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Original Article

Diathermy Versus Scalpel Skin Incision in Open Inguinal Hernia Repair: A Prospective Comparative Study

Dr Sandhya N[1] and Dr Srijika Bhattacharyya[2]

[1]Department of General Surgery, Karnataka Medical College and Research Institute, Hubli, Karnataka, India
[2]Department of General Surgery, Karnataka Medical College and Research Institute, Hubli, Karnataka, India

Corresponding Author:

Dr. Srijika Bhattacharyya
Department of General Surgery, Karnataka Medical College and Research Institute, Hubli, Karnataka, India
Email: srijikab@gmail.com

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ABSTRACT

Introduction: Inguinal hernia repair is one of the most frequently performed surgical procedures worldwide. Skin incisions may be performed using a scalpel, which relies on a sharp blade, or diathermy, which utilizes heat generated by electric current.
Aim: This prospective randomized study aimed to compare diathermy skin incisions with scalpel incisions regarding incision time, early postoperative pain, postoperative wound complications, and wound healing.
Materials and Methods: A total of 150 patients aged 18–60 years were randomly assigned to two groups: diathermy (n = 75) and scalpel (n = 75). Diathermy incisions were performed using an electrocautery needle in cut mode at 40 W, while scalpel incisions used a surgical blade with hemostasis achieved using forceps coagulation at 30 W.
Results: Incision time was significantly shorter in the diathermy group (44.94 ± 5.20 s) compared to the scalpel group (43.82 ± 5.45 s; $p < 0.001$). Early postoperative pain, assessed using VAS at 6, 12, and 24 hours, was consistently lower in the diathermy group ($p < 0.001$). No significant differences were observed in wound complications or healing between groups.
Conclusion: Diathermy is a safe and effective alternative to scalpel incisions for elective Lichtenstein inguinal hernia repair, reducing incision time and early postoperative pain without increasing wound complications.

Keywords: *Diathermy, Inguinal hernia repair, Postoperative pain, Scalpel, Skin incision time.*

INTRODUCTION

Inguinal hernia repair is among the most common surgical procedures globally, with over 20 million surgeries performed annually. Lifetime incidence is 27–43% in men and 3–6% in women [1].

Surgical skin incisions may be made using either a scalpel or diathermy. Scalpel incisions are precise but may increase bleeding and pose injury risks to staff [2]. Diathermy, introduced in the early 1900s, uses alternating electric current for cutting and coagulation, minimizing bleeding and facilitating rapid tissue dissection [3,4].

Several studies suggest that diathermy reduces operative time, blood loss, postoperative pain, and analgesic requirements [6,2,7], although concerns remain regarding wound infection [8,9]. Due to these mixed findings, this study compared outcomes of diathermy versus scalpel incisions in elective open inguinal hernia repair.

MATERIALS AND METHODS

This prospective, randomized comparative study included 150 patients at Karnataka Medical College and Research Institute (June 2023–June 2025).

Inclusion Criteria:

1. Clinically diagnosed unilateral inguinal hernia scheduled for elective Lichtenstein repair.
2. Age 18–60 years, providing written informed consent.

Exclusion Criteria:

1. Complicated hernias (irreducible, obstructed, strangulated, bilateral, or recurrent).
2. Comorbidities affecting healing (immunosuppression, diabetes, steroid therapy, or chemotherapy).

Randomization and Intervention: Randomization was done through envelopes which were randomly distributed to the 2 groups

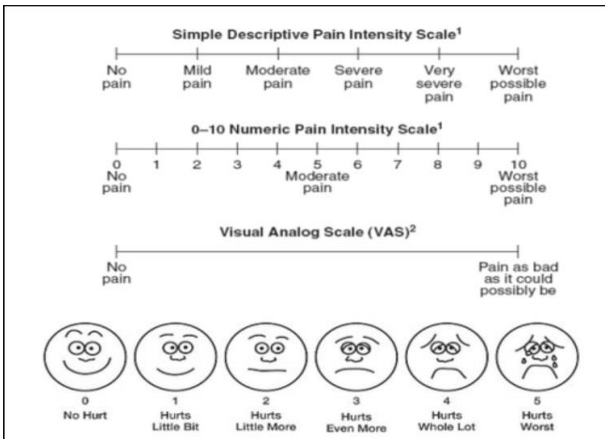
- **Diathermy group (n = 75):** Incisions with electrocautery needle in cut mode at 40 W.
- **Scalpel group (n = 75):** Incisions with surgical blade, hemostasis using forceps coagulation at 30 W.

