

A comparative study of laparotomy incision with scalpel Vs diathermy in reference to time taken, post-operative pain, type of surgery, wound healing and hospital stay

E R Bidari^{1*}, Vijay Kassa²

¹Professor, ²Associate Professor, Department of Surgery, R.C.S.M. Government Medical College, Kolhapur, Maharashtra, INDIA.

Email: dr.erbidari@gmail.com

Abstract

Background: Very few operations can be performed without cutting through the skin. It may be incised to gain access to deeper structures, or the surgery may be primarily on the skin itself whether for the repair of trauma or for the excision of a skin lesion. **Aims and Objectives:** To study laparotomy incision with scalpel vs diathermy in reference to time taken, post-operative pain, type of surgery, wound healing and hospital stay. **Methodology:** This was a cross-sectional study carried out at the Study was conducted at Medical College Hospital, in 2014 to 2015, randomly 50 of each i.e. 100 patients in a year were selected. Pain Score was measured by Visual Analogue Scale. The statistical analysis done by unpaired t-test and chi-square test and unpaired-t-test calculated by the SPSS-19 software. **Result:** The average time for incision was significantly higher for Scalpel was 9.12 ± 4.25 seconds as compared to 6.23 ± 2.92 seconds in Diathermy ($P < 0.01$). The mean VAS Score for pain was significantly higher at Day 1 in Scalpel 5.42 ± 0.72 as compared to Diathermy 2.92 ± 0.82 ($P < 0.001$); at Day 2 was 2.21 ± 0.24 and 1.72 ± 0.32 ($P < 0.01$) and at Day 5 was 0.92 ± 0.08 and 0.82 ± 0.07 ($P > 0.05$) was not significant. The duration of Healing of post-operative wound was significantly higher in Scalpel 11 ± 2.1 Days group as compared to Diathermy 8.2 ± 3.4 . The Post-operative Complications were significantly lower in Diathermy group as compared to Scalpel. ($X^2 = 7.12$ $P < 0.05$.) These complication were Seroma- 18.0% and 24.0% ; Haematoma-00% and 02.0%; Purulent-02.0% and 05.0%; Nil in 80.00 % to 70.00%. The mean hospital stay was significantly higher in Diathermy - 9 ± 2.3 days as compared to Scalpel - 12 ± 3.4 %. ($P < 0.001$). **Conclusion:** It can be concluded from our study that Diathermy is superior to scalp with respect to lesser time taken, post-operative pain, type of surgery, wound healing and hospital stay.

Key words: Scalpel, Diathermy, VAS -score, wound-healing.

*Address for Correspondence:

Dr. E R Bidari, Professor, Department of Surgery, R.C.S.M. Government Medical College, Kolhapur, Maharashtra, INDIA.

Email: dr.erbidari@gmail.com

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INTRODUCTION

Very few operations can be performed without cutting through the skin. It may be incised to gain access to deeper structures, or the surgery may be primarily on the skin itself whether for the repair of trauma or for the

excision of a skin lesion.¹ Skin bleeding is the problem after starting surgery.² Traditionally scalpels with disposable knives are used for skin incisions. Electrocautery has been used less frequently because of the fear of tissue damage leading to more postoperative pain, impaired wound healing and hypertrophic scarring.³ Electrosurgical incision of diathermy type is not a true cutting incision. This method heats cells within the tissue so rapidly that they vaporize, leaving a cavity within the cell matrix. The heat created dissipates as steam rather than being transmitted into adjacent tissues. As the electrode is moved forward, new cells are contacted and vaporized with the creation of the incision. This may explain the absence of tissue charring and the subsequent healing of tissues with minimal scarring.⁴ Cutting diathermy incises skin with little charring and necrosis compared with coagulation diathermy, which generates

