

Randomized Clinical Trial of Diathermy Vs Scalpel Skin Incision in General SurgeryBirendra Kumar¹, Rajesh Kumar Ranjan²¹ Senior Resident, Department of General Surgery, JNKTMCH, Madhepura²Senior Resident, Department of General Surgery DMCH, Laheriasarai, Darbhanga

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Conflict of interest: Nil

Abstract

Background and Objectives: Although diathermy was regularly used for tissue dissection, cutting and haemostasis, its use for making skin incision not so popular in day to day practice. Scalpel skin incision produces a clean, incised wound with minimal tissue destruction. To compare the healing of incision in both procedures. To compare the operative time, To compare incidence of post operative wound infection.

Material and Methods: Study area: Darbhanga Medical College and Hospital, Darbhanga, Bihar. Study Population: 14 – 65 years age group. Study period: January 2019 – June 2020. **Sample size:** A total 60 patients was studied. Among them 30 patients were randomly selected for diathermy skin incision and another 30 patients for scalpel skin incision. All even cases were selected for diathermy and odd for scalpel skin incision.

Conclusion: Our study one and half year randomized clinical trial into two groups. Even cases were selected for diathermy and odd for scalpel skin incision in patients undergoing midline general surgery like intestinal obstruction. Blunt abdominal trauma and peptic ulcer diseases evaluation was done in terms of incision time, amount of blood loss, post operative pain, post operative analgesic requirement and post operative wound infection. Results were analysed using mann whitney U test and chi square test.

Keywords: chi square test, Hepatitis.B, Hepatitis C, HIV.

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Introduction

Although diathermy was regularly used for tissue dissection, cutting and haemostasis, its use for making skin incision not so popular in day to day practice. Scalpel skin incision produces a clean, incised wound with minimal tissue destruction. Cutting diathermy also produces an incised wound that heals as well as the one that is created by cold scalpel but with an added advantage of achieving quick haemostats and saving operative time. [1] Traditionally skin incision has been made with stainless steel scalpel. These incisions are more bloody and painful. Electrocautery which is available in all operation theatres has been used less frequently for making incisions, in fear of tissue damage, leading to more postoperative pain, impaired wound healing and hypertrophic scarring. The use of electrode delivering pure sinusoidal current however allows tissue cleavage without damage to surrounding areas. [2] Diathermy incision is not a true cutting incision. Diathermy heat cell within tissues so rapidly that they vaporize, leaving cavity within cell matrix, the heat created disappears as steam, instead by being spread to adjacent tissue [3-6] the moving electrode contracts and vaporises

the new cell and an incision is created. This explains absence of scarring and subsequent healing with less scarring. Many studies have been conducted to compare electrocautery incision with scalpel incision over skin and many of them showed electrocautery incision to be better than scalpel incision in terms of time taken for incision, lesser pain, better wound healing and little blood loss. [7-8] The main thing of the present study was to verify and compare the usefulness of diathermy skin incision vs scalpel skin incision in general surgical patients. To achieve this goal patients were taken up for study in Darbhanga Medical College Hospital with informed consent. All the patients were operated under general anaesthesia.

Objectives

- To compare the healing of incision in both procedures
- To compare the operative time
- To compare incidence of post operative wound infection
- To compare post operative pain

Material and Methods

Study area: Darbhanga Medical College and Hospital, Darbhanga, Bihar. Study Population: 14 – 65 years age group. Study period: January 2019 – June 2020. Sample size: A total 60 patients were studied. Among them 30 patients were randomly selected for diathermy skin incision and another 30 patients for scalpel skin incision. All even cases were selected for diathermy and odd for scalpel skin incision.

Sample size: 60 Cases, In 30 cases incision was taken with electrocautery over skin. In 30 cases incision was taken with conventional scalpel.

