

Comparative Study - Electrocautery versus Scalpel in Joel Cohen Abdominal Incision in Women Undergoing Cesarean Section

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Abstract: Study was conducted in tertiary care, Santosh hospital. In this study of 60 patients who required c section, without any risk factors, we randomly divided into two groups, out of which in one group cautery was used for abdominal Joel Cohen incision and other group scalpel was used for the same. The groups were assessed for. Time taken for the incision from skin to uterus- we found that the time taken in cautery group was significantly higher as compared to that of scalpel group. Blood loss during the incision- it was measured by using standard pre weighted mops. Number of mops used and weight of the mops after the abdominal incision was calculated. It was noticed that cautery group had significantly less blood loss as compared to scalpel group. For all the cases pre-operative hemoglobin was sent, and post-operative hemoglobin was checked on day 2. It was seen that there was no significant difference in hemoglobin difference in both the groups. Fetal outcome was assessed in both the groups by noticing Apgar score at 1 min and at 5 min interval after the delivery of the fetus, we noticed that there was no difference in the apgar scores of both the groups. Post-operative pain was assessed by Waun baker scale that is the visual pain scale and it was seen that cautery has more post-operative pain as compared to scalpel group. Conclusions-Cautery is a good alternative to scalpel of abdominal incisions in C-section. Cases have to be individualized for the use of different modalities. Cautery is of benefit in India where the incidence of anemia is so high.

Keywords: Joel Cohen incision, scalpel, cautery, incision time, C section

1. Introduction

Cesarean section is the delivery of a viable baby by a surgical incision through the anterior abdominal wall and intact uterus and has been associated with severe maternal morbidity and mortality in the past. Since the time of its invent there have been various modifications in the technique. To prevent maternal and fetal morbidity and mortality the procedure has undergone various modifications. We still have many techniques used worldwide and still there have been many ideas to improve it further. Different operative techniques have been described in the steps of Cesarean section with many pros and cons for each procedure. Caesarean section is one of the most commonly performed major surgical procedures worldwide, with an estimated 18.5 million cases performed annually. [1] The Healthy People target for 2020 is a cesarean delivery rate of 23.9% in low-risk full term women with a singleton, vertex presentation. This is much higher than the never achieved target cesarean rate of 15% for Healthy People 2010. [2] Some authors tried to compare the use of diathermy versus scalpel during anterior abdominal wall incision and many of them showed that electrocautery incision is better than scalpel incision in terms of time taken for the incision, pain levels, wound healing and blood loss.[3] The rate of c section is on a hike. The modern world and the demands can be one of the cause. The factors are many and are being studied. While the technique is still evolving, there lacks uniformity. Different people have different methods. There becomes a need to find out the techniques with would favor a better maternal and fetal outcome, and a time saving procedure at the same time.

2. Literature Survey

The most practiced surgical technique for performing cesarean delivery is the lower segment cesarean section which described by Munro Kerr in the early of 20th century and by the low transverse skin incision described by Pfannenstiel in 1900. Since introduction of this technique, not many modifications has been introduced until the first of 1954 where Joel Cohen introduced a new incision for cesarean. In general, the transverse incision is associated with less postoperative pain, greater wound strength and better cosmetic results than the vertical midline incision.[4]

Types of abdominal incision in c section:

- 1) Vertical incision- Traditionally, vertical incisions were used for caesarean delivery
- 2) The lower abdominal transverse

A) Pfannenstiel-. Classically, this incision is located two fingers-breadth above the pubic symphysis. Here the skin may be entered via a low transverse incision that curves gently upward, placed in a natural fold of skin (the 'smile' incision). After the skin is entered, the incision is rapidly carried through subcutaneous tissue to the fascia, which is then nicked on either side of the midline. The subcutaneous tissue is incised sharply with a scalpel. Once the fascia is exposed, it is incised transversely with heavy curved Mayo scissors. In the standard technique, the upper and then the lower fascial edges are next grasped with a heavy toothed clamp, such as a Kocher, and elevated. Under continuous tension, the fascia is then separated from the underlying muscles by blunt and sharp dissection. Once the upper and lower fascia have been

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dissected free, and any perforating vessel sutured or electrocoagulated, the underlying rectus abdominus muscles are separated with finger dissection. If the muscles are adherent, sharp dissection is necessary to separate them. The peritoneum is then opened sharply in the midline. The initial entry is then widened sharply with fine scissors exposing intraperitoneal contents. [5]

