Section: General Surgery

Original Research Article

A STUDY ON OUTCOME OF SKIN INCISION BY CAUTERY VERSUS STEEL SCALPEL IN INGUINAL HERNIOPLASTY AT TERTIARY CARE CENTRE

Duvvuru Abhinav Pulla Reddy[1], P. Rajendra Kumar[2], Raga Bhava Harshitha Kavali[3], Aachi Srinivas[4]

[1]Senior Resident, Department of General Surgery, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad, Telangana, India.
[2]Associate Professor, Department of General Surgery, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad, Telangana, India.
[3]Assistant Professor, Department of General Surgery, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad, Telangana, India.
[4]Professor, Department of General Surgery, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad, Telangana, India

Received : 12/06/2025
Received in revised form : 25/07/2025
Accepted : 16/08/2025

Keywords:
Surgery, hematoma, cautery, incision.

Corresponding Author:
Dr. P. Rajendra Kumar,
Email: drrajendrapatwari@gmail.com

DOI: 10.47009/jamp.2025.7.4.245

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2025; 7 (4); 1294-1298

ABSTRACT

Background: Recent advancements and studies have demonstrated that electrocautery can indeed be utilized for skin incisions without causing any postoperative complications such as wound infection and scarring, while also minimizing postoperative pain compared to the use of the steel scalpel. **Objective:** To compare the outcome of skin incision by cautery vs steel scalpel in Inguinal Hernioplasty at a tertiary care centre. **Materials and Methods:** Present study was hospital based prospective comparative study carried out among 60 Patients. Patients were divided into two groups by non-randomized allocation i.e. even numbered Patients allocated to Diathermy incision and odd numbered patients allocated to Scalpel incision of which: Group A: incision was given with Electrocautery needle using pulse sine wave current in "cut" mode and power setting of forty watts. Group B: incision was given with Conventional Scalpel. The post operative pain was assessed using Visual Analogue Scale,[5] (range 0-10, where 0 being no pain and 10 being worst pain) at the intervals of 6, 12 and 24 hrs. **Result:** Both the groups were comparable for age. But, the postoperative pain at 6, 12 and 24 hours was significantly more in the scalpel group compared to the EC group and this difference was found to be statistically significant ($p<0.05$). The analgesic requirement and the Manchester scar scale was similar in the two groups ($p>0.05$). Both the groups were comparable for Local wound complications in hematoma, Local wound complications in seroma, and Local wound complications in purulent collection ($p > 0.05$). **Conclusion:** Based on observations made in this study, it has been concluded that results of the both groups i.e. electrocautery group and scalpel group: Post - Operative pain is comparatively less with Electrocautery when compared to Scalpel. Post - Operative complications like Haematoma, Seroma and Purulent Collection is comparable in both groups.

INTRODUCTION

An incision refers to a cut or slit made in order to gain access to the underlying structures.[1] Cauterization, on the other hand, is a medical term that denotes the act of burning a part of the body in order to remove it or close it,[2] The use of electrocautery has been increasingly employed for tissue dissection, although concerns about excessive scarring and poor wound healing have limited its widespread use for skin incisions.[2] Traditionally, incisions have been made using stainless steel scalpel, resulting in more bleeding and pain.[3] In order to address this issue, several advanced techniques such as laser and electron surgical aspirator have been introduced. However, these methods are costly and not widely accessible in peripheral areas.[4] Despite electrocautery being readily available in all surgical theatres, it is less commonly used for skin incisions due to concerns about tissue damage, postoperative pain, and scarring.[4] Recent advancements and studies have demonstrated that electrocautery can indeed be utilized for skin incisions without causing any postoperative complications such as wound infection and scarring, while also minimizing postoperative pain. The purpose of this study is to alleviate the apprehension within the surgical

ISSN (O): 2687-5365; ISSN (P): 2753-6556

community regarding the use of electrocautery for skin incisions and to compare the outcome of skin incision by cautery vs steel scalpel in Inguinal Hernioplasty at a tertiary care centre.

