Original Article

Outcome Comparison of Scalpel Skin Incision Versus Electrosurgical in Treatment of Inguinal Hernia

Haseeb Ahmad[1], Muhammad Waqid Bin Abdullah[1], Syed Muhammad Talha Bukhari[2], Afzaal Baig[1], Roshan Butt[1] and Zubair Ahmad[1],

ABSTRACT

Objective: To compare the outcomes of scalpel and electrosurgical skin incision in treatment of inguinal hernia.
Study Design: Randomized controlled trial study
Place and Duration of Study: This study was conducted at the Department of Surgery, Services Institute of medical sciences, Lahore from January 2020 to July 2022.
Methods: A total of 270 male patients aging between 15 to 80 years planned for unilateral inguinal hernioplasty were divided in to 2 equal groups of 135 patients each. In Group A patients were treated with electrosurgical skin incision while in Group B patients were treated with scalpel skin incision. The primary outcomes were set as postoperative pain, as assessed on visual analogue scale, at 24-hours after the procedure and incidence of hematoma as assessed on day 7 after the surgery.
Results: The Mean±SD of age in this study was 47.45±18.93 years with an age range of 15 to 80 years. The results of primary outcomes of the study show that the mean postoperative pain after 24-hour of procedure was significantly less in Group a compared to Group B (3.37 ± 1.81 Vs 4.43 ± 1.94, p-value = 0.00). Similarly, the frequency of hematoma was significantly lower in Group A compared to Group B (5.92% Vs 19.25%, p=0.00).
Conclusion: Electrosurgical skin incision provides significantly better outcomes in terms of lesser postoperative pain and lower incidence of hematoma in patients undergoing inguinal hernioplasty.
Key Words: Electrosurgical skin incision, Inguinal hernia, scalpel skin incision.

Citation of article: Ahmad H, Waqid Bin Abdullah M, Bukhari SMTB, Baig A, Butt R, Ahmad Z. Outcome Comparison of Scalpel Skin Incision Versus Electrosurgical in Treatment of Inguinal Hernia. Med Forum 2024;35(3):61-64.doi:10.60110/medforum.350314.

INTRODUCTION

The scalpel has been considered as the ultimate recommended tool for incisions in surgery as it makes the procedure simple for surgeons to make the required depth incision without any tissue damage in the surrounding area.[1,2] It is, however, associated with unnecessary blood loss and reported occurrence of injuries to the surgical staff .[3,4]

At the start of 20th century, a new method of surgical diathermy was introduced which uses alternating current (high frequency of >100000Hz) to produce cleavage. The method is commonly named as electrocautery or electrosurgery and is considered as a convenient method compared to scalpel skin incision. This method also serves the coagulation needs besides the skin incision. Electrosurgery doesn't damage the adjacent tissues and also controls the homeostasis.[5,6]

The advantages of electrosurgical skin incision regarding minimized loss of blood with lesser postoperative pain are shared in a number of studies; however, some studies have mentioned no significant difference between electrosurgical incision and scalpel incision regarding infections in the wound, duration of hospital stay and characteristics of the surgical wound.[7,8] There are also reports of poor tissue healing and bigger scars following electrosurgical incisions.[9]

The results of Huang et al. study showed that electrosurgery causes slow wound healing and more prone to infections compared to use of scalpel.[10]

Razia et al reported significantly lower mean pain in diathermy group in patients under-going hernioplasty as compared to Scalpel group (2.15 ± 1.20 Vs 4.95 ± 1.37, p-value = 0.011).[11] Zarei F while comparing scalpel skin incision versus electrocautery for their patients' under-going herniorrhaphy mentioned no difference in development of hypertrophic or colloidal scar and intensity of postoperative pain.[12] Hence there is still debate on the choice of electrosurgical incision and despite of being mentioned as better treatment choice by some researchers, the use of this electrosurgical skin incision is suboptimal.[13]

[1.] Department of Surgery, Services Hospital, Lahore.
[2.] Department of Surgery, PKLI, Lahore.

Correspondence: Muhammad Waqid Bin Abdullah, Surgical Department, Services Hospital, Lahore.
Contact No: 03338002606
Email: waqidabdullah@gmail.com

Received: June, 2023
Accepted: August, 2023
Printed: March, 2024

Electrosurgical method is also used in surgeries relating to repair of inguinal hernia with good outcomes in reducing postoperative pain and reduced requirements for the postoperative analgesic use.[14] Surgical treatment of inguinal hernia is a common procedure in surgical units and post-operative pain and complications relating to wound are important concern after inguinal surgery.

