

Comparison of Diathermy versus Scalpel Skin Incision in Oncological Surgeries

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Abstract

Introduction: Surgical incisions are usually made with scalpel. Usage of scalpel usually results in skin bleeding which obscures the operating field resulting in wastage of operating time. Although diathermy is increasingly used for underlying tissue dissection, cutting, and hemostasis, its use for making skin incisions is not gaining favor.

Aim: The aim of our study was to compare the value outcome of diathermy incisions versus scalpel incisions in abdominal surgeries.

Materials and Methods: This prospective comparative study was conducted to compare the outcome of diathermy incisions versus scalpel incisions in oncological surgeries. Total of 80 patients who divided into Group A (scalpel incision) for 39 patients and Group B (diathermy incision) for 41 patients. Treatment protocol and follow-up protocol were followed and the results were statistically analyzed and discussed.

Results: Out of 80 patients, 39 patients had scalpel incision and 41 patients had diathermy incision. In the scalpel group out of 39 patients, 21 patients were male and 18 patients were female, the mean duration of incision time in the scalpel group is 116 sec, the mean value of incisional blood loss in the scalpel group is 1.9/ml, the mean operating time in the scalpel group is 36.42 min, and the mean value of post-operative pain in day 1 is 6.42, day 2 is 5.18, and day 3 is 3.66. In the diathermy group out of 41 patients, 26 patients were male and 15 patients were female, the mean duration of incision time in the diathermy group is 88.52 sec, the mean value of incisional blood loss in the diathermy group is 1.4/ml, the mean operating time in the diathermy group is 38.75 min, and the mean value of post-operative pain in day 1 is 5.12, day 2 is 3.88, and day 3 is 2.01.

Conclusion: The findings of the present study show that diathermy seems to provide some benefit with respect to post-operative wound pain, less incision time, and less incisional blood loss and has obvious safety advantages to the surgical team compared with scalpel.

Key words: Diathermy, Scalpel, Skin incision

INTRODUCTION

Incision is a “cut or slit” to gain access to the underlying structures. Conventionally, incisions are made with stainless steel scalpel.^[1] These incisions are supposed to be more bloody which obscure the surgical field and, in some instances, lead to increased swelling, bruising, and pain.^[2]

To reduce blood loss following surgical incision, many methods have been evolved among which diathermy is the most readily available in operation theater.^[3,4] Diathermy is the use of an alternating current through tissue resistance to raise tissue temperature to achieve vaporization or the combination of desiccation and protein coagulation.^[5,6] However, diathermy skin incisions are less popular among the surgeons, as it has been hypothesized that the application of extreme heat may result in significant post-operative pain and poor wound healing.^[7] Fear of deep burns with diathermy and resultant scarring continues compared with the scalpel, which produces a clean, incised wound with minimal tissue destruction.^[8] The use of diathermy in skin incisions reduces bleeding and makes the incision quicker, but there are no differences in wound burst strength.

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Modern electrosurgical units capable of delivering pure sinusoidal currents have evolved a change in this concept. The advantages are rapid hemostasis, faster dissection, and a reduced overall operative blood loss.^[8-10] In abdominal surgery, only few studies had compared the surgical outcome of scalpel incision and diathermy. Soballe *et al.*^[11] reported that electric coagulation increases the incidence of indurated margins, infections, and weakness of the wound cut in comparison with the knife. Conversely, Groot and Chappell^[12] reported that the use of surgical diathermy to create surgical wounds in patients undergoing abdominal or thoracic operations carries a wound infection rate similar to that of scalpel.

Aim

The aim of our study was to compare the outcome of diathermy incisions versus scalpel incisions in abdominal surgeries.

MATERIALS AND METHODS

This prospective comparative study was conducted to compare the outcome of diathermy incisions versus scalpel incisions in oncological surgeries, including breast chest wall tumor laparotomies and musculoskeletal oncology under different study parameters such as sex, incision time, operating time, amount of blood loss, post-operative pain, and wound complication. Inclusion criteria include patients of both sexes and patients in the age group of 8–80 years with clean and clean-contaminated wounds. Exclusion criteria include patients with the presence of untreated coagulopathy, diabetes mellitus, and severely immunocompromised status. All patients undergo elective oncological surgeries such as including breast chest wall tumor laparotomies and musculoskeletal oncology. All emergency oncological surgeries were excluded from the study. The findings of patients' history, examination, laboratory, imaging, operative, and post-operative course were recorded. An informed consent was taken.

The patients were randomized into two groups, such as diathermy (Group A) or scalpel (Group B). In the diathermy group, skin incisions made out by electrosurgical unit. In our institute, we used ARC surgical diathermy D-400 with the setting, cutting – 40–60 was used. In the scalpel group, we used 22 sized blade for all skin incisions. Incision time was calculated from the beginning of skin incision to opening of subcutaneous tissues and it measured in seconds. Incisional blood loss was assessed by weight of gauzes, number of gauzes, and soakage of gauzes. Post-operative pain was assessed by visual analog scale. Treatment protocol and follow-up protocol were followed and the results were statistically analyzed and discussed.

