

Original Research Article

# A randomized comparative study of diathermy incisions and scalpel incisions in subacute appendicitis

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## Abstract

**Background:** Treating injuries with heat can increase blood flow and make connective tissue more flexible. It can also help minimize inflammation and reduce the incidence of edema or fluid retention. By increasing blood flow to the site of an injury, the deep heat generated with diathermy can accelerate healing. Diathermy is used to treat arthritis, back pain, fibromyalgia, muscle spasms, neuralgia, sprains and strains, tenosynovitis, tendonitis, bursitis. In the second, as an adjunct to surgery, diathermy is used to coagulate, prevent excessive bleeding, and seal off traumatized tissues. It is particularly effective in eye surgery, neurosurgery and dermatology. However, there is still not a lot of evidence to prove that diathermy is the most effective treatment for these conditions.

**Aim of the study:** Aim was comparison of Diathermy incision and Scalpel incision in elective open appendectomy surgery.

**Materials and methods:** 25 patients per group irrespective of sex was sample size. Study Group was subdivided into Study Group A – Patients were subjected to Diathermy incision. Study Group B – Patients were subjected to Scalpel incision. After obtaining pre-anesthetic check-up patients were posted for surgery. Data was collected using a proforma meeting the objectives of the study.

**Results:** The treatment group was split into two, Twenty-five cases used diathermy for skin incision and the other twenty-five cases used a traditional scalpel for skin incisions in open appendectomy

procedures. 50 patients in the study groups were compared, 4 developed wound gaping which accounts for 8%. Wound gaping was considerably seen in scalpel incision with a highly significant P value of 0.0297 using Pearson-Chi square test. A hypertrophic scar was seen in scalpel incision with a significant P value of 0.074 using Pearson-Chi square test. Keloid was considerably seen in scalpel incision with a highly significant P value of 0.0149 using Pearson-Chi square test. The pain in POD-1 was compared, the mean value was 7.44 and 6.16 in scalpel and diathermy respectively, with a highly significant P value of <0.0001. The pain in POD-2 was compared, the mean value was 6.28 and 4.72 in scalpel and diathermy respectively, with a highly significant P value of <0.0001.

**Conclusion:** All the patients were followed every day in the postoperative period until they were discharged. The following parameters were observed, that is a comparison of the two procedures with relation to the duration of incision, postoperative pain, post-operative complications in both the procedures. Diathermy is the first choice of incision for open appendectomy procedures as there is less chance of postoperative wound complications.

## Key words

Diathermy, Hypertrophic Scar, Appendicitis, Reduced Pain Score.

## Introduction

In shortwave diathermy, the part to be treated is placed between two condenser plates and the highest temperature is concentrated in the subcutaneous tissues. It is usually prescribed as a treatment for deep muscles and joints and is sometimes used to localize deep inflammatory disease such as bursitis, neuritis, osteoarthritis, rheumatoid arthritis. Absolute contraindications are hemorrhage, metal implants, infections, malignancy, pacemakers, phlebitis, pregnancy, wet dressings [1]. Ultrasound Diathermy: It uses high-frequency acoustic vibrations; their heating effect increases circulation and metabolism and speeds up the rate of ion diffusion across cellular membranes [2]. During treatment the apparatus is moved slowly across the surface of the area to be affected. Ultrasound is used to heat selected muscles that are too deep to be significantly affected by surface heating. Heat is generated by the vibration of the tissue. This promotes blood flow into the area. Microwave Diathermy: It uses microwaves to generate heat in the body. It can be used to evenly warm deep tissues without heating the skin. Since it can't penetrate deep muscles, it is best suited for areas that are closer to the skin, such as the shoulders. It uses radiation of very high frequency and short wavelength similar to radar waves [3]. All physiologic responses are due to its heating effect. Microwave

diathermy is used in the management of superficial tumors with conventional RT and CT. Treating injuries with heat can increase blood flow and make connective tissue more flexible [4]. It can also help minimize inflammation and reduce the incidence of edema or fluid retention. By increasing blood flow to the site of an injury, the deep heat generated with diathermy can accelerate healing [5]. Diathermy is used to treat arthritis, back pain, fibromyalgia, muscle spasms, myasthenia, neuralgia, sprains and strains, tenosynovitis, tendonitis, bursitis. In the second, as an adjunct to surgery, diathermy is used to coagulate, prevent excessive bleeding, and seal off traumatized tissues. It is particularly effective in eye surgery, neurosurgery and dermatology. However, there is still not a lot of evidence to prove that diathermy is the most effective treatment for these conditions [6].

