

# Comparative Analysis Of Skin Incision Technique With Scalpel Vs Electrocautery In Inguinal Hernia Undergoing Herniorrhaphy: Single Institutional Study

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## Abstract:

**Background:** Herniorrhaphy is one of the most common surgical procedures for uncomplicated inguinal hernias in young adults. With increasing knowledge about various anaesthetic options, it is now possible to perform these procedures as daycare surgeries. The two common techniques used for skin incision are scalpel and diathermy. Here, we compare the two methods of skin closure for herniorrhaphy procedures.

**Aim:** To compare the pain and wound-associated postoperative outcomes among scalpel and electrocautery incisions in adolescent inguinal hernia patients undergoing herniorrhaphy.

**Material and Method:** Our study is a Prospective Randomized Controlled Trial for six months, 50 Uncomplicated inguinal hernia in young adults who consented to elective inguinal hernia repair were randomized to undergo skin incision using either a scalpel or electrocautery. Patients were randomly grouped into two groups of 25 each, based on the method of skin incision applied. The quality of the scar, and patient satisfaction, were compared and analysed.

**Results:** The quality of the scar was assessed in terms of patient satisfaction ( $3.01 \pm 1.73$  vs.  $4.84 \pm 2.44$ ;  $P = 0.0012$ ) and observers ( $2.83 \pm 0.98$  vs.  $4.44 \pm 1.67$ ;  $P = 0.0105$ ) found the quality is significantly better in the electrocautery group compared to scalpel group. We did not find any remarkable difference between the two groups in postoperative wound pain ( $P = 0.63$ ), patient satisfaction ( $P = 0.228$ ), and outcome of wound healing ( $P = 0.899$ ).

**Conclusion:** Electrocautery inguinal skin incision gives a relatively better-quality scar to patients, it is painless, and without blood loss. Skin incision with diathermy is a rapid method with the least wound complications compared to incision with a scalpel.

**Keywords:** Herniorrhaphy, Adolescent patients, Scalpel, Electrocautery, scar, blood

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### I. Introduction:

The surgical scalpel has been used for so many decades of surgical practice and is considered a golden standard for surgical incision <sup>1</sup>. It facilitates the operating surgeons to make the desired length and depth of incision with ease, without any concern for diathermy burnt skin.<sup>2</sup> However, unnecessary blood loss and incidence of cut injuries while exchanging instruments like scalpels have been extensively reported <sup>3</sup>. The diathermy as an incision-making tool, has been used to make surgical incision that depends on an alternating current source that causes cleavage and coagulation without harming adjacent tissues <sup>4</sup>. Studies have shown that electrocautery is associated with less post-operative discomfort due to pain and negligible blood loss, though thick scars and improper tissue healing are concerns with electrocautery incision. Incidence in wound infection, complication, and wound characteristics do not differ with the scalpel incision method<sup>5</sup>. Diathermy has also been successfully used in inguinal hernia repair surgeries and is considered safe. Findings have documented that diathermy usage can minimise the need for postoperative painkillers<sup>6</sup>. This study aims to compare pain and wound-associated postoperative outcomes among scalpel and electrocautery incisions in adolescent inguinal hernia patients undergoing herniorrhaphy.

### II. Materials And Methods:

This six-month prospective comparative analysis on hernia surgery was carried out in the Department of Surgery at Karpaga Vinayaga Institute of Medical Sciences and Research Centre, a suburban teaching hospital in Chengalpattu district, from February 2024 to July 2024. Fifty Adolescent patients of both sexes, with a diagnosis of inguinal hernia, attended the surgical department and were included in this study, selected by purposive sampling methods. Simple computerised randomisation was used to divide sample populations into two groups: Group I had their wounds treated with Scalpel and Group II with diathermy. In the sixth week, the post-operative quality of the scar was evaluated based on its appearance using the visual analogue scale. Patients with recurrent hernia, skin infections at the operation site, presence of inguinal lymphadenopathy, and below and above adolescent age were excluded from the study. Surgical consultants in a single unit operated on all the patients, who were homogenised in terms of demographic details of age, type of surgery etc. The modified Bassini procedure was the only procedure considered for this study. Periodical assessments were done using a Visual analogue scale. The study documented parameters influencing scar quality, such as appearance, after the first week, the second week & after six weeks. The Patient and Observer Scar Assessment Scale (POSAS) was utilised to evaluate scar quality. The POSAS is made up of two parts: the Patient Scar Assessment Scale and the Observer Scar Assessment Scale. Quality of scar based on signs of inflammation, colour change, induration, surface regularity, softness and patient scores include allergic reaction, pain if any, visible colour change, thickness, movement restriction by pain, and pliability. A 10-point Likert scale is employed with a minimum score of 1 when the scar feature is equivalent to near-normal skin, and a score of 10 indicates a terrible surgical scar.

