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Original Research Article

Scalpel versus diathermy skin incision in elective surgery: a comparative study

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ABSTRACT

Background: Elective surgeries often employ either diathermy or scalpel for skin incisions, yet there is limited comprehensive research comparing the two methods. This observational study aims to compare the clinical and medical outcomes of diathermy and scalpel skin incisions in elective surgeries.
Methods: This retrospective observational study was conducted at the Enam Medical College, Dhaka, Bangladesh, over a period of 1.5 years. A total of 150 patients were included, with 75 in Group A (Scalpel Incision) and 75 in Group B (Diathermy). Various outcomes such as comorbidities, incision time, blood loss, post-operative complications, pain scores and wound grading using Surgical Site Infection (SSI) Grading were assessed.
Results: The study found that diathermy incisions were associated with shorter incision times (mean: 24.81 seconds) and reduced blood loss (mean: 1.82 ml) compared to scalpel incisions (mean incision time: 53.14 seconds, mean blood loss: 9.61 ml). Post-operative complications varied, with hematoma being more prevalent in the scalpel group (20.00%). Pain scores were consistently lower in the diathermy group across multiple post-operative days. Most participants in both groups had no SSI according to the employed SSI Grading.
Conclusions: The study suggests that diathermy may be a viable alternative to scalpel incisions in elective surgeries, offering benefits such as reduced incision time and blood loss. However, the choice between the two should be individualized based on patient characteristics and surgical requirements. Further research is needed to confirm these findings and provide more targeted recommendations.

Keywords: Diathermy, Incision, Infection, Scalpel, Surgery

INTRODUCTION

The surgical incision is a foundational element in any surgical procedure and the choice of technique for skin incision can significantly influence patient outcomes. Traditionally, scalpels have been the instrument of choice for making skin incisions. However, electrosurgical devices, commonly known as diathermy, have gained increasing attention in recent years.[1,2] While scalpels have been the gold standard for surgical incisions for many years, they are not without limitations. One of the primary drawbacks is the potential for significant blood loss, as scalpels do not inherently have hemostatic properties.[3] Additionally, the manual nature of scalpel use can result in longer incision times, which may extend the overall

duration of the surgical procedure.[4] To address these limitations, diathermy was introduced as an alternative method for skin incisions. Diathermy employs electrical energy to generate heat, which is then used to cut through tissue. This technique has been praised for its ability to make quick incisions with minimal blood loss.[5] Recent studies have provided statistical insights into the comparative efficacy of these two methods.[6] Despite these advantages, there are concerns about the use of diathermy for skin incisions. One of the primary concerns is the potential for improper wound healing and scarring.[7,8] This has led to hesitancy in the widespread adoption of diathermy for skin incisions, particularly in cosmetic-sensitive areas like C-sections.[8] Given the inconclusive nature of existing research and the importance of the choice of incision method on patient outcomes, there is a need for further studies to provide more definitive answers. This is particularly relevant in the context of elective surgeries, where both methods are commonly employed but seldom compared side-by-side in a rigorous manner.[9]

Therefore, the present study aims to conduct a comprehensive, observational comparison of diathermy and scalpel skin incisions in elective surgeries. By providing a thorough comparison, this study aims to contribute valuable data to the existing body of knowledge, thereby aiding clinicians in making more informed decisions regarding the choice of incision method in elective surgeries.

METHODS

This retrospective observational study was conducted over a period of 1.5 years, from March 2022 to 2023 September, at Enam Medical College, Dhaka, Bangladesh. The study aimed to compare the clinical and medical outcomes of two different methods of skin incision-scalpel and diathermy-in elective surgeries. A total of 150 patients were included in the study, with 75 patients in Group A who had undergone scalpel incisions and 75 patients in Group B who had undergone diathermy incisions. The inclusion criteria for the study were patients who had undergone elective surgery under either of the two methods-scalpel or diathermy-during the study period. Only those hospital records that were complete and included all necessary details such as patient demographics, type of surgery, incision time, blood loss, postoperative pain and wound healing complications were considered for the study. Surgical Site Infection (SSI) grading was implemented to better understand the wound related complications among participants.[10]

Data were collected retrospectively from the hospital records. All data were anonymized to ensure patient confidentiality. Statistical analyses were performed to compare the outcomes between the two groups. The study was approved by the Institutional Review Board of Enam Medical College and all ethical considerations were adhered to throughout the study.

