

COMPARITIVE ANALYSIS BETWEEN SCALPEL AND DIATHERMY IN ELECTIVE ABDOMINAL INCISIONS

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ABSTRACT

Use of diathermy in making skin incision has proved better then scalpel in many abdominal surgery with following advantages:

- Minimal pain post operatively
- Negligible blood loss
- Minimal wound collection
- Nil complication
- Better wound cosmesis

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INTRODUCTION

Surgical scalpels are traditionally used in making skin incisions. Diathermy incisions on the contrary are less popular among the surgeons. It has been hypothesized that application of extreme heat may result in significant post operative pain and poor wound healing because of excessive tissue damage and scarring respectively. Secondly, skin incision with the use of diathermy entails increased risk of wound infections in the presence of an underlying prosthetic material.¹

Recent studies and various meta-analysis comparing diathermy with scalpel for incisions proved different. This is due to the observation that there is no change in wound complication rate or post operative pain with the use of diathermy.²

The outcome in other parameters is far superior with the use of diathermy and results are better in terms of overall patient's compliance post operatively. Diathermy was used for the first time in gynecological cases by a Spanish doctor in 1910. Today diathermy is used in almost all surgical disciples. Diathermy is also known as electrosurgery. It involves the use of high frequency A.C. electrical current either for cutting or cauterizing small blood vessels to stop bleeding. This technique induces localized tissue burning and damage, the zone of which is controlled by the frequency and power of device.³

William T Bovie is credited as father of electrosurgical devices.⁴ From a meta analysis review of fourteen randomized trials on a total of 2541 patients ,1267 underwent skin incision by cutting diathermy and 1274 by scalpel, on a median length of follow up across all studies was six week. didn't report any difference in terms of wound complication rate or pain score at 24hr.⁵

Aims and objectives

1. Analysis of pain score after 24 hour in both groups of patients.
2. To estimate amount of blood loss during operative procedure.
3. Assessment of scar using Manchester scar scoring (MSS) system.
4. To analyze for wound healing and cosmeses.

Materials and Methods

Our study was conducted in MVJMC & RH on all patients as diagnosed with a surgical condition and admitted in surgical ward, between December 2012 to December 2013.

Methodology

The study being prospective study, all patients admitted to surgical wards as above were considered according to inclusion and exclusion criteria.

Sample size

Total number of causes studied-60 (30 in each group)

Inclusion criteria

All patients planned for elective surgery, who were above the age of 18 years.

Exclusion criteria

Patients undergoing emergency procedure were excluded.

Statistical analysis

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean \pm SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumptions on data is made,

Assumptions:

1. Dependent variables should be normally distributed,
2. Samples drawn from the population should be random, Cases of the samples should be independent

Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters.

Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups.

Significant figures

+ Suggestive significance (P value: 0.05<P<0.10)

* Moderately significant (P value:0.01<P ≤ 0.05)

** Strongly significant (P value : P≤0.01)

Statistical software: The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1 ,Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.⁸⁻¹²

Results

Patients with diagnosed surgical conditions, were admitted in MVJMC&RH and were studied from December 2012 to December 2013, meeting the inclusion criteria, the total number of cases studied were 60.

Table 1: Age distribution of patients studied

Age in years	Diathermy group		Scalpel group	
	No	%	No	%
<20	4	13.3	3	10.0
21-30	12	40.0	9	30.0
31-40	6	20.0	7	23.3
41-50	4	13.3	7	23.3
51-60	2	6.7	2	6.7
61-70	2	6.7	1	3.3
>70	0	0.0	1	3.3
Total	30	100.0	30	100.0
Mean ± SD	33.67±13.32		37.43±14.99	

Samples are age matched with P=0.308

The maximum number of cases were of the age group 21-30.

Table 2: Gender distribution of patients studied

Gender	Diathermy group		Scalpel group	
	No	%	No	%
Female	10	33.3	13	43.3
Male	20	66.7	17	56.7
Total	30	100.0	30	100.0

Samples are gender matched with P=0.426

Males were in majority, in both the study groups.

