The Effect of the Method of Placental Delivery and Site of Uterine Closure on Intra-operative Blood Loss and Postpartum Endometritis

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ABSTRACT

Background: Some of the short term morbidities in caesarean section include hemorrhage, post operative fever and endometritis and caesarean is the most common major operation performed worldwide on women, still there is no universally accepted procedure for management of placental delivery after caesarean section, whether to clear the uterine cavity or not for the residual membranes and whether to close the uterine incision by exteriorization or intra peritoneally. Taking all this into consideration this study was aimed at looking for the best method of practice in one of the most common operations in Obstetrics in this era.

Methods: After extraction of the baby the placenta was removed either manually or delivered spontaneously and to wipe the uterine cavity with a mop was left to the decision of the operating surgeon and closure of the uterine incision (intra peritoneal or exteriorization) was done according to the convenience of the surgeon. The following outcomes were studied based upon the above operative techniques- intra operative blood loss & post operative endometritis.

Results: The average blood loss in spontaneous delivery of placenta was 319.30±104.1 ml and in manual removal of placenta it was 346.63±111.7 ml. Uterine incision was closed extraperitoneally.

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in 61 cases with an average blood loss of 291.03±98.9 ml and in 42 cases of intraperitoneal uterine closure the average blood loss was 396.79±91.1 ml with a significant p value of <0.0001.

**Conclusion:** Spontaneous delivery of placenta along with closing the uterine incision by exteriorizing the uterus has minimal blood loss. By knowing this, caesarean sections, one of the most common operations in obstetric practice can be made as safe as possible.

**Keywords:** Caesarean section; placental delivery; endometritis; manual removal of placenta; uterine mopping.

### 1. INTRODUCTION

Of the profound alterations in the practice of Obstetrics over the past century, one of the most apparent has been the progressive increase in the frequency of caesarean delivery. Since 1990s and beyond, most countries have seen a progressive increase in caesarean birth and there is no evidence to suggest this trend is declining [1]. Along with the increase in caesarean rates maternal mortality and morbidity is also been increasing. Some of the short term morbidities of caesarean delivery are hemorrhage, post operative fever and endometritis. Infection is one of the major possible complications of caesarean delivery. The risk of endometritis is eight fold higher than after vaginal delivery [2].

Obstetric hemorrhage accounts for one of the major possible complications of abdominal delivery and a good knowledge of surgical principles helps in minimizing the morbidity associated with it [3]. Such techniques which were tried to reduce the blood loss include finger splitting versus scissor cutting of uterine incision, intraperitoneal and exteriorization of uterus for closing uterine incision and manual versus spontaneous removal of placenta [4]. Manual versus spontaneous removal of placenta have been studied in various controlled trials but according to Wilkinson and Enkin at the Cochrane collaborative, the evidences are not sufficiently strong enough to make a universal recommendation [3].

### 2. AIMS AND OBJECTIVES

1. To compare the effect of manual removal and spontaneous removal of placenta on intra operative blood loss and post caesarean endometritis.
2. To compare the site of uterine closure with operative blood loss.
3. To determine whether uterine mopping is associated with post operative endometritis.

### 3. MATERIALS AND METHODS

It is prospective, descriptive and a comparative study. All women undergoing elective LSCS (Lower Segment Cesarean Section) between September 2014 and February 2015 (6 months) were included in the study.

#### 3.1 Inclusion Criteria

1. Elective LSCS
2. Hemoglobin ≥ 10 g%
3. Gestational age ≥ 37 completed weeks
4. Singleton pregnancies

#### 3.2 Exclusion Criteria

1. Emergency LSCS
2. Placenta previa
3. Gestational diabetes mellitus
4. Obvious vaginal infections
5. Pre-eclampsia & eclampsia
6. Morbidly adherent placenta
7. Multiple pregnancy
8. Abruptio placenta
9. Polyhydramnios
10. PROM (Premature Rupture of Membranes)
11. Jaundice in pregnancy
12. Pregnancy with fibroid uterus
13. Patients with bleeding disorders
14. Immunocompromised patients
15. Prolonged obstructed labour
16. Primary and secondary PPH

After extraction of the baby the placenta was removed either manually or delivered spontaneously and to wipe the uterine cavity with a mop was left to the decision of the operating surgeon and closure of the uterine incision (intraperitoneal or exteriorization) was done according to the convenience of the surgeon.