RESULTS

In Group A, which consisted of patients who underwent scalpel incisions, 11 participants (14.67%) had hypertension, 2 (2.67%) had cardiovascular disease, 3 (4.00%) had diabetes, 3 (4.00%) had jaundice, and 1 (1.33%) had renal issues. On the other hand, in Group B, comprising patients who underwent diathermy incisions, 9 participants (12.00%) had hypertension, 1 (1.33%) had cardiovascular disease, 1 (1.33%) had diabetes, 3 (4.00%) had jaundice and 3 (4.00%) had renal issues (Table 1).

Table 1: Distribution of participants of both groups by presence of comorbidities.

Comorbidities	Group A		Group B	
	N	%	N	%
Hypertension	11	14.67	9	12.00
Cardiovascular disease	2	2.67	1	1.33
Diabetes	3	4.00	1	1.33
Jaundice	3	4.00	3	4.00
Renal issues	1	1.33	3	4.00

In Group A, consisting of patients who underwent scalpel incisions, the range of incision time was between 18 to 122 seconds, with a mean incision time of 53.14 seconds and a standard deviation of 17.24. Conversely, in Group B, comprising patients who underwent diathermy incisions, the range of incision time was between 8 to 84 seconds, with a mean incision time of 24.81 seconds and a standard deviation of 8.19 (Table 2).

Table 2: Observation of time taken for incision among participants of both groups.

Criteria	Group A	Group B
Range of incision time in seconds	18-122	8-84
Mean±SD incision time	53.14±17.24	24.81±8.19

In Group A, where patients underwent scalpel incisions, the range of blood loss was between 1 to 15.8 ml, with a mean blood loss of 9.61 ml and a standard deviation of 2.13. In contrast, in Group B, which included patients who underwent diathermy incisions, the range of blood loss was between 0 to 5.2 ml, with a mean blood loss of 1.82 ml and a standard deviation of 0.32 (Table 3).

Table 3: Observation of blood loss during incision among participants of both groups.

Criteria	Group A	Group B
Range for blood loss	1-15.8 ml	0-5.2 ml
Mean±SD blood loss	9.61±2.13	1.82±0.32

In Group A, 15 participants (20.00%) experienced hematoma, 12 (16.00%) had seroma and 13 (17.33%) faced wound dehiscence. On the other hand, in Group B, 3 participants (4.00%) had hematoma, 5 (6.67%)

experienced seroma and 13 (17.33%) faced wound dehiscence (Table 4).

Table 4: Observation of post-operative complications among participants of both groups.

Incidence of complications	Group A		Group B	
	N	%	N	%
Hematoma	15	20.00	3	4.00
Seroma	12	16.00	5	6.67
Wound dehiscence	16	21.33	13	17.33

In Group A, consisting of patients who underwent scalpel incisions, the mean pain score on the 1st post-operative day (POD) was 5.82 with a standard deviation of 1.68. On the 3rd POD, the mean pain score was 5.04 with a standard deviation of 0.24 and on the 5th POD, it was 3.56 with a standard deviation of 0.18. Conversely, in Group B, comprising patients who underwent diathermy incisions, the mean pain score on the 1st POD was 5.07 with a standard deviation of 0.28. On the 3rd POD, the mean pain score was 3.71 with a standard deviation of 0.29 and on the 5th POD, it was 2.08 with a standard deviation of 0.45 (Table 5).

Table 5: Post-operative mean pain score among participants of both groups.

Mean±SD pain score	Group A	Group B
1st POD	5.82±1.68	5.07±0.28
3rd POD	5.04±0.24	3.71±0.29
5th POD	3.56±0.18	2.08±0.45

In Group A, where patients underwent scalpel incisions, 62 participants (82.67%) had no surgical site infection (SSI), 2 (2.67%) had SSI Grade 1 (G1), 4 (5.33%) had SSI G2, 6 (8.00%) had SSI G3, 1 (1.33%) had SSI G4, and 2 had SSI G5. In contrast, in Group B, which included patients who underwent diathermy incisions, 59 participants (78.67%) had no SSI, 3 (4.00%) had SSI G1, 4 (5.33%) had SSI G2, 4 (5.33%) had SSI G3, 1 (1.33%) had SSI G4, and none had SSI G5 (Table 6).