This study was therefore planned to compare the outcomes of electrosurgical skin incision in shape of postoperative pain and post-surgical incidence of hematoma compared to scalpel skin incision. The results of this study will help the surgeons to adopt better option for their patients in the treatment of inguinal hernia.

METHODS

This randomized control trial was conducted at the Department of Surgery, Services Institute of medical sciences, Lahore from January 2020 to July 2022 over a period of 6 months.

Sample size was calculated as per following assumptions:

Alpha= 5% (two sided), power =80%.

p1 (Incidence of hematoma using scalpel incision) =9.32%

p2 (Incidence of hematoma using electrosurgical incision) =2.27%%.[15]

Estimated sample size

n1= 135, n2=135.

A total of 270 male patients aging between 15 to 80 years planned for unilateral inguinal hernioplasty were divided in to 2 equal groups of 135 patients each using lottery method.

Exclusion criteria were set as patients who had used an analgesic treatment during last 3 months at a dosage of > 3 days/week at the time of inclusion, patients having strangulated, obstructed or Irreducible hernia or patients having diabetes mellitus.

In Group A patients were treated with electrosurgical skin incision while in Group B patients were treated with scalpel skin incision.

The primary outcomes were set as postoperative pain at 24-hours after the procedure and incidence of hematoma as assessed on day 7 after the surgery.

In Group A, electrosurgery incision was conducted by using a diathermy pen electrode. In Group B, disposable blade was used for skin incision.

All the demographic information was taken and clinical findings were made and recorded at the time of randomization.

Pain was assessed at 6, 12 and 24-hours of procedure using VAS (visual analogue scale 0-10 where 0 meant no pain while 10 meant worst unbearable pain).

Post-operative hematoma was assessed at postoperative follow up day 7.

All surgeries were conducted under standardized spinal anesthesia.

The surgeries were conducted by consultant surgeons having ≥ 5 years of experience. A prophylactic dose of Inj. Augmentin 1 g was given 2 hour before the procedure and repeated on 12 hours basis for 3 days. Postoperative diclofenac injection was given to each patient in both groups.

Repair of subcutaneous tissue was done with Vicryl suture (polyglactin 910).

Ethical approval of conducting the study was taken from the ethical committee of the hospital.

The study purpose was explained and consent was taken from the participants on written forms.

Data analysis was performed using SPSS version 25. Quantitative variables were expressed in shape of Mean±SD while qualitative variables were presented in form of frequency and percentage. Independent t-test and Chi-square test were applied to find the significance of difference between the 2 groups while keeping p≤0.05 as significant.

RESULTS

The Mean±SD of age in this study was 47.45±18.93 years with an age range of 15 to 80 years. Out of total study patients 37 (13.7%) were obese. The group wise details are shown in Table-1.

Table No. 1: Demographics and baseline clinical characteristics

n=270

Demographics and baseline clinical characteristic		Group A n=135	Group B n=135
Age (Mean±SD) years		47.15±18.36	47.74±19.5
Obesity	Yes n (%)	14 (10.37)	23 (17.35)
	No n (%)	121 (89.63)	112 (82.96)

The results of primary outcomes of the study show significantly less postoperative pain in Group A at 24 hours after procedure compared to Group B assessed on VAS scale, as shown in Table-2.

Table No. 2: Postoperative pain among two groups.

n=270

Postoperative pain	Group A n=135	Group B n=135	p-value
At 6 hours on VAS (Mean±SD)	6.08±0.75	6.11±0.91	0.76
At 12 hours on VAS (Mean±SD)	4.88±0.71	4.99±0.89	0.26
At 24 hours on VAS (Mean±SD)	3.37±1.81	4.43±1.94	0.00

Similarly, the results of primary outcome of hematoma formation showed significantly less incidence of hematoma in Group A compared to Group B as assessed at day 7 after the procedure as shown in Table 3.