MATERIALS AND METHODS

Present study was a hospital based prospective comparative study carried out at department of General Surgery, Malla Reddy Institute of Medical Sciences, Suraram, Medchal from September 2022 to February 2024 for a period of 18 Months among 60 Patients

Inclusion Criteria

1. Male Patients aged between 30 to 70 Years who underwent Elective Inguinal Hernioplasty. 2. Newly diagnosed cases who underwent Elective Inguinal Hernioplasty.

Exclusion Criteria

1. Patients with Bleeding Disorders.
2. Patients with Cardio-pulmonary diseases.
3. Patients with complicated hernias like irreducible hernia, obstructed hernia and strangulated hernia.
4. Patients with previous scar and patients requiring incisions to be made over previous scars.
5. Immunocompromised States.

Methodology

Male patients aged between 30 to 70 years who underwent Inguinal Hernioplasty in the department of General Surgery were included in the study. All Patients underwent a standard clinical and laboratory evaluation that included brief information about age, sex, address, surgical profile, Ultrasound abdomen and pelvis and other investigations if necessary. All investigations were performed according to standard protocol of the institution.

Surgical profile included (i) Complete Blood Picture including Peripheral Smear. (ii) Complete Urine Examination. (iii) Blood Urea and Creatinine (iv) Viral Serology: HIV-1&2, HBsAg, HCV (v) Random Blood Glucose level (vi) Blood Grouping and Rh typing (vii) Bleeding time and Clotting time (viii) Electrocardiogram (ix) Chest X-ray

Patients satisfying the inclusion criteria were enrolled in the study. A Designated proforma for collection of data with all details of patient history and investigations performed were used. Patients were divided into two groups by non-randomized allocation i.e. even numbered Patients allocated to Diathermy incision and odd numbered patients allocated to Scalpel incision of which:

Group A: incision was given with Electrocautery needle using pulse sine wave current in “cut” mode and power setting of forty watts.

Group B: incision was given with Conventional Scalpel. The post operative pain was assessed using Visual Analogue Scale (5) (range 0-10, where 0 being no pain and 10 being worst pain) at the intervals of 6, 12 and 24 hrs.

Patients were discharged on 4th Post Operative day. Patients were evaluated for presence or absence of post operative complications which include Seroma, Haematoma and Purulent collection on 4th and 10th day. Sutures were removed on 10th post operative day when patient comes for review. Post operative Scar analysis were done on 28th day using Manchester Scar Scale,[6,7] (range 4-14, lower score denotes better outcome) in which the components are Colour, Shine, Contour, Distortion.

Ethical considerations: Ethics committee approval was taken; Scientific committee approval was taken. Informed consent was taken.

Patient benefits: Any co-morbidity detected will be treated appropriately during the period of study.

Statistical Analysis: All the data was collected in approved proforma and data is entered in master chart. Descriptive Analysis was done via SPSS 20.0 software whereas graphs, tables and charts were obtained by MS Excel and Word. Results on Continuous measurements were presented in Mean ± SD (Min Max) and Categorical measurement in Number (%). The results were analysed and compared for the two groups where Chi-Square test is used for Categorical Data and Student t test for Continuous Data. P value of < 0.05 was considered as statistically significant.

RESULTS

Table 1: Comparison of characteristics in two groups

Characteristics		EC group	SC group	P value
Age (years)		**48.9±15.13**	**48.1±10.59**	**0.81**
Post operative pain	6 hours	6.28±0.79	6.7±0.53	0.01
	12 hours	3.21±0.7	3.8±0.64	0.001
	24 hours	2.1±0.6	2.4±0.51	0.04
Analgesic requirement		1.4 ± 0.61	1.6 ± 0.48	0.18
Manchester scar scale		4.12±0.25	4.2±0.18	0.16

Both the groups were comparable for age. But, the postoperative pain at 6, 12 and 24 hours was significantly more in the scalpel group compared to the EC group and this difference was found to be statistically significant ($p<0.05$). The analgesic requirement and the Manchester scar scale was similar in the two groups ($p>0.05$). (Table 1)

