

Incision by Scalpel Vs Cautery Which Heals Faster? A Controlled Study**Mannem Swathi¹, N. Dinakar¹, Akram Shaik²**¹Assistant Professor, Department of General Surgery, ACSR, GMC, Nellore²Assistant Professor, Department of General Surgery, ACSR, GMC, Nellore³Assistant Professor, Department of General Surgery, ACSR, GMC, Nellore

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Conflict of interest: Nil

Abstract

Background: Since the time of Sushruta, scalpel incisions have been the traditional surgical approach. The advent of electrocautery (EC) introduced advantages such as reduced bleeding and improved safety for operating staff. However, concerns remain regarding delayed wound healing and excessive scarring with cautery use. Modern EC units with refined current modulation may overcome these limitations, warranting comparative evaluation with scalpel incisions.

Aims: To compare electrocautery and scalpel incisions in terms of incision-related blood loss, postoperative pain, wound healing, complications, and scar quality during follow-up.

Methodology: A prospective observational case-control study was conducted on 100 patients undergoing various surgical procedures in the Department of General Surgery, ACSR Medical College and Hospital, between July 2024 and August 2025. Patients were randomly assigned by closed envelope method—Group A (scalpel incision, n=50) and Group B (cautery incision, n=50). Parameters analyzed included intraoperative blood loss, postoperative pain (POD 0–3), and wound complications. Continuous data were analyzed using the Student's t-test, and categorical data with Fisher's exact test ($p \leq 0.05$ considered significant).

Results: Mean incision-related blood loss was significantly lower in the cautery group (1.698 ± 0.227 ml) compared to the scalpel group (2.45 ± 0.284 ml; $p < 0.05$). Postoperative pain scores on POD 0–3 and wound dehiscence rates showed no statistically significant differences between the two groups ($p > 0.05$). Healing outcomes and infection rates were comparable, with no notable delay or adverse cosmetic results in the cautery group.

Conclusion: Electrocautery incision significantly reduces intraoperative blood loss without compromising wound healing, postoperative pain, or scar formation. Hence, EC is a safe and efficient alternative to the scalpel for surgical skin incisions.

Keywords: Electrocautery Incision, Scalpel Incision, Wound Healing, Postoperative Pain, Blood Loss, Surgical Outcomes.

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Introduction

Since the days of Sushruta, the father of surgery, knife cutting has been used in surgery. After invention of power sources for cutting and coagulation, many surgeons started using cautery to avoid blood loss. Apprehensions of delayed healing are natural. Electro Cautery (EC) seals the blood vessels. Newer EC with more safety features, healing may not be adversely affected. EC can avoid the risk of hepatitis and HIV from knife injury to operating staff. [1,2]

Aims& Objectives: To study the effectiveness of cautery cutting current versus scalpel cutting in terms of the amount of blood loss, Wound healing, postoperative complications from the time of incision until the wound heals, to assess post-operative pain on the day of surgery evening, and

on postoperative days 1, 2, and 3. And to investigate whether surgical scar produced by EC or scalpel is superior at 1 and 6-8 months postoperative period.

Materials & Methods

A prospective observational case-control study was conducted on 100 patients undergoing various surgical procedures in the Department of General Surgery, ACSR Medical College and Hospital, between July 2024 and August 2025. In 100 cases selected by closed envelop method, odd number chits were given to knife cut (group A) and even will be for cautery cut (group B).

GROUP A: A scalpel was used to make a skin incision, and EC coagulation was used to control

the bleeding. GROUP B: skin (dermis +epidermis)-an incision made with cautery(cutting) with EC power of 40(available in hospital) Hemostasis is achieved with EC coagulation. Patients admitted to great eastern medical school and hospital's general surgery department undergoing all surgeries during November 2019-June 2021.

Methodology

Inclusion Criteria: All types of procedures.

Exclusion Criteria: Patients with ischemic heart disease more than 65 years and immunocompromised status.

Study variables to be analyzed are: Incision related blood-loss, Postoperative Pain, Postoperative wound complications.

Statistical Methods: The complete continuous data were expressed as means $\pm$ SD, and the means were compared by using the 2-independent-sample Student t-test. The complete categorical data are expressed as n (%) and analyzed using Fisher's exact probability test. A 2-tailed $P \leq 0.05$ was considered statistically significant.

