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Comparison of Electrosurgical Cautery and Scalpel Skin Incision in Elective Inguinal Hernia Surgery

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Abstract: ***Background: The method of skin incision may influence operative efficiency, bleeding, postoperative pain, wound morbidity and scar quality in open inguinal hernia surgery. This study compared electrosurgical cautery with conventional scalpel incision in elective inguinal hernia repair. Methods: A prospective comparative study was conducted in the Department of General Surgery at a tertiary care teaching hospital from March 2024 to September 2025. A total of 130 adult patients undergoing elective open inguinal hernia repair were included and divided equally into diathermy and scalpel groups. Incision time, blood loss, postoperative pain by Visual Analogue Scale, analgesic requirement, wound complications and Manchester Scar Scale at one month were assessed. Results: Diathermy incision had significantly shorter incision time (32.4 +/- 6.8 s vs 58.6 +/- 9.5 s; p < 0.001) and lower blood loss (6.8 +/- 2.1 ml vs 14.6 +/- 3.9 ml; p < 0.001). VAS scores, analgesic use, wound complications and scar score were also lower in the diathermy group. Conclusion: Electrosurgical cautery incision was safe and superior to scalpel incision for key perioperative outcomes in elective open inguinal hernia repair.***

Keywords: Diathermy incision; Scalpel incision; Inguinal hernia; Postoperative pain; Manchester Scar Scale

1. Introduction

Inguinal hernia is one of the commonest conditions managed in general surgical practice and forms a major component of elective operative workload. Surgical repair remains the definitive treatment. Although advances in anaesthesia, mesh and operative technique have improved outcomes, the method used for skin incision has received comparatively less attention. The conventional scalpel incision is precise and familiar; however, electrosurgical cautery enables simultaneous cutting and coagulation and may reduce bleeding and operative time [1-4].

The main concern with electrosurgical incision is possible thermal injury leading to delayed healing, infection or poorer scar cosmesis. Conversely, diathermy may reduce postoperative pain by sealing small nerve endings and providing better haemostasis. Evidence from abdominal and hernia surgery has reported shorter incision time and less blood loss with electrocautery, generally without increased wound complications [5-7,10-12]. The present study was undertaken to compare electrosurgical cautery and scalpel skin incision in elective open inguinal hernia surgery.

2. Literature Survey

Kearns et al. reported significant reductions in incision time and blood loss with diathermy in elective laparotomy [5]. Subsequent studies in general surgery and hernioplasty observed similar benefits, with no consistent increase in surgical site infection or wound dehiscence [6,7,12]. Systematic reviews have also suggested that electrosurgery is a safe alternative to scalpel incision for major abdominal incisions when appropriate settings and technique are used [10,11]. Scar assessment has increasingly been incorporated in surgical outcome research, and the Manchester Scar Scale provides an objective method to evaluate scar color, contour, texture and overall appearance [8,9].

3. Problem Definition

In elective inguinal hernia surgery, the incision method should provide a clear operative field, minimize tissue trauma and postoperative pain, and preserve wound healing and cosmetic outcome. Local data comparing diathermy and scalpel incision across intraoperative, postoperative and scar-related outcomes remain limited. This study addressed whether diathermy can be used as a safe and more efficient alternative to scalpel incision.

4. Methodology / Approach

This prospective comparative study was conducted after institutional ethical clearance in the Department of General Surgery at a tertiary care teaching hospital over 18 months, from March 2024 to September 2025. Adults aged 18 years and above scheduled for elective open inguinal hernia repair and willing to provide written informed consent were included. Emergency hernia surgery, strangulated or obstructed hernia, bleeding disorder, anticoagulant therapy, poorly controlled diabetes mellitus, active local skin infection and refusal of consent were exclusion criteria.

A total of 130 patients were included, with 65 patients each in the electrosurgical diathermy and scalpel incision groups. All procedures were performed under spinal anaesthesia using a standard open inguinal hernia repair technique. In the scalpel group, skin incision was made with a sterile

surgical blade. In the diathermy group, monopolar electrosurgical cautery in cutting mode was used. Other operative steps were kept uniform.

