

Extra abdominal versus intra abdominal uterine repair at cesarean section as regarding blood loss and duration of operation

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ABSTRACT

Aim: 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 and duration of the operation in a random sample of pregnant women attending Al hussein and Bab elshearia hospitals.

Materials and Method: two hundred pregnant women (≥ 37 weeks gestation) were included in the study. one hundred had intra abdominal uterine incision repair and one hundred had extra abdominal uterine incision repair. Baseline assessments included age, BMI, parity, hemoglobin and haematocrit levels before operation and 24 hours after operation and time of uterine incision repair using stopwatch in both groups. Data was systematically recorded and analysed to compare between both groups.

Results: no significant difference between intra abdominal group and extra abdominal group as regarding age, parity and BMI.

Hemoglobin levels and hematocrit values for both groups were similar preoperative but postoperative the mean reduction in both hemoglobin level and hematocrit value in the intra-abdominal group was more than that in the extra-abdominal group which was statistically significant.

In intra abdominal group the mean hemoglobin level was 10.9 gm before operation and became 9.78 gm 24 hours after operation so hemoglobin reduction was 1.13 gm and the mean hematocrit percent was 32.39 % before operation and became 28.8 % 24 hours after operation so hematocrit reduction was

3.59 %

In Extra abdominal group the mean hemoglobin level was 10.93 gm before operation and became 10.4 gm 24 hours after operation so hemoglobin reduction was 0.53 gm and the mean hematocrit percent was 32.31% before operation and became 30.36 % 24 hours after operation so hematocrit reduction was 1.95 %

The mean time of repair was calculated by the use of a stopwatch starting from the first stitch taken till the last stitch in the second layer and was recorded.

Patients that were undergoing extra-abdominal repair of the uterine incision revealed a significant less time used for repair(about 5.25 minutes)

than the patients that were undergoing intra-abdominal repair of the uterine incision (about 6.53 minutes)

Conclusion: The results of this study showed that extra-abdominal repair of the uterine incision was better than the intra-abdominal repair to decrease the operative blood loss and decrease the postoperative drop in the hemoglobin level and the hematocrit value of the patients and also the extra-abdominal repair of the uterine incision was less time consuming than intra-abdominal repair.

Key words: Extra abdominal- Intra abdominal- blood loss-duration of operation

Dec.2015

I. INTRODUCTION

Cesarean delivery now is the most common obstetric intra-peritoneal operation, and the number of cesarean deliveries is increasing worldwide (*Antonio et al, 2009*). Up to that in many settings cesarean delivery may be done without any medical indication which may contribute to this secular trend towards rates (*Stjernholm et al., 2010*).

Many variations in surgical techniques for cesarean delivery hadave been proposed, aimed at reducing surgical time, making the surgery easier and more efficient, lowering costs, decreasing the risk of adverse effects and postoperative morbidity, as well as length of hospital stay. The details of the surgical technique and its variation are important and were evaluated in randomized controlled trials (*Jacobs and Hofmeys et al., 2004*).

One of the more contentious issues regarding cesarean technique is the manner by which uterine repair is conducted after delivery of the infant(s) and placenta. Two techniques are well described: the uterus can either be repaired in situ within the peritoneal cavity (intra-abdominal repair) or temporarily exteriorized onto the mother's abdomen to allow uterine

repair (extra-abdominal repair) (*Hofmeyr et al., 2008*).

Temporary delivery of the uterus from the abdominal cavity (Exteriorization) has been postulated as a valuable technique for repair of the uterine incision (hysterorrhaphy) after delivery of the fetus and placental removal (*Jacobs-Jokhan & Hofmeyer, 2004*).Also *Ezechi et al., (2005)* suggested that uterine exteriorization is associated with a reduction in rates of infection and postoperative morbidity, in addition to decreasing the occurrence of peri-operative bleeding and reduction in postoperative hematocrit.

In another study conducted by *Balki and Carvalho (2005)*, regarding hemodynamic changes, surgical time, and blood loss in patients regarding hemodynamic changes, surgical time, and blood loss in patients undergoing elective cesarean delivery under a strictly standardized spinal anesthetic; they hypothesized that in situ uterine repair would be more comfortable for the patients.

Exteriorization of the uterus for repair at cesarean delivery under spinal anesthesia is a common practice in North America. 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 diminish bleeding (*Nafisi, 2007*)

II. METHODS

The study was conducted as part of Thesis submitted to the Faculty of Medicine - Al Azhar University In partial fulfillment of the requirements for the Degree of master.

Study design: This study was a prospective controlled single, blinded randomized clinical trial.

Study populations: The study included 200 pregnant women attending Al-Hussein University Hospital and Bab-Al-Shearia Hospital during the period from May 2015 to November 2015.

