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Original Article

A Study Comparing the Results of Diathermy Versus Scalpel for Inguinal Skin Incisions

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ABSTRACT

Objectives: The advent of electrocautery has introduced a significant alternative to traditional scalpels for making skin incisions in surgical procedures. Electrosurgery, also known as surgical diathermy, involves passing high-frequency electric current through body tissues to achieve coagulation, fulguration, and cutting. There are two main types of diathermy: monopolar, where the current travels from an electrode near the target tissue to a fixed electrode elsewhere on the body, and bipolar, where both electrodes are on a single device, allowing the current to flow through the treated tissue alone. Despite the advantages of diathermy, including reduced bleeding and quicker incision time, concerns about wound infection, delayed healing, and scarring have limited its use for skin incisions.

Material and Methods: This study aims to compare the outcomes of diathermy versus scalpel incisions in terms of incision time, blood loss, postoperative pain, wound infection, and scar characteristics in inguinal surgeries. Conducted at Gulbarga Institute of Medical Sciences, Kalaburgi, this prospective randomised control study spanned from August 2023 to May 2024. A total of 81 patients were randomly assigned to either the scalpel incision group [$n = 40$] or the diathermy incision group [$n = 41$].

Results: The findings indicate that diathermy incisions offer significant benefits over scalpel incisions, including reduced incision time, lower blood loss, and decreased postoperative pain. The study utilised the Manchester Scar Score to assess wound characteristics, finding no significant difference between the two groups in terms of wound healing and scar quality. The safety and efficacy of electrocautery were further supported by the absence of significant differences in postoperative wound complications, hospital stay duration, and cosmetic outcomes between the two methods.

Conclusion: In conclusion, diathermy presents a safe and effective alternative to scalpel incisions, offering reduced intraoperative blood loss and postoperative pain without compromising wound healing or increasing complications. However, the choice between diathermy and scalpel should consider the surgeon's expertise and the specific surgical context. While diathermy shows clear advantages, certain scenarios may still necessitate the use of a scalpel. Thus, the optimal surgical approach should be determined through careful evaluation of each individual case.

Keywords: Blood loss, Diathermy, Electrocautery, Electrosurgery, Operative, Postoperative pain, Randomised controlled trial, Scars, Skin incisions, Surgical, Surgical procedures, Wound healing, Wound infection.

INTRODUCTION

Traditionally, scalpels have been the standard tool for making skin incisions. However, since the advent of electrocautery, it has gained popularity for tasks like coagulation and cutting. Electrosurgery involves the use of high-frequency electric current to achieve specific clinical outcomes, and the term "diathermy" is derived from the Greek words "therma" (heat) and "dia" (through), meaning "heating through tissues." Carl France Nagelschmidt, a German physician, first coined the term in 1909.[1–3]

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Electrosurgery, also referred to as surgical diathermy or electrocautery, is widely used in surgical procedures for coagulation, fulguration, and cutting. There are two main types of diathermy: monopolar and bipolar. In monopolar diathermy, the electrical current flows from one electrode near the target tissue to a separate electrode placed elsewhere on the body, usually near the leg or buttocks. In contrast, bipolar diathermy uses both electrodes on a single device, with the current passing only through the tissue being treated, minimising the risk to surrounding tissues.[4,5]

While scalpels are commonly used for skin incisions, they often lead to bleeding that can obstruct the surgical field. Diathermy offers an alternative, primarily used for tissue destruction and hemostasis. However, surgeons often avoid diathermy for skin incisions due to concerns about wound infection, delayed healing, and scarring.[6–8] This study aims to compare the effectiveness of diathermy and scalpel incisions in terms of incision time, blood loss, wound characteristics, and scar assessment in abdominal surgeries at a tertiary care hospital in Gulbarga.

Aim and objectives

The aim of this study is to compare the outcomes of inguinal incisions versus scalpel incisions in both elective and emergency operations, focusing on incision time, incisional blood loss, postoperative pain, postoperative wound infection, and scar characteristics.

Selection of study subjects

Simple randomisation – Chit based

Sample size

Sample collected [*N*] = 81 [Table 1].

Inclusion criteria

1. Patients undergoing elective surgery for whom an inguinal incision is taken.
2. Patients aged 18–65 years.
3. Patients on anticoagulants, known cases of coagulopathies.