The mean POSAS score, mean Patient and Observer Overall Opinion score in the 1st week & mean POSAS scores during the 6 weeks were compared and evaluated between the two groups. Means and standard deviations are used to analyse quantitative data. An unpaired t-test is used to analyse differences between study groups. Frequencies and percentages are used to assess qualitative data. Fisher and 't' tests were employed to confirm the connection between the research groups.

Results: Only primary inguinal hernia patients consented to study and operated as elective procedures were included in this study. Of 50 patients included in this study where 14 were female (28%) and 36 were male (72%). In the electrocautery group (A), 35 patients (70%) were male and 15 were female (30%) whereas, in the scalpel incision group (B) there were 36 males (72%) and 16 females (32%). Cosmetic appearance and quality evaluation was done using a visual analogue scale displayed in ( Table 1.) After six weeks of post-operative care, we found that, in comparison to the Scalpel incision group, (Group I), the scar treated with diathermy (Group II) had a greater number of excellent-quality scar appearances. Nevertheless, the study of the Chi-Square test revealed no significant difference ( $p>0.05$ ) between either scalpel or diathermy.

Monopolar diathermy, electrosurgical Generator 8CS Cutting Mode (Blend) with power settings of 30 watts and 15 size scalpel was used to make skin incision.

**Table 1: Visual Analogue Scale used to assess patients' cosmetic looks six weeks after surgery**

Visual Analogue Scale (VAS)	Group I (Scalpel)		Group II (Diathermy)		P value
	n	%	n	%	
Excellent	32	64	36	72	>0.05
Good	18	36	14	28	
Total	50	100%	50	100	

Patient satisfaction six weeks after surgery, as measured by the patient's component of the POSAS score, is shown in Table 2. Results showed that the groups' scores ( $23.80 \pm 11.60$  vs.  $23.02 \pm 9.88$ ;  $p > 0.05$ ) were similar & statistically not significant between them. It was discovered that the observer's satisfaction score, obtained six weeks after surgery, using the observer's component of the POSAS score, was similar and did not significantly differ between the groups ( $26.85 \pm 5.33$  vs.  $28.79 \pm 8.32$ ;  $p > 0.05$ ). (Table 2) The Patient and Observer Scar Assessment Scale (POSAS) is a subjective scar assessment.

**Table 2: POSAS score is used to evaluate patients' cosmetic looks six weeks after surgery.**

POSAS score	Group I		Group II		P value
	n	SD	n	SD	
Patient's component	23.8	11.6	23.02	9.88	>0.05
Observer's component	26.6	5.6	26.98	8.32	>0.05

There was no discernible difference between these two groups in the current investigation ( $p > 0.05$ ). Patients in both groups had mean ages of  $14.34 \pm 15.9$ . Both research groups included a higher percentage of male patients (88.4% and 89.3%, respectively) than female patients (12.6% and 11.7%, respectively). There was no discernible relationship between the groups according to the Chi-Square ( $p > 0.05$ ).

### III. Discussion

The use of diathermy has now become one of the important skin incision-making tools by surgeons, which is easy with a relatively avascular plane, in herniorrhaphy, especially for young adolescents.<sup>7</sup> The efficacy of diathermy is well-defined for subcutaneous and muscular opening as we do in herniorrhaphy surgery.<sup>8</sup> Despite its advantages, some safety concerns for skin incisions are debatable, based on surgeons regarding wound healing and infection<sup>9</sup>. Cautious about the heat used and time to direct incision in the electrocautery, which has the potential to lead to postoperative pain, infection, and tissue damage, interfering with wound healing, and increasing the chance of hypertrophic scarring.<sup>10</sup> Our study is mainly designed to compare electrocautery incisions with scalpels in young adult patients only, patients undergoing herniorrhaphy surgery. Our findings document that there is an advantage difference between the two groups in terms of pain severity, site of infection, and the incidence of colloidal or hypertrophic scar in herniorrhaphy.

In a retrospective study, Mecca and his colleagues showed that the rate of bleeding and pain in the electrocautery group was lesser, invariant with the scalpel incision<sup>11</sup>. Furthermore, there was no difference between the two groups regarding wound infection after surgery. In our study, there was no significant difference between the two groups in terms of mean pain intensity, incidence of infection, and postoperative scar. Garcia et al.<sup>12</sup> examined abdominal wall aponeurosis in 12 post-incisional rats with scalpel and electrocautery, they reported that there was no significant difference in the histological findings of the two groups. In our study, similar results were obtained in terms of post-operative repair. Ansari et al. reported that among 60 patients undergoing inguinal repair, postoperative pain, wound-associated complications and need for analgesics were more in the scalpel group than diathermy.<sup>13</sup>

Carrie Suss et al. reported that diathermy incision in inguinal herniorrhaphy is also documented and that the need for analgesia is negligible in the immediate postoperative period. They also concluded that the use of diathermy was approximately as effective as a scalpel in wound healing. Although the results of this study were inconsistent with the results of our study, scar-associated complications and infection rates were comparable to our findings. Similarly, findings from Prakash et al.<sup>14</sup> study have also concurred that with the use of electrocautery, incision the blood loss becomes significant, with less postoperative pain however the rate of wound infection is not compared in our study.