## Materials and methods

The study was done in 2018 at Department of General Surgery in Vinayaka Mission Medical College, Karikal on patients who were posted for elective open appendectomy surgery. After obtaining informed and written consent in understandable language from patients were subjected to the study. It was a controlled prospective clinical comparative study. Number of groups were 2 and 25 patients per group

irrespective of sex was sample size. Study Group A – Patients were subjected to Diathermy incision. Study group B – Patients were subjected to Scalpel incision. After obtaining pre-anesthetic check-up patients were posted for surgery. Data was collected using a preformed meeting the objectives of the study. A detailed history and necessary investigations were taken.

#### Inclusion criteria

- All patients that undergone surgery for subacute appendicitis in the Department of General Surgery in VMMC, Karaikal.
- The incision was made on non-tension area.
- Age 10 - 70 years.
- HbA1C - <7.

#### Exclusion criteria

- Pregnant women

- Emergency cases
- Immunocompromised patients
- Patients with pacemaker device
- Unclear and untidy wounds
- Lost to follow up.

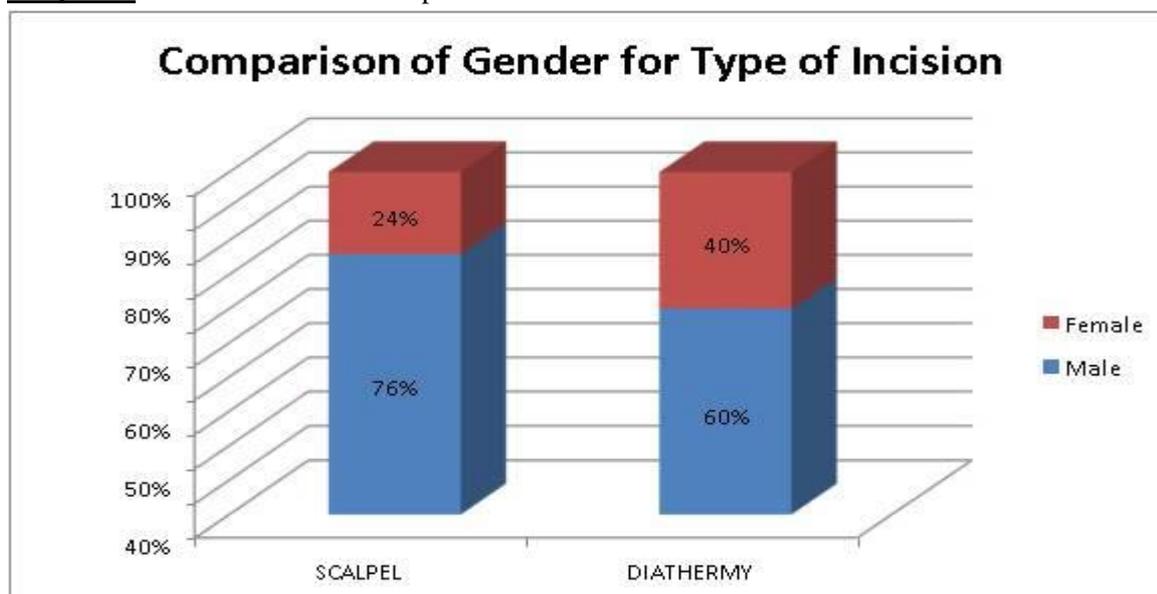
#### Statistical analysis

Independent t-test was used to examine differences and chi-square test for etiology was used. A “p” value of less than 0.05 was considered to be statistically significant. Data analysis was performed using SPSS software.

#### Results

Gender distribution of patients was as per **Graph – 1**. The p-value for the age distribution was 0.225 which was done using the Pearson chi-square test was not very significant.

**Graph – 1:** Gender distribution of patients studied.



The treatment group was split into two, Twenty-five cases used diathermy for skin incision and the other twenty-five cases used a traditional scalpel for skin incisions in open appendectomy procedures (**Graph – 2**).

