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Research Article

A COMPARATIVE STUDY OF COSMETIC AND PATIENT SATISFACTION OUTCOMES OF DIFFERENT INCISION METHODS

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ABSTRACT

Introduction: Cold steel scalpel has been the supreme choice for skin incisions among surgeons across the globe for long time. Attempts have been made in a search to find ways for achieving hemostasis during surgery. Electrocautery has been the choice for such purpose. Still there are number of surgeons avoiding cautery as it results in devitalization of tissues and delayed wound healing. The present study aims at comparing various per-operative and post-operative parameters of cold steel scalpel and cautery incisions during a surgical procedure. **Material & methods:** A clinical comparative observational study was carried out at Ajmal Khan Tibbiya College and hospital. A total number of 272 cases were enrolled and randomized into two groups: A and B, receiving scalpel and electrocautery incision respectively. Cases of two groups were assessed for various per-operative and post-operative outcomes of scalpel and diathermy incision. Cosmetic appearance of scar was primary outcome and incision time, incisional blood loss, operation time, post-operative pain, wound complications, patient's satisfaction level and duration of hospital stay were the secondary outcome measures. Analyses of data were done using appropriate statistical tests. **Results:** Significant less amount of blood loss was noted in electrocautery group as compared to scalpel group ($P < 0.05$). No statistical considerable difference was noted regarding incision time, operation time, post-operative pain, length of incision, wound complications, scar appearance, patient's satisfaction level, and duration of hospital stay between the two groups ($P > 0.05$). **Conclusion:** Electrocautery proved a good tool to achieve hemostasis, however, associated with wound complications and delayed wound healing.

Keywords: Cold steel scalpel; electrocautery; scar appearance; skin incision

INTRODUCTION

Surgeons have been in search for ideal method for skin incisions in terms of incision time, wound complications, post-operative pain, less hospital stay and best cosmetic appearance. Historically, the cold steel scalpel (CSS) has been the instrument of choice for surgical incision because of ease of use, accuracy, and predictable tissue damage. Abu Al-Qasim Al-Zahravi advocated the use of *Kayi* (cautery) in which the iron rod heated in fire were applied over bleeding vessels to stop bleeding from tissues underlying skin during a surgical procedure. Later in early 20th century, the advancement in technology and development of electrocautery made achieving hemostasis more easy during surgery. However, there is some reluctance among the surgical fraternity to use electrocautery in a belief that the instrument causes devitalization of tissue within the wound which consequently leads to wound infection, delayed wound healing, and scar formation.¹ The present study aims at comparing per-operative and post-operative outcomes of the cases operated with cold steel scalpel and electrocautery.

MATERIALS AND METHODS

Sitting and study design: After getting approval from the institutional ethics committee, a clinical comparative observational study was carried out at Ajmal Khan Tibbiya College & Hospital, Aligarh Muslim University, Aligarh for a period of two years from May 2015.

Inclusion Criteria: All cases posted for elective general surgery in the Dept. of Jarahat (Surgery), Ajmal Khan Tibbiya College, Aligarh Muslim University.

Exclusion criteria: Patients not willing to be enrolled in the study.

Preoperative investigations: All cases underwent some laboratory investigations like complete blood count, urine for routine & microscopic examinations, renal function test, blood sugar level, electrocardiogram, x-ray chest, bleeding and clotting time, and abdominal ultrasonography.

Procedure: After obtaining informed consent from every patient posted for elective general surgery, a total number of 272 patients were randomized using random number table into two groups; 128 in group-A and 144 in group-B. Scalpel was used for incision in group-A and diathermy pen in group-B. Per-operative assessment like incision time, incisional blood loss, operation time and length of incision was done during the procedure of surgery. Incision time was defined as the time between placing incision to opening of the peritoneum in case of cholecystectomy and appendicectomy, lumbar fascia in nephrolithotomy or pyelolithotomy, external oblique aponeurosis in groin hernia, wall of urinary bladder in prostatectomy or cystolithotomy. During incision, blood loss was measured and graded as minimal, moderate and severe. Operation time was defined as the time between placing skin incision to completion of wound dressing.

Length of incision was measured at the end of procedure in centimeters. After surgery patients were shifted to post operative ward. At different follow-up periods, patients were assessed for post operative outcomes.

Assessment parameters & follow-up: Patients were followed up in out-patient-department 15 days after discharge from hospital then at one month, three months, and six months and assessed for Scar appearance by patient observer scar assessment score (POSAS), patient satisfaction level, post-operative pain, length of incision, wound complication, and duration of stay in hospital. Different assessment parameters have been described below.