### IV. Conclusion

The results from this study are based on a relatively smaller sample size, as compared to the other studies discussed in different research articles including meta-analysis compared to our single-centre study. Only adolescent patients in the age group of fourteen to eighteen only included in our study compared to other studies that included adult patients with mesh plasty. Bias in our study was eliminated by utilizing only one incision that is along the medial half of the inguinal ligament. Our study did not include intraoperative parameters, which limited the data provided in this study. The quality of the scar in the electrocautery group was found better in terms of patient satisfaction and can be safely used in suitable cases and procedures as patients who underwent skin incision through diathermy have shorter incision time and less incision-related blood loss.

**References:**

- [1] A Comparative Study Of Electrocautery Versus Cold Scalpel For Skin Incision In Inguinal Hernia Repairj Nepalgunj Med Coll, 14 (2017), P. 14, 10.3126/Jngmc.V14i1.17487[Published Online First: Epub Date]
- [2] Shivagouda P, Gogeri BV, Godhi AS, Metgud SC Of Diathermy Incision Versus Scalpel Incision Over Skin In Patients Undergoing Inguinal Hernia Repair. Rec Res Sci Tech 2010; 2: 44-47.
- [3] Mendy Hatibie Oley ,Maximillian Christian Oley Billy Johnson Kepel Et Al, Post-Skin Incision Scar Tissue Assessment Using Patient And Observer Scar Assessment Scales: A Randomised Controlled Trial Annals Of Medicine And Surgeryvolume 71, November 2021, 103006 Annals Of Medicine And Surgery
- [4] F. Zarei, M.K. Shahmoradi Scalpel Versus Electrocautery For Herniorrhaphy Incision: A Randomized Controlled Trail Int. J. Surg. Open., 28 (2021), Pp. 33-36, 10.1016/J.Ijso.2020.12.005
- [5] N.N. Massarweh, N. Cosgriff, D.P. Slakey Electrosurgery: History, Principles, And Current And Future Uses J. Am. Coll. Surg., 202 (2006), Pp. 520-530, 10.1016/J.Jamcollsurg.2005.11.017\
- [6] C.D. Johnson, J.W. Serpell Wound Infection After Abdominal Incision With Scalpel Or Diathermybr. J. Surg., 77 (2005), Pp. 626-627, 10.1002/Bjs.1800770610
- [7] R. Alizadeh, S.-M. Mireskandari, M. Azarshahin, M.E. Darabi, R. Padmehr, A. Jafarzadeh, Et Al. Oral Clonidine Premedication Reduces Nausea And Vomiting In Children After Appendectomy Iran J Pediatr, 22 (3) (2012), P. 399View In Scopusgoogle Scholar
- [8] A. Ismail, A.I. Abushouk, A. Elmaraezy, A. Et Alcutting Electrocautery Versus Scalpel For Surgical Incisions: A Systematic Review And Meta-Analysisj Surg Res, 220 (2017), Pp. 147-163, 10.1016/J.Jss.2017.06.093[Published Online First: Epub Date]
- [9] G. Han, R. Ceilley Chronic Wound Healing: A Review Of Current Management And Treatments Adv Ther, 34 (3) (2017), Pp. 599-610
- [10] A. Garcia, J.E. Aguilar-Nascimento, E.M. Darold, R.E.D.F. Pimentel, E.A. Curvo, F.O. Daud Healing Of Abdominal Wall Aponeurosis Of Rats After Incision With Either Cold Scalpel Or Electrocauteryacta Cir Bras, 22 (2007), Pp. 12-15View In Scopusgoogle Scholar
- [11] R. Alizadeh, Z. Aghsaefard, N. Alavi, F. Abbasvandi, A. Khanigarabadi A Cross-Sectional Study On The Postoperative Analgesic-Associated Side Effects And Clinical Parameters Following Partial Mastectomy Int J Surg Open, 27 (2020), Pp. 114-118, 10.1016/J.Ijso.2020.10.018
- [12] M. Ansari, S. Mishra, B. Baskotaa Comparative Study Of Electrocautery Versus Cold Scalpel For Skin Incision In Inguinal Hernia Repairj Nepalgunj Med Coll, 14 (2017), P. 14, 10.3126/Jngmc.V14i1.17487[Published Online First: Epub Date]
- [13] L.D. Prakash, N. Balaji, S.S. Kumar, V. Katecomparison Of Electrocautery Incision With Scalpel Incision In Midline Abdominal Surgery - A Double Blind Randomized Controlled Trial Int J Surg, 19 (2015), Pp. 78-82, 10.1016/J.Ijsu.2015.04.085