Duration: One and half year

After taking the informed consent, patients were randomized and divided in two groups A and B. In Group A- Incision was taken with electro cautery needle using pulse sine wave current and power setting of 70 watts. Hemostasis was achieved with force coagulation. In Group B-Skin incision was taken with scalpel, bleeding controlled by force coagulation using pulse sine wave on power supply 30 watts. All standardized incision will be midline incision. Inj ceftriaxone (1gm) was given 15 minute before procedure. Closure of the abdominal layer was done with continuous proline no.1. interrupted suture and 2-0 ethilon with curved cutting needle used for skin closure

Inclusion Criteria

- All general surgical operations with midline incision
- Surgery performed under general anaesthesia.
- No history of previous laparotomy
- Clean contaminated cases also included

- Patients with preoperative investigation (CBC, LFT, KFT, RBS) within normal range.

Exclusion Criteria

- Patients with chronic scar pain >3 months.
- Blood coagulation disorders
- Severe hepatic, renal, cardiovascular dysfunction.
- Diabetes mellitus.
- Immunocompromised patients
- Pregnant women

The results were finally analyzed and compared for the two groups using Mann-Whitney U Test, and percentage of type of complication at incision site is measured. After taking the informed consent, patients are randomized and divided in two groups A and B. In Group A-Incision is taken with electro cautery needle using pulse sine wave current and power setting of 70 watts. Hemostasis is achieved with force coagulation. In Group B-Skin incision is taken with scalpel, bleeding controlled by force coagulation using pulse sine wave on power supply 30 watts. All standardized incision will be midline incision. All the procedures are carried under standardized general anaesthesia. Premedication is given inj ceftriaxone(1gm) 15 minute before procedure.

Results

In our study midline incision was taken 30 patients were taken for scalpel skin incision in which 18 patients of intestinal obstruction (IO). 8 patients of blunt abdominal trauma (BAT) and 4 patients of peptic ulcer disease (PUD) In Diathermy skin incision 18 patients of IO, 6 patients of BAT and 6 patients of PUD showing in Table 1.

Table 1:

	Intestinal obstruction	Blunt Abdominal Trauma BAT	Peptic ulcer DS (PUD)
Scalpel	18	8	4
Diathermy	18	6	6

60 patients with midline incision were randomized. All even were selected for diathermy and odd for scalpel skin incision there were no significant demographic difference between two groups noted (Table-2) mean age of patients in the Diathermy group was 42.10 yrs compared with 41.40 yrs in the scalpel group.

Table 2: Age Distribution in Diathermy vs scalpel skin incision.

Group	Age group	N	%	Mean (Age)
Diathermy incision	15-25	4	13.33	42.1 (SD-12.26)
Diathermy incision	26-35	6	20.00	
Diathermy incision	36-45	5	16.66	
Diathermy incision	46-55	15	50.00	
Scalpel Incision	15-25	5	16.66	41.4 (SD-11.77)
Scalpel Incision	26-35	3	10.00	
Scalpel Incision	36-45	8	26.66	
Scalpel Incision	46-55	14	46.66	

In this study 17 male and 13 female were taken for diathermy skin incision. 18 male and 12 female were taken for scalpel skin incision. In both groups, male predominance was seen (Table-3)

Table 3: Gender Distribution patients in Diathermy vs scalpel skin incision.

Group	Gender	Frequency count	% of total frequency
Diathermy incision	F	13	43.33%
Diathermy incision	M	17	56.66%
Scalpel incision	F	12	40%
Scalpel incision	M	18	60%

In this study the mean body mass index of subject undergone surgery by diathermy skin incision was 21.9 kg/m² (Table-5) and by scalpel skin incision was 21.4 kg/m². BMI was comparable in both group. It had been observed that incidence of surgical wound infection increase steady with increasing body mass index.

Table 4: Body Mass Index Distribution Pattern

Group	Group	N	%
Diathermy incision	19-25	23	76.66
Diathermy incision	26-29	4	13.33
Diathermy incision	<18	3	10.00
Scalpel incision	19-25	22	73.33
Scalpel incision	26-29	3	10.00
Scalpel incision	<18	5	16.66

Table 5: Mean Value of BMI

BMI in kg/m ²	Diathermy		Scalpel	
	n	%	n	%
<-18	3	10	5	16.66
19-25	23	76.66	22	73.33
26-29	4	13.33	3	10.00
Total	30	100	30	100
Mean ± SD	21.98 ± 2.622		21.41 ± 2.65	

Overall wound complications were assessed for 7 days post operatively. In our study we assessed complications like Seroma, hematoma and purulent collection. Rate of post operative wound complication was no different between the Diathermy and Scalpel group (p=0.108) and was not statistically significant.