- **Incisional blood loss: Minimal-** presence of small bleeders which were controlled easily with forcep with no need of mopping towel. **Moderate-** presence of small and large bleeders which were controlled with forcep and by applying pressure and 50% of mopping towel was wet during mopping. **Severe-** It was difficult to control bleeding. Bleeders were either cauterized or ligated with catgut. More than 50% of mopping towel was wet during mopping.
- **Post-operative pain:** It was assessed using visual analogue scale (0: No pain, 1-3: Mild pain, 4-6: Moderate pain, 10: severe pain).
- **Wound complication/ infection:** It was assessed using Southampton wound scoring system). **Grade-0:** Normal healing, **Grade-I:** Normal healing with mild bruising, **Grade-II:** Erythema, **Grade-III:** Discharge from wound-Serosanguinous or clear, **Grade-IV:** Discharge from wound-Purulent, **Grade-V:** Deep wound infection with tissue breakdown.
- **Scar assessment:** It was assessed using POSAS. **Excellent:** Scar in line with healthy surrounding skin, **Fair:** Elevation of scar with moderate fibrosis, **Poor:** Excessive fibrosis, elevation and ugly appearance.
- **Patient's satisfaction level:** It was assessed using Likert score and graded as unsatisfactory, fair, satisfactory and excellent.

STATISTICAL ANALYSIS

Continuous measurements have been presented in mean±SD and categorical data in number and percentage. Chi square test was applied for inter group comparison in case of categorical data and Z-test for continuous data. P value less than 0.05 was considered as significant.

RESULTS

Majority of operations performed in group-A were open cholecystectomies 70% followed by hernia repairs 23.4 % and appendectomies 3.2%. In group B, open cholecystectomies were performed most 62.5% followed by hernia repairs 20.8% and then choledocholithotomies 5.6%. Mean age in scalpel group was 39±11.8 years and 37.1±10.9 years in electro-cautery group. Table 1 describes baseline attributes.

The mean incision time was 185.37±69.34 seconds in group-A and 180.16±62.9 seconds in group B (P>0.05; not significant). Minimum blood loss was recorded in 70.13% (101 out of 148) patients in the electro-cautery group and 22.65% (29 out of 128) patients in the scalpel group (P<0.05; Significant). Moderate blood loss was noted in 76.5% (98 out of 128) cases in the scalpel group and 29.16% (42 out of 144) cases in cautery group (P<0.05; Significant). Severe blood loss was noted in two cases one in each group. Figure 1 describes the relative blood loss amount in two groups. The mean operation time was 44.34±14.91 minutes in

cautery group and 46.13±14.25 minutes in scalpel group (P>0.05; not significant). **Table 2** describes per-operative assessment.

No post operative pain was recorded in 18.75% (24 out of 128) cases in group-A and 13.88 % (20 out of 144) cases in group-B (P>0.05). Mild pain was recorded in 81.25% (104 out of 128) cases in scalpel group and 86.11% (124 out of 144) cases in cautery group (P>0.05). No moderate or severe pain was recorded in either group. Normal healing was observed in 51.5% (66 out of 128) cases in scalpel group and 43.75% (63 out of 144) cases in cautery group (P>0.05). Normal healing with some bruising was observed in more cases in cautery group than scalpel group (30.55% Vs.28.12%). However, this was not statistically significant (P>0.05). Purulent discharge from wound was observed in 5 cases in cautery group and one case in scalpel group (P>0.05). POSAS score (A tool to assess cosmetic appearance of scar) was recorded as 26.2±6.8 and 27.2±9.2 in scalpel and cautery group respectively (P>0.05; Not Significant). Likert score (A tool to assess the satisfaction level of patients) was noted as 9.2±1.5 and 9.25±0.92 in scalpel and cautery group respectively (P>0.05). The mean duration of hospital stay was 7.1±1.7 days in scalpel group and 7.2±2.1 days in cautery group (P>0.05). **Table 3** describes post-operative assessment.

DISCUSSION

Data like age and nature of operation performed were comparable in two groups and no statistically significant difference was found. No comparable data was found regarding age, nature of surgery performed and operation time.

In our study, no significant difference in incision time between two groups was recorded. Johnson CD *et.al.*² and Thingujam D *et.al.*³ reported no difference between electrocautery and scalpel group regarding incision time. Ali MP *et.al.*,⁴ Hameed N *et.al.*,⁵ Chalya PL *et.al.*⁶ and Valluru *et.al.*⁷ reported significant difference in incision time between electrocautery and scalpel group.

Less blood loss was recorded in electrocautery group in our study. Same finding was observed by Kearns *et.al.*,⁸ Ali MA *et.al.*,⁴ Chalya PL *et.al.*,⁶ Shamim *et.al.*,⁹ Chrysos *et.al.*,¹⁰ and Sheikh B *et.al.*¹¹ in their studies.

There was no significant difference in post operative pain score in two groups in our study. Ali MA *et.al.*⁴ observed no significant difference in post operative pain score in cautery and scalpel group. However, Hussain SA *et.al.*¹² and Kearns *et.al.*⁸ reported less pain score in electrocautery group as compared to scalpel group.

Shorter length of incision was noted in cautery group as compared to scalpel group in present study. Kadyan *et.al.*¹³ reported shorter incision length in cautery group. Jamali KS *et.al.*¹⁴ and Thingujam T *et.al.*³ reported no significant difference between incision lengths in two groups.