Table No. 3: Incidence of hematoma n=270

Incidence of Hematoma	Group A n=135	Group B n=135	p-value
Yes n (%)	8 (5.92)	26 (19.25)	0.00
No n (%)	127(94.07)	111 (82.22	

DISCUSSION

Electrosurgery was introduced about 100 years ago and is still not in frequent use due to concerns related to risk of neighboring tissue damage, infection and wound complications. However, use of electrocautery in place of scalpel is gaining acceptance with the introduction of advanced electrosurgical instruments which provide pure sinusoidal currents.[16]

A study conducted by Dhanke P compared the method of electrocautery and scalpel incisions in herniorrhaphy patients. The results showed that electrocautery is safe and no difference was recorded in wound infection and scar complication between the 2 groups. The study reported the incidence of hematoma in electrocautery group by 2.27% while this incidence was 9.32% in the scalpel group.[15]

Chauhan HR compared the outcomes of scalpel and electrosurgery skin incisions after inguinal hernioplasty. The study outcomes were set as postoperative pain, time taken for wound healing, infection at the surgical site and cosmetics. The results showed no difference between the two groups regarding wound infection however significant better outcomes were shared for postoperative pain in electrosurgery group compared to scalpel group($P<0.001$).[13]

Ansari M in a study comparing the scalpel incision and electrosurgical incision reported that hematoma was seen in 20% of cases of herniorrhaphy treated with Scalpel incision while only 3.33% cases with electrocautery incision (p-value < 0.05).[17]

A study conducted by Ragesh K V with 200 patients compared skin incision with diathermy and scalpel with primary outcome of postoperative pain assessed on VAS. The results showed significantly less pain in the diathermy compared to scalpel incision (p-value <0.01). The authors of the study therefore concluded that diathermy provides more advantages to skin reflected by less postoperative pain.[18]

Yadav SK conducted a study to compare the wound complications and postoperative pain in patients either treated with scalpel or electrosurgery for their inguinal hernia. The ratio of male patients in this study was 88.3%. The study showed significantly more (5.1 times) wound complications in scalpel compared electrosurgery group (p=0.04). The study however reported no difference in postoperative pain at 6, 12 and 24 hours after surgery.[19]

Quazi M analyzed the 2 incision methods for better healing and minimal complication after inguinal hernia surgery in 200 patients equally divided in 2 groups. The results of this study proved that electrosurgical incision was better than scalpel incision regarding postoperative pain as assessed on VAS scale (2.51 ± 0.65 Vs 2.97 ± 0.17 respectively, p=0.000).[20]

A systemic review including 9 studies by Hajibandeh S comparing the outcomes of scalpel versus diathermy in inguinal hernia concluded that there no difference regarding other outcomes, however, diathermy may help to reduce the risk of hematoma.[21]

The Mean±SD of age in our study was 47.45±18.93 years with an age range of 15 to 80 years. Out of total study patients 37 (13.7%) were obese.

The results of primary outcomes of the study show that the mean postoperative pain after 24-hour of procedure was significantly less in Group A compared to Group B (3.37 ± 1.81 Vs 4.43 ± 1.94, p-value = 0.00). These results are in line with the results shared by researches working on the comparison between these two methods regarding postoperative pain. [11,13,18,20]

Similarly, the frequency of hematoma was significantly lower in Group A compared to Group B (5.92% Vs 19.25%, p=0.00). Better results regarding hematoma with electrosurgical incision were also shared by studies and meta-analysis conducted previously to evaluate this important surgical outcome.[15,17,19,21]

The results of our study therefore prove electrosurgical incision as a better option for effective inguinal hernia surgery with significantly better post-operative outcomes. Limitation of this study is short follow up time. Moreover, we worked on some selected outcome. Future studies in this segment with longer follow up and more outcomes will be helpful in providing guidelines to surgeons performing inguinal hernia surgeries in our local population.

CONCLUSION

The use of electrosurgical skin incision in routine inguinal hernia surgeries is supported by the evidence provided in the results of this study showing significantly better outcomes in terms of lesser postoperative pain and lower incidence of hematoma.

Author's Contribution:

Concept & Design of Study:	Haseeb Ahmad
Drafting:	Muhammad Waqid Bin Abdullah, Syed Muhammad Talha Bukhari
Data Analysis:	Afzaal Baig, Roshan Butt, Zubair Ahmad
Revisiting Critically:	Haseeb Ahmad, Muhammad Waqid Bin Abdullah
Final Approval of version:	Haseeb Ahmad

Conflict of Interest: The study has no conflict of interest to declare by any author.

Source of Funding: None

Ethical Approval: No.ERB/430/1023/SIM dated 17.09.2021.