B) Maylard and Cherney- When exposure is limited and additional space is required, the Maylard or Cherney modification may be used. In the Maylard procedure, the rectus abdominus muscles are divided either sharply or by electrocautery to allow greater access to the abdomen. However, this may result in a good deal of tissue damage and the underlying artery may be entered. The Maylard incision length is usually longer than the Pfannenstiel incision. However, difficulty in delivery of the fetus is minimal with Pfannenstiel incisions measuring at least 15 cm in length, the length of a standard Allis clamp - the Allis clamp test. Shorter incisions may lead to difficulty in general exposure or delivery of the baby's head, or both. [5] In the Cherney procedure, the lower fascia is reflected exposing the tendinous attachment of the rectus abdominus muscle bodies to the fascia of the pubis. The muscle is severed as low as possible and the proximal and distal ends suture ligated. One or both muscle attachments may be divided as required. The Mouchel incision is similar to the Maylard incision. This transverse incision runs at the upper limit of the pubic hair and is thus lower than the Maylard incision. The muscles are divided above the openings of the inguinal canals.[6]

C) Pelosi technique- In the Pelosi technique for caesarean delivery, the skin is cut in a low transverse fashion with a knife. The subcutaneous tissues and fascia are incised with electrocautery. The upper aspect of the fascial incision is elevated and the median raphe (line or ridge) is dissected cephalad (towards the head) 2 cm to 3 cm using electrocautery. The rectus muscles are separated bluntly with fingers to identify the underlying peritoneum, which is then entered by inserting the index finger inwards and upwards or sharply as required. The peritoneum and muscles are stretched to the full extent of the skin. In this technique, no bladder flap is created before incision of the uterus (hysterotomy). After delivery of the baby, the obstetrician awaits spontaneous placental expulsion before closing the hysterotomy in one layer. The fascia is closed and the skin edges are approximated with staples. The Pelosi technique was reported to be associated with decreased operative time, decreased blood loss, improved patient outcome and decreased overall cost.

D) Joel-Cohen described a transverse skin incision, which was subsequently adapted for caesarean sections. This modified incision is placed about 3 cm below the line joining the anterior superior iliac spines. This incision is higher than the traditional Pfannenstiel incision. Sharp dissection is minimized. After the skin is cut, the subcutaneous tissue and the anterior rectus sheath are opened a few centimeters only in the midline. The rectus sheath incision may be extended

laterally by blunt finger dissection or by pushing laterally with slightly opened scissor tips, deep to the subcutaneous tissues. The rectus muscles are separated by finger traction.

E) Misgav ladach- If exceptional speed is required in the transverse entry, the fascia may be incised in the midline and both the fascia and subcutaneous tissue are rapidly divided by blunt finger dissection. Stark used this incision for caesarean delivery along with single layer closure of the exteriorized uterus and non-closure of the peritoneum. This package of surgical techniques for caesarean section used at the Misgav-Ladach hospital, Jerusalem, has been popularized by Stark and others. The reported advantages include shorter operating time, less use of suture material, less intraoperative blood loss, less postoperative pain and less wound infection in the group undergoing caesarean by these techniques. There are other Cochrane reviews on surgical techniques used at caesarean section, for example, techniques of repair of the uterine incision, techniques for closure of the abdominal wall and skin after caesarean section. This review focuses specifically on abdominal surgical incisions for caesarean section.[5]

Electrosurgery involves manipulation of electrons through living tissue using an alternating current density sufficient to create heat within tissue cells to destroy them. Two different surgical effects can be achieved with Electrosurgery, namely cutting (of tissue) and coagulating. In the cutting mode, a continuous current rapidly produces extreme heat causing intracellular water to boil and cells to explode into steam (vaporization). By moving the electrode quickly, more cells vaporize and the tissue is divided with minimal devitalized or charred tissue left along the margin of the cut surface. Thermal damage is minimal since heat evaporates as steam and is not conducted through the cut tissues, which would dry out the adjacent cells. In the coagulating mode, short bursts of electrical current are applied with a pause between each burst. As a result, the heat produced in the cells dries up the tissue but is not intense enough to evaporate intracellular water. [7]. The potential benefits of Electrosurgery have been suggested to include reduced blood loss, dry and rapid separation of the tissue, and a possible decrease in the risk of accidental injury caused by the scalpel blade to operative personnel [7]. There are concerns about the impact of electrosurgery on wound infection, wound healing, scarring, and adhesion formation, which have limited the use of electrosurgery for surgical wound creation. [8]

3. Materials and methods

Duration of Study: 9 months

Inclusion Criteria

Patients willing to participate in the study, age more than 18 years undergoing c section as in-patients in Santosh hospital, Bangalore. And giving consent to be a part of the study. The patients were divided into 2 groups based on the type of abdominal incision used in the c section.

- 1) Scalpel for entering the abdomen in Joel Cohen incision
- 2) Electrocautery for entering the abdomen in Joel Cohen incision.