Table 3: Diagnosis of patients studied

Diagnosis	Diathermy group		Scalpel group	
	No	%	No	%
Recurrent Appendicitis	10	33.3	8	26.7
Para Umbilical Hernia	6	20.0	4	13.3
Incisional Hernia	4	13.3	3	10.0
Cholelithiasis	2	6.7	3	10.0
Left indirect inguinal hernia	1	3.3	3	10.0
Right inguinal Hernia	0	0.0	4	13.3
Epigastric hernia	2	6.7	0	0.0
Rectal Prolapse	2	6.7	0	0.0
Sub Acute Intestinal obstruction	1	3.3	1	3.3
Bergers disease	0	0.0	1	3.3
Hollow Viscus Perforation	0	0.0	1	3.3
Recurrent left inguinal direct hernia	1	3.3	0	0.0
Right direct inguinal Hernia	1	3.3	0	0.0
Right Femoral Hernia	0	0.0	1	3.3
Schwannoma of Abdominal wall	0	0.0	1	3.3
Total	30	100.0	30	100.0

Recurrent appendicitis cases were the maximum number of cases in both the groups, followed by Para umbilical hernia.

Table 4: Type of surgery of patients studied

Type of surgery	Diathermy group		Scalpel group	
	No	%	No	%
Hernioplasty	15	50.0	14	46.7
Appendicectomy	10	33.3	8	26.7
Cholecystectomy	2	6.7	3	10.0
Laprotomy	0	0.0	2	6.7
Rectopexy	2	6.7	0	0.0
Excision	0	0.0	1	3.3
Herniorraphy	0	0.0	1	3.3
Laparotomy	1	3.3	0	0.0
Lumbar Sympthectomy	0	0.0	1	3.3
Total	30	100.0	30	100.0

The maximum number of operative procedures performed were hernioplasty in both the groups, followed by Appendicectomy.

Table 5: Amount of blood loss (ml) in two groups of patients studied

Amount of blood loss	Diathermy group		Scalpel group	
	No	%	No	%
0	26	86.7	0	0.0
1-5	4	13.3	20	66.7
6-10	0	0.0	7	23.3
>10	0	0.0	3	10.0
Total	30	100.0	30	100.0

P<0.001**, Significant, Fisher Exact test

In our study, it was observed that p value was significant with relation to amount of blood loss. In the diathermy group 13.3% patients had blood loss in the range of 1-5 gram and 66.7% patients had blood loss in the range of 1-5 gram.

The amount of blood loss was calculated by $x-y/1.0055$

X is the weight of soaked gauze, Y is the weight of fresh gauze.

Table 6: Additional Analgesia in two groups of patients studied

Additional Analgesia	Diathermy group		Scalpel group	
	No	%	No	%
Epidural Catheter	1	3.3	0	0.0
NSAID	29	96.7	23	76.7
Tramadol	0	0.0	7	23.3
Total	30	100.0	30	100.0

P=0.011*, Significant, Fisher Exact test

Our study showed better pain relief in diathermy group as suggested by the p value. All patients in diathermy group complied with the routine postoperative NSAID. In scalpel group 7 patients were administered additional opiod along with NSAID.

Table 7: Pain score after 24hrs in two groups of patients studied

Pain score 24hrs	Diathermy group		Scalpel group	
	No	%	No	%
0 (No Pain)	0	0.0	0	0.0
1,2,3 (Mild)	9	30.0	1	3.3
4,5,6 (Moderate)	21	70.0	19	63.3
7,8,9,10 (Severe)	0	0.0	10	33.3
Total	30	100.0	30	100.0
Mean ± SD	3.93±1.53		6.27±1.55	

P<0.001**, Significant, student t test

Our study showed lesser postoperative pain in diathermy group, in comparison to scalpel group. Patients complaining of severe pain were 33% in the scalpel group and no patient complained of severe pain in diathermy group.

Table 8: Collection in wound in two groups of patients studied

Collection in wound	Diathermy group		Scalpel group	
	No	%	No	%
No	28	93.3	25	83.3
Present on Day 2	1	3.3	0	0.0
Discharge	0	0.0	5	16.7
30 ml in drain on day 4	1	3.3	0	0.0
Total	30	100.0	30	100.0

P=0.052+, Significant, Fisher Exact test

Our study showed lesser postoperative wound collection in the diathermy group, as suggested by the p value. In the scalpel group 16% of the patients had discharge.

