

COMPARISON OF SUPERFICIAL SURGICAL SITE INFECTION FOLLOWING USE OF DIATHERMY AND SCALPEL FOR MAKING SKIN INCISION IN INGUINAL HERNIOPLASTY

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ABSTRACT

Background: The method of making surgical incision remains a complex problem. Although controversial, the use of diathermy instead of scalpel for skin incision and underlying tissue dissection is gradually gaining wide acceptance. This is due to the observation that no change in wound complication rate or postoperative pain is reported with the use of Diathermy. However, the fear of excessive scarring and poor wound healing has curtailed its widespread use for skin incision.

Objective: The objective of the study is to compare superficial surgical site infection (SSSI) in diathermy and scalpel skin incision in inguinal hernioplasty.

Study Design: Quasi experimental study.

Place and Duration of Study: Study was conducted at Surgical Unit II, Holy Family Hospital. Rawalpindi from 1st Jan. 2008 to 30th September. 2008.

Patients and Methods: A total of 80 patients who presented with inguinal hernias were included in the study. Patients were divided in two groups. Group 1: In 40 patients skin incision was made with Diathermy, Group 2: The other 40 had skin incision with scalpel.

Results: The mean age of patients in the intervention group (Group 1) was 50 years while in the control group (Group 2) it was 46 years. 48% patients in Group 1 and 55% in the Group 2 had indirect inguinal hernias. SSSI was noted in 12.5% cases in Group 1 whereas in Group 2 it was 17.5% but this difference was not found to be statistically significant (p value=0.378).

Conclusion: The use of diathermy for making skin incisions is as safe as scalpel and there is no significant difference amongst both regarding wound infection.

Keywords: Diathermy incision, electrocautery, scalpel skin incision, superficial surgical site infection.

INTRODUCTION

Postoperative surgical site infections (SSI) remains a major source of illness and a less frequent cause of death in the surgical patient. The incidence of infection varies from surgeon to surgeon, from hospital to hospital, from one surgical procedure to another, and most importantly from one patient to another.

The Center for Disease Control and Prevention (CDC) changed the term for infections associated with surgical procedures from surgical wound infection to Surgical Site Infection in 1992. Surgical Site Infection has been sub-divided into superficial (skin and subcutaneous tissue) and deep (deep soft tissue-muscle and fascia).

The pathogens isolated from infections differ, primarily depending on the type of surgical procedure. In clean surgical procedures in which the

gastrointestinal, gynecologic, and respiratory tracts have not been entered, *Staphylococcus aureus* from the exogenous environment or the patient's skin flora is the usual cause of infection.

The most critical factors in the prevention of postoperative infections, although difficult to quantify, are the sound judgment and proper technique of the surgeon and surgical team, as well as the general health and disease state of the patient. Incidence of postoperative wound infection for clean surgical wounds is generally low (<3%) but it is affected by factors like wound hematoma, wound closure under tension, necrotic tissue & airborne micro-organisms etc. The choice of parenteral prophylactic antibiotic agents and the timing and route of administration have become standardized on the basis of well-planned prospective clinical studies. Controversial areas include the routine use of antibiotic prophylaxis in clean surgical procedures, such as hernia repair or breast surgery⁷. Inguinal Hernioplasty is a clean operation. Surgical procedure

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must be performed meticulously; as extensive tissue damage may predispose to infections. It has been suggested that tissue dissection using electrocautery may result in poor wound healing because of scarring and significant post operative pain attributed to local nerve damage. Recent technical improvements have enabled the electrosurgical devices to deliver pure sinusoidal current that rapidly vaporizes cells producing minimal damage in neighboring tissues and limits morbidity. Various international studies measuring the wound infection rate in the abdominal, thoracic and inguinal incisions made by diathermy compared to those made by scalpel have been performed with variable results.^{15,16}

The use of diathermy versus scalpel in making surgical incisions still remains controversial in surgical practice and this study aims to determine the rate of superficial surgical site infection (SSSI) in surgical incision of inguinal hernioplasty made by diathermy as compared to that made by scalpel.