50 patients in the study groups were compared, 4 developed wound gaping which accounts for 8% (**Graph – 3**).

50 patients in the study groups were compared, 3 developed hypertrophic scar which accounts for 6% (**Graph – 4**).

50 patients in the study groups were compared, 2 developed keloid which accounts for 4% (**Graph – 5**).

The duration of incisions was compared, the mean value was 7.24 and 6.29 in scalpel and

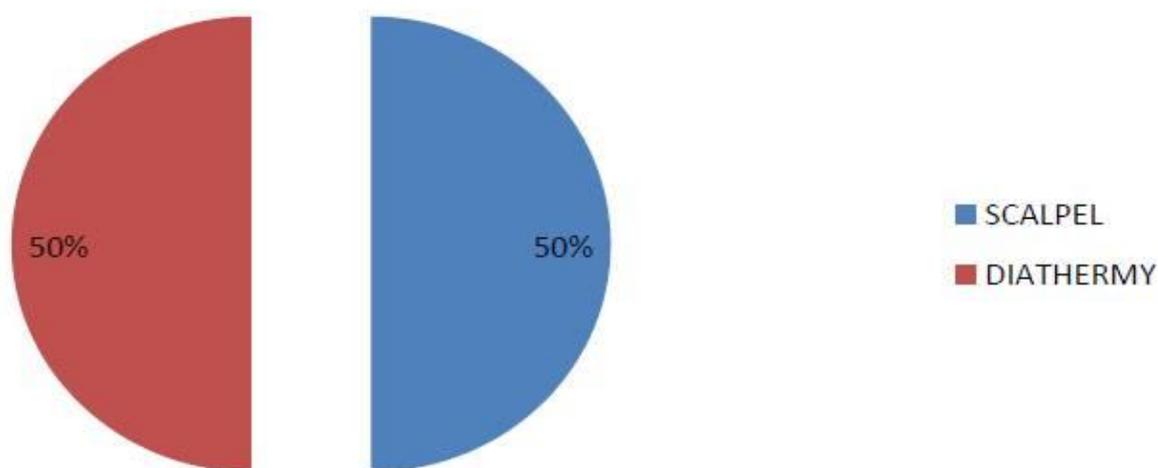
diathermy respectively, with a highly significant P value of <0.0001 (**Graph – 6**).

The pain in POD-1 was compared, the mean value was 7.44 and 6.16 in scalpel and diathermy

respectively, with a highly significant P value of <0.0001. The pain in POD-2 was compared, the mean value was 6.28 and 4.72 in scalpel and diathermy respectively, with a highly significant P value of <0.0001 (**Graph – 7**).

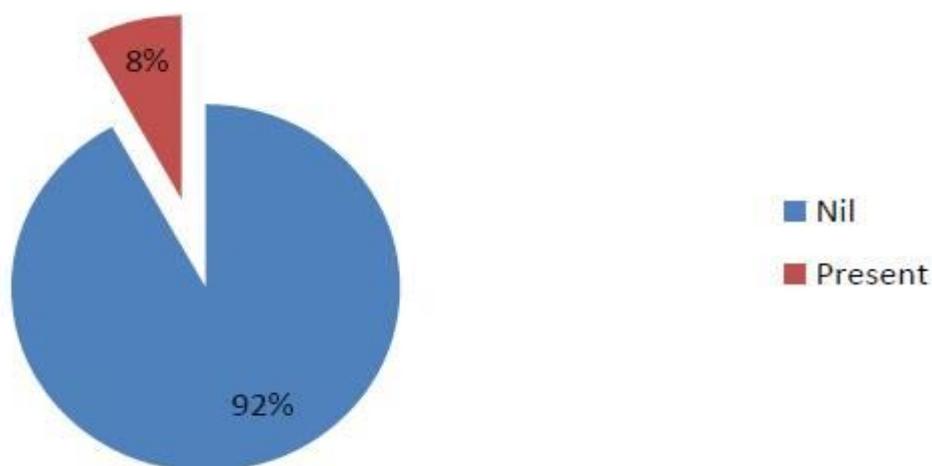
**Graph – 2:** Treatment distributions of patients studied.