The following outcomes were studied based upon the above operative techniques

- Intra operative blood loss &
- Post operative endometritis.
Intra operative blood loss was compared between the patients with manual removal of placenta and spontaneous delivery of placenta and also operative blood loss was compared with intraperitoneal closure of uterine incision with closure of uterine incision after exteriorization of the uterus.

The effect of mopping the uterine cavity after placental delivery to remove the residual membranes on post operative endometritis was studied.

For the study purpose

1. Blood loss was estimated by the formula\[\text{Actual blood loss (in ml)} = \text{BV} \times \left(\frac{\text{HI} - \text{HA}}{\text{HAVG}}\right)\]
   i. \(\text{BV} = \text{Blood volume, calculated by- body weight } \times 70\)
   ii. \(\text{HI} = \text{Initial hematocrit (on the previous day of surgery)}\)
   iii. \(\text{HA} = \text{Hematocrit after surgery on 3rd postoperative day}\)
   iv. \(\text{HAVG} = \text{Average of both the hematocrits.}\)

2. Post operative endometritis was diagnosed by having at least 2 temperature readings of > 38°C with minimum of 6 hrs apart after the first 24 hrs with any of the following two criteria.
   i. Soft and tender uterus
   ii. Foul smelling lochia
   iii. Leukocytosis (> 15000/cu mm)
   iv. Sub involution of uterus (Rate of involution at <1 cm/day)

3.3 Method of Collection of Data

A pre-structured proforma was made and details regarding general information of the patient, bio demographic data, age, parity, gestational age, indication for cesarean section, general and systemic examination, pre operative haemoglobin and haematocrit were entered in it. All the cesareans were done by equally competent surgeons with similar years of experience in the field and the description of the operative techniques adopted for placental delivery that is whether it was removed manually or delivered spontaneously and site of uterine closure (intraperitoneal or extraperitoneal), whether uterine cavity was wiped by a mop to clear the residual membranes were documented in the proforma. For the documentation of post operative endometritis, temperature was measured in Celsius and uterine tenderness was documented by palpating the fundus of the uterus daily. Symphysio-fundal height was measured in centimeters using measuring tape and measurements were made to record rate of involution, with women in dorsal position. They was asked to void urine before recording as it might increase the fundal height and can give false positive values; first measurement was taken on first post-operative day and there after every day until discharge from hospital. Rate of involution of <1 cm per day was considered as sub involution. On 3rd post-operative day, blood was drawn for determination of hemoglobin, estimate of hematocrit, total white blood count and all these values were entered in a pre-structured proforma and statistical analysis was done using SPSS (version 16) software and statistical methods used for analysis were Descriptive statistics, Independent t test and Fishers exact test.

4. RESULTS

A total of 103 cases underwent elective LSCS during the study period. The mean age of the participants in the study was 28 years (range 19-38 years), and 28 cases were primigravia and 75 were second gravida. The mean gestational age at cesarean was 38 weeks 4 days, with the most common indication for cesarean being previous cesarean (67%), other indications were breech presentation (13.6%), contracted pelvis (11.6%), oblique lie (4.9%) and precious pregnancy (2.9%).

The mean blood loss in the study was 334.16±108.72 ml. Placenta was removed manually in 56 cases and the average blood loss was 319.30±104.1 ml and in 47 cases placenta was delivered spontaneously with an average blood loss of 346.63±111.7 ml.

After the delivery of the placenta, the uterine incision was either closed after exteriorizing the uterus or intraperitoneally. Uterine incision was closed extraperitoneally in 61 cases which had an average blood loss of 291.03±98.9 ml and the uterine incision was closed intraperitoneally in 42 cases, with an average blood loss of 396.79±91.1 ml with a statistically significant p value of <0.0001.
Chart 1. Comparing the average blood loss in manual removal of placenta and spontaneous delivery

Chart 2. Comparing the site of uterine closure with blood loss

Table 1. Comparing method of placental delivery with site of uterine closure and blood loss

| Placental removal method | Site of uterine closure | Number of cases | Mean blood loss in ml | Std. deviation | P value |
|--------------------------|-------------------------|-----------------|-----------------------|----------------|---------|
| Spontaneous delivery     | Intraperitoneal          | 20              | 411.55                | 77.35          | <0.0001 |
|                          | Extraperitoneal          | 27              | 250.96                | 58.63          |         |
| Manual Removal           | Intraperitoneal          | 22              | 383.36                | 102.01         | 0.047   |
|                          | Extraperitoneal          | 34              | 322.85                | 112.77         |         |
Out of these 61 cases of extraperitoneal uterine closure, placenta was removed manually in 34 cases and delivered spontaneously in 27 cases. It was noted that the average blood loss was 322.8±112.77 ml for manual removal of placenta and 250.9 ±58.63 ml for spontaneous delivery of placenta in the extraperitoneal uterine closure group with a statistically significant p value of 0.004. Likewise in 42 cases of intraperitoneal uterine closure, manual removal of placenta was done in 22 cases with a blood loss of 383.36±102.01 ml and placenta was delivered spontaneously in 20 cases with an average blood loss of 411.5±77.35 ml (p value, 0.32).