Ethical considerations: The Purposes and the procedures of this trial were explained to all eligible women before recruitment in the trial. Any woman had the right to accept or refuse joining to this clinical trial, without being harmed by this refusal concerning medical & ethical management. Both surgical techniques used in this study have no harmful effects or threatening to patients life and both of them were used in clinical practice. The protocol of the trial was approved by the Ethical Committee of Medical Researches in Obstetrics and Gynecology Department, Faculty of Medicine and Al Azhar University.

The patients were chosen according to the following criteria:

- **Inclusion criteria:**

- 1- Cesarean section whether elective or emergency.
- 2- Gestational age: ≥ 37 weeks or fetal weight > 2.5 kg.
- 3- Singleton pregnancy.
- 4- Vertex presentation.

- **Exclusion criteria:**

- 1- Any bleeding disorder or bleeding tendency.
- 2- Abnormal placentation e.g. placenta previa.
- 3- Uterine leiomyomata.
- 4- Eventful and complicated cesarean delivery (e.g. uterine artery injury, excessive intra-operative hemorrhage).

Randomization: - Randomization had been performed using a computer generated randomization system using Microsoft excel version 2007.

- Simple randomization with 1:1 allocation ratio

1- Group I: 100 women with intra-abdominal repair of the uterine incision.

2- Group II: 100 women with extra-abdominal repair of the uterine incision.

Post-operative: The differences in hemoglobin levels and hematocrit values before performing the caesarean delivery and 24 hours post-operative was calculated and used to estimate the affection of the technique used in repair of the uterine incision in terms of blood loss and duration of operation. The results were tabulated and

statistically analyzed using SPSS package for social sciences (SPSS).

III. Results

This randomized controlled trial was conducted in Al Hussein University Hospital and Bab Elshearia Hospital. A total of 200 women were included in the trial.

Those patients were randomly allocated into two groups:

Group I : 100 women who underwent intra-abdominal repair of the uterine incision.

Group II : 100 women who underwent extra-abdominal repair of the uterine incision.

Table (1): Comparison between intra-abdominal and extra-abdominal groups regarding the maternal age, BMI & the parity.

	Extra-abd (N = 100)		Intra-abd (N = 100)		
	Range	Mean ± SD	Range	Mean ± SD	
32	16.0-43.0	27.72±6.11	16.0-43.0	27.39±6.48	Age In years
46	20.0±33.9	27.1±4.24	20.0-33.0	26.48±4.24	BMI Kg/m ²
	Extra-abd (N=100)		Intra-abd (N=100)		

		Multi gravida	Primi gravida	Multi gravida	Primi gravida	
0.755	0.173	75 (75%)	25 (25%)	76 (76%)	23 (23%)	Parity

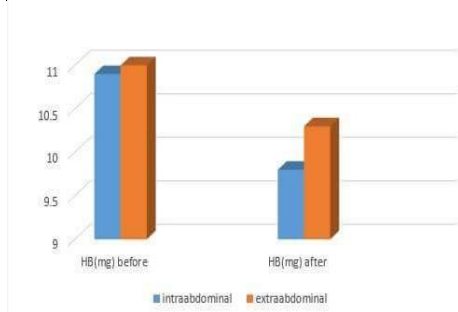
t : Independent t-test Z² :
Chi square test

No signification difference between intra-abdominal and extra-abdominal groups regarding the maternal age, BMI & the parity.

Table (2): Comparison between intra-abdominal and extra-abdominal groups regarding the hemoglobin level (gm/dl) before and after the operation

P	t	Extra-abd (N = 100)		Intra-abd (N = 100)		Hb (g m/dl)
		Range	Mean ± SD	Range	Mean ± SD	
0.817	0.231	8.8-13.9	10.93 ± 1.12	8.5-13.9	10.9 ± 1.24	Before

0.001*	5.864	7.8±13.3	10.4±1.15	7.1 - 13.0	9.78 ±1.24	After
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t : Independent t-test ** highly significant statistical test

Figure (1): Hemoglobin level (gm/dl) before and after the operation in intra-abdominal and extra-abdominal groups.

Table (2) and figure (1) show no significant difference between intra-abdominal and extra-abdominal groups regarding the hemoglobin level before the operation but the hemoglobin level after the operation was significantly lower in cases that underwent intra-abdominal repair of the uterine incision than those who underwent extra-abdominal repair.

Table (3): Comparison between hemoglobin reduction (gm/dl) after the operation in intra-abdominal and extra-abdominal groups.

P	Z	Extra-abd	Intra-abd	
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		(N=100)	(N=100)	
0.001**	11.402	0.53±0.32	1.13±0.66	Hb reduction

Z : for Mann Whitney nonparametric test ** highly statistical significant

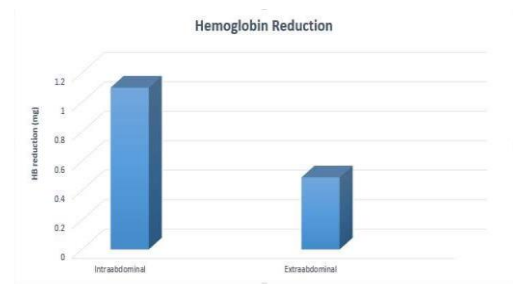


Figure (2): Hemoglobin reduction after the operation in intra-abdominal and extra-abdominal groups.

