

Electrocautery Verses Scalpel for Abdominal Incisions in Repeat Caesarian Section

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ABSTRACT

Objective: To compare the mean operative time, post-operative pain and blood loss with electrocautery verses scalpel in repeat caesarian sections for abdominal incisions.

Study Design: Randomized controlled trial study

Place and Duration of Study: This study was conducted at the MCH Centre PIMS Hospital, Islamabad from June, 2020 to December, 2020 for a period of six months.

Materials and Methods: Total 100 women with singleton pregnancy (assessed on USG) of gestational age 37-41 weeks (assessed by LMP) undergoing cesarean section of 18-45 years of age were selected and randomly divided into two groups of 50 women in each. Women with Gestational Diabetes, Primigravida, hepatic or renal impairment were excluded. Group A included woman who had incision with electrocautery. Group B included women who had incision with scalpel. All operations in both groups were done by same surgeon and operative time, post-operative pain and blood loss was measured.

Results: In our study, the mean operative time in Group A (Electrocautery group) was 66.92 ± 7.39 minutes while in Group B (scalpel group) was 86.98 ± 5.84 minutes (p-value = 0.0001). Mean blood loss in Group A (Electrocautery group) was 194.32 ± 56.01 ml while in Group B (scalpel group) was 418.96 ± 26.18 ml (p-value = 0.0001). Mean post-operative pain in Group A (Electrocautery group) was 1.84 ± 1.13 while in Group B (scalpel group) was 3.28 ± 1.37 (p-value = 0.0001).

Conclusion: This study concluded that the electrocautery incision is better than scalpel skin incisions in terms of incision time, blood loss and post-operative pain.

Key Words: caesarean section, electrocautery, blood loss

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INTRODUCTION

The caesarean section is the most commonly performed surgery in the female of reproductive age. There are many techniques of performing Caesarian section. Every technique has its own advantage and disadvantage. The skin incision may be vertical, midline, Para median and the most common being pfannenstiel incision.¹ Electrocautery is an alternate method to open the skin by the use of an alternating current.¹

Electrocautery is time saving method with rapid haemostasis, rapid and precise tissue dissection and a reduced overall operative blood loss.² The complications for electrocautery include burns at the patient plate, explosion and fire, surgical smoke and ventricular fibrillation in patients with pacemakers.¹

Skin incisions are routinely made with stainless steel scalpel which are supposed to be more bloody and painful.³ The disadvantages of steel scalpel include more blood loss, indistinct tissue separation, more operative time. The scalpel method requires use of foreign material in the wound leading to infection risk.

In Liaquat University Jamshoro Pakistan, Clinical trial on Diathermy and Scalpel incision in elective general surgery by surgery department shows that for Scalpel group the Mean incision time was 8.9025 sec/cm² (SD ± 1.3666 sec/ cm²) and for Diathermy group the mean incision time was 7.3057 sec/cm² (SD ± 0.9677 sec/cm²). Mean incision blood loss in Scalpel group was also found to be significantly higher i.e. 1.8262 mL/cm² (SD ± 0.2984 mL/cm²) compared to Diathermy group patients i.e 1.1346 mL/cm² (SD ± 0.3399 mL/cm²). Postoperative pain on day one, two, and five

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was assessed by Verbal Rating Scale (VRS). It was significantly higher in Scalpel group.⁴

Chalya et al in their study on diathermy versus scalpel incisions in elective midline laparotomy in general surgery at Tanzania showed the reduction in mean incision time with Scalpel was statistically significant. The mean loss of blood for Diathermy incisions was significantly less as compared to Scalpel.⁵

In a study at a teaching hospital in Sola, patients were allocated consecutively to have either scalpel or cutting electrocautery incisions. The incision time was significantly shorter and the blood loss was significantly less with the electrocautery compared to the scalpel.⁶ Another study concluded that electrocautery use for the skin incision is having better cosmetic results with shorter healing time⁷.

There are only a few studies conducted in Pakistan to compare electrocautery versus scalpel in abdominal surgeries. Caesarian section rate has increased over the last decade. The complications related to wound have also increased resulting in increased morbidity and increased use of hospital resources in a low income country. Our study results may provide better methodology that may be adopted in future for better outcome.

MATERIALS AND METHODS

After approval from ethical committee, a randomized control trial was conducted in MCH center PIMS Islamabad from June 30, 2020 to December 29, 2020. After taking written consent 100 women fulfilling following selection criteria were included in study.

Inclusion Criteria:

- Singleton pregnancy
- Elective repeat caesarian section (previously 1-4 caesarian sections).
- Gestational age at term, 37-41 weeks.
- Age 18-45 years.

Exclusion Criteria:

- Anemia with Hb <10 g/dl.
- History of steroids intake
- Severe hepatic, renal impairment or Gestational Diabetes
- Bleeding disorder
- History of pacemaker

Patients were divided randomly using computer gen into two equal groups. 50 patients in group A (Electrocautery) while 50 in group B (Scalpel).

