Original Research Article

A Compararative Study to Evaluate Surgical Site Infections Using Diathermy and Scalpel

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Abstract

Background: The use of electrocautery for making skin incisions remains controversial. **Aim:** Its effect on the rate of Superficial Surgical Site Infection (SSSI) vis-à-vis scalpel use was compared in this study. **Methods:** A total of 100 patients undergoing open inguinal hernia repair were divided into two: 50 in Electrocautery group, 50 in Scalpel group. Patients were assessed for up to 30 days post-operatively by an assessor blinded to the method used for making skin incision. CDC/NHSN criterion for SSSI was adopted for wound assessment while grading was done using Southampton Wound Grading System. **Results:** Both groups had comparable mean age (p-value=0.29) and BMI (p-value=0.39). The difference in the incidence of SSSI (5 in Electrocautery, 7 in Scalpel group) on statistical analysis was found to not be significant (p-value=0.53). **Conclusion:** We conclude that skin incision made with electrocautery is a safe alternative and a convenient method for performing surgeries.

Keywords: Surgery, Electrocautery, Skin incision, Surgical site infection.

Introduction

Post-operative surgical site infections remain a major source of morbidity in surgical patients. Open inguinal hernia repair is a clean operation for which the incidence of post-operative wound infection is low (<3%)[1].

Electrocautery that is commonly used in operative procedures is less frequently used for skin incisions for fear of damaging the tissues and surgical site infection. 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 conducted with variable results[2-8,10,11].

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 infections in skin incisions of open inguinal hernia repair made by diathermy as compared to that made by scalpel.

Methodology

This prospective study was conducted at Department of Surgery at Vardhman Institute of Medical Science, Pawapuri. The study was approved by the institutional ethical and research committee. The study was conducted for a period of 12 months from September 2015 to August 2016. An informed and written consent was taken from all the participating subjects prior to the commencement of the study.

The study involved 100 patients undergoing open inguinal hernia repair.This was a quasi-experimental study where the patients were slotted into 2 groups:

Group A, wherein Electrocautery was used for incision and The inclusion criteria was patients aged above 16 years with reducible uncomplicated inguinal hernia while those with complications, recurrence, comorbidities and preexisting infections were excluded.

All patients were given single dose of prophylactic at the start of procedure. Spinal anaesthesia was used for all surgeries. Apart from diathermy or scalpel use in making skin incision, rest of the surgical steps (Lichtenstein tension free hernioplasty) were the same for both groups.

Primary outcome measure was Superficial Surgical Site Infection (SSSI) which was assessed on 1, 2, 5, 7, 15 and 30 post-operative days by an assessor blinded to the method used for making skin incision. CDC/NHSN criterion for superficial surgical site infection was adopted for wound assessment in the post-operative period. Wound grading was done using Southampton Wound Grading System.

The data was tabulated and was subjected to ststistical analysis using SPSS Software, Version 11.0.

Results

150 patients were assessed for eligibility of which 20 patients did not meet the eligibility criteria and 30 patients did not give consent for the study. Both the groups A and B had comparable mean age groups (electrocautery group=49 years, scalpel group=48 years, p-value=0.29) and comparable BMI (electrocautery group=22 Kg/m2 , scalpel group=22.14 Kg/m2, p-value=0.39).

In the Electrocautery group, 26 patients had direct hernia and 24 patients had indirect hernia while in the Scalpel group 27 patients had direct hernia and 23 patients had indirect hernia.

In the Electrocautery group, 5 patients had SSSI and in the scalpel group, 7 patients had SSSI.

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Table 1: Incidence of SSSI in both groups

Study Group	SSSI Present	SSSI Absent	Total
Electrocautery	5	45	50
Scalpel	7	43	50
Total	12	88	100

The data was analysed with the Chi-square test and the p-value was found to be 0.53.

The difference of SSSI rates between the 2 groups is not statistically significant.

According to Southampton Wound Grading System, the grades of SSSI in the two groups are shown in Table 2.

Table 2: Southampton Wound Grading of all patients

	Electrocautery		Scalpel	
Southampton wound grade	No. of patients	%	No. of patients	%
Grade 0	45	90%	43	86%
Grade i	1	2%	1	2%
Grade ii	1	2%	1	2%
Grade iii	2	4%	4	8%
Grade iv	1	2%	1	2%
Grade v	0	0	0	0

In the Electrocautery group, out of 5 infected cases, wound swabs taken from 2 patients showed no growth in culture, while swabs from 3 patients grew organisms in culture (Staphylococcus aureus 2, Klebsiella 1).

In the scalpel group, out of 7 infected cases, wound swabs taken from 2tients showed no growth in culture, while swabs from 5 patients grew organisms in culture (*Staphylococcus aureus* 3, *Klebsiella* 2).

Discussion

Electrosurgery has been used extensively since its introduction in 1929, and has now become an indispensable tool in every operating room[1]. Despite this, few surgeons use diathermy to incise skin. This reluctance to incise skin with electrocautery is attributed partly to the commonly held belief by operating surgeons that electrosurgical instruments increase devitalized tissue within the wound. This is believed to lead to increased wound infection, increased scar formation, greater post-operative pain and delayed wound healing. On the contrary, it has also been suggested by others that local tissue heating increases subcutaneous oxygen tension, thus enhancing the resistance of surgical wounds to infection[9].

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. After the introduction of oscillator units, which produce pure sinusoidal current, there has been an increasing trend in the use of diathermy for making skin incisions.

In our study superficial surgical site infections were seen in 5 patients out of 50 patients undergoing open inguinal hernia repair where skin incision was taken using cutting diathermy and among 7 patients out of 50 patients undergoing open inguinal hernia repair where skin incision was taken using scalpel. The difference in results was not found to be statistically significant (p=0.53).

This matches the studies by Chrysos E, et al and Kearns SR, et al which have also shown that there was no difference in wound infection rate amongst the two groups.[4,3] Several other studies by Groot G et al [8] at University of Sasketelwen, Canada; Franchi M et al[6] at University of Insubria, Italy; Dixon AR, et al[5]; Patil Shivagouda et al[14] have shown similar results and conclude that electrocautery use for skin incision does not lead to higher infection rates than scalpel use.

Aird et al [13] from Canada performed a systematic review of literature and analysed six randomized control trials (RCTs), which compared the electrocautery method of skin incision (n = 606) with scalpel incision (n = 628). They noticed less incisional blood loss, reduced operating time and no increased risk of wound infection with the electrocautery method of skin incision.

The risk for sharps injury from the use of scalpels is the most compelling reason to use cutting diathermy instead[12]. Diathermy incision is safe for both patients as well as for surgeon. The use of diathermy in skin incision keeps scalpels away from the operative field thereby decreasing chances of transmission of blood borne diseases to the operating team.

The results of our study are comparable with various international studies and clearly support the use of electrocautery in performing skin incisions, it being as safe as the use of scalpel.

Conclusion

This study disproves the age-old myth regarding the fear of use of electrocautery for skin incision that prevails in surgical community, and concludes that cutting diathermy is as safe as scalpel for making skin incision. There is no increased rate of SSSI associated with the use of cutting diathermy for skin incisions.

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