ORIGINAL ARTICLE

Comparison of Diathermy and Scalpel Incision in Inguinal Hernia Repair in Terms of Surgical Site Infection

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Abstract

Background
Scalpels are traditionally used for making skin incisions that produce little damage to surrounding tissues. However, potential risk of blood transmitted diseases such as Hepatitis B, Hepatitis C and Human Immunodeficiency Virus (HIV) transmission to both doctor and patient in the presence of scalpel in surgical field promotes continuous surge for identifying other modalities of skin incision. This study aimed to compare the frequency of surgical site infection during inguinal hernia repair between diathermy and scalpel incision in adults who underwent surgical correction at Combined Military Hospital Quetta, Pakistan.

Material and Methods
We conducted randomized clinical trial at surgery department in Combined Military Hospital (CMH) Quetta during 15 Sep 2010 to 14 Sep 2011. 212 subjects scheduled for inguinal hernia repair were randomly assigned to either scalpel incision (n=106) or diathermy incision (n=106) by using table of random numbers. Both groups were assessed at post-operative days 2 and 7 for normal healing, mild bruising, erythema with signs of inflammation, clear or hemoserous discharge, pus discharge and tissue separation. Data was recorded on questionnaire. Both groups were compared for superficial surgical site infection and p value for significant difference was calculated by using two sided Chi-Square test.

Results
Difference in the frequencies of infection between the two groups (as shown in table 1) was not statistically significant. In Group A, which received scalpel incision, 95 patients had normal healing, 4 patients had mild bruising/ erythema and erythema with signs of inflammation each and 3 patients had clear or hemoserous discharge. In group B, which received diathermy incision 98 patients healed normally, 6 had mild bruising/ erythema, 2 patients had erythema with sings of inflammation and no patient developed hemoserous discharge. Difference between two groups as regards to the development of SSIs is statistically non-significant with p value of 0.47 (as it is more than 0.05).

Conclusion
Scalpel incision has no superior advantage over diathermy incision in terms of superficial surgical site infection in elective inguinal hernia repair.

Keywords
Diathermy, Incision, surgical site infection, scalpel.

Introduction
A hernia is a protrusion of a viscus or part of a viscus through an abnormal opening in the walls of its containing cavity.[1] All hernias occurring through the anterior abdominal wall, excluding groin hernia, constitute ventral abdominal wall hernias.[2] Each year, approximately 90,000 men, women and children undergo surgery for abdominal hernia repair in the United States of America alone.[3]

A lack of consensus exists among practicing general surgeons, on the most appropriate option for skin incision in inguinal hernia repair. Traditionally scalpel incision is used in inguinal hernia repair but recently electrosurgical incision with diathermy is also getting popularity among the surgeons as it rules out the scalpel from surgical field and provides an attractive preventive option against blood-transmitted diseases like AIDS, Hepatitis B and Hepatitis C; which carry significant risk of transmission to both doctor and patient.[1-4] National and international studies carried out on inguinal hernia repair incisions have shown that diathermy has significant advantage over scalpel incision on the basis of incision related blood loss, incision time (longer in scalpel group p=0.001) and post-operative pain (markedly reduced in diathermy group p=0.000).[5] However, in terms of superficial surgical site infection, its use as incision modality is still controversial due to fear of surgeons for acquiring post-operative infection due to heat damage of skin and subcutaneous tissues, but same study has shown that there is no significant difference between scalpel and diathermy as incision modality in terms of post-operative wound complications.[5]

Objective
To compare diathermy and scalpel incision in inguinal hernia

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repair in terms of surgical site infection.

Material and Methods

This quasi experimental study was carried out in Combined Military Hospital Quetta, Pakistan over a period of 1 year from 15 Sep 2010 to 14 Sep 2011. The patients reporting in surgical outpatient department with clinical diagnosis of inguinal hernia of either gender between 15 to 60 years of age were included in study. Patients with recurrent hernia, concurrent anticoagulant therapy, concurrent corticosteroid therapy, diabetics and immunocompromised were excluded from study. The sample was calculated using WHO sample size calculator. A sample of 212 patients was selected by convenience sampling technique. It was then randomized by using lottery method into two groups, A and B comprising of 106 patients in each group. Written and informed consent was obtained from the patients in the language they understood the best. The patients of group A underwent scalpel incision while the patients of group B received diathermy incision. Pre Anesthesia assessment of all the patients was done before surgery. Operation was performed by consultant surgeon. General surgical set, scalpel, disposable blade, standard diathermy and pen electrode were used. Patients were operated in supine position under spinal/general anesthesia. All patients were given injection Augmentin 1.2 gram intravenously at the time of induction, after a test dose. Approval from hospital ethical committee was obtained.