RESULTS

Out of 80 patients, 39 patients had scalpel incision and 41 patients had diathermy incision. In the scalpel group out of 39 patients, 21 patients were male and 18 patients were female, and in the diathermy group out of 41 patients, 26 patients were male and 15 patients were female [Table 1].

Out of 80 patients, 39 patients had scalpel incision and 41 patients had diathermy incision, the mean duration of incision time in the scalpel group is 116 sec and mean duration of incision time in the diathermy group is 88.52 sec [Table 2].

Out of 80 patients, 39 patients had scalpel incision and 41 patients had diathermy incision, the mean value of incisional blood loss in the scalpel group is 1.9/ml and mean value of incisional blood loss in the diathermy group is 1.4/ml [Table 3].

Out of 80 patients, 39 patients had scalpel incision and 41 patients had diathermy incision, the mean operating time in the scalpel group is 36.42 min and mean operating time in the diathermy group is 38.75 min [Table 4].

Out of 80 patients, 39 patients had scalpel incision and 41 patients had diathermy incision. In the scalpel group out of 39 patients, 2 patients had infection, 1 patient had

Table 1: Gender in two groups of patients

Gender	Scalpel group	Diathermy group
Males	21	26
Females	18	15
Total	39	41

Table 2: Incision time in two groups of patients

Incision time, sec	Scalpel group	Diathermy group
Mean	116	88.52
Standard deviation	44.36	48.52

Table 3: Incisional blood loss in two groups of patients

Incisional blood loss/ml	Scalpel group	Diathermy group
Mean	1.9	1.4
Standard deviation	0.1	0.2

Table 4: Operative time in two groups of patients

Operative time (min)	Scalpel group	Diathermy group
Mean	36.42	38.75
Standard deviation	18.49	19.28

wound dehiscence, and 3 patients had hematoma, and in the diathermy group out of 41 patients, 4 patients had infection, 1 patient had wound dehiscence, and 2 patients had hematoma [Table 5].

Out of 80 patients, 39 patients had scalpel incision and 41 patients had diathermy incision. In the scalpel group, the mean value of post-operative pain in day 1 is 6.42, day 2 is 5.18, and day 3 is 3.66. In the diathermy group, the mean value of post-operative pain in day 1 is 5.12, day 2 is 3.88, and day 3 is 2.01 [Table 6].

DISCUSSION

Diathermy is used increasingly for hemostasis and tissue dissection. Despite this, few surgeons use diathermy to incise skin; this reluctance is partly attributable to the belief that electrosurgical instruments increase devitalized tissue within the wound, which consequently leads to increased wound infection, increased scar formation, and delayed wound healing. However, these concerns have not been substantiated by recent studies of skin incision, which have shown faster operating times, reduced blood loss, reduced early post-operative pain, and lower analgesia requirements with diathermy compared with scalpel incision.^[8] In an experimental study on rats, fascia incisions with cold scalpel were found to gain tensile strength faster than with harmonic scalpel or diathermy.^[13] Another study on rats concluded healing of abdominal wall after diathermy with cold scalpel or electrocautery is equivalent and does not differ.^[14] It has been suggested that local tissue heating increases subcutaneous oxygen tension, thus enhancing the resistance of the surgical wounds to infection.^[7]

In our study out of 80 patients, 39 patients had scalpel incision and 41 patients had diathermy incision, the mean

Table 5: Wound complications in two groups of patients

Wound complications	Scalpel group	Diathermy group
Infection	2	4
Wound dehiscence	1	1
Hematoma	3	2

Table 6: Post-operative pain assessment in two groups of patients

Post-operative pain assessment	Scalpel group	Diathermy group
	Mean±SD	Mean±SD
Day 1	6.42±0.8	5.12±0.52
Day 2	5.18±0.9	3.88±0.64
Day 3	3.66±0.54	2.01±0.76

SD: Standard deviation

duration of incision time in the scalpel group is 116 sec and mean duration of incision time in the diathermy group is 88.52 sec. Thus, incision time is shorter in the diathermy group compared to the scalpel group. Other studies also stated that cutting diathermy resulted in a statistically significant shorter incision time than the use of the scalpel.^[8,15]

In our study out of 80 patients, 39 patients had scalpel incision and 41 patients had diathermy incision, the mean value of incisional blood loss in the scalpel group is 1.9/ml and mean value of incisional blood loss in the diathermy group is 1.4/ml. Thus, incisional blood loss is less in diathermy compared to scalpel incision. Other studies also stated that cutting diathermy resulted in a statistically significant less incision blood loss than the use of the scalpel.^[8,15]

Yilmaz *et al.*^[16] compared scalpel and electrocautery and reported that seroma incidence was higher in the electrocautery group than the other groups and there was no difference between groups with respect to hematoma. In our study, infection rate was higher in the diathermy group compared to the scalpel group.

There was a significant difference in post-operative pain scores at the 1st day, 2nd day, and 3rd day between incisions made with cutting diathermy and scalpel. This finding is consistent with the results of two meta-analyses.^[17] Our study results suggested a significantly reduced post-operative pain in the diathermy group.

CONCLUSION

The findings of the present study show that diathermy seems to provide some benefit with respect to post-operative wound pain, less incision time, and less incisional blood loss and has obvious safety advantages to the surgical team compared with scalpel.

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