Normal healing was recorded slightly higher in scalpel group as compared to cautery group in present study. Five cases experienced purulent discharge from wound in cautery group. However, these differences were not significant. Chrysos E *et.al.*,¹⁰ Aird LN *et.al.*¹⁵ and Kearns *et.al.*⁸ reported no difference in post-operative wound complication in cautery and scalpel group. Soballe *et.al.*¹⁶ and Amin *et.al.*¹⁷ reported that electrocautery incisions were associated with more post operative wound complications than scalpel incisions.

Table 1: Baseline attributes of cases of two groups

Attributes	Group-A (n=128)	Group-B (n=144)
Age (Mean±SD)	39±11.8 years	37.1±10.9 years
Operations performed		
Appendicectomies	04 (3.2%)	06 (4.1%)
Open cholecystectomies	90 (70.3%)	90 (62.5%)
Choledocholithotomies	01 (0.8%)	08 (5.6%)
Hernia repair	30 (23.4%)	30 (20.8%)
Suprapubic cystolithotomy	01 (0.8%)	3 (2.1%)
Pyelolithotomy/ nephrolithotomy	02 (1.5%)	07 (4.9%)

Table 2: Per-operative assessment of cases of two groups

Attributes	Group-A (n=128)	Group-B (n=144)
Incision time		
Mean±SD	185.37±69.34 seconds	180.16±62.9 seconds
Incisional Blood Loss		
Minimum	29 (22.65%) cases	101(70.13%) cases
Moderate	98 (76.56%) cases	42 (29.16%) cases
Severe	01 (0.78%) cases	01 (0.69%) cases
Operation time		
Mean±SD	46.13±14.25 minutes	44.34±14.91 minutes
Length of incision		
<10 centimeters	60 (46.87%) cases	131 (90.97%) cases
>10 centimeters	68 (53.12%) cases	13 (9.02%) cases

Table 3: Post-operative assessment of cases of two groups

Attributes	Group-A (n=128)	Group-B (n=144)
Post-operative pain		
No pain (0)	24	20
Mild pain (1-3)	104	124
Moderate pain (4-6)	00	00
Severe pain (7-10)	00	00
Wound complications (Southampton score)		
Grade-0	66	63
Grade-I	36	44
Grade-II	18	22
Grade-III	07	10
Grade-IV	01	05
Grade-V	00	00
Scar assessment (POSAS)		
Mean±SD	26.2±6.8	27.2±9.2
Patient's satisfaction (Likert's score)		
Mean±SD	9.2±1.5	9.25±0.92
Duration of hospital stay		
Mean±SD	71. ±1.7 days	7.2±2.1 days

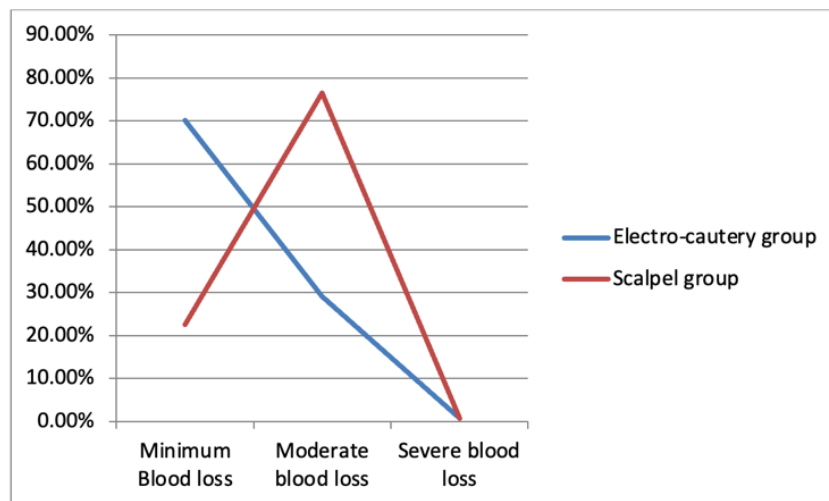


Figure 1: Blood loss in two groups studied

No significant difference in cosmetic appearance of scar of two groups (POSAS score) was recorded in our study. Chau *et.al.*,¹⁸ Kearns *et.al.*,⁸ Shamim *et.al.*,⁹ Kumar V *et.al.*,¹⁹ and Ravikumar *et.al.*²⁰ observed no significant difference in cosmetic appearance of two groups.

In present study, no significant difference was observed in patient's satisfaction score (Likert's score) at 6 months follow-up in two groups. Chau *et.al.*¹⁸ also reported no significant difference in patient's satisfaction score in cautery and scalpel group at 6 months follow-up.

CONCLUSION

The parameter which was found clinically and statistically significant was incisional blood loss. We observed less blood loss in electrocautery group. However, few wound complications were observed among cases of this group. No considerable difference was noted in other parameters between the two groups. It can be inferred that use of electrocautery is favorable for good hemostasis, but attempts should be made to find out ways to limit wound complications associated with electrocautery.

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