## TYPE OF INCISION



**Graph – 3:** Post-operative wound gaping inpatient studied at pod-7.

## POST OPERATIVE WOUND GAPING

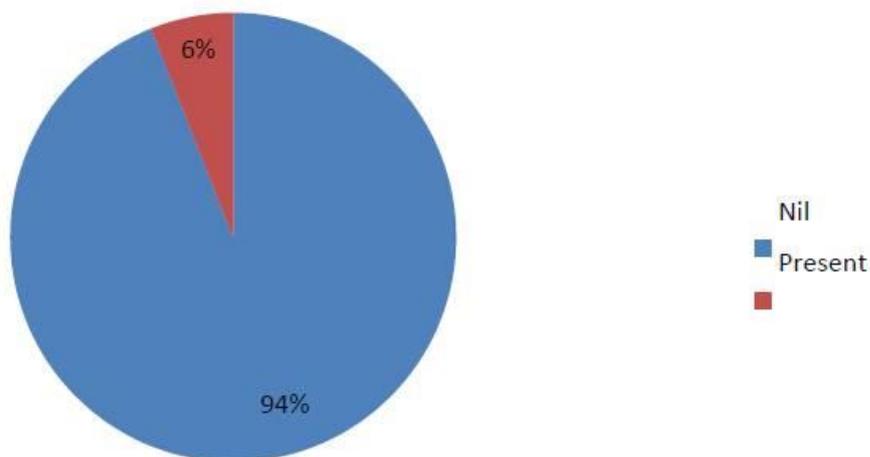


According to the data collected and observed, 12% of the patients who had undergone scalpel incisions had developed postoperative wound

gaping which was very significant, only 4 percent in patients underwent diathermy incisions had wound gaping (**Graph – 8**).

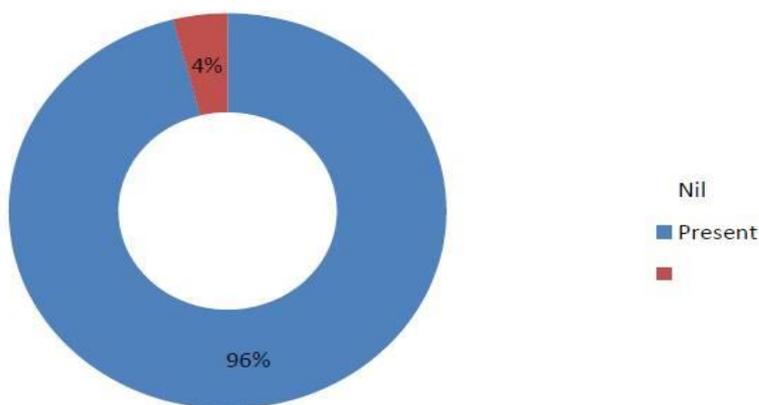
**Graph – 4:** Post-operative hypertrophic scar in patients studied.

### HYPERTROPIC SCAR



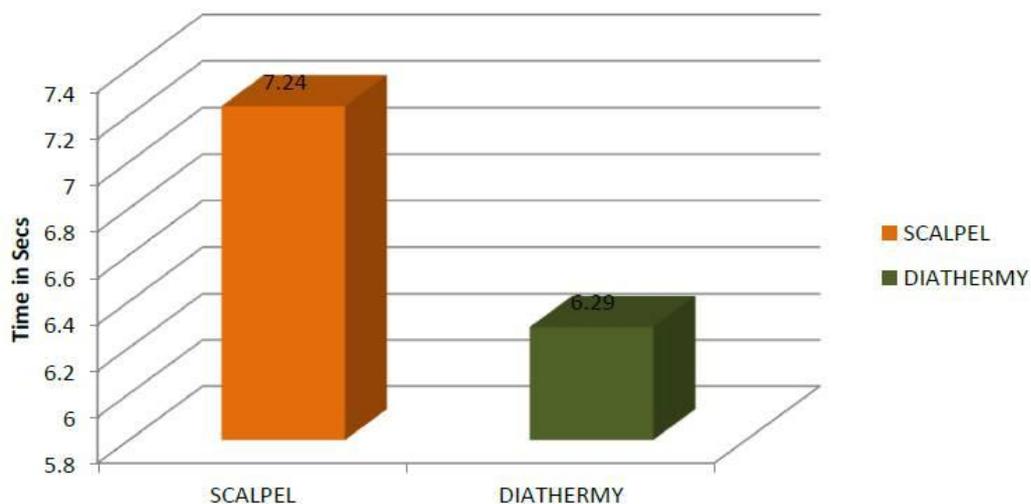
**Graph – 5:** Post-operative keloid in patients studied.