All CS was carried out by a same surgeon of more than 2 years of experience. An observer noted the time from skin incision till the completion of procedure namely skin closure. At the end of the procedure suction bottle was measured and sponges were counted and weighed to see the total blood loss during the procedure. All women were evaluated for post op pain and pain

intensity was calculated according to numeric rating scale at 12 hours. After the operation and during the post-operative stay in the hospital analgesia was given intra-muscularly three times a day to all patients according to hospital protocol.

All the data was entered and analyzed by using SPSS version 24.0. Age, gestational age and parity, operative time, pain and blood loss were presented as mean and standard deviation. Comparison of the mean operative time, pain and blood loss between both groups was analyzed by independent 't' test. P value ≤0.05 was considered as statistically significant. Effect modifiers like age, gestational age, number of CS and type of anesthesia were controlled by stratification.

RESULTS

Age range in this study was from 18 to 45 years with mean age of 28.13 ± 6.02 years. The mean age of patients in group A was 28.18 ± 6.37 years and in group B was 27.76 ± 5.55 years.

Table No.I: Comparison of mean operative time, post-operative pain and blood loss with electrocautery versus scalpel in repeat caesarian sections for abdominal incisions

Outcome	Group A (n=50)	Group B (n=50)	P-Value
	Mean ± SD	Mean ± SD	
Operation time (minutes)	66.92 ± 7.39	86.98 ± 5.84	0.0001
Blood Loss (ml)	194.32 ± 56.01	418.96 ± 26.18	0.0001
Pain	1.84 ± 1.13	3.28 ± 1.37	0.0001

Table No.2: Stratification of Operative time with respect to age, gestational age, number of CS and type of anesthesia

Co-morbid conditions		Group A (n=50)		Group B (n=50)		P-value
		Operative time (minutes)		Operative time (minutes)		
		Mean	SD	Mean	SD	
Age (years)	20-30	68.31	7.56	85.31	6.65	0.0001
	31-45	65.42	7.05	87.76	5.35	0.0001
GA (weeks)	37-39	68.08	7.65	86.83	6.17	0.0001
	40-41	63.93	5.90	87.36	5.11	0.0001
Number of CS	1-2	66.89	7.28	87.54	6.11	0.0001
	3-4	67.0	7.90	86.27	5.55	0.0001
Type of anesthesia	GA	68.72	8.76	84.59	5.92	0.0001
	SA	65.91	6.43	88.21	5.49	0.0001

Mean gestational age was 38.76 ± 1.17 weeks. The mean gestational age in group A was 38.72 ± 1.11 weeks and in group B was 38.78 ± 1.23 weeks. Mean

parity was 2.21 ± 0.96 . The mean number of previous CS in group A was 2.14 ± 0.95 and in group B was 2.35 ± 0.98 . Only 9 out of 100 patients (9%) required general anesthesia, 5 out of 50 (10%) in group A while 4 out of 50 (8%) in group B. The remaining 91 patients were given spinal anesthesia.

In my study, the mean operative time in Group A (diathermy group) was 66.92 ± 7.39 minutes while in Group B (scalpel group) was 86.98 ± 5.84 minutes (p-value = 0.0001). Mean blood loss in Group A (diathermy group) was 194.32 ± 56.01 ml while in Group B (scalpel group) was 418.96 ± 26.18 ml (p-value = 0.0001). Mean post-operative pain in Group A (diathermy group) was 1.84 ± 1.13 while in Group B (scalpel group) was 3.28 ± 1.37 (p-value = 0.0001) as shown in Table I.

Table No.3: Stratification of blood loss with respect to age, gestational age, number of CS and type of anesthesia

Co-morbid conditions		Group A (n=50)		Group B (n=50)		P-value
		Blood Loss (ml)		Blood Loss (ml)		
		Mean	SD	Mean	SD	
Age (years)	20-30	182.15	33.50	417.88	24.50	0.0001
	31-45	207.50	71.52	421.25	30.18	0.0001
GA (weeks)	37-39	188.94	33.61	421.58	24.38	0.0002
	40-41	208.14	92.19	412.21	30.27	0.0001
Number of CS	1-2	197.63	62.44	417.50	27.72	0.0001
	3-4	186.60	37.67	420.82	24.60	0.0001
Type of anesthesia	GA	239.22	68.58	416.82	23.53	0.0001
	SA	169.06	23.45	420.06	27.74	0.0001

Table No.4: Stratification of Post-operative pain with respect to age, gestational age, number of CS and type of anesthesia

Co-morbid conditions		Group A (n=50)		Group B (n=50)		P-value
		Post-operative pain		Post-operative pain		
		Mean	SD	Mean	SD	
Age (years)	20-30	1.81	1.23	3.15	1.37	0.0001
	31-45	1.88	1.03	3.56	1.36	0.0001
GA (weeks)	37-39	1.72	1.00	3.19	1.21	0.0001
	40-41	2.14	1.41	3.50	1.74	0.0001
Number of CS	1-2	1.83	1.22	3.54	1.32	0.0001
	3-4	1.87	0.92	2.95	1.40	0.0001
Type of anesthesia	GA	1.78	1.21	3.18	1.01	0.0001
	SA	1.88	1.10	3.33	1.53	0.0001

Stratification of Operative time with respect to age, gestational age, number of CS and type of anesthesia is shown in Table 2. Stratification of blood loss with respect to age, gestational age, number of CS and type of anesthesia is shown in Table 3. Stratification of post-operative pain with respect to age, gestational age, number of CS and type of anesthesia is shown in Table 4.