Anesthesia: Spinal (3–3.5 ml of 0.5% heavy bupivacaine + 60 µg buprenorphine at L3–L4/L2–L3).

Postoperative Analgesia: IV paracetamol 1 g TID; tramadol 100 mg in 100 ml normal saline as rescue.

Outcomes:

1. **Incision time** (seconds)
2. **Early postoperative pain** (VAS at 6, 12, 24 h)

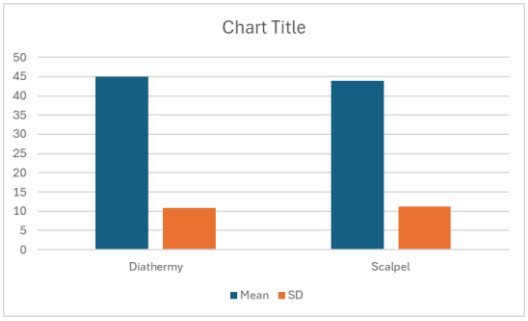


3. **Wound complications** (infection, hematoma, seroma)
4. **Wound healing** (assessed at first-week follow-up)

RESULTS

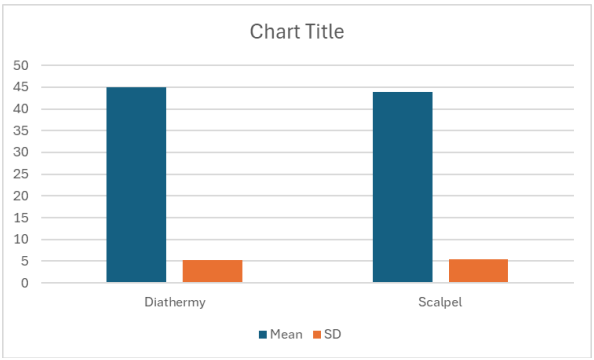
Age distribution

	Group	N	Mean	SD	P value	Result
Age	Diathermy	75	44.94	10.82	0.48	Not Significant
	Scalpel	75	43.82	11.15		



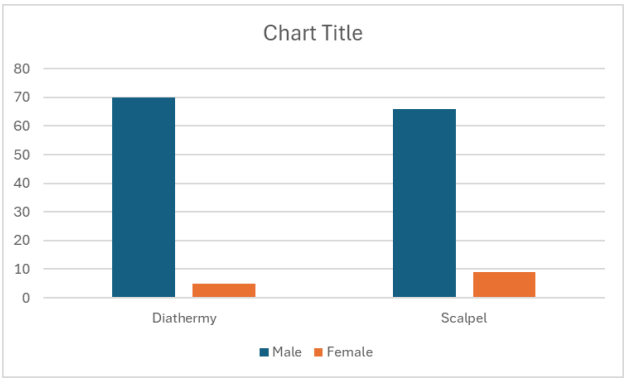
Incisional time

Variable	Group	N	Mean	SD	P value	Result
Incision time	Diathermy	75	44.94	5.20	<0.001	Significant
	Scalpel	75	43.82	5.45		



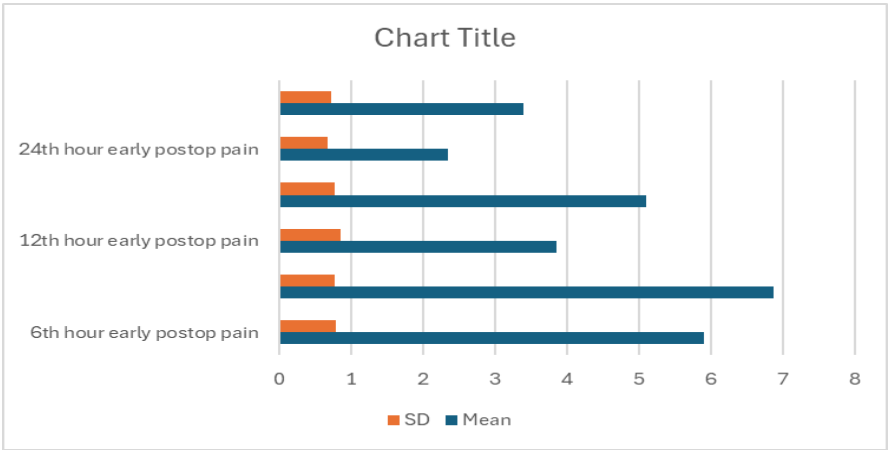
Gender distribution

Variable	Group	N	Male	Female	P value	Result
Gender	Diathermy	75	70	5	0.26	Not Significant
	Scalpel	75	66	9		