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 2: Comparison of other characteristics in two groups

Characteristics		EC group	SC group	P value
Local wound complications in hematoma	Yes	1 (3.3%)	6 (20%)	0.1
	No	29 (96.7%)	24 (80%)	
Local wound complications in seroma	Yes	9 (30%)	10(33.3%)	0.1
	No	21 (70%)	20 (66.7%)	
Local wound complications in purulent collection	Yes	4 (13.3%)	5 (16.6%)	0.99
	No	26(86.7%)	25(83.4%)	

Both the groups were comparable for Local wound complications in hematoma, Local wound complications in seroma, and Local wound complications in purulent collection ($p > 0.05$). (Table 2)

DISCUSSION

This study was conducted among 60 patients diagnosed with inguinal hernia were enrolled over a period of one year. These patients were evenly divided into two groups: the electrocautery group and the scalpel group. The primary aim was to evaluate the outcomes associated with different methods of skin incision during hernia repair surgery. Regarding surgical outcomes, both groups demonstrated comparable results in terms of intraoperative parameters such as operative time and intraoperative complications. Postoperatively, the incidence of wound infection, hematoma formation, and seroma formation was similar between the two groups. Further analysis of postoperative pain scores and patient satisfaction surveys is underway and will be reported separately to provide a comprehensive evaluation of the efficacy and patient-reported outcomes associated with electrocautery versus scalpel techniques for skin incision in inguinal hernia repair. The study compared the ages of patients in the electrocautery (EC) and scalpel (SC) groups to assess the equivalence of the two groups in terms of age distribution. The mean age in the EC group was 48.9 years with a standard deviation of 15.13 years, while the mean age in the SC group was 48.1 years with a standard deviation of 10.59 years. A t-test was performed to determine if there was a statistically significant difference in the mean ages between the two groups.

The result of the t-test showed a t-value of 0.2373 with 58 degrees of freedom, and the standard error of the difference was 3.372. The p-value obtained from this test was 0.81, indicating that there is no significant difference in the ages between the two groups. Therefore, age was not a confounding variable in this study. The present study compared pain scores post-surgery at 6, 12, and 24 hours for electrocautery (EC) and scalpel (SC) groups. At 6 hours, EC group had mean score of 6.28±0.79, SC group had higher mean of 6.7±0.53, with p-value 0.01, showing significant difference. At 12 hours, EC group mean score was 3.21±0.7, SC group had 3.8±0.64, with p-value less than 0.01, again showing significant difference. At 24 hours, EC group had mean score of 2.1±0.6, SC group had 2.4±0.51, with p-value 0.04, indicating significant difference. Results show EC group consistently had lower postoperative pain scores than SC group at all time points measured. A similar double blind randomized control study conducted at the Department of General surgery, Combined Military Hospital Rawalpindi, by Razia Bano, Farhan Ahmed Majeed, Fatima Sadiq, Amna.[16] A total of sixty patients were included in the study where the Patients receiving diathermy incision were placed in group A and patient receiving scalpel incision were placed in group B.