Exclusion criteria

1. Patients aged <18 years and >65 years.
2. Scar at planned incision site.
3. Patients with pacemakers.
4. Patients with preexisting pain at the incision site or any neuropathy.
5. Immunocompromised patients due to chemotherapy, immunosuppressants, corticosteroids, etc.
6. Pregnancy.

Data collection

Data regarding history, clinical examination, nature of surgery, and postoperative outcome will be included

MATERIAL AND METHODS

A total of 81 patients were included in the study, divided equally into two groups: Group A (40 patients) underwent scalpel incisions and Group B (41 patients) underwent diathermy incisions [Table 2 and Figure 1]. Both groups were operated on by the same surgical unit. Patients were informed about the benefits and risks of each incision method, and consent was obtained. All surgeries were performed under spinal anaesthesia, with a standard antibiotic protocol using Inj. Ceftriaxone [Table 3 and 4].

Randomisation was done using a chit system. In the scalpel group, incisions were made with a no. 22 scalpel blade, with haemostasis achieved by applying pressure with a sterile swab. Diathermy was only used for deeper incisions. In the diathermy group, a monopolar diathermy pencil was used at a 20 CUT mode with 434 KHz [Figure 2 and 3]. Blood loss during the incision was measured by weighing sterile swabs pre- and post-incision, and incision time was recorded with a stopwatch [Table 5]. Postoperative pain was managed with Inj. Diclofenac and, if needed, Inj. Tramadol and assessed using a visual analogue scale (VAS). Wounds were evaluated using the South Hampton wound scoring system on days 4, 10, and 28 [Table 6, 7 and 8].

RESULTS

Table 1: Sex distribution

	Male	Female
Number	81	0

Table 2: Cases in different group

	Diathermy	Scalpel
Number	41	40

Table 3: Age distribution

Age in years	Number
18–25	13
26–35	20
36–45	16
46–55	18
56–65	14

Mean age of 41.35 ± 1.54 years.

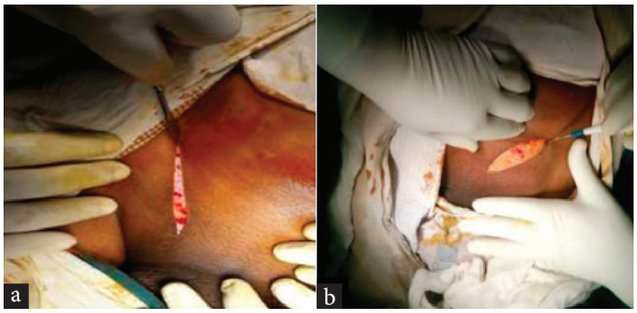

Figure 1: (a) Operative incision with scalpel, (b) Operative incision with diathermy.

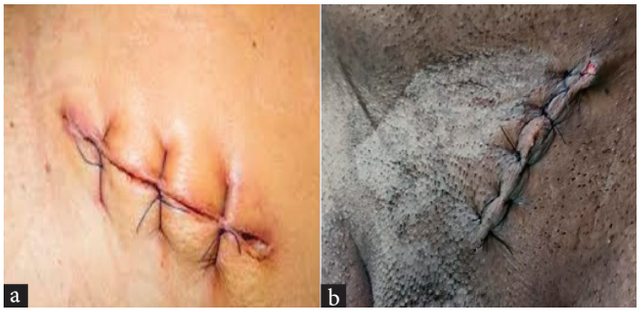

Figure 2: (a) Postoperative image of scalpel, (b) Postoperative image of diathermy.

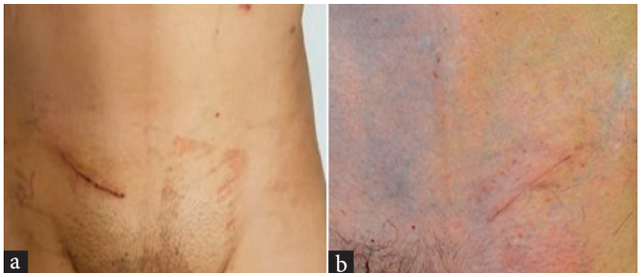

Figure 3: (a) Healed incision after 1 month of Scalpel, (b) Healed incision after 1 month of diathermy.

Table 4: Time taken for the incision

	Diathermy (in sec)	Scalpel (in sec)	P value
Mean	4.892 ± 0.28	5.82 ± 0.24	<0.0001
SD	1.74	1.603	

SD- Standard deviation.

