Original Article

Comparison of Diathermy versus Scalpel Incision in Obstetrics Surgeries

Farah Javed, Wajiha Shadab, Umm-e-Salma, Sadaf Afzal, Saba Mehmood and Shamaila Sharif

ABSTRACT

Objective: Electro-surgery frequently mentioned as surgical diathermy is crucial to reduce blood loss during surgery. This study aimed to compare abdominal incision from skin till parietal peritoneum given by scalpel as compared to diathermy in terms of mean volume of blood loss and mean incision time.

Study Design: Quasi experimental trial study

Place and Duration of Study: This study was conducted at the department of Gynecology and Obstetrics of Railway General Hospital; Rawalpindi form May, 2017 to November, 2017 for a period of six months.

Materials and Methods: A total of 100 patients undergoing elective surgeries of obstetrics and gynecology were included in this study.

Results: Fifty patients each were randomly allocated to Groups A (Scalpel) and B (Diathermy). The mean age of patients was 39.82 ± 12.27 years in Scalpel group and 39.20 ± 12.59 years in Diathermy group. The mean time of incision in Scalpel and diathermy group were 150.04 ± 30.31 sec and 88.34 ± 33.54 sec respectively ($p < 0.001$). The mean blood loss was greater for the Scalpel group (18.70 ± 7.41 ml) as compared to the Diathermy group (5.70 ± 1.96 ml; $p < 0.001$).

Conclusion: It is concluded that diathermy is an effective, convenient and time saving method of tissue dissection during surgery, which also reduces volume of blood loss during surgery.

Key Words: Abdominal incision, partial peritoneum, hemostasis, scalpel, diathermy, blood loss, incision time

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INTRODUCTION

Skin incisions are commonly used in obstetric procedures to allow the surgeon access to abdominal organs. These include midline, lower abdominal, transverse, vertical, paramedian, pfannensteil, maylard or cherney, joel-cohn and Pelosi incisons.[1] Any surgical incision should be of an adequate length to allow the surgeons to have a clear view of the surgical field facilitating hand movement and instrumentation.[2]

Scalpels have been widely used in obstetric surgery for giving surgical incisions. However, scalpels result in increased bleeding thereby blocking clear access to the procedures and hence, resulting in prolonged operating time.[3]

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More recently, surgical diathermy has gained popularity for surgical procedures of the abdomen.[4] In this procedure, an electrode is used for generating sinusoidal current allowing cleavage of the tissue without compromising the surrounding area. As a result, there is decreased scarring of the tissue and improved healing.[4, 5] The surrounding tissue is not damaged, as the heat vaporizes immediately without dissipating to other tissue.[6] As a result, surgical diathermy has the advantage of reduced bleeding, reduced operating time and rapid hemostasis.[7]

However, a few complications have been associated with surgical diathermy. These include patient burns, surgical smoke, explosion, fire, capacitative coupling, direct coupling and insulation failure. These complications are further aggravated during laparoscopic procedures, owing to reduced surgical access [8, 9] Moreover, diathermy incisions have greater scarring at the surgical site, in comparison to those produced by scalpel incisions. The difference is possibly due to a much cleaner incision given by a scalpel. Also, diathermy incisions have also been reported to cause slower wound healing and a greater infection risk, as compared to scalpel incisions.[10]

The use of conductive gel and skin cleaning may reduce burns secondary to the use of diathermy, as the use of the gel increases the contact of the skin with the return electrode.[11]

Electrosurgery has also been reported to be a risk factor for ventricular fibrillation in cardiac patients with pacemakers, resulting in pacemaker failure. Thus, the use of bipolar applications may reduce possible complications.[12] In addition, it is recommended that the electricity circuit should be maintained far away from prosthetic, conductive joints in patients with such joints.[13] Diathermy is currently not commonly used for Obstetrics and Gynecology surgeries in Pakistan owing to the fear of causing deep burns and scarring. No study in Pakistan has been reported to compare diathermy and scalpel incisions for Obstetrics and Gynecology surgeries. The present study aimed to compare abdominal incision from skin till parietal peritoneum with complete hemostasis by scalpel versus diathermy in terms of blood loss and incision time.

