There was no statistical significant difference in the age distribution ($P$ = 0.918) between the two interventional groups.

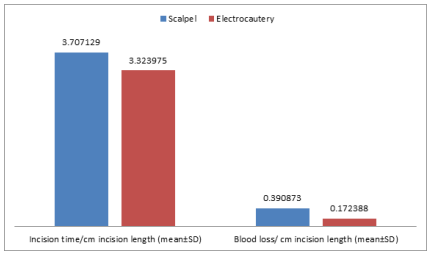
One patient from each group had controlled DM {1(3.57%) of 28 patients in the scalpel group, 1 (2.78%) of 36 patients in the diathermy group} and there was no statistical significant difference between the no. of DM patients between scalpel and cautery group ($P$ =0.856) (Table no. 1).

32 out of 64 patients (50%) were smokers (15 of 28 patients (53.57%) in the scalpel group, 17 of 36 patients (47.22%) in the diathermy group) but there was no significant statistical difference between smoker patients between two groups (P= 0.614). Similarly no significant difference was found in no. of patients taking alcohol between 2 groups (4 of 28 patients (14.29%) in the scalpel group and 1 of 36 patients (2.78%) in the diathermy group) (P= 0.088). None of the patients had keloid or hypertrophic scar after previous trauma or scar if any. None of the patients had history of previous steroid intake or any drug abuse (Table no. 1).

**Table 1: History of patients**

| History of patient | Scalpel group (N= 28) | Electro-cautery group (N=36) | P Value |
|---|---|---|---|
| Controlled DM | 1 (3.57%) | 1 (2.78%) | 0.856 |
| Smoking | 15 (53.57%) | 17 (47.22%) | 0.614 |
| Alcohol | 4 (14.29%) | 1 (2.78%) | 0.088 |

The mean incision time is less in diathermy group when compared to scalpel group (3.323975 sec/cm as compared to scalpel group 3.707129 sec/cm); it denotes that there is a significant difference between two groups (P<0.00001). Mean blood loss per centimetre of incision by scalpel was 0.390873±0.088822 ml/cm in comparison to diathermy group which was 0.172388±0.100327 ml/cm. Unpaired 2 tailed t-test showed there was statistically significant difference between 2 groups (P<0.00001). (Graph no. 1)




**Graph no. 1: Incision time and blood loss during incision**

In 19 out of 64 incisions (29.69%), wound discharge was present in post-op period (13 out of 36 incisions (36.11%) in cautery group and 6 out of 28 incisions (21.42%) in scalpel group) (Table no. 2), but there was no statistically significant difference between two interventional groups(P=0.202). Two patients (3.125%) developed surgical site infection (1 patient (2.77%) in cautery group and 1 patient (3.57%) in scalpel group). There was no statistically significant difference between patient developing SSI in 2 groups (P= 0.856). No patient had hypertrophy or keloid in post-op period and follow up.

**Table 2: Wound complications**

| Complications | Scalpel (N=28) | Electro Cautery (N=36) | P value |
|---|---|---|---|
| Wound discharge | 6 (21.42%) | 13(36.11%) | 0.202 |
| SSI | 1(3.125%) | 1(2.77%) | 0.856 |

**DISCUSSION:**
An ideal method of skin incision which would provide an adequate and rapid exposure, minimum blood loss and a clean and cosmetically acceptable wound is every surgeon's desire. The advantages derivable from the use of diathermy in terms of haemostasis, and the concerns regarding its effect on wound outcomes, when used for skin incisions, provided the clinical equipoise for its comparison with the traditional scalpel technique in this study.

In our study incision time and blood loss during incision with diathermy was significantly lower than scalpel group which was consistent with most of the studies like Ly et al.(1), Aird et al.(2), Siraj et al. (3), Shivogauda et al. (4) and Chalya et al. (5).

In our study, wound infection rates in the two treatment arms were also found not to be different. This is similar to the findings by Ali *et al*. (6), who compared the rate of wound infections in eighty patients who had inguinal herniorrhaphies and randomised into equal numbers for diathermy and scalpel skin incisions. Kadyan *et al*. (7) in 2014 recorded lesser number of cases of SSIs in the scalpel skin incision group (13.1%) compared to the diathermy group (15.7%) but this difference was not significant statistically.

Groot and Chappell (8) found that electro cautery did not increase the wound infection rate. Ahmad *et al*. (9) have shown that diathermy incised wounds are not more prone to infection. This may be because the heating effect of the diathermy produces local tissue heating, which in turn increases subcutaneous oxygen tension and enhances the resistance of the surgical wound to infections (10).

**CONCLUSION:**
Surgeons have been always in search of an ideal method of making skin incision which would provide quick and adequate exposure with minimum loss of blood. Our study is one of the few attempts towards comparing the effectiveness of the two incision techniques. Electrosurgical incision is safe for both patients as well as for surgeon. It requires less time, there is less blood loss during skin incisions however we could not found any significant difference statistically in terms of wound complications. Based on the finding of our study, we concluded that the diathermy device may be accepted as an alternative modality used for surgical skin incisions.

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