Results

Table 1: Age of the Study Population

Age Groups	Number of patients
≤ 20	2
21 – 30	15
31 – 40	25
41 – 50	25
51 – 60	22
61 – 70	7
71 – 80	4
Group A n = 50	Mean 45.62 SD 13.27
Group B n = 50	Mean 42.46 SD 13.6

Table 2: Sex of the Study Population

	Female	Male	Total
A	17 (34%)	33 (66%)	50
B	25 (50%)	25 (50%)	50
Total	42	58	100

Table 3: Incision Related Blood Loss

Group	Mean	Standard Deviation
A	2.45	0.284
B	1.698	0.227
P – Value	< 0.05(Significant)	

Table 4: Length of Incision

Group	Mean	Standard Deviation
A	6.07	2.334
B	6.03	2.446
Overall	6.05	2.379
P – Value	< 0.05	

Table 5: Post-Operative Pain

Table 3: Post-Operative Pain			
POD 0			
Group	Mean	Standard Deviation	P - Value
A	3.16	1.283	0.727
B	3.24	0.96	
POD 1			
A	2.62	1.123	0.995
B	2.62	0.987	
POD 2			
A	1.68	0.891	0.581
B	1.78	0.91	
POD 3			
A	1.24	0.847	0.352
B	1.04	0.968	

Table 6: Wound Dehiscence

Group	No	Yes	Total
A	43	7	50
B	44	6	50
Total	42	58	100
P – Value	0.766		

Table 7: Skin/ Full Wound Dehiscence

Group	Full	Skin	Total
A	1 (14%)	6(86%)	7
B	0 (0%)	6 (100%)	6
Total	1	12	13
P – Value	0.49		

Table 8: Final Outcome of Wound Healing

Group	Full	Skin	Total
A	43 (86%)	7 (14%)	50
B	44 (88%)	6 (12%)	50
Total	87	13	100
P – Value	0.766		

Table 9: Microorganism Isolated in Wound Dehiscence Cases

Microorganisms	A	B	Grand Total
E. Coli	4	3	7
Kleb	1	2	3
No Organism		1	1
Pseudomonas	1		1
Staph Aureus	1		1

Discussion

A slit/cut is used to gain access to underlying structures and referred as an incision. "CAUTERIZATION" - the process of removing or closing a portion of the body by burning it with chemicals or electricity. Although EC is becoming more widely used in tissue dissection, concerns about poor wound healing & excess scarring have limited its usage in skin incision. The EC Incision isn't the same as a traditional cutting incision. Electrodes that deliver pure electricity are used. The use of sinusoidal current allows tissue to be cleaved without causing damage to the environment.

A variety of benign cutaneous lesions can be treated with an EC machine, with good cosmetic results. Stainless steel scalpels are typically used to make incisions. For a variety of tissue and surgical procedures, stainless-steel scalpels and disposable knives are used. Many modern procedures, such as laser & cavitron electron surgical aspirator, have been developed to address this issue; however, the aforementioned technologies are expensive, and these devices are relatively unavailable in peripheral surgical setups. For concern of tissue damage, post-operative pain, and scarring, EC, that is available in theatres, utilised less commonly in skin incisions. Recent research and studies have demonstrated that EC can be utilised for skin incisions with no postoperative problems such as

wound infection, scarring, or pain. This research aims to dispel the surgical community's apprehension about employing EC for skin incisions. Many studies have been published in the literature that compare EC incision to scalpel incision, and many of them show that EC incision is superior to scalpel incision in terms of time, pain, and blood loss. There is contradictory evidence showing that EC use impairs healing and increases scarring. This has sparked enough debate, and there is now renewed interest in studying EC with scalpel incisions.

Tissue injuries fear been revealed earlier when EC used by "peterson in faciomaxillary surgery [3] "klippel & mann' in paediatric surgery [4] "kamer –rhitioplasty [5] & 'Tabin –blepharoplasty [6] had minimal scarring & best results. As previously stated, the studies conducted in order to assess the efficacy of EC over scalpel in skin incisions, with varying results. Some of them are better with EC, while others show comparable results.

Age: There were 100 patients included in this study, for 50 patients EC was used in skin incision and for another 50 patients steel scalpel was used. Age group of patients ranged from 19-76 years, youngest being 19 years and oldest being 76 years. And 24-76 years in group A, 19-73 YEARS in group B. the mean age in this study was 45.62 in group A and 42.46 in group B with overall mean of 44.04. No significant difference in groups with

respect to age (p value 0.953) The mean age reported in study by s.r.kerans et al [7] is 61 years for scalpel and 60 per EC. The mean age reported in study by nataraj et al [8] the mean age for EC is 47.8, 47.7 IN SCALPEL, which are almost similar.

