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DIATHERMY INCISION VS SCALPEL INCISION IN OPEN CHOLECYSTECTOMY- RANDOMIZED CONTROL STUDY AT A RURAL TEACHING INSTITUTE

General Surgery

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ABSTRACT

Background: Electrocautery can be used for skin incisions with limited post-operative complications like wound infection, scarring and post-operative pain. Cutting diathermy incises skin with little charring and necrosis as compared with scalpel incision. But electrocautery which is available in all surgical theaters is less frequently used for skin incisions due to fear of various reason. **Material & Methods:** This study was conducted to assess the efficacy in terms of incision time and incision related blood loss between diathermy incision and scalpel incision in department of general surgery at SGT Medical College Haryana. A hospital-based prospective, randomized double blind study conducted amongst adults aged 18 and above. Data were summarized using frequencies, proportions and appropriate statistical test were applied for significance. **Results:** A total 100 patients were randomized equally in both groups and found that mean time in group I which undergone electrocautery incision was 5.42±0.66 min and for group II which undergone scalpel incision was 6.24±0.33 min and mean blood loss was 5.32±0.70 ml and 6.05±0.46 ml respectively and this difference was found to be statistically significant. **Conclusion:** Electrocautery incision is less time consuming and causes less blood loss compare to scalpel incision. Current study conclude that diathermy could be replaced and accepted as an alternative method for scalpel incision.

KEYWORDS

Blood Loss, Electrocautery, Incision Time, Scalpel

INTRODUCTIOJN:

Incision is a cut or slit to gain access to underlying structures. Very few operations can be performed without cutting through the skin. An incision may be used to gain access to deeper structures or surgery may be performed on the skin itself, whether for repair of trauma or for excision of a skin lesion.[1]

Traditional incisions are made with stainless steel scalpel. These incisions are supposed to be more bloody and painful. To overcome this problem many advanced techniques have come viz. laser, plasma scalpel, cavitron surgical aspirator but the above said methods are costly and relatively unavailable at peripheries.[2] Diathermy skin incision practiced less among the surgeons, due to fear of post-operative complications like wound infection, scarring, pain etc.[3]

There has been a widespread use of diathermy for hemostasis, but fear of production of large scars and improper tissue healing has restricted its use in making skin incisions.[4] Now-a-days electrodes used in making diathermy incision generate a pure sinusoidal current which produces cleavage in tissue planes without creating damage to the surrounding tissues, thus reducing damage inflicted to tissues leading to minimal scar formation.[3]

This study was performed to compare both methods in terms of incision time taken and blood loss by each method.

MATERIALS AND METHODS:

Study design: This was a prospective randomized double blind trial conducted in the department of General Surgery, SGT Medical College Hospital and Research Institute, Gurugram, Haryana. This study was conducted among the adults aged 18 years and above who presented to our surgical department with features suggestive of cholelithiasis.

Inclusion criteria and exclusion criteria: All the patients aged 18 years and above with findings suggestive of cholelithiasis in USG, Patients who were willing to go for open cholecystectomy as the choice of treatment instead of laparoscopic cholecystectomy, and patient who were in relatively good health and had adequate nutrition. Patient who were on anticoagulation therapy, with chronic diseases expected to affect wound healing, such as diabetes , hypertension, liver diseases , chronic anemia , renal impairment, with previous history of hypertrophic or keloid scarring and with known allergy to cephalosporin antibiotics were excluded from the study.

Methodology:

Patients undergoing open cholecystectomy were recruited in the study. Patients were randomly divided into two groups by envelope method. Group 1 (total 50 patients) underwent surgery by using diathermy in cutting mode for making skin incision. A monopolar diathermy using a pen electrode and delivering 500 kHz of sinusoidal current was used in the procedure. Group 2 (total 50 patients) underwent surgery by using cold steel scalpel for making skin incision, incising the muscles and opening of the peritoneum. Diathermy in coagulation mode was used to secure hemostasis in both groups. Open cholecystectomy was performed through a sub costal incision of about 5 to 7 cm. Prophylactic antibiotics (ceftriaxone/ cefotaxime/ cefoperazone + salbactum) was given 1hr prior to the operation and was continued post operatively till 2nd postoperative day. Incision time was noted from the start of making skin incision till complete opening of the peritoneum. Blood loss during these steps of the surgery were noted by using pre weighted dry gauze packs.

Statistical analysis:

We obtained approval from Institutional Ethics Committee and written informed consent was taken from the patients. Permission for the study was sought from the institutional head. Data were analyzed using statistical package of social sciences version 20 (SPSS v 20). Summary statistics were used to describe the data using frequencies, proportions and mean with standard deviation. A p-value of less than 0.05 was considered significant. The results for the same have been depicted in the form of simple and cross tabulations, as well as figures and graphs.

Results:

The study was conducted amongst 100 patients operated for open cholecystectomy by electrocautery incision and scalpel incision. Group were divided I and II who underwent electrocautery incision and scalpel incision respectively.

