Extra-abdominal versus intra-abdominal repair of the uterine incision at cesarean section

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List of abbreviations

ACOG	American College of Obstetrics and Gynecology
APH	Ante Partum Haemorrhage
aPTT	Activated Partial Thromboplastin Time
BMI	Body Mass Index
CBC	Complete Blood Count
Cm	Centimeter
CS	Cesarean Section
DIC	Disseminated Intravascular Coagulation
ECG	Electrocardiogram
EDD	Expected Date of Delivery
EPCA	Epidural Patient-Controlled Analgesia
Fig.	Figure
GA	Gestational Age
HBV	Hepatitis B Virus
HIV	Human Immunodeficiency Virus
I.M	Intramuscular
I. U	International Unit
IUGR	Intra Uterine Growth Retardation
I.V	Intravenous
IVF	In Vitro Fertilization
Lab	Laboratory
MRSA	Methicillin Resistant Staph Aureus

List of abbreviations (continue)

MTCT	Mother-To-Child Transmission
NCHS	National Centre for Health Statistics
NICU	Neonatal Intensive Care unit
NSAID	Non-Steroidal Anti-Inflammatory Drugs
NSCSA	National Sentinel Caesarean Section Audit
PCA	Patient-Controlled Analgesia
PPH	Post Partum Hemorrhage
PT	Prothrombin Time
RCOG	Royal College of Obstetrics and Gynecology
RCT	Randomized Controlled Trial
RDS	Respiratory Distress Syndrome
SPSS	Statistical Package for the Social Sciences
T_4	Fourth Thoracic vertebra
T 10	Tenth Thoracic vertebra
TED	Thromboembolic Disease
TTN	Transient Tachypnoea of the Newborn
UK	United Kingdom
VBAC	Vaginal birth after cesarean delivery
WHO	World Health Organization

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Aim of the work

The aim of this study was to compare extra abdominal and intra abdominal repair of the uterine incision during cesarean delivery regarding the blood loss.

Discussion

There is a conflicting opinion among obstetricians as to whether one should routinely exteriorize the uterus to facilitate repair during cesarean section or alternatively suture the uterine incision while the uterus lies intraperitoneally **(Wahab et al., 1999)**.

Exteriorization of the uterus for repair at cesarean delivery is a common practice worldwide. Proponents of the technique justify that exteriorization of the uterus offers better exposure of the angles and results in an easier and faster repair, thus decreasing intra-operative hemorrhage and also resulting in shorter surgical time. In addition, they claim that the elevation of the uterus promotes venous drainage and reduces vascular congestion, further contributing to the diminished bleeding **(Siddique et al., 2007)**.

Although some obstetricians remain convinced of the surgical merits of the technique of uterine exteriorization and continue to use it, the patient's comfort remains a disputed matter. Uterine exteriorization has been associated with adverse outcomes, including nausea and vomiting, pain, hemodynamic changes and air embolism **(Nafisi, 2007)**.

Due to the controversy regarding the optimum method for uterine repair and also there are few randomized controlled trials concerned with this issue and results are discordant, there is a need for a study evaluating both procedures regarding outcomes and side effects***(Wilkinson et al; 2003)***.

This study tried to find out an easy as well as an efficient technique of closure of the uterine incision during cesarean delivery with least time

consuming, least affection on the patient's hemoglobin level and hematocrit value as well as postoperative pain, nausea, vomiting and febrile illness.

This randomized clinical trial was conducted on 500 pregnant women who were randomly allocated into 2 groups (each was formed of 250 pregnant women) according to the site of repair of the uterine incision (intra-abdominal repair or extra-abdominal repair).

Patients included in the study were ≥ 37 weeks gestational age. Patients with uterine leiomyomata and abnormal placentation e.g. placenta previa were excluded from the study. Patients with coagulation disorders were excluded from the study due to different techniques regarding anesthesia and more intra-operative blood loss.

All cesarean sections for patients of both groups were performed under spinal anesthesia.