Data Collection Procedure

The Patients were admitted from outpatient department and followed up post-operatively in ward and outpatient department. Patients were randomly allocated into Group A and B by using the lottery method. The patients of Group A underwent scalpel incision while Group B received diathermy incision for inguinal hernia repair. Following operation, both groups of patients were given similar analgesics. Patients were assessed on post-operative days 2 and 7 by the PI. Demographic information like name, age, gender and address were obtained and entered in pre designed proforma. Information regarding surgical site infections, as per the operational definitions was entered in the proforma. Telephone contacts of patients were obtained to ensure follow-up.

Operational Definitions

- Early Post Operative Complications

  These include postoperative pain, surgical site infection, hematoma or seroma formation occurring within four weeks of surgery.

Data Analysis Procedure

Data was analyzed by using SPSS version 17.0. Sample size was 106 patients in each group using non probability consecutive sampling**.** Quantitative data, like age was calculated in terms of mean and Standard Deviation (SD). Qualitative data like gender and post operative surgical site infection were presented in terms of percentages and frequencies. Both groups were compared for superficial surgical site infection by applying Chi-Square. With level of significance 5 % and Power of test was 80 %, P value ≤ 0.05 was considered statistically significant.

Results

The ages of the participants ranged from 16-60 years (32±9). Majority of them were males (n=205, 97%). The frequencies of surgical site infections according to Southampton scoring system is summarized in Table 1**.** In Group A**,** who received scalpel incision, 95 (89.6%) patients had normal healing. 11 (10.3%) patients had SSIs out of which 4 patients had mild bruising/ erythema, 4 had erythema with signs of inflammation and 3 patients had clear or hemoserous discharge. In Group B, which received diathermy incision, 98 (92.4%) patients healed normally, while 8 (7.5%) developed SSIs, out of which 6 had mild bruising/ erythema, 2 patients had erythema with signs of inflammation and no patient developed hemoserous discharge. Difference between two groups as regards to the development of SSIs is statistically non-significant (p=0.47).

Discussion

In pre Halothane era, use of electro surgical instruments in human surgery was very selective due to explosive nature of anesthetic agents. After its introduction diathermy has been increasingly used for hemostasis and dissection of tissue planes. But, its use for making skin incisions is still infrequent due to the fear of increased amounts of necrotic tissue produced within the wound which may result in wound infection leading to delayed wound healing and excessive scarring.[5-7]

- Trend in the use of diathermy for making skin incisions has been increased after the introduction of oscillator units, which produce pure sinusoidal current. Recent literature has shown that results of diathermy and scalpel in inguinal hernia repair are comparable in terms of operating time, diminished blood loss, and reduced pain after surgery using the diathermy method of skin incision when compared to scalpel incision.[5]

In our study we have observed 11 cases (10.37%) of Superficial Surgical Site Infection in scalpel group as compared to 8 cases (7.5%) in diathermy incision group. A randomized clinical trial conducted in Royal College of surgeons Ireland in 2001 revealed that diathermy has significant advantages over scalpel incision in abdominal wall incisions in terms of incision time, blood loss and post operative pain.[5] A prospective, double-blind, RCT compared outcomes of elective or emergency general surgery performed using either diathermy (n = 185) or surgical scalpels (n = 184) at Fatima Hospital, Baqai Medical University and Shamsi Hospitals in Karachi, Pakistan, from January 2006 to December 2007. Results: diathermy patients experienced 7.9% complications, a similar incidence to the 10.6% experienced by patients whose surgery was performed with scissors (P = 0.74) within groups.[8]