In our study mean age of the participants of group I and group II was

51.54± 7.18and 53.66±5.82 respectively. Youngest participant for group I and II was 25 and 41 years old while oldest participant was 64 for group I and for group II 65 years , female participants were 82% and 86% among group I and II respectively.. There was no statistically significant age and gender difference between both groups.(Table 1, 2).

In our study, mean time for group I was 5.42±0.66 min and for group II, 6.24±0.33 min so mean time was less in group I compared to group II and this difference was found to be statistically significant. It was also found that mean blood loss for group I was 5.32±0.70 ml and for group II 6.05±0.46 ml and blood loss was statistically significant less in group I compared to group.(Table 3,4).

Current study revealed that most of the patients had healthy suture line on 8th day in both the groups. But 25 patients had gaping among them most of i.e. 68% (seventeen patients) belonged to group II and rest 32% (eight) were in group I. Superficial wound dehiscence occurred in four patients among them three were in group I and remaining one were in group II . This difference was not found to be statistically significant.(Table 5).

DISCUSSION:

Several studies have shown that diathermy is increasingly being used for making skin incisions and dissecting tissue planes. It facilitates hemostasis, reduces overall intra-operative time and shows similar wound healing as scalpel incision.. In recent years after introduction of advanced electrocautery units (pure sinusoidal current), there is an increasing trend in the use of cautery for making skin incision. Studies have shown that when compared with scalpels, use of electrocautery resulted in reduced operating time, minimum blood loss and early pain reduction and required fewer analgesics in postoperative period.

In our study mean time for group I was 5.42±0.66 minutes and for group II, 6.24±0.33 minutes and this difference was found to be statistically significant, mean blood loss for group I was 5.32±0.70 ml and for group II 6.05±0.46 ml and this difference was found to be statistically significant. Current study revealed that most of the patients had healthy suture line on 8th day in both the groups and there was no statistically significant difference were noted when this was compared. Similarly, Ly et al[5] in their systematic review and metaanalysis of fourteen randomized trials comprising of 2541 patients (1267 undergoing abdominal wall incision by cutting diathermy and 1274 by scalpel), found that diathermy had significant advantages in many variables including, operative blood loss, incision time and postoperative pain. They noticed significantly reduced amounts of blood loss (mean difference of 0.72 ml/cm^2.

Similarly Study conducted by Nandurkar VS et al[6] found that use of electrocautery resulted in significantly reduced mean incision time (27±10.1 s vs 38.8±8.8).The observation of present study are comparable to findings reported by Talpur et al[7], who in their study reported statistically significant reduction in mean incision time and mean blood loss with electrocautery when compared to scalpel (7.3057sec/cm2 versus 8.9025 sec/cm2 and 1.1346 ml/cm2 versus 1.8262ml/cm2 respectively).

In contrast to our study, Mittal P et al[8] found that the use of the harmonic scalpel significantly reduces intraoperative blood loss .This is in agreement with most of the studies conducted by Deo and Shukla[9], Kozomara et al[10]., Khan et al[11]., and Huang et al[12]. The harmonic scalpel provides a better hemostasis with less lateral thermal injury; thus, undesirable injury is avoided , resulting in lesser intraoperative blood loss. There was no statistically significant differences in terms of wound complications with use of electrocautery and scalpel in our study. Talpur et al[7] have also shown no statistically significant difference in wound healing with electrocautery and scalpel.

Conclusion:

Current study suggests that use of electrocautery for skin incision is associated with shorter duration of incision time and reduced blood loss as compared to scalpel incision and both have similar healthy suture line after surgery. So it is concluded that electrocautery can be an alternate option for scalpel incision in surgery.

Tables:

Table 1: Age (in years) distribution among both groups:

Group	Mean ±SD	Range	p-value
I	51.54±7.18	39(25-64)	0.108
II	53.66±5.82	24(41-65)	
Total	52.60±6.59	42(25-65)	

*Unpaired Student t-test

Table 2: Gender distribution among both groups:

Gender	Groups		p-value
	I n(%)	II n(%)	
Male	9(18)	7(14)	0.786
Female	41(82)	43(86)	
Total	50(100)	50(100)	

Chi square test, $\chi^2 = 0.298$, df = 1

Table 3: Distribution of time (in minutes) among both groups:

Group	Mean ±SD	Range	p-value
I	5.42±0.66	4.65(4.5-9.15)	**0.001**
II	6.24±0.33	1.51(5.5-7.01)	
Total	5.83±0.66	4.65(4.5-9.15)	

*Unpaired Student t-test

Table 4: Comparison of blood loss (in ml) among both groups:

Group	Mean ±SD	Range	p-value
I	5.32±0.70	2.6(4.0-6.6)	**0.001**
II	6.05±0.46	1.8(5.2-7.0)	
Total	5.69±0.69	3.0(4.0-7.0)	

*Unpaired Student t-test

Table 5: Comparison of suture line on 8th day among both groups:

	Group I		Group II		p-value
	Number	%	Number	%	
Healthy	39	54.9	32	45.1	0.068
Gaping of skin	8	32	17	68	
Superficial wound dehiscence	3	75	1	25	

Fishers Exact test, (0.298, df = 2)

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