Table 5: Blood loss

	Diathermy (in g)	Scalpel (in g)	P value
Mean	2.584 ± 0.16	3.720 ± 0.19	<0.0001
SD	1.04	1.26	

SD- Standard deviation.

Table 6: Postoperative pain

POD-1	Diathermy (in g)	Scalpel (in g)	P value
Mean	4.65 ± 0.12	5.45 ± 0.7	<0.0001
SD	0.74	0.70	
Median	5	5	
POD-2	**Diathermy (in g)**	**Scalpel (in g)**	**P value**
Mean	3.92 ± 0.75	4.73 ± 0.10	<0.0001
SD	0.75	0.70	
Median	4	5	

SD- Standard deviation, POD- Post operative day.

Table 7: Wound healing

POD-4	Diathermy (in g)	Scalpel (in g)	P value
Mean	3.92 ± 0.32	3.76 ± 0.25	0.667
SD	2.005	1.63	
Median	4	3	
POD-10	**Diathermy (in g)**	**Scalpel (in g)**	**P value**
Mean	2.63 ± 0.27	2.76 ± 0.25	0.727
SD	1.71	1.63	
Median	2	2	
POD-28	**Diathermy (in g)**	**Scalpel (in g)**	**P value**
Mean	0	0.04 ± 0.04	0.228
SD	0	0.30	
Median	0	0	

SD- Standard deviation, POD- Post operative day.

Table 8: Scar characteristics

POD-4	Diathermy (in g)	Scalpel (in g)	P value
Mean	7.73 ± 0.19	8.52 ± 0.17	0.564
SD	1.22	1.13	
Median	7	8	
POD-10	**Diathermy (in g)**	**Scalpel (in g)**	**P value**
Mean	7.10 ± 0.11	7.904 ± 0.29	0.014
SD	0.72	1.93	
Median	7	7	
POD-28	**Diathermy (in g)**	**Scalpel (in g)**	**P value**
Mean	5.02 ± 0.02	5.5 ± 0.17	0.008
SD	0.16	1.131	
Median	5	5	

SD- Standard deviation, POD- Post operative day.

DISCUSSION

Diathermy incisions have historical roots dating back to ancient times and offer several advantages over traditional scalpel incisions, including reduced incision time, lower blood loss, and shorter postoperative recovery. Unlike scalpels, diathermy uses heat to vaporise tissue, creating an incision without spreading heat to adjacent tissues.[9–12]

Electrocautery is considered safe and effective for surgical skin incisions, showing benefits such as faster incision time, reduced blood loss, and lower postoperative pain compared to scalpel incisions. Studies indicate no significant difference in postoperative wound complications, hospital stay duration, or wound cosmetic outcomes between the two techniques.[10,13–17] For instance, a randomised trial revealed that cutting diathermy is the preferred technique for abdominal skin incisions, with no increased risk of wound infection. Additionally, several studies have demonstrated that diathermy incisions result in less postoperative pain.[14,15,18,19]

In elective surgeries, diathermy offers significant benefits over scalpel use, while in emergency surgeries, the results regarding wound healing and complications are more variable. However, the choice between scalpel and diathermy does not significantly impact early postoperative and long-term wound complications, making the decision dependent on the surgeon's skill and experience.[18–20]

The use of Manchester Scar Score in assessing wound outcomes showed that the mean and median scar scores were slightly higher in scalpel incisions, though the difference was not statistically significant. This aligns with several studies that found no significant difference in scar outcomes between diathermy and scalpel incisions. Further research is needed to fully understand the impact of electrocautery on wound healing and complications.[20–25]

CONCLUSION

Diathermy incision, or electrocautery, is a well-established and effective surgical technique, offering several advantages over traditional scalpel incisions. It reduces procedural time, minimises blood loss, and decreases postoperative pain and complications, making it an attractive option for many surgeries. Our study highlights that diathermy results in less intraoperative blood loss, reduced postoperative pain, and no scar dissimilarity appearance in the techniques, with comparable wound healing outcomes. Diathermy also eliminates the risk of sharp injuries associated with scalpel blades, though precautions must be taken to prevent fire and electrical burns.

However, choosing between diathermy and scalpel depends on factors such as the surgeon's experience, the specifics of the procedure, diathermy equipment and specifications, and patient considerations. While diathermy offers clear benefits, there are situations where a scalpel may be preferred or necessary. Ultimately, the decision should be based on a careful evaluation of the surgical context and the expertise of the surgical team.

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