Hematoma

Group	Yes	No	Total
Diathermy	1(3.3%)	29	30
Scalpel	6(20%)	24	30

P = 0.108

Seroma

Group	Yes	No	Total
Diathermy	9(30)	21	30
Scalpel	10(33.33)	20	30

P = 0.108

Purulent Collection

Group	Yes	No	Total
Diathermy	4	26	30
Scalpel	5	25	30

P = 0.108



Diathermy Skin Incision With Smoke



Scalpel Skin Incision

Discussion

This randomized clinical trials (Even cases for Diathermy and odd for scalpel) demonstrated that a skin incision can be made more quickly by cutting diathermy than by scalpel (p value = 0.0034) and no increase in the rate of wound complication (p value = 0.108) or postoperative pain (p value = 0.21877). Scalpel incision requires several instrument exchange with coagulation diathermy that can be overcome with the use of cutting diathermy. Although the reduction in blood loss may seem irrelevant clinically, frequent instrument exchanges that require handling of the scalpel may result in an increase in the risk of sharps injuries to the surgeon. The risk of skin and soft tissue damage as well as the potential for significant bleeding and exposure to blood born infections, was well recognized in scalpel usage [9-11]. Sharps injuries have been estimate to occur at a rate of about 6.4 per 1000 surgical procedures in the operating room (In this study only one sharp injury occurred during scalpel use) second to injuries from suture needles which occur at a rate of about 41 per 1000 [10-12] perhaps the most compelling reason for the routine use of cutting diathermy for skin incisions, therefore removal of the scalpel from the operating theatre and

elimination of an important cause of injury. We did not find any difference in the rate of wound complications between cutting diathermy and scalpel in our study. It may be that cutting diathermy produces heat so quickly that tissue vaporization occurs, as opposed to the charring and necrosis associated with coagulation diathermy that may predispose to wound complications [13,14]. Injuries to the operating surgeon and patients owing to the use of diathermy had been reported in approximately two per 1000 surgical procedures [15]. Burn injury may occur if the integrity of the surgeon's gloves was compromised. The patients may also be burnt inadvertently via conduction through the length of the diathermy tip, other surgical instruments or improper grounding increasing concern had also been raised about diathermy smoke plumes and the potential long term consequences of prolonged inhalation to theatre staff and patients. Diathermy smoke plume has been shown to contain a number of chemicals that have been potential for carcinogenesis and organisms have been shown to be retrievable from the plume, raising the possibility of diseases transmission. Proper precautions must be taken to address this issue including use of smoke extraction system. The fear of injury tissue was first

unfolded when this technique was used by Peterson in reconstructive and cosmetic faciomaxillary surgery [7], mann and klippel in paediatric surgery [8], kamer in rhytidoplasty [9], Tabin in blepharoplasty with minimum scarring and excellent results. Various studies were undertaken to evaluate the efficacy of electrocautery over scalpel in making skin incision and results were varying some show better results with electrocautery whereas other demonstrate similar results.

In our study 60 patients were randomized into two groups. All even cases were selected for diathermy and odd for scalpel skin incision and evaluated in terms of incision time, amount of blood loss, post operative pain, postoperative wound infection and requirement of analgesic dose. This study showed no difference between the two groups in post operative pain, analgesic requirement and post operative wound infection. Diathermy incision were faster and were associated with significantly lower blood loss and results were consistent with shamim [16].

Conclusion

Our study one and half year randomized clinical trial into two groups. Even cases were selected for diathermy and odd for scalpel skin incision in patients undergoing midline general surgery like intestinal obstruction. Blunt abdominal trauma and peptic ulcer diseases evaluation was done in terms of incision time, amount of blood loss, post operative pain, post operative analgesic requirement and post operative wound infection. Results were analysed using mann whitney U test and chi square test. The skin incision time was less in diathermy group. Statistically significant shorter incision time than scalpel ($p=0.003$).

Amount of blood loss was less in diathermy group. The p value calculated was statistically significant ($p<0.0001$) Post operative pain were similar in both group statistically insignificant ($p=0.21877$).

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