# Exteriorization Of Uterus At Cesarean Section

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**OBJECTIVE -** To assess intraoperative and postoperative morbidity following exteriorization of uterus at cesarean section, as compared to intraperitoneal repair of the uterus. **MATERIAL AND METHODS -** Two hundred and nineteen consecutive women scheduled for low transverse cervical cesarean section through Pfannenstiel or sub umbilical midline incision were randomized to either exteriorization (N – 111) or intaperitoneal repair group (N 108). Perioperative, intraoperative and postoperative management decisions were made without reference to treatment groups. Statistical analysis compared intraoperative and postoperative outcome between the two groups. **RESULTS -** There were significant reductions in intraoperative blood loss (P< 0.05), febrile morbidity (P< 0.05) and perioperative hemoglobin decrease (P< 0.05) in the study group as compared those in the control group. There was no significant difference between the two groups regarding intraoperative pain, nausea and retching or vomiting amongst patients undergoing cesarean section under regional anesthesia. There was no significant difference in operating time, anesthesia time and postoperative pain as assessed by both Visual Analog Scale (VAS) score and number of analgesic doses. The two groups did not differ significantly with regard to time needed for return of bowel function, incidence of endomyometritis, cystitis, wound infection and period of hospitalization **CONCLUSION -** Exteriorization of uterus at cesarean section is associated with lesser intraoperative blood loss, perioperative hemoglobin fall and reduced febrile morbidity as compared to intraperitoneal repair of the uterus.

**Key words :** uterus, exteriorization, cesarean section

## Introduction

Cesarean section is the most common intraperitoneal surgical procedure in obstetrics. Though over the years there is a wider recognition of the desire to reduce cesarean section rate, there has been little debate on the operating technique[1].

Various studies on the techniques of performing a caesarean section have focused on reducing the operating time, blood loss, wound infection and cost. Exteriorization and traction on uterus after delivery of fetus and placenta are a common practice with the belief that it gives better access to the lower uterine segment, facilitates uterine suturing and decreases blood loss.[2] Patients commonly complain of pain, nausea and vomiting with uterine exteriorization under regional anesthesia. Intraoperative hemodynamic instability and increased puerperal morbidity are other hypothesized complications of the technique. Higher incidence of rare but often life threatening complications like venous air embolization has been reported with exteriorization[3].

There have been a few randomized controlled trials comparing intraoperative and postoperative morbidity following exteriorization of uterus compared with intraperitoneal or in situ repair. [4,5] But the conclusions drawn from these trials have been conflicting. Some of these trials have been criticized for poor methodology and power. Presently there is not enough information to evaluate the routine use of exteriorization of the uterus for repair of the uterine incision and further studies are needed to examine the value of exteriorization of the uterus whilst repairing it[7,8].

The present study was undertaken with the aim to assess intraoperative and postoperative morbidity following exteriorization of uterus at cesarean section as compared to those with intraperitoneal or in situ repair

## Material and methods

This prospective randomized controlled trial was conducted at an armed forces zonal hospital. Informed consent was taken from all subjects. All consecutive women undergoing emergency or elective cesarean section were randomly allocated to exteriorization or intraperitoneal group. Randomization was by computer generated random numbers and the randomized allocations were kept secure in sealed envelopes, which were in the operation room. In the exteriorization group uterus was exteriorized after delivery of fetus and placenta for repair, while in the intraperitoneal group repair was done in situ.

Both Pfannenstiel and subumbilical midline incisions were used and all uterine incisions were low transverse

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type. Placenta was removed by controlled traction after spontaneous separation. Uterus was exteriorized after delivery of placenta. Uterine incision was closed in single layer with No. 2 chromic catgut. Visceral and parietal peritoneums were not closed. Rectus sheath was approximated with No. 1 polypropylene. Skin was approximated with subcuticular closure. Tubal ligation was done by modified Pomeroy's technique. Intraoperative blood loss was calculated by measuring blood in the suction apparatus and on sterile drapes before abdominal irrigation and by evaluating the blood in abdominal swabs and gauzes. In cases operated under regional anesthesia, intraoperative pain, nausea, retching and vomiting were noted.