The demographics of age, parity and maternal weight were similar among the two studied groups (table1) this can be attributed to proper selection of the sample involved in the study.

In this study haemoglobin levels (tables 2, 3 and fig ٩,10) and hematocrit values (tables 4,5 and fig 11,12) were assessed preoperative and reassessed 24 hours postoperative and the differences between the 2 values were used as a method to express the amount of blood loss during the procedure of cesarean delivery as well as to compare between the intra-abdominal repair and the extra-abdominal techniques in terms of their effect on blood loss at the time of cesarean delivery.

The mean reduction in both hemoglobin level and hematocrit value in intra-abdominal group was more than that in extra-abdominal group which was statistically significant.

Despite being statistically significant, the difference between the two techniques was clinically insignificant since no patients in either of the two groups required blood transfusion.

Wahab et al. (1999) and Orji et al. (2008) have shown that there was a reduction in mean intra-operative blood loss in the exteriorization group as compared to the non-exteriorization group that was consistent with the findings of this study.

In a similar study that was held in the ***Instituto Materno-Infantile Prof. Fernando Figueira (Recife, Brazil***), they calculated the amount of blood lost during the cesarean section by a different method; where blood loss was estimated by the difference between the bloody and dry weights of surgical drapes and towels. The estimated blood loss was <800 ml in 61.2% of cases in the exteriorized group , while blood loss < 800 ml in only 57.4% of cases that had in-situ repair of the uterus with a single case that required urgent blood transfusion ***(Coutinho et al; 2008).***

The method they used in calculating the amount of blood loss wasn't used in this study because it may be affected by the amount of amniotic fluid which may increase the number or weight of the wet or soaked surgical drapes and towels.

Inconsistent with the findings reported in this study, **Coutinho et al. (2008)** evaluated blood loss during surgery by the difference between preoperative and postoperative hematocrit (immediately before cesarean delivery and postoperative), attempting to associate the volume obtained

in each assessment method with the surgical technique used and found no statistically significant difference between the groups, which is in agreement with other studies **(Siddiqui et al., 2007; Jacobs-Jokhan and Hofmeyr, 2008 and Ozbay, 2011)**.

In this study the comparison of intra-abdominal versus extra-abdominal repair of the uterine incision regarding the time taken from the first stitch till the last stitch in the second layer was statistically significant between group I and group II.

Regarding the mean time of repair: the mean time of repair in group I = 6.53± SD 0.81, while the mean time of repair in group II = 5.25± SD 0.92 (table 6 and fig 13). Duration of the procedure was significantly shorter in extra-abdominal procedure than intra-abdominal procedure. The shorter time of repair in the extra-abdominal group was mostly due to better exposure, wider field which facilitated a wide and comfortable range of movement for the surgeon.

Consistent with this results, **Coutinho et al. (2008)** compared uterine exteriorization with in situ uterine repair at cesarean delivery. They found significant differences in the two techniques for duration of the surgical procedure and number of sutures used. Time was shorter and sutures were fewer in number when the uterus was exteriorized.

In their study, **Coutinho et al. (2008)** observed a shorter surgical time, approximately 2.5 minutes, when the uterus was exteriorized for repair**.** A systematic Cochrane review evaluated this outcome in six studies and found no significant difference in the duration of surgery, according to type of repair of the uterine incision **(Jacobs-Jokhan and Hofmeyr, 2008)**.

Consistent with results of this study, a controlled trial conducted and published in 2007 showed a statistically significant decrease in duration of uterine repair in the exteriorized uterus group in comparison with the in situ uterus group **(Siddique et al., 2007)**. Despite this shorter time for uterine repair in the exteriorized group, there was no statistically significant difference when the total surgical time (from skin incision to skin closure) was considered. This finding was surprising but the authors do not explain this finding.