Table (3) and figure (2) show that the hemoglobin level was decreased in cases that underwent intra-abdominal or extra-abdominal procedures, but the mean reduction in intra-abdominal group was more than that of the extra-abdominal group which is statistically significant.

Table (4): Comparison between intra-abdominal and extra-abdominal groups regarding the hematocrit % before and after the operation.

P	t	Extra-abd (N = 100)		Intra-abd (N = 100)		H C T
		Ran ge	Mea n ± SD	Ra nge	Mea n ± SD	
0.781	0.279	25.3 - 39.7	32.31 ±2.93	23.5- 40.0	32.39 ±3.32	Be for e
0.001*	5.516	23.8 ±37.8	30.36 ±3.04	20.6- 37.7	28.8± 3.26	Aft er

t : Paired t-test **
highly statistical significant

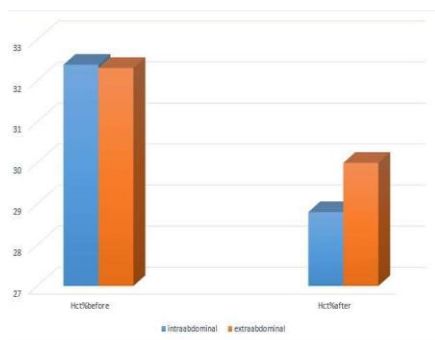


Figure (3): Hematocrit % before and after the operation in intra-abdominal and extra-abdominal groups.

Table (4) and figure (3) show no significant difference between intra-abdominal and extra-abdominal groups regarding the

hematocrit % before the operation but hematocrit % after the operation was significantly lower in cases that underwent intra-abdominal repair of the uterine incision than those who underwent extra-abdominal repair.

Table (5): Comparison between hemoglobin reduction after the operation in intra-abdominal and extra-abdominal groups.

P	t	Extra-abd (N=100)	Intra-abd (N=100)	Hematocrit reduction
0.001**	9.74	1.95±1.54	3.59±2.16	

t : Paired t-test **
highly statistical significant

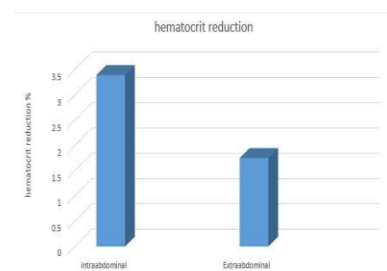


Figure (4): Hematocrit reduction after the operation in intra-abdominal and extra-abdominal groups.

Table (5) and figure (4) show that the hemoglobin value was decreased in cases that underwent intra-abdominal or extra-abdominal procedures, but the mean reduction in intra-abdominal group was more than that of the extra-abdominal group which is statistically significant.

Table (6): Comparison between intra-abdominal and extra-abdominal groups regarding the duration of uterine repair (minutes)

P	t	Extra-abd (N = 100)		Intra-abd (N = 100)		Dur atio n of uteri ne repa ir (min utes)
		Ra ng e	Mea n ± SD	Ra ng e	Mea n ± SD	
0.001*	16.437	4-7	5.25 ±0.92	5-8	6.53 ±0.81	

t : Independent t-test

** highly statistical significant

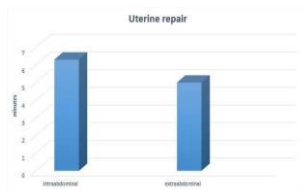


Figure (5): Comparison between intra-abdominal and extra-abdominal groups regarding the duration of uterine repair

Table (6) and figure (5) show that the duration of uterine repair is shorter in extra abdominal group

IV. 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 reduce 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.

This randomized clinical trial was conducted on 200 pregnant women who were randomly allocated into 2 groups (each was formed of 100 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 (table 1) this can be attributed to proper selection of the sample involved in the study.

In this study hemoglobin levels (tables 2,3 and figures 1, 2) and hematocrit values (tables 4,5 and figures 3,4) 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 on-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 blood 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 of 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 = $6.53 \pm \text{SD } 0.81$, while the mean time or repair in group II = $5.25 \pm \text{SD } 0.92$ (table 6 and figure 5). 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**) observed a shorter surgical time, approximately with in situ uterine repair at cesarean delivery. They found significant differences in the two techniques for duration of the surgical procedure. Time was shorter when the uterus was exteriorized.

In their study, **Coutinho et al. (2008)** observed 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; Dimitrouet 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 these 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*).

V. Conclusions

The results of this study showed that extra-abdominal repair of the uterine incision was better than the intra-abdominal repair to decrease the operative blood loss and decrease the postoperative drop in the hemoglobin level and the hematocrit value of the patients and also the extra-abdominal repair of the uterine incision was less time consuming than intra-abdominal

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