Day of operation was considered as day 0. Treatment allocations was disclosed neither to the nursing or medical staff providing postoperative care, nor to the women. Perioperative, intraoperative and postoperative management decisions were made without reference to treatment groups. The outcome measures noted were anesthesia time, operating time, intra operative blood loss, postoperative pain as assessed by both Visual Analog Scale (VAS) and number of analgesic doses given in the first post operative day, return of bowel function, periopertative decrease in hemoglobin, febrile morbidity, endomyometritis, cystitis, wound infection and period of hospitalization. In the absence of complications, patient was discharged on the sixth postoperative day.

Postoperative pain was measured once employing a 10 cm visual analog scale (no pain = 0, worst pain ever = 10) at approximately 24 hours after surgery. Women were asked to indicate the average intensity of pain experienced during the last several hours. Analgesics were given as needed, and the number of doses of analgesics administered during the first postoperative day was recorded. Intestinal transit was assessed by auscultation of bowel sounds. Febrile morbidity was defined as temperature more than 38.0 C on two occasions 12 hours apart, excluding the first postpartum day.

Perioperative decrease in hemoglobin was calculated from preoperative and third postoperative day hemoglobin estimations. Endomyometritis was diagnosed if uterine tenderness and fever were present. Cystitis was diagnosed by a positive urine culture growth. The presence of purulent discharge from the incision with erythema or induration, with or without fever indicated wound infection. Anesthesia time (general anesthesia) and operation time were abstracted from operation notes. The length of postoperative stay was calculated from medical records.

Women were followed up at six weeks and six months. They were advised to report to the hospital in case of any complication. Late morbidity was assessed in the form of chronic pelvic pain and incisional hernia.

Power of the study was based on a projected sample size of 200 women, with 100 randomly allocated to each study group. This was sufficient at 95% significant level to detect an odds ratio (OR) of 0.48 for blood loss 600 ml with 92% power, OR of 0.46 for perioperative hemoglobin decrease of 1.0 gm/dl with 93.7% power and OR of 0.41 for febrile morbidity with 87.4% power. Student-t test was used for analysis of continuous variables. Categorical variables were analyzed by Chi square test or Fisher exact test if numbers were small. $P < 0.05$ was considered probability level to reflect significant difference. Odds ratios (OR) and 95% confidence intervals (95% CI) were calculated for categorical data. Statistical software Epi Info 2000, version 1.1.2 (Center for Disease Control and Prevention Atlanta, Georgia, USA) was used for statistical analysis of data.

## Results

Between Jan 1999 to Jun 2000, a total of 219 women were recruited for the study; 111 were randomized to exteriorization group and 108 to the intraperitoneal group. There was no significant difference between two groups with respect to age, parity, gestational age, and preoperative hemoglobin. Both groups were also similar with respect to primary/repeat or elective/emergency cesarean section. The two groups did not differ with respect to the type of anesthesia, abdominal incision or concurrent sterilization (Table I). There was no difference between the two groups with respect to the indication for cesarean section or various high risk factors (Tables II and III).

There was no significant difference in operating time and anesthesia time between the two groups (Table IV). There was no significant difference between the study and the control groups regarding intraoperative pain (3/20 and 2/21, respectively; $P$ 0.59), nausea and retching (4/20 and 2/21, respectively; $P$ 0.34) and vomiting (1/20 and 1/21, respectively; $P$ 0.97) amongst patients undergoing cesarean under regional anesthesia. There was significant reduction in the mean intraoperative blood loss in the study group as compared to controls (597.8 ± 97.7 and 629.6 ml + 106.8, respectively; $P<0.05$). Proportion of cases with blood loss of 600 ml were also significantly less in the study group as compared to controls ($P<0.05$). Mean perioperative hemoglobin decrease was significantly lower in the study group as compared to the control group (0.85 gm/dl + 0.27 and 0.93 gm/dl ± 0.25 respectively; $P<0.05$)

Proportion of cases with perioperative hemoglobin decrease of 1.0 gm/dl were also significantly less in the study group as compared to controls (P= 0.01). Two cases in each group were given blood transfusion (P=0.67).