VAS score of the patient on 6,12,24th hour

Variables	Group	N	Mean	SD	Mann–Whitney U value	p-value	Remarks
6th hour early postop pain	Diathermy	75	5.90	0.80	1190	<0.001	Significant
	Scalpel	75	6.88	0.77			
12th hour early postop pain	Diathermy	75	3.85	0.85	910	<0.001	Significant
	Scalpel	75	5.10	0.78			
24th hour early postop pain	Diathermy	75	2.35	0.68	890	<0.001	Significant
	Scalpel	75	3.40	0.72			



Wound Complications:

Variable	Group	N	Complications	P value	Result
Complications	Diathermy	75	5	0.73	Not significant
	Scalpel	75	4		

DISCUSSION

The use of electrocautery for initial skin incisions remains debated, despite its well-established safety and effectiveness for subcutaneous and muscle layer dissection. Recent studies on diathermy have demonstrated promising outcomes, including shorter operating times, reduced blood loss, decreased postoperative pain, and lower analgesic requirements compared to traditional scalpel incisions.[6,2,7] However, some studies have raised concerns regarding wound healing, reporting a higher incidence of wound infections with electrocautery.[8,9] Historical concerns regarding tissue injury with electrocautery trace back to the early work of Peterson A in faciomaxillary surgery and Mann W in abdominal incisions, though these observations were made under strict aseptic conditions.

In the present study, a prospective randomized comparison was conducted between diathermy and scalpel skin incisions in patients undergoing elective Lichtenstein tension-free inguinal hernia repair. Our findings indicate that diathermy incisions were associated with a significantly shorter incision time compared to scalpel incisions (44.94 ± 5.20 s vs. 43.82 ± 5.45 s, $p < 0.001$). Early postoperative pain, assessed at 6, 12, and 24 hours using the Visual Analogue Scale (VAS), was consistently lower in the diathermy group, with all differences being statistically significant ($p < 0.001$). All wound complications were Type 1 Southhampton Wound surgical site infection and were managed conservatively and patient improved.

Importantly, there were no significant differences between the two groups in terms of postoperative wound complications, wound healing, or infection rates. Gender and age distribution were also comparable between groups, indicating that the observed outcomes were unlikely influenced by demographic variables. These findings suggest that while diathermy may reduce early postoperative pain and operative time, it does not adversely affect wound healing or increase complication rates.

Overall, our results align with previous studies demonstrating the efficacy of diathermy in reducing incision time and early postoperative pain without compromising wound integrity.[6,2,7] Electrocautery can therefore be considered a safe and effective alternative to scalpel incisions for inguinal hernia repair.

Study	Sample Size (n)	Procedure	Incision Method	Incision Time	Early Postoperative Pain	Wound Complications	Key Findings
Present Study	150 (75/group)	Lichtenstein inguinal hernia repair	Diathermy vs Scalpel	Diathermy faster (44.94 ± 5.20 s vs 43.82 ± 5.45 s, $p < 0.001$)	Lower in diathermy at 6, 12, 24 h ($p < 0.001$)	No significant difference	Diathermy reduces incision time and early pain without affecting wound healing
Study by [6]	100	Inguinal hernia repair	Diathermy vs Scalpel	Reduced with diathermy	Lower with diathermy	No significant difference	Faster operating time, less blood loss, reduced analgesic requirement
Study by [2]	80	Abdominal surgeries	Diathermy vs Scalpel	Reduced with diathermy	Lower with diathermy	No significant difference	Diathermy safe and effective alternative to scalpel
Study by [7]	60	Hernia repair	Diathermy vs Scalpel	Shorter with diathermy	Significantly lower early pain	No significant difference	Confirms reduced incision time and pain

Study by [8]	70	Abdominal incisions	Diathermy vs Scalpel	Slightly longer	Slightly higher early pain	More wound infections with diathermy	Caution regarding wound healing required
Study by [9]	50	Hernia repair	Diathermy vs Scalpel	Similar	Similar	Higher wound infection in diathermy	Shows risk of tissue injury, but under strict aseptic precautions

CONCLUSION

Diathermy is a safe and effective alternative to scalpel incisions in elective Lichtenstein inguinal hernia repair. It significantly reduces incision time and early postoperative pain without affecting wound healing or complication rates. Electrocautery enhances patient comfort and operative efficiency while maintaining comparable surgical outcomes.

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