MATERIALS AND METHODS

This comparative study was performed in the department of Gynaecology and Obstetrics in the Railway General Hospital, Rawalpindi from May till November 2017. Ethical approval was taken from the Hospital ethical review committee. The WHO calculator was used for sample size estimation. With a 5% significance level, 90% power of test, population mean blood loss of 6.53 ± 3.8[14] ml ± and anticipated mean blood loss of 18.16±7.36[14] ml, a sample of 50 in each group was estimated to be adequate.

Females with ages between 18 and 60 years having elective surgeries of gynecology and obstetrics patients were involved in the study. All patients with a history of previous surgeries anemia, bleeding disorders or undergoing emergency procedures were excluded.

An informed verbal permission was taken from all patients. Lottery method was used for randomly allocating patients to two groups: A and B. While scalpel incisions were given to patients in Group A, group B patients underwent diathermy. Blood loss during skin incisions was calculated by weighing the surgical swabs used mainly during hemostasis. One gram was taken as equal to one ml of blood (1g= 1ml). Use of suction evacuation for blood was avoided while making the incision. Blood loss was calculated as ml per cm^2. Total time from the beginning of skin incision with full hemostasis till achievement of the peritoneal incision was recorded. The length and width of incision at the end of procedure was measured in centimeters. Product of length and width of skin incisions was calculated to determine the incision area.

Data was inserted and analyzed using SPSS v17.0. Mean and standard deviation were described for quantitative variables, such as age, length, width of incision, blood loss and incision time. To compare any difference in the mean values of these quantitative variables, independent sample T test was applied. Effect modifiers such has age, BMI, length, width of incision type of surgery was controlled by post stratification independent sample t-test. A p-value of ≤ 0.05 was taken as significant. Frequencies and percentages were calculated for the type of surgeries.

RESULTS

A total of 100 patients participated in the study with 50 patients in each group. The mean age of the patients was 39.82 ± 12.27 years in Group A (Scalpel) and 39.20 ± 12.59 years in Group B (Diathermy). In Group A 21(42%) had Obstetric and 29(58%) had Gynecology related surgeries, while in Group B, there were 27(54%) Obstetric and 23(46%) Gynecology related surgeries. The mean length of incision was 8.57 ± 0.88 cm in Group A and 8.35 ± 0.85 cm in Group B. The mean width of incision in was 5.88 ± 0.58 cm in Group A and 5.99 ± 0.65 cm in Group B. The mean time of incision was found to be greater in Group A patients (150.04 ± 30.31 sec), as compared to Group B patients (88.34 ± 33.54 sec; $p < 0.05$) The mean blood loss was greater in Group A (18.70 ± 7.41 ml) as compared to that for Group B (5.70 ± 1.96 ml; $p < 0.05$).

Table No.1: Mean comparison of different variables in both groups (n = 100)

	Group A	Group B	Total	p-value
Age (Years)	39.82 ± 12.27	39.20 ± 12.59	39.51 ± 12.37	0.804
Length of incision (cm)	8.57 ± 0.88	8.35 ± 0.85	8.46 ± 0.86	0.209
Width of incision (cm)	5.88 ± 0.58	5.99 ± 0.65	5.94 ± 0.62	0.352
Time of incision (sec)	150.04 ± 30.21	88.34 ± 33.54	119.19 ± 44.38	<0.001
Blood loss (ml)	18.70 ± 7.41	5.70 ± 1.96	12.20 ± 8.47	<0.001

DISCUSSION

This study set out to compare the surgical success and post-operative complications between scalpel and diathermy skin incisions in gynecology and obstetrics surgeries. Success has been reported in the use electrosurgical systems for vessel-occlusion in abdominal, vaginal hysterectomies and other surgical procedures.[15]