## Table I: Patient Characteristics and Procedure

|  | Exteriorization | Intraperitoneal | Significance |
|---|---|---|---|
| Maternal age (years) | 26.5 ± 4.5[a] | 25.4 ± 3.5[a] | NS |
| Parity | 2.1 ± 0.9[a] | 1.9 ± 0.6[a] | NS |
| Gestational age (weeks) | 38.1 ± 1.7[a] | 37.8 ± 1.8[a] | NS |
| Preoperative Hb (gm/dl) | 10.6 ± 0.9 | 10.5 ± 0.8 | NS |
| Cesarean section | | | |
|    Primary | 73(65.7) | 72(66.6) | NS |
|    Repeat | 38(34.3) | 36(33.4) | NS |
|    Elective | 75(67.5) | 76(70.3) | NS |
|    Emergency | 36(32.5) | 32(29.7) | NS |
| Anaesthesia | | | |
| General | 91(81.9) | 87(80.5) | NS |
| Spinal | 14(12.6) | 18(16.6) | |
| Epidural | 6(5.5) | 3(2.9) | |
| Abdominal incision | | | |
|    Pfannenstiel | 74(66.6) | 77(71.2) | NS |
|    Midline | 37(33.4) | 31(28.8) | |
| Tubal ligation | 38(34.2) | 32(29.6) | NS |

[a]Mean + SD     Values in parentheses indicate percentage     NS - Not significant

## Table II: Indications for Cesarean Delivery

|  | Exteriorization (N=111) | Intraperitoneal (N=108) | Significance |
|---|---|---|---|
| Previous cesarean section | 41(36.9) | 38(35.1) | NS |
| Dysfunctional labour | 22(19.8) | 27(25.0) | NS |
| Breech presentation | 13(11.7) | 11(10.1) | NS |
| Fetal distress | 12(10.8) | 10(9.2) | NS |
| Others | 23(20.7) | 22(20.3) | NS |

Values in parentheses indicate percentage     NS - Not significant

## Table III: High Risk Factors

|  | Exteriorization (N=111) | Intraperitoneal (N=108) | Significance |
|---|---|---|---|
| Bad obstetric history | 36(32.4) | 32(29.6) | NS |
| Premature rupture of membranes | 23(20.7) | 16(14.8) | NS |
| Hypertensive disorders | 13(11.7) | 8(7.4) | NS |
| Antepartum hemorrhage | 2(1.8) | 6(5.5) | NS |
| Intrauterine growth retardation | 3(2.7) | 4(3.7) | NS |
| Others | 8(7.2) | 8(7.4) | NS |

Values in parentheses indicate percentage     NS - Not significant

Table - IV: Operative Factors and Postoperative Morbidity

| | Exteriorization (N=111) | Intraperitoneal (N=108) | Significance | OR (95% CI) |
|---|---|---|---|---|
| Operating time (min) | 31.6 ± 6.6[a] | 33.0 ± 4.5[a] | NS | |
| Anesthesia time[b] (min) | 41.0 ± 3.8[a] | 42.0 ± 3.0[a] | NS | |
| Intraoperative blood loss (ml) | 597.8 ± 97.7[a] | 629.6 ± 106.8[a] | P<0.05 | |
| Intraoperative blood loss >600 ml | 67 (60.3) | 82(75.9) | P<0.05 | 0.48(0.26-0.90) |
| Postoperative Hb (gm/dl) | 9.7 ± 1.0[a] | 9.6 ± 0.9[a] | NS | |
| Perioperative Hb decrease (gm/dl) | 0.85 ± 0.27[a] | 0.93 ± 0.25[a] | P<0.05 | |
| Hb decrease ≥ 1.0 gm/dl | 70(63.0) | 85(78.7) | P<0.01 | 0.46(0.24-0.88) |
| Postoperative pain VAS score | 2.9 ± 0.7[a] | 3.1 ± 0.5[a] | NS | |
| No. of analgesic doses | 3.5 ± 0.5[a] | 3.6 ± 0.5[a] | NS | |
| Opening of bowels (days needed) | 1.2 ± 0.2[a] | 1.2 ± 0.1[a] | NS | |
| Febrile morbidity | 11(9.9) | 23(21.2) | P<0.05 | 0.40(0.17-0.93) |
| Endomyometritis | 05(4.5) | 10(9.2) | NS | 0.46(0.12-1.55) |
| Cystitis | 03(2.7) | 08(7.4) | NS | 0.35(0.6-1.50) |
| Wound infection | 03(2.7) | 07(6.4) | NS | 0.40(0.07-1.82) |
| Hospitalization (days) | 6.7 ± 0.8[a] | 7.5 ± 1.2[a] | NS | |

[a] Mean ± SD    [b] GA    Values in parentheses indicate percentage    NS Not significant

Febrile morbidity was 9.9% in the study group as compared to 23% in the control group (P=0.05). The two groups did not differ significantly with regard to postoperative pain as assessed by both Visual Analog Scale (VAS) score and number of analgesic doses, time needed for return of bowel function, postoperative hemoglobin, incidences of endomyometritis cystitis and wound infection, and period of hospitalization. There were no women with pelvic pain or incisional hernia in either group during the follow up period.