REFERENCES

1. Sharma N, Chauhan A, Sharma V, Gupta A, Pathania S. Harmonic scalpel, the tool for new age laparoscopic cholecystectomy. Int Surg J 2018;5(6):2327e30.
2. Shahmoradi MK, Mehri J, Taheri HR. Comparison of hemorrhoidectomy using harmonic scalpel and electrocautery: a randomized controlled trial. Int J Surg Open 2020;27:39e42.
3. Zimrin AB, Bai Y, Holcomb JB, Hess JR. Hemorrhage control and thrombosis following severe injury. Consultative Hemostasis and Thrombosis: Elsevier; 2019. p. 811e8.
4. Vahabi S, Veiskarami P, Roozbahani M, Lashani S, Farzan B. Cross-sectional study on hearing loss and auditory reaction time before and after spinal anesthesia with marcaine 0.5% in patients undergoing elective surgery. Annal Med Surg 2020;60:236e40.
5. Vahabi S, Karimi A, Beiranvand S, Moradkhani M, Hassanvand K. Comparison of the effect of different dosages of celecoxib on reducing pain after cystocele and rectocele repair surgery. Open Anesth J 2020;14(1).
6. Ismail A, Abushouk AI, Elmaraezy A, Menshawy A, Menshawy E, Ismail M, et al. Cutting electrocautery versus scalpel for surgical incisions: a systematic review and meta-analysis. J Surg Res 2017;220:147e63.
7. Moradkhani M, Shabaninia S, Vahabi S. Comparison between ketamine and propofol combined against propofol alone for brachial plexus nerve block in open fixation of forearm fracture: a randomized controlled trial. Int J Surg Open 2020;27:136e9.
8. Moradkhani M, Beiranvand S, Nadri S, Hejri P. Effects of adjuvant ketamine on induction of anesthesia for the Cesarean section. Curr Clin Pharmacol 2020;32156239.
9. AbdElaal NK, Ellakwa HE, Elhalaby AF, Shaheen AE, Aish AH. Scalpel versus diathermy skin incision in Caesarean section. J Obstet Gynaecol 2019;39(3): 340e4.
10. Huang J, Yu Y, Wei C, Qin Q, Mo Q, Yang W. Harmonic scalpel versus electrocautery dissection in modified radical mastectomy for breast cancer: A meta-analysis. PLoS One 2015;10(11).
11. Razia B, Farhan AM, Fatima S, Amna. Skin Incision in Inguinal Hernioplasty in Terms of Early Postoperative Pain. J Surg Pak 2014;19(4):142-5.
12. Zarei F, Shahmoradi MK. Scalpel versus electrocautery for Herniorrhaphy Incision: A randomized controlled trail. Int J Surg Open 2021;28:33-36.
13. Chauhan HR, Charpot RV. A comparative study to evaluate the outcome between electrocautery versus scalpel skin incision in tension free inguinal hernioplasty: a tertiary care teaching centre experience. Int Surg J 2016;3(2):516-20.
14. Beiranvand S, Karimi A, Shoar MH, Baghdashti MB. The effects of magnesium sulfate with lidocaine for infraclavicular brachial plexus block for upper extremity surgeries. J Brachial Plexus Peripher Nerve Inj 2020;15(1):e33.
15. Dhanke P, Ugane S, Kurane S. A comparative study for determining the efficacy of scalpel incision versus diathermy incision over skin in patients undergoing open tension free repair for inguinal hernia. Int J Clin Surg Adv 2014;2(3):1-7.
16. Chalya P, Mchembe M, Mabula J, Gilyoma J. Diathermy versus scalpel incision in elective midline laparotomy: A prospective randomized controlled clinical study. Afr J Surg 2013;18(1): 71-7.
17. Ansari MA, Mishra S, Baskota B. A Comparative Study of Electrocautery Versus Cold Scalpel For Skin Incision In Inguinal Hernia Repair. J Nepalgunj Med Coll 2017;14(1):14-7.
18. Ragesh K, Mahendran S, Mathad S. Outcome of skin incision by cautery versus steel scalpel in hernia surgery: a prospective cohort study at a tertiary medical college hospital in South India. Int Surg J 2017;4(5):1521-24.
19. Yadav SK, Shrestha S, Sitoula N, Singh RK. Outcome of Scalpel Versus Diathermy Skin Incision in Inguinal Hernia Surgery: A Comparative Cross Sectional Study. Birat J Health Sci 2021;6(1)14.
20. Quazi M, Harbad SR, Jadhav SP, Subhedar AD. Comparative Study of Diathermy Versus Scalpel Incision in Inguinal Hernia Repair. Int J Surg Med 2021;7(5):1-4.
21. Hajibandeh S, Hajibandeh S, Maw A. Diathermy versus scalpel for skin incision in patients undergoing open inguinal hernia repair: A systematic review and meta-analysis. Int J Surg 2020;75:35-40.