The mean blood loss for the Scalpel Group A (18.70 ± 7.41 ml) was greater than that for Diathermy Group B (5.70 ± 1.96 ml; $p < 0.001$). Our study reported a greater mean incision time for the Scalpel Group A (150.04 ± 30.31 sec), as compared to Diathermy Group B (88.34 ± 33.54 sec). In a clinical trial, Prakash et al reported that there was no difference in the mean incision time of the electrocautery (9.40 ± 3.37 s/cm^2) and the scalpel groups (9.07 ± 3.40 s/cm^2; $p = 0.87$). Like our study, they found that the mean blood loss for the Scalpel group (23.40 ± 15.28 ml) was greater than that for the Electrocautery group (6.46 ± 3.94 ml; $P < 0.0001$). The wound infection rates between the

electrocautery group and the scalpel groups (14.63% and 12.19%; p = 0.347) was not statically significant. This implies that electrocautery could be considered as a safe and effective tool for skin incisions in laparotomy and abdominal surgeries instead of using scalpel for incision[16].

Another randomized controlled trial compared the volume of blood loss, wound incision time and post-operative complications during repeated cesarean section (CS) performed with scalpels and electro surgery in transverse abdominal incisions. The findings suggested a substantial difference between the two groups in terms of blood loss (median [interquartile range], 11 [8–15.25] g for the diathermy group and 20 [18–23] g for the scalpel group, p< 0.001) and skin-to-peritoneum incision time (median [interquartile range], 7 [5–7.25] min for the diathermy group and 10 [7–11] min for the scalpel group, P< 0.001).[1] Rongetti et al. conducted a randomized clinical trial comparing electrocautery and scalpel surgeries, in terms of surgical site infection (SSI) in subcutaneous tissues and skin. The study reported that while both groups were balanced for all variables, the surgical time, was meaningfully higher in the electrocautery group (203.5 min vs 161.1 min versus, p = 0.029). The SSI rates were 9.7% and 7.4% for the electrocautery and scalpel groups respectively (p = 0.756). The exploratory multivariate model revealed that body mass index 30 kg/m^2 (OR = 24.2, 95% CI: 2.8-212.1) and transverse surgical incision (OR = 8.1, 95% CI: 1.5-42.6) are independent risk factors for SSI[17]. A prospective study equated diathermy and steel scalpel in terms of incision-time, postoperative wound infection, early postoperative pain, and scar tissue. Postoperative pain (VAS) was markedly reduced during initial 48 hours in the diathermy group (P < 0.0001). Postoperative wound infection (P > 0.05) was almost same in both groups. Thus, diathermy showed significant advantages in terms of incision time, early postoperative pain, and analgesia requirement [18].

Another randomized controlled trial conducted by Damani et al. compared the incision time, blood loss, post-operative complications (wound infection) and post-operative pain in midline laparotomies incisions made by scalpel versus diathermy. A total 220 patients were involved in this study who were then randomly assigned to Group A (Scalpel incision) and Group B (Diathermy incision) using opaque labeled envelopes. The results showed significantly reduced incision time (p = 0.001), post-operative pain (p=0.001, 0.012 and 0.021 on day 1, 2 and 3 respectively), blood loss (p=0.014), and post-operative analgesics requirement (p=0.021) for the diathermy group. On the contrary no noteworthy statistical difference was recorded regarding postoperative complications (wound infection) and duration of hospital stay. Thus, diathermy use for incision in midline laparotomy is significantly superior than scalpel because of less incision time, less blood loss, reduced analgesic requirements and less early postoperative pain.[19]

CONCLUSION

Surgical diathermy was found to have a lesser incision time and blood loss as compared to skin incision given by scalpels during obstetric surgical procedures. Thus, diathermy may be recommended as a safe and effective method for skin incisions during surgical procedures.

Author's Contribution:

Concept & Design of Study:	Farah Javed, Wajiha Shadab
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Final Approval of version:	Farah Javed, Wajiha Shadab

Conflict of Interest: The study has no conflict of interest to declare by any author.

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