## Discussion

In the first comparative study by Hershey and Quilligan[2], similar blood loss, duration of surgery, hospital stay and rates of puerperal febrile and infectious morbidity were reported in their groups of women who underwent either uterine exteriorization or in situ repair. They reported higher vomiting in the exteriorization group and a higher mean hematocrit drop in those who had in situ repair.

Magann et al[3] in their prospective randomized study involving 100 women who were undergoing cesarean section, compared blood loss in the exteriorized versus non - exteriorized groups, with manual versus spontaneous placental removal subgroups. They reported that uterine position did not significantly affect blood loss in the spontaneous group or the manual placental removal groups and concluded that the method of placental removal and not the position of the uterus at the time of its repair had a significant role in blood loss during cesarean birth.

In another study by Magann et al[4] assessing infectious morbidity, operative blood loss, and length of the operative procedure in cesarean delivery studying method of placental removal and site of uterine repair concluded that manual placental 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 cesarean delivery and increases the length of hospitalization.

Edi – Osagie et al[5] in a study comparing the influence on cesarean section morbidity by uterine exteriorization compared with that by in situ repair, demonstrated that uterine exteriorization and in situ repair had similar

effects on perioperative cesarean section morbidity. Intra-operative pain reflected in inadequacy of anaesthesia, while vomiting reflected inadequacy of pre-operative preparation of patients. They concluded that exteriorizing the uterus at cesarean section is a valid option.

Wahab et al[5] in a randomized, controlled study of uterine exteriorization and repair at cesarean section found that with effective anesthesia, exteriorization of the uterus for repair following cesarean delivery is not associated with significant problems and is associated with less blood loss.

In a Cochrane review by Wilkinson and Enkin[7] two trials involving 486 women were included. Exteriorization made no significant difference to blood loss. Exteriorization was associated with fewer post-operative febrile days and a non-significant trend towards fewer infections. There was also a non-significant trend towards more nausea and vomiting when exteriorization was done under regional analgesia. They concluded that there was not enough information to evaluate the routine use of exteriorization of the uterus for repair of the uterine incision.

In the present study there was no difference in the operation time between the two groups, a fact similar to that reported by Edi-Osagi et al[6]. In a study of stepwise duration of cesarean section, Dimitrov et al[10] reported that exteriorisation of uterus does not affect repair time. Magann et al[9] reported increased operation time in the exteriorized group. Operative time has been associated with increased infectious morbidity rates at cesarean delivery and entails the use of longer-acting agents in patients under regional anesthesia, possibly the use of general anesthesia, prolonged exposure of the abdominal contents to the environment and more likely blood loss[11,12].

There was no significant difference between the two groups with regard to intraoperative pain, nausea, retching and vomiting during regional anesthesia, a fact similar to that reported by Edi-Osagie et al[6]. Hershey and Quilligan[2] however reported higher incidence of vomiting during exteriorization. Decreased intraoperative blood loss in the study group is similar to that reported by Wahab et al[5]. However other studies found no differene[2,6] and one study found increased loss in the exteriorized group with manual removal of placenta[4]. Exteriorization theoretically might help in reducing blood loss by kinking of uterine arteries during exteriorization, possibly also by more effective bimanual compression, better access to uterine incision and faster suturing and hemostasis. On the other hand relatively bloodless field during exteriorization may be an erroneous impression as blood flows away from the operating field into drapes, unlike the pooling and obscuring of operating field that occurs with in situ repair.

Blood loss at cesarean delivery is difficult to assess accurately[13]. More accurate assessment of blood loss can be done by using plastic drapes with pockets for collection of blood, heparinization of blood amniotic fluid mixture in the suction bottle and estimation of blood fraction in the mixture by comparing hemoglobin concentration in the mixture with that of patient's blood[14]. In the present study, to obviate the above limitations, change between preoperative hemoglobin and the third postoperative day hemoglobin was studied to assess the blood loss indirectly. The fall in perioperative hemoglobin was significantly lower in the study group, a fact similar to that reported by Wahal, et al[5]. However, Edi-Osagie et al[6] reported mean perioperative hemoglobin fall in exteriorization group to be more than that in in situ repair but the difference was not significant.

