

ORIGINAL ARTICLE

COMPARISON OF ELECTROCAUTERY VERSUS SCALPEL INCISIONS IN ELECTIVE MIDLINE LAPAROTOMY IN POPULATION OF PESHAWAR, PAKISTAN

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ABSTRACT

Background: Incision for surgical procedures has been given by scalpel blades since long, but in recent modern era electrocautery is also favored by many surgeons. The aim of this study was to compare electrocautery versus scalpel incisions in elective midline laparotomies in terms of per operative incision timings, post-operative pain, blood loss and wound infection in population of Peshawar Pakistan.

Materials & Methods: This was Quasi experimental study conducted in Department of General Surgery MTI Lady Reading Hospital Peshawar, KP from Jan 2021 to Oct 2021. Total 100 patients of elective laparotomy were included. Inclusion criteria were all male/female adults' patients without Diabetes and bleeding disorders. Patients were randomly assigned in two groups by lottery method. Group A (50 patients) underwent incision with scalpel while in group B (50 patients) incision was given by electrocautery at cutting mode. Data was analyzed by SPSS ver.23.0.

Results: The mean age of patients in group A and B was 44.10 ± 13.14 and 48.06 ± 11.66 years respectively. Mean incision time in Group A was 3.87 ± 1.06 seconds while in group B it was 3.65 ± 1.40 seconds. Mean pain (VAS) in group A at 24 hours was 2.22 ± 0.54 and 1.62 ± 0.60 in group B (p value 0.000). Mean blood loss in group A was 2.94 ± 1.53 ml while in group B it was 1.66 ± 1.23 ml (P value 0.001). Fifteen patients (30%) of group A and 6 patients (12%) of group B developed post-operative surgical site infection which was statistically significant (p value 0.02).

Conclusion: We recommend use of electrocautery as a safe alternative to scalpel for skin incision. Incision with electrocautery has a significant advantage over scalpel as it causes little blood loss, significantly low postoperative pain and decreased chances of wound infections.

KEY WORDS: Scalpel incision; Electrocautery; Laparotomy.

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INTRODUCTION

Traditionally, incision for surgical procedures has always been given by scalpel blades from many centuries. Surgical scalpel has got preference by many surgeons because of its accuracy and little damage

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to surrounding skin.¹ The main disadvantage of scalpel is accidental prick to surgeon and other operation theatre staff while transferring it from one hand to other hand and more bleeding.² Electrocautery is the most common electrical device used in surgery nowadays. It was first used by Dr. Harvey Cushing in 1926.³ Electrocautery has cutting and coagulation mode which uses alternating current through high tissue resistance which causes water vaporization or protein coagulation according to mode selected.⁴ Although, it is widely used for below skin tissue dissection, hemostasis, and cutting purposes but its use for skin incisions is still debatable. Many surgeons do not favor it for skin incision due to fear of deep burns, post-operative pain and scarring.⁵

There is also a concept that incision with diathermy leads to tissue devitalization which may cause poor wound healing.⁶ The reported complications by use of electrocautery include deep burns at receiving plate, smoke, explosion, and fire.⁴ Postoperative pain after abdominal surgeries is most common complaint in early postoperative period which lead to longer hospital stays, delays early recovery, and disturbs normal routine of patients.⁷ A meta-analysis by Ahmad NZ *et al* found no significant difference between incision with electrocautery and scalpel in terms of post-operative wound complications and stated that electrocautery has less blood loss, low post-operative pain (p value 0.031), and shorter incision time.⁸ However, a study by Guang *et al* showed contrary results that incision with electrocautery is associated with increased wound complications, delayed wound healing (p value 0.01), and increased infections (p value 0.05) than incisions made with scalpel.⁹ We conducted this quasi-experimental study to compare per operative incision timings and post-operative pain, blood loss and wound infection in scalpel vs electrocautery incisions in elective midline laparotomies in population of Peshawar Pakistan.

MATERIALS AND METHODS

We conducted a quasi-experimental study in general surgery department of MTI Lady Reading Hospital Peshawar, KP from Jan 01, 2021 to Oct 30, 2021 after approval from ethical committee. Sample size of 100 cases was estimated by keeping 80% power of study, 5% significance level. Inclusion criteria were any adult patient undergoing elective surgery irrespective of gender, non-Diabetic, no previous history of any surgery at present site, non-infected site of surgery and patients not on anticoagulants. Exclusion criteria were patients of anemia, COPD, chronic kidney disease, pregnancy and ischemic heart disease patients or patients with pacemaker in place. Informed written consent was taken from all patients/relatives before including them in study. One hundred patients were allocated to group A and B by lottery method. Group A (control group) patients underwent incision with scalpel while in group B (study group) incision was given by electrocautery at cutting mode. Bleeding during incision making was measured by weighing swabs pre surgery and post-surgery and every increase in 1 gram was taken as 1ml of blood per cm². No suction was used during incision making. After surgery every skin closure was done by using prolene 2/0 by same surgical team. Wound infection was labeled as per south ampton classification of wound infection.¹⁰ Post-operative pain was measured by using visual analogue score card after 24 and 48 hours post operatively.¹¹ Score on vas from 1-3 was labeled as mild pain, 4-6 was labeled as moderate and 7 and more than 7 was labeled as severe pain.¹¹ Every patient was given injection paracetamol 1gram IV during per operative

and post-operative period. Stitches were opened on 14th post-operative day. Data was collected and entered on a preformed proforma by the postgraduate trainee on call.