DISCUSSION

Electrocauterization or electrocautery is routinely used in surgery to remove unwanted or harmful tissue, i.e., tissue dissection, burn and seal blood vessels, and to create a surgical incision. It is also used increasingly to reduce or stop bleeding.⁸ However, electrocautery, which is available in all surgical theaters, is less frequently used for skin incisions due to fear of tissue damage, poor wound healing, postoperative pain, and excessive scarring.⁹ We have conducted this study to compare the mean operative time, post-operative pain and blood loss with electrocautery verses scalpel in repeat caesarian sections for abdominal incisions.

In our study, the mean operative time in Group A (diathermy group) was 66.92 ± 7.39 minutes while in Group B (scalpel group) was 86.98 ± 5.84 minutes (p-value = 0.0001). Chalya et al⁵ in their study on diathermy versus scalpel incisions in elective midline laparotomy in general surgery at Tanzania showed the mean incision time with scalpel was 9.21 ± 1.40 sec/cm² in comparison to 7.84 ± 0.82 sec/cm² with diathermy incisions. The difference between the two groups with respect to the mean incision time was statistically significant. A randomized clinical trials, has shown that incision time was significantly longer for patients in scalpel group (p = 0.001).¹⁰ In Liaquat University Jamshoro Pakistan, Clinical trial on Diathermy and scalpel incision in Elective general surgery by surgery department shows that for group A the Mean incision time was 8.9025 sec/cm² (SD \pm 1.3666 sec/ cm²) and for group B the mean incision time was 7.3057 sec/cm² (SD \pm 0.9677 sec/cm²) for group B patients.⁴ Ly et al¹¹ in their systemic review and meta-analysis of fourteen randomized trials comprising of 2541 patients (1267 undergoing skin incision by cutting diathermy and 1274 by scalpel), found that diathermy may offer significant advantages in many variables including, operative blood loss, incision time and postoperative pain. A prospective non-randomized study¹² has shown significantly lesser incision time ($6.6 \text{ min} \pm 3.1 \text{ min}$; $t = 2.8$; $P = 0.006$) compared to scalpel group. In a study at a teaching hospital in Sola, patients were allocated consecutively to have either scalpel or cutting electrocautery incisions. The incision time was shorter in the electrocautery group ($P < 0.001$).⁶

Our study has shown the mean blood loss in Group A (diathermy group) was 194.32 ± 56.01 ml while in Group B (scalpel group) was 418.96 ± 26.18 ml (p-value = 0.0001). Mean incision blood loss in scalpel

group was also found to be significantly higher i.e. 1.8262 mL/cm² (SD \pm 0.2984 mL/cm²) compared to diathermy group patients i.e. 1.1346 mL/cm² (SD \pm 0.3399 mL/cm²).⁴ Ly et al¹¹ in their systemic review and metaanalysis of fourteen randomized trials comprising of 2541 patients (1267 undergoing skin incision by cutting diathermy and 1274 by scalpel), found significantly reduced amounts of blood loss (mean difference of 0.72 mL/cm (2); P < 0.001) as compared to scalpel incisions. The blood loss was less with the electrocautery compared to the scalpel (6.53 \pm 3.84 ml vs. 18.16 \pm 7.36 ml, P<0.001).⁶ A prospective nonrandomized study¹² had a significantly low blood loss (18.1 g \pm 16.1 g vs. 35.8 g \pm 16.9 g; t = 4.1; P = 0.0001).

Mean post-operative pain in Group A (diathermy group) was 1.84 \pm 1.13 while in Group B (scalpel group) was 3.28 \pm 1.37 (p-value = 0.0001). Pain perception was found to be markedly reduced during the first 48 h in group A (p = 0.000).¹⁰ In Liaquat University Jamshoro Pakistan, postoperative pain on day one, two, and five was assessed by VRS. It was significantly higher in diathermy group.⁴ In one study by Kearns and colleagues¹³ it was found that diathermy produces significantly less postoperative pain on the first and second postoperative day when compared to scalpel incisions. From the third postoperative day onwards, severity of pain after surgery became significantly different between the two groups. A prospective nonrandomized study¹² has shown that electrosurgery group also had a significantly lesser postoperative pain score at 6 h, 12 h, and 24 h.

CONCLUSION

This study concluded that the diathermy incision is better than scalpel skin incisions in terms of incision time, blood loss and post-operative pain. So, we recommend that diathermy should be used routinely in repeat caesarian sections for abdominal incisions for reducing the blood loss and post-operative pain which will in turn improve their quality of life by reducing post-operative morbidity.

Author's Contribution:

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