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ORIGINAL ARTICLE

Mean Postoperative Pain in patients with Elective Midline Laparotomies Using Either Scalpel or Diathermy for Incision

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ABSTRACT

Background: During a laparotomy, the midline incision is frequently made with an electrocautery or scalpel. According to studies, there is no difference between these procedures' rates of complications.
Aim : To assess the average postoperative pain in patients who underwent elective midline laparotomies at the Hayatabad Medical Complex Peshawar using either a scalpel or diathermy for incision.
Methodology: This was a randomized controlled trial, which included 60 laparotomies patients who were divided into two groups at random. One group of patients had diathermy, whilst the other group underwent scalpel incisions. On the second postoperative day, a follow-up was conducted.
Results: In diathermy group we had 63.3% males and 36.7% females while in the scalpel group we had 17 males and 13 females. 40% patients in diathermy group were hypertensive, this ratio was 36.7% in the scalpel group, diabetic patients were 26.7% in diathermy group and 16.7% in scalpel group.
Practical implication: Cutting by diathermy is simpler, quicker, and results in less blood loss. Furthermore using diathermy to make an incision is no more likely to result in complications than using a scalpel
Conclusion: For an elective laparotomy, skin incision with diathermy provides superior postoperative pain management than a scalpel.
Keywords: Diathermy, incision, Laparotomy, woundpain, scalpel

INTRODUCTION

Laparotomies are frequently performed for a variety of medical conditions[1]. An incision is made in the anterior abdominal wall to get access to the abdominal cavity and obtain information that cannot be obtained with the aid of regular diagnostic procedures. Although a laparotomy is often an exploratory treatment, it can be transformed into a therapeutic procedure during surgery when the surgeon determines an easily treatable cause for the patient's morbidity[2].

Similar to this, laparotomies are occasionally performed in order to take a biopsy from an intraabdominal tumor[3]. Laparotomies are still one of the most often performed procedures in any surgical department, despite the fact that their usefulness has reduced with the development of improved diagnostic techniques. This is because they are still frequently cost-effective in many circumstances. In cases of abdominal TB, tubo-ovarian disease, and in patients with suspected intraabdominal adhesions, an elective laparotomy is performed[4].

In settings with limited resources, laparotomy followed by on-table endoscopy is used to treat gastrointestinal bleeding with an unidentified origin[5]. A midline incision is frequently used by surgeons because it provides simple access to the peritoneum. Additionally, it leads to minimal blood loss.[6] Bowel damage risk is also decreased by midline incision. Other techniques that surgeons can use, when needed, include transverse and para-median incisions. Due to a number of post-operative complications, laparotomy causes a great deal of pain for the patient.Incisional herniae and wound infection are the outcomes[7]. Although these side effects are well known, the post-operative pain is sometimes overlooked and underestimated as a result of laparotomy[8].

The operating surgeons used to have serious concerns about using cautery to make incisions because they feared burns and slower wound healing. But with the development of current diathermy units, cautery has revolutionized incision making because it reduces operating time and causes less blood loss due to excellent haemostasis. Not only are laparotomy incisions large, but they also require a lot of surgical time to allow for full exposure[9].

Patients have significantly more post-operative pain with midline laparotomies than with other incisions, in particular. Therefore, it's crucial to select the proper incision procedures in order to lessen the postoperative pain for these patients. Either a scalpel or electrocautery can be used to cut the skin in the midline incision. Cutting by diathermy is simpler, quicker, and results in less blood loss. According to studies, using diathermy to make an incision is no more likely to result in complications than using a scalpel[10].

As of now, the primary result of the current investigation has been postoperative pain. Furthermore, in light of the conflicting results of various studies, our study was carried out in the general population with a focus on post-operative pain in midline skin incisions during emergency laparotomies with a crucial concern to evaluate the superior method over the alternatives that would reduce the patient's post-operative pain, an important contributor to post-operative morbidity and subsequently helpful to the patient's recovery.

METHODOLOGY

This randomized controlled trial was conducted in the Department of General Surgery Hayatabad Medical Complex Peshawar from February 2022 to November 2022. Sample size was 60 and Sampling technique used was non-probability consecutive sampling.
Data collection: The sample size was estimated using the anticipated pain scores of 12.65±8.06 for the diathermy group and 17.12±9.49 for the scalpel group, with a 5% level of significance and an 80% power of the test. procedure was used to enroll 60 patients (thirty in each group), who were eligible for the study.
Inclusion criteria: In the study, both male and female patients with elective laparotomy indications between the ages of 18 and 60 were included.
Exclusion criteria: The study excluded all patients who used Warfarin, had a history of abdominal surgery, or underwent a midline laparotomy.

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Data analysis: SPSS 23.0 was used to record and analyze the data. For quantitative factors such age, surgery time, hospital stay, intraoperative blood loss, and postoperative pain scores, mean ± SD were determined. For categorical factors including gender, history of DM, and HTN, frequencies and percentages were determined. An independent sample T-test was used to compare the average pain scores between the two groups, and a p-value of ≤0.05 was considered significant. To evaluate if there was any effect modification, pain scores were stratified according to age, operation length, history of DM and HTN, using a t-test and a p-value of 0.05 as significant.