The mean VAS in the diathermy group was 2.15 + 1.200 with a significant p value of 0.00. Conversely, the mean VAS in the scalpel group was 4.95 + 1.373. The mean percentage of pain score in the scalpel group was 49.5%, whereas in the diathermy group, it was 21.5%, demonstrating a significant reduction compared to the scalpel group. Hence, Diathermy incision presents a notable advantage over scalpel incision in terms of decreased early postoperative pain. The present study is also in accordance with another similar study conducted by Ismail A et al,[8] compared cutting electrocautery and steel scalpel for surgical incisions. Here the parameters measured included blood loss, operative times, post operative pain, wound infection rates and overall subjective scar score. Forty-one studies (36 randomized trials, four observational, and one Quadrasion study) were incorporated into the meta-analysis, encompassing a total of 6422 participants. Utilizing cutting electrocautery for surgical incisions, as opposed to the scalpel incision, was associated with notably reduced blood loss (SMD = -1.16, 95% CI [-1.60 to -0.72]), decreased incisional length (SMD = -0.63, 95% CI [-0.96 to -0.29]) and duration of surgery (SMD = -0.59, 95% CI [-1.12 to -0.05]), as well as lower levels of postoperative pain (SMD = -0.91, 95% CI [-1.27 to -0.55]). There were no significant disparities observed in terms of wound infection rates (OR = 0.92, 95% CI [0.74-1.15]) or overall subjective scar assessment (SMD = -0.49, 95% CI [-1.72 to 0.75]). In conclusion, the utilization of cutting electrocautery for surgical incisions may offer advantages in terms of expediency, reduced blood loss, and diminished postoperative pain levels when compared to the traditional scalpel incision approach. No statistically noteworthy distinctions were identified between the two methods regarding postoperative wound complications, duration of hospital stay, and aesthetic attributes of the wound. Hence, we advocate for the routine adoption of cutting electrocautery for surgical incisions. Another comparative prospective study done in the Department of Surgery, Basrah Teaching Hospital by Al-Mahfooz NA et al,[9] compared Electrocautery

ISSN (O): 2687-5365; ISSN (P): 2753-6556

incisions and traditional scalpel incision in various abdominal surgeries. Two groups, each consisting of 62 patients, were prospectively evaluated. One group underwent incision with an electrocautery knife, while the other group underwent incision with a traditional scalpel, cutting through the layers of the abdominal wall starting from the skin. Parameters assessed encompassed the duration required to complete the incision along with all necessary hemostasis, the length of the wound, the macroscopic response of the tissue, the occurrence of infections, and the resulting tissue scar. The employment of an electrocautery knife demonstrated a higher speed compared to the traditional scalpel, at 4.2 cm/minute and 2.7 cm/minute respectively. Initial observations revealed a slight increase in macroscopic tissue response during the initial 3-4 days, which exhibited no divergence between the two groups by the 4th and 5th day. Notably, there existed no variance in the infection rate or the final scar appearance after a one-year follow-up between the two groups. Electrocautery presents itself as a viable alternative to scalpel employment for creating incisions in abdominal skin, offering the benefits of reduced time consumption, diminished blood loss, all the while preserving wound healing, infection rates, and scar formation.

The present study evaluated the incidence of local wound complications, specifically Hepatoma, Seroma and Purulent collections, in the electrocautery (EC) and scalpel (SC) groups. In the EC group, 4 patients (13.3%) developed complications, whereas in the SC group, 5 patients (16.6%) experienced complications. Conversely, 26 patients (86.7%) in the EC group and 25 patients (83.4%) in the SC group did not develop a complication. A statistical analysis using a Chi-squared test was performed to compare the incidence between the two groups. The resulting p-value was 0.99, indicating that there was no statistically significant difference in the rate of purulent collections between the EC and SC groups. This suggests that the method of incision, whether electrocautery or scalpel, did not significantly impact the likelihood of developing post-operative wound complications. A similar cohort study done at Department of general surgery, Kozhikode Medical college and Hospital,[10] aiming to compare Diathermy and Scalpel skin incisions in Elective Inguinal hernia surgeries, focusing on post-operative pain, post-operative wound infection rate, and wound healing. In this research, a total of 200 patients were included, with 100 patients in the Diathermy incision group (group A) and 100 patients in the Scalpel incision group (group B). The findings revealed that patients who underwent either Scalpel or Diathermy skin incisions, the rates of postoperative infection and scar formation were found to be similar in both groups. Hence, there was not any statistically significant results. The present study compares the Manchester Scar Scale (MSS) scores between the Electrocautery (EC) and Scalpel (SC) groups. The EC group has an average MSS score of 4.12 with a standard deviation of 0.25, while the SC group has an average MSS score of 4.2 with a standard deviation of 0.18. The p-value of 0.16 suggests there is no statistically significant difference between the MSS scores of the two groups. The t-value is 1.4224 with 58 degrees of freedom, and the standard error of the difference is 0.056, indicating that the observed difference in scar quality is likely due to chance. This is similar to a hospital-based prospective interventional study carried out at the Department of General Surgery, Sri Manakula Vinayagar Medical College and Hospital, Puducherry, India.[11] Patients were alternatively allocated to receive incision using electrocautery (group A) or a traditional steel scalpel (group B), with each group consisting of 65 patients. There was no marked dissimilarity in scar assessment between group A and group B at 12 weeks, with a p-value of 0.673 for the patient evaluation and 0.189 for the observer evaluation. In conclusion, the utilization of cutting electrocautery for surgical incisions may offer no special advantage for scar formation over scalpel. The present study assessed the incidence of local wound complications between the electrocautery (EC) and scalpel (SC) groups. In the EC group, 9 patients (30%) developed Complications like Seroma & Purulent Collection, compared to 10 patients (33.3%) in the SC group. Conversely, 21 patients (70%) in the EC group and 20 patients (66.7%) in the SC group did not develop any such complications.

