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## Electrocautery versus Scalpel Incision in Inguinal Hernioplasty

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### ABSTRACT

Both electrocautery and scalpel can be used for making an incision. There are various controversies regarding the merits and demerits of the use of electrocautery for making an incision. Incisions made by electrocautery are found to be associated with reduced blood loss, dry and rapid separation of the tissue, less post operative pain and a possible decreased risk of accidental injury to operative personnel while a few studies report an increased risk of wound infection and decreased wound strength. The purpose of present study is to explore in a clinical setting whether the use of electrocautery or scalpel offers advantage(s) in terms of parameters like blood loss, post-operative pain and wound infection.

**Keywords:** Electocautery, scalpel, hernioplasty

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## INTRODUCTION

From the first century when it was described by Celsus, inguinal hernia repair has undergone many changes and modifications. From the earliest anatomic repairs of the 16<sup>th</sup> century which involved ligation of the sac inducing inflammation and fibrosis of the external oblique aponeurosis using a red-hot iron through the era of repair under tension (19<sup>th</sup> and 20<sup>th</sup> centuries) to the present day understanding of tension-free repair, there have been great strides in the surgical approach and operative success rates [1]. Yet, there remains some controversy regarding the first step of the operation – making the skin incision. While the cold scalpel (CS) has been the time-honoured method of performing the skin incision, the use of electrocautery (EC) has been gaining popularity in recent times. A number of studies have shown that EC has a number of advantages over CS including reduced blood loss, reduced incision time and reduced post-operative pain and analgesia requirement. However, there remains a widespread fear among surgeons that the heat generated would cause excessive scarring, increased infection rates and poor wound healing. This is of special concern in inguinal hernioplasty where any infection in the presence of the prosthetic mesh could lead to disastrous consequences. A prospective, randomised controlled trial was undertaken to examine the efficacy of electrocautery and scalpel for incision in inguinal hernioplasties based on blood loss, post operative pain and wound infection. We present our results and review the existing literature on the subject.

### Patients and methods:

All patients who underwent Lichtenstein inguinal mesh hernioplasty during a 2 year period in the Department of Surgery, Christian Medical College and Hospital, Ludhiana were included in the study. Patients with obstructed or incarcerated hernia were excluded. Patients were randomised into two groups using block randomisation method. The skin incision in the first group was made using a cold stainless-steel scalpel and in the second group, the incision was made using electrocautery produced by a Valleylab FX generator in blend mode. Patients of each group received two doses of prophylactic antibiotics, once immediately before the operation and the second, 6 hours after. Post-operative pain was managed with intramuscular injections of Pentazocine (30mg) with Promethazine (25mg) given every 8 hours on the day of the operation and afterwards with oral Diclofenac Sodium (75mg) given twice daily. Pain was assessed postoperatively at 4hrly interval using the visual analogue scale (VAS). Intramuscular Paracetamol (500mg) was given if pain score was more than 4 on VAS. The wound was inspected on 3 occasions after the operation - at 48 hours, 1 week and 1 month after the surgery and status of the wound was documented. Comparison was made between two groups based on amount of blood loss, post operative pain and wound complication rates.

## RESULTS

A total of 62 patients were enrolled in the study of which 30 were randomly assigned to the Electrocautery group and 32 to the scalpel group. The two groups were similar demographically. Patients undergoing incision with electrocautery were found to have

significantly less pain at 4<sup>th</sup> postoperative hour though there was no difference between the groups at subsequent assessments. Table 1 depicts the post-operative pain score at various time intervals.