PATIENTS AND METHODS:

Patients:

This study was conducted for duration of 9 months in surgical unit II, Holy Family Hospital, Rawalpindi, Pakistan on adult patients (> 18 yrs of age) presenting with inguinal hernia (Both direct and indirect) who were admitted for elective inguinal hernioplasty. With 5% level of significance and 80% power of the study, the sample size was calculated to be 36 patients in each group, which when inflated for loss to follow-up came out to be 40 patients in each group.

Patients not giving consent for inclusion in the study, recurrent inguinal hernias, Obstructed or strangulated inguinal hernias and diabetics were excluded from the study.

Assignment of intervention:

Patients who fulfilled the inclusion criteria and gave informed consent for participation in the study were assigned either to the intervention group (Group 1: Inguinal skin incision made by diathermy) or the control group (Group 2: Inguinal skin incision made by scalpel) based on non-probability convenient sampling.

All patients were given single dose of prophylactic antibiotic (one gm of 1st Generation Cephalosporin) at

the beginning of procedure. Apart from diathermy or scalpel use in making skin incision, rest of the surgical procedure, Prolene mesh and aseptic measures were the same for both Groups.

Outcome measure:

Primary outcome measure was superficial surgical site infection (SSSI) which was assessed on 2nd, 5th, 7th, 15th, and 30th post operative day by an assessor blinded to the type of method used for making skin incision. The following criteria given by National nosocomial Infections Surveillance (NNIS) programme was adopted:

- Occur within 30 days of procedure
- Involve only the skin or subcutaneous tissue around the incision.

At least one of the following criteria:

- Purulent drainage from the incision
- Organisms isolated from an aseptically obtained culture of fluid or tissue from the incision.
- At least one of the following signs or symptoms of infection - pain or tenderness, localized swelling, redness or heat - and the incision is deliberately opened by a surgeon, unless the culture is negative.

Statistical analysis:

The collected data was analyzed using SPSS version 14. The exposure and outcome variable being categorical, Pearson's chi-square test was performed for testing statistical significance according to intention to treat analysis.

RESULTS:

150 patients were assessed for eligibility, of whom 45 did not meet the eligibility criteria and 25 did not give consent for the study. The Flow diagram of the study is presented in Figure 1.

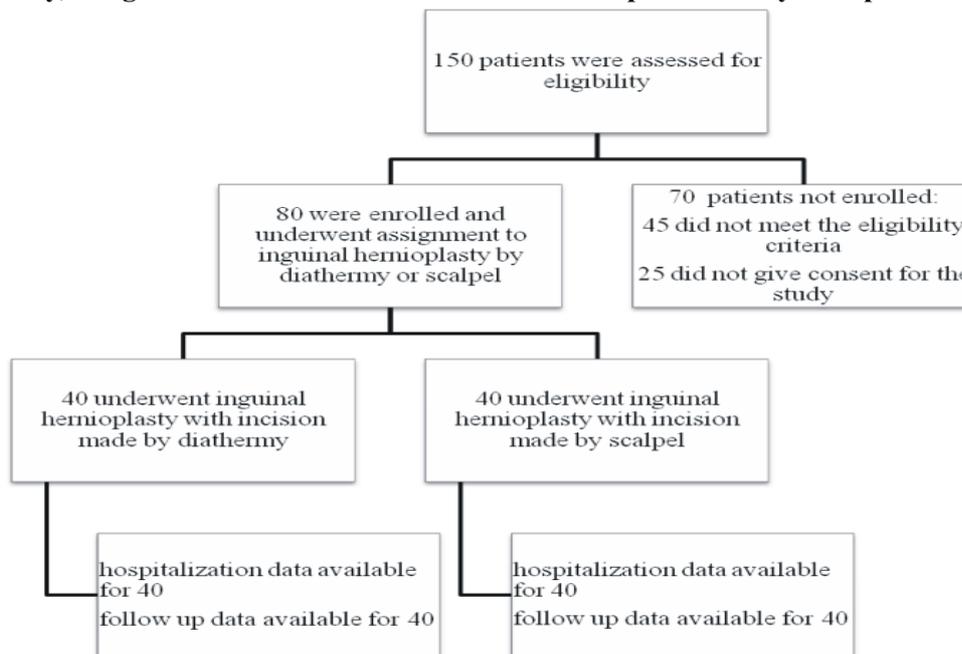
Comparison of both groups regarding various characteristics is depicted in table 1.