By delivering the placenta spontaneously, and when the intraoperative blood loss was compared between intraperitoneal uterine closure and extraperitoneal uterine closure, it was noted that the intraperitoneal uterine closure had a blood loss of 411.5±77.35 ml and it was 250.9 ±58.63 ml when uterus was closed extraperitoneally with a statistically significant p value of <0.0001.

Out of 103 cases in this study 99 cases had no endometritis and 4 cases were found to have endometritis with incidence of 3.9%. In cases where no uterine mopping was done to remove the residual membranes endometritis was not seen, whereas in 64 cases where uterine mopping was done 4 cases had endometritis with an occurrence rate of 6.3% (p value of 0.3) and it can be inferred that uterine mopping might increase the chances of endometritis.

## Table 2. Effect of uterine mopping on endometritis

| Uterine mopping | No of cases | %     | No of cases | %     |
|----------------|------------|-------|------------|-------|
| No (39)        | 39         | 100.0%| 0          | 0%    |
| Yes (64)       | 60         | 93.8% | 4          | 6.3%  |
| Total (103)    | 99         | 96.1% | 4          | 3.9%  |

5. DISCUSSION

The process of separation of the placenta starts immediately the baby is born when contraction and retraction of uterine muscles result in reduction in the size of the uterus. Consequently, the surface area of the uterus to which the placenta is attached becomes smaller than the relatively incompressible placenta. As a result, the placenta is sheared off and the blood vessels supplying the now denuded placental bed are compressed by the continued contraction and retraction of the uterine muscles to reduce bleeding [6]. The present study noted that when
the placenta was removed manually the blood loss was more and also when the uterus was closed intraperitoneally the blood loss was more compared to extraperitoneal closure. So when manual removal of placenta is done there will be less time for the blood vessels to get trapped in between the contracting muscles and the amount of blood loss will be more in manual removal of placenta as noted in this study. Also when the uterine incision is closed by exteriorizing the uterus the blood supply to the uterus will be kinked and naturally the amount of bleeding will be less as shown in this study.

There are studies which showed that spontaneous delivery of placenta is better than manual removal in terms of intraoperative blood loss and post caesarean endometritis [7,8]. In a study by Washburne et al they have concluded that manual removal and exteriorization of the uterus for repair of the surgical incision increases the infectious morbidity rate in women receiving prophylactic antibiotics at the time of caesarean delivery and increased length of hospital stay [9], whereas another study showed that exteriorization of uterus was preferred during caesarean section for shorter operative time, less blood loss and with similar morbidity profile as compared to intraperitoneal closure of uterine incision [10].

There are two studies which showed no significant differences in complications between exteriorization and intraperitoneal repair of uterine incision at caesarean delivery [11,12]. In this study we noted that there was no endometritis in the group where no uterine mopping was done and in 65 cases uterus was mopped and 4 cases from this group had signs of endometritis but the p value was not statistically significant. In a study by Samir et al uterine wiping for residual membranes after manual removal of placenta has shown greater incidence of post caesarean endometritis [3], in contrary there are studies which concluded that the rate of post caesarean endometritis did not increase in patients with uterine wiping after placental delivery to clear the residual placental membranes [5,13].

6. CONCLUSION

The conclusion in the present study on comparing the manual versus spontaneous delivery of placenta, along with or without uterine wiping and the site of uterine closure in relation with operative blood loss and post caesarean endometritis it is noted that spontaneous delivery of placenta along with closing the uterine incision by exteriorizing the uterus has minimal blood loss when compared to other methods and also exteriorizing the uterus gives a clear vision to suture. As such when spontaneous delivery of placenta and manual removal are compared there is not much difference in blood loss but when uterus is exteriorized to suture there is significant decrease in blood loss so it is better to deliver the placenta spontaneously and close the uterine incision by exteriorizing the uterus.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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