Despite the similarity of results between the two groups, it can be concluded that electrocautery is a safe method for conducting skin incisions, considering the comparable outcomes between the groups. It is recommended that further extensive research be conducted on the application of electrocautery in various surgical procedures, with a focus on its comprehensive evaluation.

CONCLUSION

Based on observations made in this study, it has been concluded that results of the both groups i.e. electrocautery group and scalpel group: Post - Operative pain is comparatively less with Electrocautery when compared to Scalpel. Post - Operative complications like Haematoma, Seroma and Purulent Collection is comparable in both groups i.e., it is similar in both the groups. Post - Operative Scar formation is also similar in both the groups.

REFERENCES

1. Dixon AR, Watkin DFL. Electrosurgical skin incision versus conventional scalpel: a prospective trial. F R Coll Surg Edinb 1990; 35:299-301.
2. Chowdri NA, Wani NA, Ganai AA et al. Comparative study of electro surgical and scalpel incision in general surgery. Int J Surg. 2002; 63: 308-310.
3. Kerans SR, Connoly EM, Namara DA et al. Randomised clinical trial of diathermy versus scalpel incision in elective mid line laparotomy. Br J Surg 2001; 88:41-44.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

4. Chrysos E, Athanasakis E, Antnakakis S et al. A prospective study comparing diathermy and scalpel incision in tension free inguinal hernioplasty. Am Surg 2005 Apr; 71(4):326-329.
5. Pollinger HS, Mostafa G, Horold KL et al. Comparison of wound healing characteristics with feedback circuit electrosurgical generators in a porcine model. Am Surg 2003; (12):1054 1060.
6. Cohen IK, Diegelmann RF, Lindblad WJ: Wound Healing: Biological and Clinical Aspects. 1992
7. Lazarus GS, Cooper DM, Definitions and Guidelines for Assessment of Wound and Evaluation of Healing.1994
8. Ismail A, Abushouk AI, Elmaraezy A et al. Cutting electrocautery versus scalpel for surgical incisions: a systematic review and meta-analysis. J Surg Res. 2017 Dec; 220:147-163.
9. Al-Mahfooz NA, Al-Abayachii AM. Electro-cautery versus scalpel incision in abdominal surgery. Basrah Journal of Surgery. 2005 Jun 28; 11(1):31-7.
10. Ragesh KV, Mahendran S, Mathad S. Outcome of skin incision by cautery versus steel scalpel in hernia surgery: A cohort study at a tertiary medical college hospital in South India. International Surgery Journal. 2017 Apr 22;4(5):1521-4.
11. Haripranav S, Arulselvan A, Anto M. Diathermy versus scalpel skin incision for open inguinal hernia surgery: An interventional study. Int J Anat Radiol Surg 2024.

ISSN (O): 2687-5365; ISSN (P): 2753-6556