RESULTS

Total 60 patients were included. Patients were randomly allocated into two groups by lottery methods (30 in each group). Mean age of patients in the diathermy group was 36±8.6 years while in the scalpel group 32.5±8.9 years (p 0.125). Details of the age groups for both treatment arms are elaborated in Table 1.

In diathermy group we had 63.3% males and 36.7% females while in the scalpel group we had 56.7% males and 43.3% females (p 0.598).The mean duration of surgery inboth groups are shown in (Table 2). 40% of patients in the diathermy group were hypertensive compared to 36.7% in the scalpel group (p 0.791), 26.7% in the diathermy group were diabetic compared to 16.7% in the scalpel group (p 0.347).

The mean duration of hospital stay in the diathermy group was 3.5±1.6 days compared to 3.2±1.7 days in the scalpel group (p 0.426). The mean postoperative pain of patients in the diathermy group was 2.9±1.2 while that of the scalpel group was 3.7 + 1.6. The difference was statistically significant after applying the independent sample T-test with a p-value of 0.040 (Table 3).

Table 1.Comparisonofage groups

Age group	Groups		P value
	Diathermy	Scalpel	
20-30 years	8 (26.7%)	13 (43.3%)	0.376
30-40 years	13 (43.3%)	11 (36.7%)	
40-50 years	9(30%)	6(20%)	

Table 2.Comparisionofsurgery durationin categories

Time duration	Groups		P value
	Diathermy	Scalpel	
30-45 minutes	14(46.7%)	17 (56.7%)	0.438
45-60 minutes	16 (53.3%)	13 (43.3%)	

Table 3.Comparsionofmeanpainbetweentreatment groups

Group	Pain score			P value
	N	Mean	SD	
Diathermy	30	2.9	1.2	0.040
Scalpel	30	3.7	1.9	

DISCUSSION

Decades back, it was believed that using a scalpel to make skin incisions was the best option since it eliminates the risk of electrical burn and allows for precise depth control. The use of "Sharpless" alternative procedures for skin incision, including electrocautery, was prompted by the increased seroconversion rate among healthcare professionals as a result of handling sharps. According to Perry J et al 8% of all injuries that happened in hospitals involved a scalpel, and there have been accounts of surgeons getting HIV after suffering a scalpel injury[11].

Scalpel usage should be reduced to reduce both the spread of infection and the loss of manpower days brought on by serious mechanical injury. Although electrocautery is frequently used to separate subcutaneous tissue, muscle, fascial layers, and to maintain hemostasis during surgery, it has not yet gained widespread acceptance as a substitute for a scalpel when it comes to making skin incisions due to concerns that it could result in burns from wound complications and unintentional injury to deeper structures[12].

However, ongoing study and inventive technology allowed for the development of alternative skin incision techniques, and contemporary electrosurgical devices have generated considerable interest in this area. Since its development by Shetty et al, hemostasis and underlying dissections have been the primary uses of electrosurgery[13]. During diathermy, the electrical current is changed into a high-frequency alternating current that travels through the body, excites the molecules of the tissue, and produces energy. This heat impact of diathermy damages sensory nerve fibers partially or completely, which compromises the transmission of nerve signals. When used for skin incisions, diathermy has been linked to safety and may have other benefits in addition to reducing early postoperative wound pain. Historically stainless steel scalpel is frequently used for making skin incisions[14].

Numerous writers evaluated this approach in reconstructive and aesthetic faciomaxillary surgery, pediatric surgery, rhinoplasty, and blepharoplasty, and found that it produced great cosmetic outcomes with less scarring than scalpel use.15-17 The idea that electrosurgery might devitalize tissues with adequate hydration was refuted. The current study showed that electrocautery-created incisions had low early postoperative pain and a reduced need for analgesics, which are similar and congruent findings to earlier research investigations.

The findings of our study agreed with those of the study conducted by Zarei F et al which revealed statistically significant mean pain scores on postoperative days 1, 2, and 3 for the scalpel group of 3.92±1.24, 3.10±1.04 and 2.40±0.20 respectively, and scores of 2.42±0.40, 1.22±0.18 and 1.01±0.11 for the diathermy group.[18] On postoperative days 1, 2, and 3 correspondingly a different study conducted by Yadav SK et al reports mean scores of 3.13, 2.69, and 2.34 for the scalpel group and 1.68, 1.89, and 2.48 for the diathermy group[19].

But according to another study by Farooque U et al, there was no difference in pain score between diathermy and scalpel incisions on the first postoperative day (mean difference 0.89)[20]. Campwala I et al validated a finding from our study that patients who had a midline laparotomy with a skin incision made using diathermy experienced considerably less pain than those whose skin incisions were made with a scalpel[21]. The present investigation has been strengthened by the careful selection of inclusion and exclusion criteria, consecutive sampling, the strongest study design (RCT), and scientifically sound computation of sample size. Additionally, we stratified the analysis to account for confounders and effect multipliers. Additionally, the use of objective criteria for outcome and predictor variables minimized the source of bias in our study.

