

# Comparison of Effectiveness of Scalpel and Diathermy for Abdominal Skin Incisions

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## ABSTRACT

**Background:** Skin incisions are typically made using a scalpel, which causes greater pain and blood loss. The introduction of surgical diathermy mitigated the inherent drawbacks of scalpels, such as unclear tissue planes and lack of hemostasis, extended operating time, the danger of infection from the use of foreign material (ligature) in the wound, and the potential for unintentional harm in the operating room. **Objective:** The objective of study was to compare diathermy and scalpel for abdominal skin incisions in terms of mean blood loss, post operative pain and time of incision. **Study Design:** Randomized control trial. **Settings:** Surgical Units of Allied Hospital, Faisalabad Pakistan. **Duration:** Six months from 01-01-2021 to 30-06-2021. **Methods:** 80 patients presented to the allied hospital were studied after taking verbal consents and surgical details were taken from the surgeons and their operation notes. **Results:** In this study, 2.5% (n=1) were between 15-20 years, 27.5% (n=11) were between 21-30 years, 25.0% (n=10) between 31-40 years, and 27.5% (n=11) were between 41-50 years and 17.5% (n=7) were between 51-60 years of age in group A (scalpel group). In Group B (diathermy group), 5.0% (n=2) were between 15-20 years, 17.5% (n=7) were between 21-30 years, 32.5% (n=13) were in 31-40 years, 22.5% (n=9) between 41-50 years, and 22.5% (n=9) were among 51-60 years of age. 35% (n=14) were males, while 65% (n=26) were females in group A (scalpel group). In group B (diathermy group), 37.5% (n=15) were males, while 62.5% (n=25) were females. **Conclusion:** We concluded that the effectiveness of diathermy for abdominal skin incisions is better than scalpel as there is significantly decreased time of incisions, decreased blood loss, and decreased postoperative pain. So, diathermy can be routinely used for making abdominal skin incisions.

**Keywords:** Scalpel, Diathermy, Abdominal skin incisions, Efficacy, Incisions, Post-operative pain.

## INTRODUCTION

Midline laparotomy (ML), a common surgical technique, provides quick, easy, and extensive access to nearly all abdominal structures. Numerous issues, including incisional hernias, wound infection, and wound dehiscence, can arise with laparotomies. Another important side effect of ML is pain, which must be treated in order to aid patients in a speedy and painless recovery. Several factors influence the degree of postoperative pain, including the type of anesthesia used, the duration of the treatment, the analgesia utilized, and the incision formed. Both hospitals and surgeons have varying infection

prevalences. Widespread tissue damage increases the risk of wound infection, therefore surgical procedures need to be done with caution.<sup>1,2,4</sup>

### Operational Definitions:

The swabs used only for the incision and hemostasis were weighed in order to determine the blood loss; one gram was equivalent to one milliliter of blood. The blood was not suctioned out during the skin incision.

**Blood Loss:** weight of dry sponge (a) and Weight of soaked sponge (b) volume = mass/ density

b – a = gms (volume = mass/ density)

**Time of Incision:** The duration of the incision was noted from the beginning of the skin incision to the end of the peritoneal incision with full hemostasis.

**Postoperative Pain:** It was evaluated 24 hours after surgery using a verbal evaluation scale.

## METHODS

This randomized control trial was conducted at the Surgical Department of Allied Hospital, Faisalabad Pakistan. The duration of the study was six months from 01-01-2021 to 30-06-2021. Non-probability consecutive sampling technique was used.

All the 80 patients between 15-60 years of age of either gender undergoing elective abdominal surgery were included in the study.

Patients of pre-operative use of analgesics for 3 times per week for 3 months, patients with chronic pain, patients with age less than 15 years and geriatrics > 60 years, patients with diabetes mellitus, history of drug abuse and alcohol, immunocompromised patients and patients who had previous abdominal surgeries were excluded.

Every patient in the research was admitted to the outpatient department (OPD). The nature, benefits, and drawbacks of the treatment were explained to the patients, and their informed consent was obtained.

Data was collected using a methodical questionnaire, and analysis was done using SPSS software version 17. Researchers evaluated categorical data, including gender, using frequencies and percentages. Age, blood loss at the time of incision, and post-operative pain were among the continuous variables that were compared between two groups using means, standard deviations, and an independent sample t-test.

## RESULTS

Eighty cases in all that met the requirements were enrolled, with forty in each of the two groups. In group A (scalpel group), the age distribution of the patients revealed that 2.5% (n=1) were between the ages of 15 and 20, 27.5% (n=11) were between the ages of 21 and 30, 25% (n=10) were between the ages of 31 and 40, 27.5% (n=11) were between the ages of 41 and 50, and 17.5% (n=7) were between the ages of 51 and 60. Of the individuals in group B (diathermy group), 5.0% (n=2) were between the ages of 15 and 20, 17.5% (n=7) were between the ages of 21 and 30, 32.5% (n=13) were between the ages of 31 and 40, 22.5% (n=9) were between the ages of 41 and 50, and 22.5% (n=9) were between the ages of 51 and 60 (Table 1).

Gender distribution of the patients revealed that 35% (n=14) of group A's patients were men and 65% (n=26)

were women. Males made up 37.5% (n=15) of group B, while females made up 62.5% (n=25) (Table 2).