There was no difference in the postoperative pain as assessed by both VAS score and number of analgesic doses. A trend towards higher immediate and late pain score in the exteriorization group reaching significance on day three has been reported by Edi-Osagie et al[6] In the present study pain was assessed only in the immediate postoperative period.

Significantly lower febrile morbidity found in this study in the exteriorization group is similar to that reported by others[7,9]. But some other studies have reported no difference[5,6]. Lower febrile morbidity has been attributed to reduced operating time, but the difference in operating time between the two groups in the present study was not significant. Insignificant trend towards decreased infectious morbidity in the form of endomyometritis, cystitis and wound infection was noted in the present study which is similar to that reported by Wilkinson and Enkin[7]. However, two studies[5,6] found no difference and one[9] reported higher infectious morbidity with exteriorization and manual removal of placenta. Length of hospital stay depends primarily on the infectious morbidity. There was no difference in the length of hospital stay in the present study between the two groups, which is similar to that reported by others[5,6]. However Magann et al[9] have reported longer hospital stay in the exteriorization group. In the present study, there were no women with late postoperative complications such as chronic pelvic pain or incisional hernia in either group that could be attributed to complications associated with lower segment cesarean section.

Our sample size was relatively small. Blood loss estimated may not have been true approximation of the actual loss. Though perioperative hemoglobin decrease was also studied, better method of estimation of intraoperative blood loss as reported by Wallin and Fall[14] may be more accurate. The follow-up period was limited upto six months because of migratory nature of the study population due to service conditions involving frequent separation of families. Further studies with larger sample size, more accurate assessment of intraoperative blood loss and longer follow up are needed to assess morbidity following exteriorization.

## References

1. Rayburn WF, Schwartz WJ III. Refinements in performing a cesarean delivery. *Obstet Gynecol Surv* 1996; 51: 445-51

2. Hershey DW, Quilligan EJ. Extra abdominal uterine exteriorization at cesarean section. *Obstet Gynecol* 1978; 52: 189-92

3. Handler JS, Bromage PR. Venous air embolism during cesarean delivery. *Reg Anesth* 1990; 15:170-3

4. Magann EF, Dodson MK, Allbert JR et al. Blood loss at time of cesarean section by method of placental removal and exteriorization versus in situ repair of the uterine incision. *Surg Gynecol Obstet* 1993; 177: 389-92

5. Wahab MA, Karantzis P, Eccersley PS et al. A randomised, controlled study of uterine exteriorisation and repair at caesarean section. *Br J Obstet Gynaecol* 1999; 106: 913-6

6. Edi-Osagie EC, Hopkins RE, Ogbo V et al. Uterine exteriorization at caesarean section: influence on maternal morbidity. *Br J Obstet Gynaecol* 1998; 105:1070-8

7. Wilkinson C, Enkin MW. Uterine exteriorization versus intraperitoneal repair at caesarean section. *Cochrane Database Syst Rev* 2000; (2):C D000085

8. Hema KR, Johanson R. Techniques for performing caesarean section. Best Pract Res. *Clin Obstet Gynecol* 2001; 15:17-47

9. Magann EF, Washburne JF, Harris RL. et al. Infectious morbidity, operative blood loss and length of the operative procedure after cesarean delivery by method of placental removal and site of uterine repair. *J Am Coll Surg* 1995; 181:517-20

10. Dimitrov A, Stamenov G, Krusteva K. The overall and step-by-step duration of cesarean section. *Akush Ginekol (Sofiia)* 1999; 38: 7-10

11. Gibbs RS. Clinical risk factors for puerperal infection. *Obstet Gynecol* 1980; 55:178-83

12. Nafe RW, Chauhan SP, Chevalier SP et al. Prediction of hemorrhage at cesarean delivery. *Obstet Gynecol* 1994; 83:923-6

13. Wilcox CF, Hunt AB, Owen CA. The measurement of blood loss during caesarean section. *Am J Obstet Gynecol* 1959; 77: 772-9

14. Wallin G, Fall O. Modified Joel-Cohen technique for caesarean delivery. *Br J Obstet Gynaecol* 1999; 106: 221-6