A controlled clinical study published in 1990 by Dixon AR and

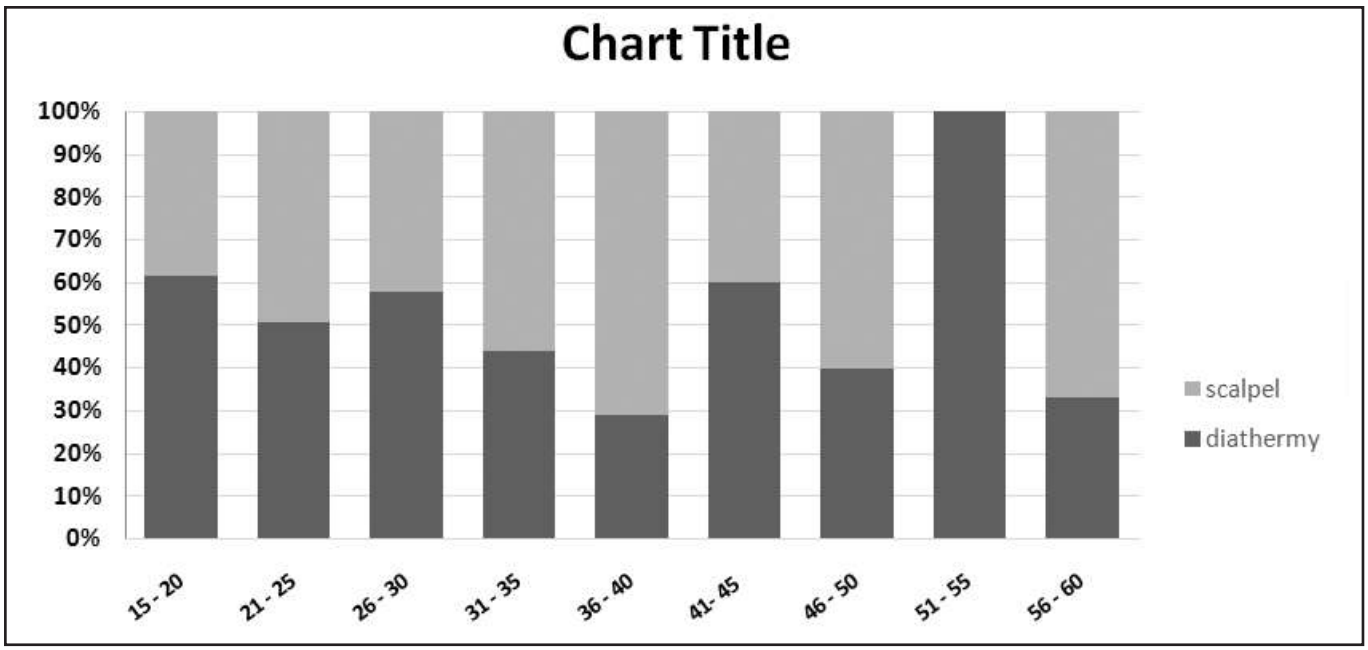

Fig 1. Frequencies of surgical site infections according to Southampton scoring system with age stratification

Table 1: Age Range * Southampton Wound Score * Procedure Cross-tabulation

Procedure		Southampton wound score				
		Normal Healing	Mild bruising / Erythema	Erythema with signs of inflammation	Clear or Hemoserous discharge	Total
Diathermy	Age Range (in Years)					
	15 - 25	32	2	2		36
	26 - 35	45	2	0		47
	36 - 45	15	1	0		16
	46 - 55	5	0	0		5
	56 - 60	1	1	0		2
	Total	**98**	**6**	**2**		**106**
Scalpel	Age Range (in Years)					
	15 - 25	27	2	2	1	32
	26 - 35	40	1	1	2	44
	36 - 45	21	1	1	0	23
	46 - 55	3	0	0	0	3
	56 - 60	4	0	0	0	4
	Total	**95**	**4**	**4**	**3**	**106**

P value = 0.47

Watkin DF comparing skin incision by conventional scalpel with electrosurgical needle incision has shown the latter technique to be highly effective, quicker, and to give better cosmetic results with minimal complications. Skin diathermy burns and wound haematomas were only seen after conventional scalpel incision. Fears of delayed wound healing, keloid formation and high infection rates were not found.[9]