Table 1: Post operative pain score

Post-operative hour	Electrocautery group(Mean score)	Scalpel group (Mean score)	p value
4 <sup>th</sup> hr	2.97	3.78	<0.05
8 <sup>th</sup> hr	2.97	3.22	>0.05
12 <sup>th</sup> hr	2.63	2.72	>0.05
16 <sup>th</sup> hr	2.13	2.41	>0.05
24 <sup>th</sup> hr	1.70	1.66	>0.05

Table 2: Comparison of wound in each group at various inspections

Group	Wound at 48 hours						Total	p value
	Healthy	%	Seroma	%	Infected			
Electrocautery	26	86.67	4	13.33	Nil	Nil	30	>0.05
Scalpel	30	93.75	2	6.25	Nil	Nil	32	
At 1 week								
Electrocautery	29	96.67	1	3.33	Nil	Nil	30	>0.05
Scalpel	30	93.75	1	3.12	1	3.12	32	
At 1 month								
Electrocautery	30	100	Nil	Nil	Nil	Nil	30	>0.05
Scalpel	30	93.75	1	3.12	1	3.12	32	

Additional analgesia required was also significantly less in the electrocautery group (1.33cc) as compared to the group who underwent incision with scalpel (2.81cc). There was a trend towards greater blood loss in the scalpel group – 6 patients (18.75%) versus 2 patients (6.6%) but this did not reach statistical significance.

The comparison of wounds in each group at various inspections is shown in Table 2. There were 6 patients who were found to have a seroma on the first wound inspection at 48 hours – 4 in the electrocautery group (13.33%) and 2 in the scalpel group (6.25%). Of these, 4 had subsided without aspiration by the second inspection (1 persisting seroma in each group) and 5 by the third inspection (one patient with persisting seroma in the scalpel group). One diabetic patient in the scalpel group developed a superficial wound infection which settled with oral antibiotics within a week of the operation. There were no other complications in either group.

### DISCUSSION

The use of heat for reducing blood loss during operations was first described by Hippocrates. Since then there has been great progress in the science of electrosurgery and the advanced technology has made surgery safer and easier in many respects. However, in spite of

the widespread acceptance and use of electro-surgery for haemostasis and for cutting internal organs, there is still a reluctance on the part of the surgical fraternity to use it for the skin incision due to the belief that electro-surgical instruments cause devitalisation of tissue within the wound which consequently leads to wound infection, delayed wound healing and wound scar formation. The recent guidelines from the National Institute of Health and Excellence in the UK recommend avoiding diathermy for skin incisions [2]. In recent years, there have been a number of studies which have examined the efficacy of electro-surgery over cold scalpel in a number of different settings. A randomised, controlled trial in patients undergoing elective midline laparotomy showed significant decrease in incision time, blood loss, post-operative pain and analgesia requirement.[3] Similar results were reported in another randomised controlled trail that included all patients undergoing elective and emergency general surgery operations[4]. Studies done on specific operations like cholecystectomy [5], operations for head and neck cancer[6], neurosurgery [7,8] and a meta-analysis of studies on abdominal skin infections all point to diathermy scoring over the cold scalpel in areas of blood loss, incision time and post-operative pain. A study on patients undergoing bilateral neck dissection revealed no difference in cosmesis or patient satisfaction between scalpel and diathermy incisions [9]. No difference has been reported in wound healing time or keloid formation [10] and one study reported better cosmesis with electrocautery [11]. The fear of increased post-operative infection has also been proven to be unfounded [12,13]. Animal studies have shown increased stress resistance [14] and tissue stiffness [15] in diathermy incisions, though some studies have reported delayed epithelialisation [16], a wider scar [17] and increased tissue necrosis and inflammatory reaction [18] in cautery incisions.

In spite of early evidence to show that electro-surgical skin incisions do not cause increased wound complications and are in fact, better than cold scalpel incisions with regard to post-operative pain, incision time, blood loss and analgesia requirement, many centres still persist with the use of cold scalpel for skin incisions. Our study was conducted to add to the growing body of evidence in favour of diathermy and also to examine any increased risks in hernia repair due to the presence of a prosthetic mesh. Another prospective trial on hernioplasty showed a decreased analgesia requirement in patients with electro-surgical incisions and no difference in wound complications [19].

### CONCLUSION

This study has proved the superiority of electro-surgical wounds over cold scalpel in patients undergoing tension-free hernioplasty with regard to post-operative pain and analgesia required with no increased complications. In spite of the logical mental barrier toward electro-surgical incisions, it is probably time to consider switching to diathermy for all skin incisions in general surgical practice.

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