Incision time was measured in seconds using a stopwatch from start to completion of skin incision. Blood loss during incision was estimated in millilitres using gauze and suction measurements. Postoperative pain was measured using the Visual Analogue Scale on the day of surgery, postoperative day 1 and postoperative day 2. Analgesic requirement was recorded as diclofenac equivalent dose. Wound complications, including infection, seroma and hematoma, were monitored. Scar quality was assessed at one month using the Manchester Scar Scale. Continuous variables were expressed as mean +/- standard deviation and categorical variables as number and percentage. Student unpaired t-test, chi-square test or Fisher exact test were applied as appropriate. A p-value < 0.05 was considered significant.

Table 1: Baseline clinical profile of the study groups

Variable	Diathermy	Scalpel	Inference
Patients, n	65	65	Equal groups
Male sex	65 (100%)	65 (100%)	Comparable
Rural residence	37 (56.92%)	35 (53.85%)	Comparable
Indirect hernia	42 (64.62%)	44 (67.69%)	Predominant
Right-sided hernia	36 (55.38%)	34 (52.31%)	Predominant
Recurrent hernia	7 (10.77%)	6 (9.23%)	Similar

5. Results and Discussion

The study included 130 male patients undergoing elective open inguinal hernia surgery. Both groups had equal sample size and similar residence pattern, type of hernia, side of hernia and recurrence profile. Indirect hernia and right-sided hernia were the commonest clinical patterns in both groups, consistent with established epidemiology of inguinal hernia [1-3].

Diathermy incision significantly improved operative efficiency. Mean incision time was 32.4 +/- 6.8 seconds in the diathermy group compared with 58.6 +/- 9.5 seconds in the scalpel group ($p < 0.001$). This difference can be attributed to the simultaneous cutting and coagulation effect of electrosurgery. Blood loss during incision was also significantly lower with diathermy (6.8 +/- 2.1 ml vs 14.6 +/- 3.9 ml; $p < 0.001$), supporting its haemostatic advantage [4-6,10].

Postoperative pain was consistently lower in the diathermy group. VAS scores on the day of surgery, postoperative day 1 and postoperative day 2 were all significantly lower than in the scalpel group. Correspondingly, analgesic requirement was lower in the diathermy group. These findings are in agreement with previous studies that suggested reduced early postoperative pain after electrocautery incision, possibly due to sealing of small cutaneous nerves and reduced bleeding-related inflammation [5-7, 12].

Importantly, diathermy did not increase wound morbidity. Wound complications were observed in 6 patients (9.23%) in the diathermy group and 14 patients (21.54%) in the scalpel group ($p = 0.047$). The one-month Manchester Scar Scale score was also better in the diathermy group, indicating superior scar quality. These findings suggest that with proper technique, electrosurgical skin incision can improve efficiency and comfort without compromising wound healing or cosmesis.

Table 2: Comparative intraoperative and postoperative outcomes

Outcome	Diathermy	Scalpel	p-value
Incision time (s)	32.4 +/- 6.8	58.6 +/- 9.5	<0.001
Blood loss (ml)	6.8 +/- 2.1	14.6 +/- 3.9	<0.001
VAS day 0	4.2 +/- 0.8	5.6 +/- 0.9	<0.001
VAS day 1	3.1 +/- 0.7	4.4 +/- 0.8	<0.001
VAS day 2	2.1 +/- 0.6	3.3 +/- 0.7	<0.001
Analgesic dose (mg/day)	165.4 +/- 38.6	238.2 +/- 45.1	<0.001
Wound complications	6 (9.23%)	14 (21.54%)	0.047
Manchester Scar Scale	7.2 +/- 1.4	9.1 +/- 1.6	<0.001

6. Conclusion

Electrosurgical cautery skin incision was associated with significantly shorter incision time, lower incision-related blood loss, reduced postoperative pain, lower analgesic requirement, fewer wound complications and better one-month scar score compared with conventional scalpel incision. The findings support electrosurgical cautery as a safe and effective alternative to scalpel incision in elective open inguinal hernia repair when used with appropriate technique.

7. Future Scope

Further multicentric randomized trials with larger sample size, longer scar follow-up and standardized electrosurgical settings are recommended to confirm long-term wound and cosmetic outcomes across diverse patient populations.

Declarations
Ethical clearance was obtained from the institutional ethical committee. Written informed consent was obtained from all participants. No external funding was reported. The authors declare no conflict of interest.

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