Data was collected and later on entered and analyzed in SPSS v. 23. Mean and standard deviation was calculated for quantitative variables and frequency and percentages for qualitative variables. Student t test was applied to compare postoperative pain and McNemar Chi square test was used to compare both groups for postoperative wound complications. The significance level was set at p<0.05.

RESULTS

We included total 100 patients who underwent midline laparotomy (50 patients in each group). The mean age of patients in group A (scalpel) was 44.10 ± 13.14 years while in group B (Electrocautery) it was 48.06 ± 11.66 years. In group A, there were 29 (58%) males and 21 (42%) females. In group B, there were 32 (64%) males and 18 (36%) females (table I). Mean incision time in Group A was 3.87 ± 1.06 seconds while in group B mean incision time was 3.65 ± 1.40 seconds. Demographics are mentioned in table I.

Table-I: Demographics of patients

	Study Group	
	Group A (scalpel)	Group B (electrocautery)
No of patients	50	50
Age (years)	44.10 ± 13.14	48.06 ± 11.66
Male	29 (58%)	32 (64%)
Female	21 (42%)	18 (36%)
Mean incision time(seconds)	3.87 ± 1.06	3.65 ± 1.40

Post procedure patients were followed at 24 hours and 48 hours for pain using visual analogue score. Mean pain in group A at 24 hours was 2.22 ± 0.54(VAS) and 1.62 ± 0.60 in group B which was statistically significant(p value 0.00). Mean pain in group A at 48 hours was 1.58 ± 0.49 (VAS) and 1.28 ± 0.45 in group B which was statistically significant(p value 0.002). Mean blood loss in group A during incision was 2.94 ± 1.53 ml while in group B it was 1.66 ± 1.23ml which was statistically significant(p value 0.001). Fifteen patients (30%) of group A and 6 patients (12%) of group B developed post-operative surgical site infection which was statistically significant (p value 0.02). All variables are mentioned in table II.

Table-II: Comparison of variables in both groups

Variable	Study Group		t-test
	Group A (scalpel)	Group B (electrocautery)	
Surgical Site Infection	15 (30%)	6 (12%)	0.02
Mean blood loss (ml)	2.94 ± 1.53	1.66 ± 1.23	0.001
Mean pain at 24 hours	2.22 ± 0.54	1.62 ± 0.60	0.000
Mean pain at 48 hours	1.58 ± 0.49	1.28 ± 0.45	0.002

DISCUSSION

Electrocautery is one of the most common electrical devices used by every surgeon nowadays.¹² Its use for hemostasis and tissue dissection is well established but its use for skin incision is controversial and many surgeons do not prefer it.¹³ Early studies with old electrocautery machines have reported electric burns and poor wound healing but with the use of modern electrocautery which delivers pure sinusoidal current has revolutionized its usage.¹⁴ A study by Shetty *et al* showed that patients of electrocautery group shows less blood loss (1.31 ± 0.19 ml/cm² in diathermy and 1.97 ± 0.26 ml/cm² in scalpel group), less post-operative pain as compare to scalpel group (p value 0.001), less incision time, however no significant difference was found In post-operative wound infection.¹ Similarly, a study by Lalgudi *et al* showed that blood loss is significantly low with electrocautery group i-e 6.46 ± 3.94 ml when compared to that of 23.40 ± 15.28 ml in the scalpel group (p = < 0.0001).¹⁵ Similarly, a study by Yadav *A et al* showed significantly low blood loss with the use of electrocautery (0.31 ± 0.04 ml/cm² as and 1.21 ± 0.21 in scalpel group, p value = 0.0001).¹⁶ A meta-analysis by Ismail *A et al* showed that electrocautery is associated with significantly low blood loss, less post-operative pain, less incision time but no difference in post-operative wound infection is reported.¹⁷ A study by Mukherjee *et al* stated a significantly low post-operative pain in electrocautery group when compared with scalpel group (p value 0.001).¹⁸ Similarly, a study by Shrestha *D et al* showed that electrocautery group has significantly low post-operative pain when compared with scalpel group and fewer analgesics were given to electrocautery group post operatively.¹⁹ A study by AbdElal *et al* showed significant difference between the scalpel and diathermy group i-e incisional blood loss (p < .001), operative time (p < .001) and the postoperative pain (p < .001).²⁰ Aird *et al* showed in their study a significant difference in pain on first post-operative day mean pain on day one with electrocautery was 1.68 versus 3.13 with scalpel (P = 0.018) and less incision time but no significant difference in post-op-

erative wound infection was declared.²¹

Limitations of our study were short sample size and short study duration. Long term results and complications like wound scarring need further studies.

CONCLUSION

We conclude that incision with electrocautery has a significant advantage over scalpel as it causes less blood loss, significantly low postoperative pain and low postoperative wound complications. We recommend use of electrocautery as a safe alternative to scalpel for skin incision.

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CONFLICT OF INTEREST
 Authors declare no conflict of interest.
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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	AUK, MNK
Acquisition, Analysis or Interpretation of Data:	AUK, MNK, MRN, HUH
Manuscript Writing & Approval:	AUK, MNK, MRN, HUH

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



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