### KELOID



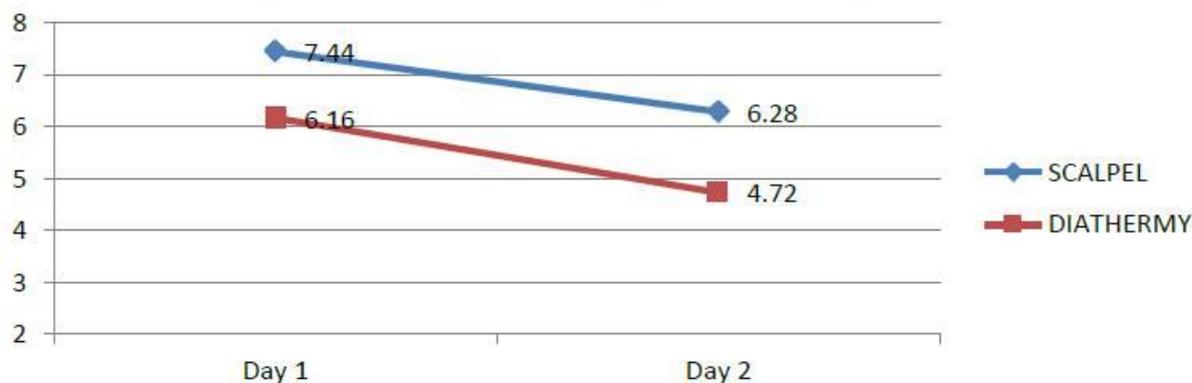
**Graph – 6:** Duration of incisions in patients studied.

### DURATION OF INCISION



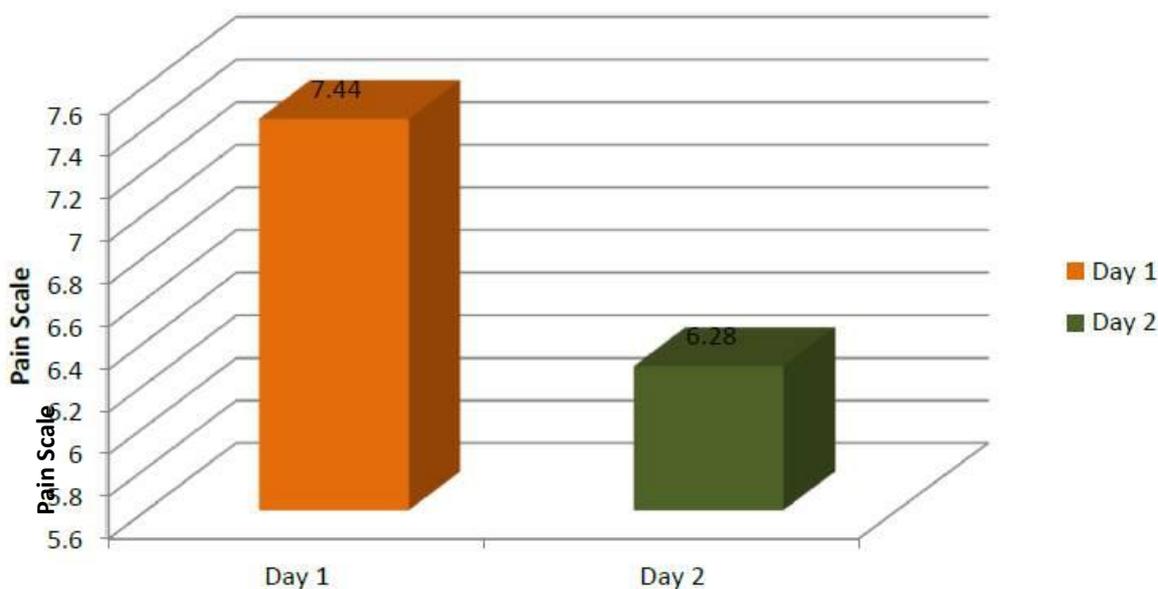
**Graph – 7:** Comparative studies in pain scale from patients in pod- 1 and pod-2.