Sex: In my study Male: female ratio is group A is 33:17, in group B 25:25. While in study conducted by kerans et al [7] is Male: female ratio in scalpel is 27:23, in EC 27:23. No significant difference in between 2 groups with respect to sex (p value 0.105) Age and sex has no effect on final outcome of results.

Incision related blood loss: The mean Incision related blood loss is 2.45 in group A and 1.698 in group B with overall mean of 2.074. standard deviation group A was 0.284, group B 0.227 with overall standard deviation 0.456. the p value is < 0.05 which is statistically significant implying that blood loss using EC less compared to scalpel. Similar to the present study, studies conducted by S.R.KEARNS et al [7] Rappaport WD et al [9], Chrysos E et al [10], Johnson CD et al [11], Amit yadav et al [12] incision related blood loss is significantly less in EC.

Pain in post-operative period: In patients, pain measurement may be unreliable and inconsistent. Subjective measures, such as a linear visual analogue scale, as well as objective measures, such as PEFR, are useful in measuring post-operative pain. Pain is felt more acutely in parts of the body that move frequently, such as the chest and abdomen. [9]

The midline abdominal wound is inherently more painful, and any benefit from the incision technique may be overshadowed by the severity of the pain. [13] It appears that a variety of factors, including incision characteristics, have an impact on post-operative discomfort. The degree of abdominal distension, the duration of any paralytic ileus, the presence of inflammation or infection, as well as central and personality-related factors, may all play an additional and important role in postoperative pain. In the current study, there was no statistically significant difference in the two groups on post-operative days 0,1,2,3. Ram singh keluth et al. [14] concluded that post-operative pain scores and analgesia need are same in both groups, lending support to the current study.

Kearns et al [7] concluded that using EC for skin incision resulted in less early postoperative pain and a lower need for analgesia. Similarly, Ahmad et al. [15] discovered that post-operative pain was significantly reduced with EC incisions in the first 24 hours. Similar findings were reported by Siraj et al [16], but we did not compare post-operative pain with the various sites of surgery because the different anatomic sites with varying amounts of

underlying tissue dissection and inherent class of surgery may all affect the pain assessment score.

Wound Dehiscence & Healing: Infection of a Wound Surgical wound infections continue to consume a sizable portion of health-care resources. Even though complete elimination of wound infections is not possible, reducing the observed wound infection rate to a minimum level could have significant benefits in terms of both patient comfort and resources used.

In the study, group A 43 cases (86%) showed normal healing with no dehiscence and remaining 7 cases (14%) had wound dehiscence and had delayed healing. In group B of 50 cases 6(12%) cases showed delayed wound healing due to wound dehiscence. Because the p value is 0.766, there was no significant difference in postoperative wound healing between the two groups; nevertheless, as compared to the scalpel group, the EC group had adequate healing.

Chrysos et al. reported no difference in terms of wound complication rates with EC use when performing prosthetic mesh inguinal hernioplasties, proclaiming it as safe and effective as the scalpel in wound healing. [10]

Scalpel and EC thoracotomy incisions had equivalent early and late wound healing rates, according to Stoltz et al. [17] When scar development was measured postoperatively, there was no significant difference in between the scalpel and EC groups. There was no evidence of keloid development. The long-term effects of EC on scar formation will require more research. However, there is no proof that EC results in low cosmetic scar scores at this time.

When comparing scalpel skin incision to electrosurgical needle incision, Dixon [18] discovered that the latter method was more effective, faster, and offered superior cosmetic results with fewer problems. It's a straightforward procedure that people tolerate well and doesn't create any additional difficulty. Cutting EC versus scalpel for skin incision was the subject of a comprehensive review and meta-analysis by J. Ly et al. [19] which comprised 14 randomised studies with a total of 2541 patients (1267 by cutting EC and 1274 by scalpel). The study found that EC skin incisions are faster and result in less blood loss than knife incisions. There are no variations in wound complications or postoperative discomfort rates between the two groups. The tiny sample size in this study constituted a serious flaw. However, the outcomes of this study are comparable to those of other worldwide investigations, indicating that EC can be used in skin incisions.

More large-scale randomised trials with larger sample sizes are needed to compare the clinical and cosmetic outcomes of the EC and scalpel groups.

Conclusion

Based on the findings of the study, it was concluded that EC is superior in terms of incision-related blood loss, and EC and scalpel groups are comparable in terms of: post-operative pain, wound dehiscence, final outcome.

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