heat more slowly via an interrupted current output. The use of thermal energy, of either type, raises concerns about collateral heat damage, impaired wound healing and a possible increased risk of wound infection secondary to necrosis at the wound edges.^{5,6} Traditionally scalpels are used for making skin incisions that produce little damage to surrounding tissues⁷. However, there has been a continuous surge in identifying other methods of skin incision and in the recent years electro surgical instruments have achieved great attention in this regard. There has been a widespread use of diathermy for homeostasis but fear of production of large scars and improper tissue healing has restricted their usage in making skin incisions^{8,9}. Electrodes used in making diathermy incision generate a pure sinusoidal current, which produces cleavage in tissue planes without creating damage to the surrounding areas. This is one of the reasons of less damage inflicted to the tissues leading to minimal scar formation^{8, 10}. At the same time, use of diathermy in skin incisions reduces bleeding and makes the incision quicker¹¹ but there are no differences in wound burst strength. Previously, it has been reported that there is a greater rate of infection with diathermy incisions than with scalpel incisions¹².

METHODOLOGY

This was a cross-sectional study carried out at the General surgery department of the tertiary health care center during the year January 2015 to January 2016, in the patient who undergone laparotomy those such patients who operated with Diathermy as the initial laparotomy incision and scalpel as the laparotomy incision with the consent were randomly 50 of each i.e. 100 patients in a year were selected. All the detailed information like time taken, post-operative pain, type of surgery, wound healing and hospital stay etc. All the patients who given consent were included and those who didn't given consent and immunocompromised patients were excluded from the study. The statistical analysis done by un-paired t-test and chi-square test and unpaired-t-test calculated by the SPSS-19 software.

RESULT

Table 1: Distribution of the Patients as per the type of surgery

Type of surgery	Diathermy	Scalpel	Total (%)
	No. (%)	No. (%)	
Appendicectomy	21 (42)	28 (56)	49 (49%)
Cholecystectomy	10 (20)	8 (16)	18 (18)
Renal calculi	12 (24)	6 (28)	18(18)
Blunt trauma to Abdomen	3 (6)	4 (8)	7(7)
Inguinal hernia	1 (2)	2 (4)	3 (3)
Umbilical hernia	4 (8)	2 (4)	6 (6)
Total	50 (100%)	50 (100%)	100 (100)

The patients for Diathermy and Scalpel were almost similar. The most common surgeries were Appendicectomy- 49%, Cholecystectomy -18%, Renal calculi-18%, Blunt trauma to Abdomen-7%, Umbilical hernia -6%, Inguinal hernia-3%.

Table 2: Distribution of the Patients as per the average Time required for surgery

Time	Mean ± SD (n=100)	P-value
Diathermy	6.23 ± 2.92	P=0.001
Scalpel	9.12 ± 4.25	

The average time for incision was significantly higher for Scalpel was 9.12 ± 4.25 seconds as compared to 6.23 ± 2.92 in Diathermy (P<0.01).

Table 3: Distribution of the Patients as per the Pain at Day 1,2,5 post operatively

Pain, day 1	Mean ± SD (n=100)	P-value
Scalpel	5.42± 0.72	P<0.001
Diathermy	2.92 ± 0.82	
Pain, day 2		
Scalpel	2.21 ± 0.24	P<0.01
Diathermy	1.72 ± 0.32	
Pain, day 5		
Scalpel	0.92 ± 0.08	P>0.05
Diathermy	0.82 ± 0.07	

The mean VAS Score for pain was significantly higher at Day 1 in Scalpel 5.42± 0.72 as compared to Diathermy 2.92 ± 0.82 (P<0.001); at Day was 2.21 ± 0.24 and 1.72 ± 0.32 (P<0.01) and at Day 5 was 0.92 ± 0.08 and 0.82 ± 0.07 (P>0.05) was not significant.

Table 4: Distribution of the Patients as per the duration of Healing of post-operative wound

Healing of Post-operative wound	Mean ± SD (Days) (n=100)	P-value
Diathermy	8.2 ± 3.4	P<0.001
Scalpel	11 ± 2.1	

The duration of Healing of post-operative wound was significantly higher in Scalpel 11 ± 2.1 Days group as compared to Diathermy 8.2 ± 3.4.