Exclusion Criteria:

- Patients with Patients with coagulopathy or hemoglobinopathies.
- Severe anemia (<7 gm%).
- Preterm c sections.
- PPH

- 1) During the Cesarean section the time interval was observed from the time of skin incision till the time of uterine incision, in seconds.
- 2) A standard sized mop weighing 400 grams was used for all cases. Number of mops were counted in each cases and were weighed separately at the end of procedure, using the standard weighing machine.
- 3) Postoperative pain assessment, two hours after the section will be assessed with help of pain scale



- 4) Post-operative demand for analgesia was noted.
- 5) On postoperative day 2 a repeat hemoglobin will be sent to assess the amount of blood loss during the surgery.
- 6) Any cases undergoing postoperative complications like wound dehiscence, infection, hematoma formation was noted. Proportions were compared using Chi-square test of significance.

4. Discussion

The patients were matched in both the groups in accordance to the history of previous sections. With the matching, in both the groups patients undergoing section for the first time were 13(43.3%), previously had one section were 12(40.0%) and previously had two sections were 5(16.7%). After the matching in both the groups there was some measure of patients undergoing C section for first time, with history of one section and with history of two sections. Statistically this matching allowed to eliminate the effects of previous sections in the various parameters which are considered for comparison of the two modalities.

In the 30 patients who underwent C section using Cautery, 10(33.3%) were elective surgeries and 20(66.7%) were emergency surgeries. In the 30 patients who underwent C Section by using Scalpel technique 15(50%) were elective surgeries and 15(50%) were emergency surgeries.

In our study for all 30(100%) patients who underwent the procedure using Cautery method 1 mop was used during the procedure, in patients who underwent the procedure by scalpel method 1 mop was used in 27(90%) patients and 2 mops were used in 3(10%) patients. This indicated that there was relatively more blood loss in patients undergoing the procedure with scalpel method.

In our study there was significant difference in mean weight of mops used in the procedures for both the groups. The mean weight of mops in procedures with cautery method was 59.0 gm and for procedures with scalpel method was 366.5 gm In statistical analysis the p value was found to be <0.001 which is statistically significant. This indicated that there was significantly more blood loss in scalpel method for C Section. So we found a significant difference in the blood loss during incision between cautery and scalpel group. Cautery has less blood loss, less usage of mops and less mops weight.

On comparison of the pre section and post section (POD-2) Hemoglobin levels it was found that there is reduction in the Hb values for both the methods used, with cautery method leading to slightly higher Hb values then the scalpel method on POD 2, however on statistical analysis on comparison of both the modalities for difference between the cautery method and scalpel method the p value was found to be 0.080 with is not considered statistically significant. So although the cautery method has led to higher Hb values at POD 2 the difference from the scalpel method is considered statistically insignificant.

On comparison for Time taken in incision from skin to uterus the mean time taken for cautery method was 368.6 sec and for scalpel method was 204.7 seconds. This implies that for there was significantly more time taken in cautery group in our study as compared to the scalpel group. On comparing both groups statistically the p value was found to be <0.001 which is statistically significant. This indicated that there is a significant difference in time taken in the cautery method and scalpel with the time taken in the cautery method being significantly more.

On comparing the fetal outcome of for both the methods, there was no difference seen in fetal outcome in both the groups. The mean Apgar score for both cautery and scalpel was 8.47 at 1 min and was 9.47 for cautery and 9.67 for scalpel at 5 min. on statistical analysis the p value was found to be 1.0 at 1 min and 0.147 at 5 min with is statistically insignificant

As regards pain intensity, our study showed that there are more complaints of post-operative pain in cautery group. The mean pain range in cautery group was 5.6 and in scalpel group was 4.2. On statistical analysis the p value was found to be <0.001 which is statistically significant.

5. Conclusion

Blood loss was significantly less in the cautery group as compared to the scalpel group as estimated by the number of mops used which was statistically significant less in the cautery group, and also by the weight of mops used during both the modalities. Cautery mops weighed very less in comparison to scalpel. In the cautery group the time taken was significantly more than the time taken in scalpel group. Despite this fact the fetal outcome in both the groups was similar, which was assessed by fetal Apgar score at 1 minute and at 5 minutes. The post-operative pain was high in cautery

group but this has not been supported by many studies in the past. Long term effects still needs to be evaluated, but the cases have to be individualized for the usage of different modalities, such as time available and also for minimization of blood loss. We can conclude that usage of electrocautery with correct training to the surgeons will definitely give better results than scalpel incision in relation to the blood loss and can be used as an alternative method or in conjunction with scalpel.

Author Profile



Dr Purvi Agrawal has completed her DGO and DNB from Karnataka and presently she is undergoing training in fetal medicine.

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