Previous reports **(Edi-Osagie et al., 1998; Dimitrou et al., 1999 and Orji et al., 2008)** have shown no significant difference in the duration for surgery between the two groups that was inconsistent with the findings of this study. Also, **Magann et al. (1995)** have reported increase in the duration of surgery in the exteriorized group. This could be due to time consumption during exteriorization and repositioning of the uterus intraperitoneally.

Exteriorization and in situ repair of uterine incision are valid options during surgery. Cesarean sections took less time and the duration of hospital stay was shorter when uterine incision was repaired in situ **(Ozaby, 2011)**.

Pain during the first 24 hours after cesarean delivery is a real concern for many women. This is usually the worst pain that a woman experiences during the course of an uncomplicated cesarean section. Post-cesarean delivery pain is not considered by obstetricians when repairing the surgical incision, yet it may have an effect **(Nafisi, 2007)**.

The non steroidal anti-inflammatory drugs (NSAIDs) were used to overcome the postoperative pain (e.g. voltaren 75mg in the form of intramuscular injections), the analgesic doses were given repeatedly upon

patient's request and the total doses of analgesics were calculated and tabulated (Table 7 and fig 14). In the intra-abdominal group the mean analgesic dose = 210.6±61.9, while in the extra-abdominal group the mean analgesic dose = 382.5±108.64 with the P value < 0.001.

Since a variety of reasons could cause the postoperative pain in the patients who underwent a cesarean delivery including:

- Pain due to the use of instruments during the procedure to catch both angles of the uterine incision to ensure proper suturing of the angles, the retractors used to widen the field as well as protecting the urinary bladder and 2 Kochers to catch the angle of the rectus sheath.
- Sheath pain due to the continuous non-locked sutures.
- Pain due to uterine contractions and uterine involution.

So during the course of the procedure the same steps were done in both groups with the exception of the site of the repair of the uterus. The results of the study showed that patients who had intra-abdominal repair of the uterus had less frequent demands of postoperative analgesic doses than the patients with the extra-abdominal group.

From an economical point of view, the patients who had their uteri exteriorized for repair had consumed more numbers of postoperative analgesic doses than those with the in situ group, so it will be financially more convenient for the hospital budgets if the obstetricians have done more of the in situ repair if it doesn't affect the patient health.

Consistent with this results, a randomized controlled study conducted by **Nafisi (2007)** to assess postoperative pain in patients, demonstrated lower pain scores in the group with in situ uterine repair on both the first and second postoperative nights.

Also, **Coutinho et al. (2008)** consistnetly reported pain 6 hours postoperatively to be less intense in the in situ uterine repair group.

A similar study was conducted in the United Kingdom that also revealed that patients with the in situ repair of the uterine incision had a less tendency to suffer from the postoperative pain than the exteriorized group and had less frequently used analgesic doses for their pain ***(Duale et al;2003).***

In contrast, **Wahab et al. (1999)** found that exteriorization of the uterus was not associated with increased pain.

Also, in a systematic review of the Cochrane Library, a meta-analysis was performed to assess postoperative pain, and no statistically significnat difference was observed between the groups **(Edi-Osagie et al., 1998 and Jacobs-Jokhan and Hofmeyr, 2008)**.

Also in this study, Vicryl ampoules required for the repair of the uterine incision were counted (fig 15). In the intra-abdominal group the use of Vicryl was:1 ampoule of Vicryl in 10.4% of cases, 2 ampoules in 85.2% and 3 ampoules in 4.4% of cases, on the other hand in the extra-abdominal group it was:1 ampoule in 13.2% of cases, 2 ampoules in 84.8% of cases and 3 ampoules in 2.0% and P = 0.214 that was statistically insignificant.

Also in this study, the patients were monitored for the occurrence of the postoperative complications of nausea, vomiting and postoperative febrile illness.

Regarding the occurrence of nausea, it occurred in about 30.0% of cases of the intra-abdominal group, while it was about 56.8% of cases of the extra-abdominal group, with p = 0.001 (Table 8 and fig 16), while