The diathermy group's mean incision length was 39.28 cm<sup>2</sup>, while the scalpel group's was 36.70 cm<sup>2</sup>; there was no discernible difference between the two groups (p value = 0.337) (Table 3). The diathermy group's mean incision time was 2.6470 seconds per centimeter, while the scalpel group's was 5.1555 seconds per centimeter. A significant difference was indicated by the computed p value of 0.0001 (Table 4). Blood loss was measured at 0.8468 ml/cm<sup>2</sup> in group B and 1.9385 ml/cm<sup>2</sup> in the scalpel group. A significant difference was indicated by the computed p value of 0.0001 (Table no 5). After 24 hours, the scalpel group's post-operative pain score was 4.78 (VAS), while the diathermy group's was 3.85 (VAS). A significant difference was indicated by the computed p value of 0.0001 (Table 6).

**Table 1: Age distribution**

Age Group	Group A	Group B	Total
15-20	1(2.5%)	2 (5.0%)	3 (3.8%)
21-30	11 (27.5%)	7 (17.5)	18 (22.5%)
31-40	10 (25%)	13 (32.5%)	23 (28.8%)
41-50	11 (27.5%)	9 (22.5%)	23 (28.8%)
51-60	7.9 (17.5%)	9 (22.5%)	16 (20.0%)
Total	40	40	80
Mean ± SD	37.99 ±11.903.		

Chi square value = 20.64, p value = 0.724

**Table 2: Gender distribution**

Gender	Group A	Group B	Total
Male	14 (35%)	15 (37.5%)	29 (36.3%)
Female	26 (65%)	25 (62.5%)	51 (63.8%)
Total	40	40	80

Chi square value = 0.054, p value = 0.816

**Table 3: Length of incision cm<sup>2</sup>**

	Mean	SD	P value
Scalpel (group A)	36.70	11.494	0.337
Diathermy (group B)	39.28	12.308	0.337

**Table 4: Time of incision sec/cm<sup>2</sup>**

	Mean	SD	P value
Group A	5.1555	1.66151	0.0001
Group B	2.6470	0.84021	

**Table 5: Blood loss ml/cm<sup>2</sup>**

	Mean	SD	P value
Group A	1.9382	0.44262	0.0001
Group B	0.8468	0.34832	

**Table 6: Post-operative pain 24 hours**

	Mean	SD	P value
Scalpel Group A	4.78	0.423	0.0001
Diathermy group B	3.85	0.362	

## DISCUSSION

Traditionally, scalpels have been used to produce longer and more painful skin incisions. Surgical diathermy was developed to get around the inherent problems with scalpels. Of the 214 patients who signed up for the trial, which we intended to conduct in Tanzania in 2011,<sup>1</sup> 108 were randomized at random to group A (scalpel) and 106 to group B (diathermy). Diathermy-acted laparotomy incisions were significantly faster than scalpel incisions (p value = 0.0001). The diathermy group lost significantly less blood than the scalpel group on post-operative days 1 (p value = 0.0001), 2 (p value = 0.011), and 3 (p value = 0.021) (p value = 0.012). Furthermore, the mean visual analogue scale was significantly lower in the diathermy group. The outcomes of another trial that compared the efficacy of diathermy and scalpels for midline incisions were similar. While the scalpel group's average incision time was 8.20±1.42 seconds/cm<sup>2</sup>, the diathermy group's was 6.84±0.82 seconds/cm<sup>2</sup>. There was a statistically significant difference in the length of surgery. Incisional blood loss was 1.43±0.20 ml/cm<sup>2</sup> for the diathermy group and 1.53±0.20 ml/cm<sup>2</sup> for the scalpel group (p=0.014). The diathermy group's mean scores were 2.42, 1.5, and 1.01 from day 1 to day 3, while the scalpel group's average pain levels were 3.92, 3.00, and 2.40. This suggests that group B's VAS pain score was much lower.<sup>2</sup> Ali *et al.* found similar results when comparing the incision time and incision blood loss of diathermy and scalpel for open cholecystectomy. Although the diathermy group suffered significantly less blood loss, the scalpel incision time was longer than the diathermy group (p=0.0001). Nonetheless, there was no difference between the two groups' assessments of post-operative pain as determined by the visual pain analog scoring system (p=0.57).<sup>3</sup> The results of our investigation were further supported by a comparison of the two methods for making incisions for an open cholecystectomy by Pearlman *et al.*<sup>5</sup> Our investigation's results are corroborated by a study by Chyrous and colleagues that examined inguinal hernioplasty incision times using either a scalpel or diathermy. Our findings are corroborated by another study that examined the differences between the diathermy and scalpel incisions performed on patients undergoing midline elective laparotomy in Pakistan.<sup>6</sup> The study included a total of 100 patients who were divided equally into two groups.

Significantly less bleeding occurred in the diathermy group (p value = 0.014), with mean incision blood loss in the diathermy group being 1.43±0.20 ml/cm<sup>2</sup> and in the scalpel group being 1.53±0.20 ml/cm<sup>2</sup>. When comparing diathermy and steel scalpels for abdominal incisions, another Indian study found that the former resulted in

much shorter incision times (p < 0.0001) and lower pain levels than the latter. Overall, it was discovered that diathermy produced skin incisions far more effectively than scalpels.<sup>7</sup> This implies that blood loss, incision time, and postoperative pain can all be decreased by use diathermy rather than a scalpel.

## CONCLUSION

Diathermy is more effective than scalpels for making incisions in the abdomen skin because it causes significantly less blood loss, less pain during the process, and substantially shorter incision durations. As a result, diathermy can be used to frequently make incisions in the abdomen skin.

## LIMITATIONS

Single Centre based study.

## SUGGESTIONS / RECOMMENDATIONS

We suggest that diathermy is more effective than scalpels for making incisions in the abdomen skin because it causes significantly less blood loss, less pain during the process, and substantially shorter incision durations

## CONFLICT OF INTEREST / DISCLOSURE

None.

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