Limitation: One of our limitation is that we had included a small sample size of cases. Therefore, we urge more randomized controlled trials, particularly with bigger sample sizes and consideration of other factors that may affect postoperative pain following laparotomy

CONCLUSION

For an elective laparotomy, skin incision with diathermy provides superior postoperative pain management than a scalpel. Therefore we advise its routine usage in patients undergoing laparotomy.

Conflict of interest: Nil

REFERENCES

1. Pandey S, Choubey RP, Narain IT. Diathermy versusconventional scalpel in making an abdominal incision: a prospective study. J ClinDiag Res 2019;13:9-11.
2. Agar E, Karakoc G. Comparison of electrocautery andscalpel for blood loss and postoperative pain in Pfannenstiel incisions in recurrent cesarean sections: arandomized controlled trial. Clin Exp Obstet Gynecol 2021;48:534-9.

3. Nandurkar VS, Mohan-Kumar K, Prakash M., Suma S.Diathermy versus scalpel incisions in elective abdominal surgery: a comparative study. IntSurg J 2018;5:3124-8.
4. Farooque U, Ahmed R, Kumar D. Mean post-operativepain score in midline laparotomy incisions made using scalpel vsmonopolar diathermy. J LiaquatUni MedHealth Sci 2019;18:99-103.
5. Okereke CE, Katung AI, Adesunkanmi AK, Alatise OI.Surgical outcome of cutting diathermy versus scalpel skin incisions in uncomplicated appendectomy: Acomparative study. Niger Postgrad Med J 2019;26:100-5.
6. Mukherjee MP, Patole MM. Scalpel versus diathermy skin incision: A randomised clinical trial. Int Surg J 2019;7(1):258-262.
7. Manatsathit W, Khrucharoen U, Jensen DM, et al. Laparotomy and intraoperative enteroscopy for obscure gastrointestinal bleeding before and after the era of video capsule endoscopy and deep enteroscopy: A tertiary center experience. The American Journal of Surgery. 2017.
8. Bostanci EI, Guler I, Akdulum FC, et al. Electrocautery versus scalpel in women undergoing primary cesarean section and neonatal outcomes. GynecolObstetReprod Med 2020;26(3):184-187.
9. Junaid Khan Lodhi, Aasim Malik, Saba TahirBokhari, Muhammad Zubair. Comparative Study of Use of Diathermy Versus Scalpel for Incision Making in Midline Laparotomy With Respect to Incision time and Blood Loss. P J M H S Vol. 16, No. 04, 2022: 156-57.
10. Nandurkar VS, Prakash M, Suma S. Diathermy versus scalpel incisions in elective abdominal surgery: A comparative study. IntSurg J 2018;5(9):3124-3128.
11. Perry J, Parker G, Jagger J. Percutaneous injury rates. Adv expos prevent EPINet Rep., 2005;7:42-45.
12. Liang SS, Ying AJ, Affan ET, et al. Continuous local anaesthetic wound infusion for postoperative pain after midline laparotomy for colorectal resection in adults. The Cochrane Library. 2016.
13. Shetty K, Shetty D, Nemani PK. RandomisedControlled Clinical Trial of Scalpel Versus Diathermy for Abdominal Skin Incisions. Indian JSurg2021;83(6):1464-9.
14. Mrunalini P, Raju NV, Nath VN, Saheb SM. Efficacy of transverses abdominis plane block in patients undergoing emergency laparotomies. Anesth Essays Res. 2014; 8(3): 377-82.
15. Talpur AA, Khaskheli AB, Kella N, Jamal A. Randomized clinical Trial on Diathermy and Scalpel Incisions in Elective General Surgery. Ira Red Crescent Med J. 2015; 17(2): e14078.
16. Ayandipo OO, Afuwape OO, Irabor D, Oluwatosin OM, Odigie V. Diathermy versus scalpel incision in a heterogeneous cohort of general surgery patients in a Nigerian Teaching Hospital. Niger J Surg. 2015; 21(1): 43-47.
17. Shamim M. Diathermy vs. scalpel skin incisions in general surgery: pouble-blind, randomized, clinical trial. World J Surg. 2009; 33(8): 1594- 99.
18. Zarei F, Shahmoradi MK. Scalpel versus electro-cautery for herniorrhaphy incision: A randomized controlled trail. Int J Surg Open2021;28:33-6.
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 Sci2021;6(1):1358-62.
20. Farooque U, Ahmad R, Kumar D. Mean Post-Operative Pain Score in Midline Laparotomy Incisions Made using Scalpel VS MonopolarDiathermy. JLUMHS2019;18(02):99-103.
21. Campwala I, Unsell K, Gupta S. A comparativeanalysis of surgical wound infection methods: predictive values of the CDC, ASEPSIS, andSouthampton scoring systems in evaluating breast reconstruction surgical site infec-tions. PSURG 2019 ;27(2):93-9.