Table 5: Post-operative Complications in Patients

Complications	Diathermy		Scalpel		Chi-square value p- value
	No	%	No	%	
Seroma	9	18.0	12	24.0	X ² =7.12 P<0.05.
Haematoma	00	00	01	02.0	
Purulent	01	02.0	02	05.0	
Nil	40	80.00	35	70.00	
Total	50	100	50	100	

The Post-operative Complications were significantly lower in Diathermy group as compared to Scalpel. (X²=7.12 P<0.05.) These complication were Seroma- 18.0% and 24.0%; Haematoma-00% and 02.0%; Purulent-02.0% and 05.0%; Nil in 80.00 % to 70.00%.

Table 6: Distribution of the patients as per the Mean Hospital Stay

Mean Hospital Stay (Days)	Mean \pm SD	P-value
Diathermy	9 \pm 2.3	P<0.001
Scalpel	12 \pm 3.4	

The mean hospital stay was significantly higher in Diathermy - 9 \pm 2.3 days as compared to Scalpel -12 \pm 3.4 %. (P<0.001)

DISCUSSION

In an era of explosive anesthetic agents, electro surgical instruments were used only selectively in human surgery. After the introduction of halothane as an anesthetic agent, diathermy became increasingly used to control bleeding and for dissection of tissue planes. However, it is still infrequently used for making skin incisions. The reluctance in the use of skin incision is due to the fear that electro surgical instruments create increased amounts of necrotic tissue within the wound which may increase the chances of wound infection leading to delayed wound healing and excessive scarring (8, 8-10).

In our study we have seen that The patients for Diathermy and Scalpel were almost similar. The most common surgeries were Appendicectomy- 49%, Cholecystectomy -18% , Renal calculi-18%, Blunt trauma to Abdomen-7%, Umbilical hernia -6%, Inguinal hernia-3% . The average time for incision was significantly higher for Scalpel was 9.12 \pm 4.25 seconds as compared to 6.23 \pm 2.92 in Diathermy (P<0.01) . The mean VAS Score for pain was significantly higher at Day 1 in Scalpel 5.42 \pm 0.72 as compared to Diathermy 2.92 \pm 0.82 (P<0.001); at Day 2 was 2.21 \pm 0.24 and 1.72 \pm 0.32 (P<0.01) and at Day 5 was 0.92 \pm 0.08 and 0.82 \pm 0.07 (P>0.05) was not significant. The duration of Healing of post-operative wound was significantly higher in Scalpel 11 \pm 2.1 Days group as compared to Diathermy 8.2 \pm 3.4. The Post-operative Complications were significantly lower in Diathermy group as compared to Scalpel. (χ^2 =7.12 P<0.05) These complication were Seroma- 18.0% and 24.0%; Haematoma-00% and 02.0%; Purulent-02.0% and 05.0%; Nil in 80.00 % to 70.00%. The mean hospital stay was significantly higher in Diathermy - 9 \pm 2.3 days as compared to Scalpel -12 \pm 3.4%. (P<0.001)

These findings are similar to Altaf Ahmed Talpur *et al.*¹³ Mean incision time was 8.9025-sec/cm² for group A and 7.3057 sec/cm² for group B patients. Mean blood loss during incision making was 1.8262 mL/cm² and 1.1346 mL/cm² for group A and B patients, respectively. Pain was 5.2957 for group A patients on day one and 3.1181 for group B patients. Pain score was 2.1049 and 1.6206 on day two and 0.8191 and 0.7192 on day five, for group A and B patients, respectively. Postoperative wound

complications were noticed in 26 (18.18%) patients of Scalpel group and 22 (15.71%) patients of Diathermy. Also similar to Chhabda T. S¹⁴ Compared with a scalpel incision, cutting diathermy resulted in significantly less blood loss (mean difference 0.36 ml/cm; P <0.001) and shorter incision times (mean difference 14 s; P <0.001), with no differences in the wound complication rate.

CONCLUSION

It can be concluded from our study that Diathermy is superior to scalp with respect to lesser time taken, post-operative pain, type of surgery, wound healing and hospital stay.

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