### Comparison of Pain in Day1 and day 2 for Scalpel and Diathermy incision patients



**Graph – 8:** Comparison of pain between day 1 and day 2 for diathermy incision.

### Pain in Diathermy incision patients



### Discussion

The incision will be the only part the patient sees after surgery. The scars are the only cosmetic problem for the patient undergoing elective surgery. This study mainly concentrates on the superiority of diathermy incisions which has early postoperative pain relief, lesser incision time, minimal scar and better cosmetic result [7]. Many studies concentrated mainly on the postoperative complications. In this study, I have

enlightened about the lesser incision time, early postoperative pain relief and lesser complications in diathermy incisions in open appendectomy cases. Mean age from 7 to 70 years of age was selected randomly and included in this study. 32% of the females were included and 68% of the male included in the study. Gender distribution was verified. In age distribution of the patient was calculated according to the gender. Up to the age of 10 years, a total of 4 percentages of patients was included in this age group. From 11

to 20 of years age group, a total of 22% patients were included [8]. From 21 to 30 years of age group, totally 26% of patients were included in this age group. 31 to 40 years of age group, totally 26% of patients were included. 41 to 50 years of age group, totally 10% of patients were included. 51 to 70 of year age group, totally 12% of patients were included in this age group. According to the statistics, P-value came as less than 0.001, which suggest statistically significant at age distributed according to gender.

Gender distribution was studied, among them 76% of males and 24% of females were subjected to scalpel incision whereas 60% of males and 40 percent of females were subjected to diathermy incision [9]. The total time taken to complete the incision was compared between the treatment groups and observed that the mean value was 7.24 and the standard deviation was 0.27 in scalpel group. Diathermy is found to be superior with mean value 6.9 and the standard deviation was 0.24. Hence diathermy is easier and less time consuming than scalpel incision with a p-value of 0.0001 which was statistically highly significant. Pain scale according to visual analog scale was studied comparing the treatment groups in postoperative day 1 and 2 respectively and results are mentioned below [10]. In postoperative day 1, the standard deviation of scalpel and diathermy was 0.51 and 0.80 respectively whereas in postoperative day 2, the standard deviation of scalpel and diathermy was 0.54 and 0.79. The p-value was 0.0001 and was highly significant which also shows the early postoperative pain relief is observed in diathermy incision than in scalpel incision. Three complications were taken into account and compared with the patients who underwent scalpel and diathermy incisions and had wound gaping at seventh postoperative day, the hypertrophic scar was observed only in scalpel incision, keloid was also noted only in scalpel incision [11]. In the seventh post-operative day, wound gaping was observed in three patients which accounts to 12% who underwent scalpel incisions whereas in diathermy incisions only one patient had wound gaping which accounts only 4% and p-value was

observed to be 0.297, which was highly significant [12]. Hypertrophic scars were observed in some of the patients and their results were tabulated. 12% of the patients who underwent scalpel incision developed hypertrophic scars. No single case developed hypertrophic scar that underwent diathermy incision so the study proves that diathermy incision is superior to the scalpel in preventing postoperative complications with p-value 0.074 which was statistically significant [13]. Keloid was observed in 8% of patients who underwent scalpel incision and none of them developed keloid in diathermy incision. P value was 0.149 which was statistically not very significant [14, 15].

## **Conclusion**

All the patients were followed every day in the postoperative period until they were discharged. The following parameters were observed, that is a comparison of the two procedures with relation to the duration of incision, postoperative pain, postoperative complications in both the procedures. Diathermy is the first choice of incision for open appendectomy procedures as there is less chance of postoperative wound complications. Post-operative pain, duration of incision is comparatively less in diathermy incision when compared to scalpel incision. Thereby I conclude that diathermy incisions are far better than traditional scalpel incisions owing to the various beneficial factors and in the future years of advancements in surgery to come.

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