There was no loss to follow up. Five out of Forty patients (12.5%) developed SSSI in Group 1. (Two on 5th post op day and three on 15th post op day) whereas, seven out of forty (17.5%) in Group 2 developed SSSI. (One on 2nd post op day, One on 5th post op day, two on 7th post op day, two on 15th post op day and one on 30th post op day). There was no statistically significant difference (p=0.378) between the two groups according to Fischer's Exact test.

Table 1: Characteristics of the Study Groups of Inguinal Hernia Patients.

Characteristic	Intervention group (surgical incision with diathermy)	Control group (surgical incision with scalpel)
Age (in yrs)	50±18.69	46±15.87
BMI (kg/m ²)	22±3	22±2.5
Smokers	15/40(37.5%)	17/40(42.5%)
Indirect Inguinal Hernioplasty performed in:	19/40 (47.5%)	22/40 (55%)

Figure 1: Eligibility, Assignment to Treatment Arms and Follow-Up of the Study Groups.



DISCUSSION

In this study the mean age of patients was 50 years in the intervention group and 46 years in the control group. In a study by Chrysos E et al, mean ages of patients were 55.1 years in diathermy group and 58.8 years in scalpel group¹⁴

Indirect inguinal hernia was seen in 21 to 40 years of age while direct inguinal hernia was seen in 61 to 80 years of age which is in accordance with the fact that indirect hernias are more prevalent in younger age groups.¹⁷ Regarding the primary outcome-superficial surgical site infection (SSSI), the difference in results of the intervention and the control group was not found to be not statistically significant ($p > 0.05$). The studies by Chrysos E et al and Kearns S R et al have also shown that there was no difference in wound infection rate amongst the two groups (diathermy Vs scalpel incision).¹⁴

Wound healing is a complex process that lasts several months. It proceeds from coagulation and inflammation through fibroplasia, matrix deposition, angiogenesis, epithelialization, collagen maturation and finally wound contraction. Because several metabolic diseases, drugs and structural tissue disorders are well known predisposing factors of impaired healing, patients with long standing diabetes mellitus, patients receiving corticosteroids or anticoagulants and those with recurrent hernias were excluded from participating in the study. The use of diathermy for skin incision left this healing process undisturbed.¹⁹

A prospective, randomized, blinded clinical trial was conducted by Groot G et al at Saskatoon, Saskatchewan, Canada to determine whether electrocautery as a means of creating abdominal or thoracic wounds would result in increased wound infection rates. Over a 15-month period, 492 consecutively studied patients were randomly placed

into 1 of 2 groups: scalpel or electrocautery. There were no differences in age grouping, use of steroids, incidence of diabetes, number of days preoperative, operative time, use of preoperative antibiotic prophylaxis, use of drains, number of obese patients, or gender ratio. Wound infections developed in 38 of the 250 scalpel patients (15%) and in 30 of the 242 electrocautery patients (12%) which show that the use of electrocautery to create surgical wounds does not increase wound infection rates.²⁰

In another study by Franchi M et al conducted at Department of Obstetrics and Gynecology, University of Insubria, Italy showed that Scalpel and diathermy are similar in terms of early and late wound complications when used to perform midline abdominal incisions. Therefore the choice of method to make incision remains a matter of surgeon's preference.²¹

One important study favouring the use of scalpel for making incision is an observational study conducted by Husnain S.S et al at Military hospital Karachi and PNS Shifa to determine frequency of postoperative wound infection with the use of scalpel /diathermy during elective cholecystectomy concluded that ratio of wound infection with scalpel cutting is less as compared to diathermic cutting and we can protect the patient from wound infection with the use of scalpel.²²

From the above discussion and our present study it can be concluded that the extent of tissue damage and risk of septic complications are not influenced by the application of excessive heat produced by the diathermy electrode. On the contrary, it has been suggested that local tissue heating increases subcutaneous oxygen tension, thus enhancing the resistance of surgical wounds to infection.²³

The results of this study are comparable with international studies and clearly support the use of electrocautery in performing skin incisions, for it is as

safe as the use of scalpel.

CONCLUSION

From the above mentioned study and results it can be safely concluded that:

- Skin incision made with diathermy is as safe as incision with scalpel and it does not increase incidence of wound infection.

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