Table 9: MSS score in two groups of patients studied

MSS score	Diathermy group		Scalpel group	
	No	%	No	%
1-5	8	26.7	3	10.0
6-10	20	66.7	25	83.3
11-15	2	6.7	2	6.7
Total	30	100.0	30	100.0
Mean ± SD	7.30±1.91		7.67±2.06	

P=0.478, not significant, student t test

No specific advantage of diathermy over scalpel was observed in our study, in relation to postoperative scar.

Table 10: Complications in two groups of patients studied

Complications	Diathermy group (n=30)		Scalpel group (n=30)	
	No	%	No	%
No	29	96.7	25	83.3
Yes	1	3.3	5	16.7
• Wound dehiscence	0	0.0	5	16.7
• Wound gapping	1	3.3	0	0.0

P=0.195, Not significant, Fisher Exact test

No advantage was observed in our study in relation to the prevention of complications, as suggested by the p value.

DISCUSSION

Diathermy is an important tool in the armamentarium of a surgeon. In this study, we demonstrate the comparison between the scalpel and diathermy on skin incisions.

Our study included 60 patients, 30 patients were assigned to the scalpel group and 30 patients were assigned to the diathermy group. The two groups were compared with each other on the basis of factors like amount of blood loss, additional analgesia, pain score after 24 hours, collection in wounds, MSS (Manchester scar scoring), complications including wound dehiscence and wound gapping.

The study was conducted in the MVJMC&RH, the data from the study was analyzed and statistical data was obtained by Student t test and Chi-square/ Fisher Exact test.

Comparison of our data with other studies

Parameters	Our study	Ali et al ²	Ly J et al ⁵	Kadyan et al ⁸
Amount of blood loss	<i>p</i> <0.001	<i>p</i> =0.03	<i>p</i> <0.001	
Additional analgesia	<i>p</i> <0.011	<i>p</i> =0.98		
Pain score after 24 hours	<i>p</i> <0.001	<i>p</i> =0.57	<i>p</i> =0.05	<i>p</i> <0.0001
Collection in wounds	<i>p</i> <0.052	<i>p</i> =0.64		
Manchester scar scoring	<i>p</i> <0.478			<i>p</i> >0.01
Complications	<i>p</i> <0.195	<i>p</i> =0.33	<i>p</i> =0.29	<i>p</i> >0.05

In our study, amount of blood loss is statistically significant, in cases of diathermy usage. As evident from our study, the p value in our study is less than 0.001 and was significant. In the diathermy group 26 patients (86.7%) had no bleeding as compared to 20 patients (66.7%) who had bleeding with scalpel usage. In Ali et al

study the p value is equal to 0.03 which is significant. Similarly in Ly J et al study the p value is less than 0.001 which is also statistically significant.

In our study, 29 patients (96.7%) did not require any additional analgesia in the diathermy group other than routine NSAID, whereas in scalpel group, 7 patients (23.3%) had to be given additional analgesia like opioids for pain relief. These values are statistically significant as shown by the p value which is less than 0.011. In comparison with Ali et al study for additional study the p value is equal to 0.98 which is statistically insignificant.

As for pain score after 24 hours, in the diathermy group 20 patients (70%) experienced moderate pain and 10 patients (30%) experienced mild pain. In the scalpel group 19 patients (63.3%) had moderate pain while 10 patients (33.3%) experienced severe pain which is statistically significant with p value being less than 0.001.

According to the study done by Ly J et al and Kadyan et al the respective p values for pain score are 0.05 and <0.0001, both are statistically significant. The study of Ali et al has p value equal to 0.57, which is statistically insignificant.

In the diathermy group, no wound collection was observed in 28 patients (93.3%) , whereas in the scalpel group 5 patients (16.7%) had wound collection with discharge, p value is less than 0.052 which is statistically significant. In Ali et al study, the p value is equal to 0.64, which is insignificant.

MSS was statistically insignificant in our study. In Kadyan et al the MSS was also insignificant. Our study showed statistically insignificant p value with regards to p value. In other studies p values are also statistically insignificant.

CONCLUSION

Use of diathermy in making skin incision has proved better then scalpel in many abdominal surgery with following advantages:

- Minimal pain post operatively
- Negligible blood loss
- Minimal wound collection
- Nil complication
- Better wound cosmesis

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