Table 6: Postoperative wound grading among participants of both groups.

Surgical site wound grading	Group A		Group B	
	N	%	N	%
None	62	82.67	59	78.67
SSI G1	2	2.67	3	4.00
SSI G2	4	5.33	4	5.33
SSI G3	6	8.00	4	5.33
SSI G4	1	1.33	1	1.33
SSI G5	2	2.67	0	0.00

DISCUSSION

In the observational study conducted, a comprehensive comparison between scalpel and diathermy skin incisions in elective surgeries was made, focusing on various clinical and medical outcomes such as comorbidities, incision time, blood loss, post-operative complications, pain scores and wound grading. The discussion that follows aims to situate these findings within the existing body of literature, while maintaining an observational tone. The prevalence of hypertension was slightly higher in Group A (14.67%) compared to Group B (12.00%). Although no specific studies were located that discuss the distribution of comorbidities in patients undergoing diathermy versus scalpel incisions, it is worth noting that hypertension is generally prevalent in surgical patients. When it comes to incision time, the study observed a significantly shorter mean incision time in the diathermy group (24.81 seconds) compared to the scalpel group (53.14 seconds). This observation is consistent with a study by Lodhi et al, which, while not finding a statistically significant difference in incision time between the two methods, did note less blood loss in the diathermy group.[11] Another study by Shaaban et al also found that diathermy was associated with a decreased incisional period and post-operative pains during Cesarean sections.[8] Regarding blood loss, the study found a mean blood loss of 9.61 ml in the scalpel group and 1.82 ml in the diathermy group. This observation is in line with the findings of Lodhi et al, who concluded that diathermy is a primary choice for minimizing blood loss.[11] In the domain of post-operative complications, the study observed that hematoma was more prevalent in the scalpel group (20.00%) than in the diathermy group (4.00%). While a study by Yadav et al also compared outcomes of scalpel versus diathermy skin incision in inguinal hernia surgery, it did not specifically discuss hematoma rates.[12] Concerning pain scores, the study observed consistently lower mean pain scores in the diathermy group across the 1st, 3rd and 5th post-operative days. This observation corroborates the study by Shaaban et al, which reported significantly lower visual analogue scale (VAS) scores in the diathermy group at various post-operative time points.[8] Lastly, the study employed Surgical Site Infection (SSI) Grading and observed that most participants in both groups had no SSI. While no comparable studies with SSI Grading were found, a study by Yadav et al discussed the risks associated with scalpel injuries, suggesting that reducing the use of scalpel could decrease the transmission of infection.[12] In summary, the findings of this observational study largely corroborate existing literature, with some variations possibly attributable to methodological differences or patient demographics. Further research is warranted to confirm these findings and to delve deeper into the nuances that this study has brought to light.

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community, was limitations of this study.

CONCLUSION

In this observational study conducted at Enam Medical College, Dhaka, Bangladesh, a comprehensive comparison

between diathermy and scalpel skin incisions in elective surgeries was undertaken. The study focused on various clinical and medical outcomes, including comorbidities, incision time, blood loss, post-operative complications, pain scores, and wound grading. The findings suggest that diathermy incisions are associated with shorter incision times and reduced blood loss compared to scalpel incisions. However, both methods showed varying rates of post-operative complications, with hematoma being more prevalent in the scalpel group. Pain scores were consistently lower in the diathermy group across multiple post-operative days. The study also employed Surgical Site Infection (SSI) Grading, revealing that most participants in both groups had no SSI. The study's findings largely corroborate existing literature, with some variations possibly attributable to methodological differences or patient demographics. These observations contribute to the growing body of evidence that supports the use of diathermy as a viable alternative to scalpel incisions in elective surgeries. However, it is crucial to note that the choice between diathermy and scalpel should be made based on individual patient characteristics, surgical requirements, and the surgeon's expertise. Further research is warranted to confirm these findings and to explore the nuances that this study has brought to light. Such research could provide more targeted recommendations for surgical practice, thereby enhancing patient outcomes and healthcare efficiency.

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