A Prospective study comparing diathermy and scalpel incisions in tension-free Inguinal hernioplasty was published in THE

AMERICAN SURGEON in April 2005 in which 125 consecutive patients submitted to inguinal hernioplasty using the tension-free technique were allocated alternately to either scalpel (n = 60), or diathermy (n = 57) groups.[10] The parameters measured included blood loss during the skin incision and underlying tissue dissection, postoperative pain and requirements for analgesics, the presence of wound dehiscence in the absence of infection, and postoperative wound infection on the day of discharge, on the day staples were removed, and 1 month after surgery. There was no difference between the two groups in terms of Infectious complications, so diathermy incision is safe option in hernia repair.[10]

A prospective, randomized, blinded clinical trial was conducted to determine that electrocautery incision does not increase wound infection; published in THE AMERICAN JOURNAL OF SURGERY in 1994 in which 492 patients were studied consecutively. The results revealed that wound infections developed in 38 of the 250 scalpel patients (15%) and in 30 of the 242 cautery patients (12%). The inference was concluded that the use of electrocautery to create surgical wounds does not increase wound infection.[11]

Increased prevalence of blood borne diseases like Hepatitis B, C and HIV signifies the use of diathermy in skin incisions to keep the scalpel out of operative field. Our study is one of the attempts towards comparison of effectiveness of the two incision techniques. However, like any other study our study also had some limitations as comparison was only between two methods of open hernia repair, laparoscopic procedure was not included in the study. Long term complications, like recurrence of hernia could not be assessed in this study. It was not possible for us to detail more than one person for assessment of clinical outcomes due to limitations of resources but there was no compromise on consistent and reliable measurements.

Conclusion

We conclude that scalpel incision has no superior advantage over diathermy incision in terms of superficial surgical site infection in elective inguinal hernia repair. Diathermy for skin incision is safe for both patients and surgeon in terms of avoiding transmission of Hepatitis B, C and HIV by keeping the scalpel away from surgical field.

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References

1. Murphy EL, Bryzman SM, Glynn SA. Risk Factors for Hepatitis C Virus Infection in United States Blood Donors. Hepatology 2000; 31:756.
2. Garfein RS, Vlahov D, Galai N. Viral infections in short-term injection drug users: The prevalence of the hepatitis C, hepatitis B, human immunodeficiency, and human T- lymphotropic viruses. Am J Public Health 1996; 86:655.
3. Stark K, Hanel M, Berg T, Schreier E. Nosocomial transmission of hepatitis C virus from an anesthesiologist to three patients--epidemiologic and molecular evidence. Arch Virol 2006; 151:1025.
4. Alter MJ. Healthcare should not be a vehicle for transmission of hepatitis C virus. J Hepatol. 2008; 48:2. doi: 10.1046/j.1365-2168.2001.01625.x.
5. Emmanuel C, Elias A, Sokratis A, Evaghelos X, Odysseas Z. A prospective study comparing diathermy and scalpel incisions in tension-free inguinal hernioplasty. The American Surgeon. 2005;71:326-9.
6. Kearns SR, Connolly EM, McNally S, McNamara DA, Deasy J. Randomized clinical trial of diathermy versus scalpel incision in electivemidline laparotomy. Br J Surg. 2001;88:41–4.
7. Ozgun H, Tuncyurek P, Boylu S, Erpek H, Yenisey C, Kose H, et al. The right method for midline laparotomy: what is the best choice for wound healing? Acta Chir Belg. 2007; 107:682–6
8. Shamim M. Diathermy vs. scalpel skin incisions in general surgery: double blind, randomized, clinical trial. WJS. 2009;33:1594-9.
9. Dixon AR,Watkin DFL. Electrosurgical skin incision versus conventional scalpel: a prospective trial. F R Coll Surg Edinb. 1990;35:299-301.
10. Chrysos E, Athanasakis E, Antnakakis S, Xynos E, Zoros O. A prospective study comparing diathermy and scalpel incision in tension freeinguinal hernioplasy. Am Surg. 2005;71:326-9.
11. Groot G, Chappell EW. Electrocautery used to create incisions does not increase wound infection rates. The American journal of surgery. 1994;167:601-3.