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COMPARISON BETWEEN UTERINE EXTERIORIZATION AND IN-SITU REPAIR OF UTERUS IN CAESARIAN SECTION

By

Islam Mohamed Ali Elwany, Emad Abd El-Rahman El-Tamamy and Ashraf Hamdy Mohamed

Department of Obstetrics and Gynecology, Faculty of Medicine, Al-Azhar University

Corresponding author: Islam Mohamed Ali Elwany,

E-mail: islam_elwany2525@gmail.com

ABSTRACT

Background: Cesarean delivery (CD) is one of the most common surgeries performed throughout the world. Many surgical techniques exist to perform CD, but the most optimal technique to limit maternal morbidity is still subject to debate. One aspect of this debate relates to the method of uterine repair following delivery and its potential impact on maternal morbidity.

Objective: To compare uterine exteriorization with in situ repair with duration of surgery and blood loss as primary outcome and postoperative or intraoperative complications of cesarean delivery as the secondary outcome.

Patients and methods: The current study is a double-blinded randomized clinical trial was conducted at Beni-suef General Hospital between December 2019 and December 2020. This study was planned to be conducted on 200 pregnant females that were undergoing an elective cesarean section at full term. The patients were randomly allocated into two equal groups: Group 1: 100 women with in-situ repair of uterine incision. Group 2: 100 women with exteriorization of the uterus for repair of uterine incision.

Results: Hemoglobin levels showed that the mean reduction in hemoglobin level was in the in-situ group more than the exteriorization group. As regard duration of the operation, exteriorization of the uterus had a significant less time than in-situ uterine repair. The occurrence of intra-operative nausea & vomiting increased markedly in the exteriorization group than in the in-situ group. Regarding post-operative pain, it was significantly more in the exteriorization group than in the in-situ group. There was no significant difference between in-situ and exteriorization groups regarding the post-operative febrile illness, wound complications, time of mobilization, time of return of bowel habits, time of oral intake and duration of hospital stay.

Conclusion: Exteriorization of the uterus has less time consuming in the operation, decrease blood loss and decrease the post-operative drop in the hemoglobin level. On the other hand, in-situ uterine repair has much less post-operative complications (nausea, vomiting, pain and febrile illness) than the exteriorization group.

Keywords: Uterine Exteriorization, In-Situ Repair of Uterus, Cesarian Section.

INTRODUCTION

Cesarean delivery (CD) is one of the most frequently performed surgical procedures in women, with an increasing rate of operations worldwide *(Chauhan and Devi, 2018).*

The World Health Organization (WHO) has recommended a maximum CD rate of 10–15% in order to reduce

maternal and neonatal morbidity and mortality *(Betran et al., 2016),* nevertheless, rates have been reported up to more than 50%, especially in developing countries *(Mohr-Sasson et al., 2020).*

Cesarean delivery is the most common method of delivery in Egypt. It is applied in over 60% of all deliveries. Because of this, it is imperative to practice an optimal surgical technique for cesarean delivery *(Al Rifai, 2017).*

Different techniques have been practiced in order to reduce morbidity during and after cesarean delivery, the techniques vary depending on both the clinical situation and the preferences of the operator, and mainly due to limited information available concerning the most appropriate surgical technique to adopt *(Dodd et al., 2014).*

For uterine repair, two techniques are well described: the uterus can either be repaired in situ within the peritoneal cavity or temporarily exteriorized out of the mother's abdomen to allow better visualization of any uterine extensions and to facilitate uterine repair *(Jacobs-Jokhan et al., 2010).*

Many randomized clinical trials have compared these two techniques to identify the optimum surgical procedure, minimize operation time and blood loss, reduce postoperative complications and hospital stay, and achieve rapid regain of bowel movement, with conflicting results *(El-Khayat et al., 2014).* They have been extensively studied with multiple randomized controlled trials and meta-analyses but no conclusions have been drawn on the superiority of one technique *(Mireault et al., 2020).*

The aim of the present study was to compare uterine exteriorization with in situ repair with duration of surgery and blood loss as primary outcome and postoperative or intraoperative complications of cesarean delivery as the secondary outcome.

PATIENTS AND METHODS

The current study was a double-blinded randomized clinical trial conducted at Beni-suef General Hospital between December 2019 and December 2020. This study was planned to be conducted on 200 pregnant females that were undergoing an elective cesarean section at full term. The patients were randomly allocated into two equal groups: Group 1: 100 women with in-situ repair of uterine incision. Group 2: 100 women with exteriorization of the uterus for repair of uterine incision.

The Scientific and Ethics Committee of the study hospital approved the study protocol. All pregnant women with an indication for cesarean delivery received written and verbal information about the study and were asked to participate. Those who agreed signed an informed consent forms.

We included pregnant women with a single fetus at term of gestational age (>37 weeks). The recruited women were preoperatively assessed for their age, parity, gestational age, and body mass index (BMI) measurement. Additionally, hemoglobin levels and hematocrit values were measured before surgery. Anemic women (Hb <8gm/dL) and those with multiple gestations, placenta previa, premature rupture of membranes, chorioamnionitis, pre-eclampsia, diabetes mellitus, current or previous history of

heart disease, liver, renal disorders or known coagulopathy and with previous repair of ruptured uterus, abdominal or pelvic surgery other than CD were excluded from the study.

All cesarean deliveries were carried out by third-year obstetric residents trained to perform both techniques of incision repair and under the supervision the specialist and the study responsible. Technique of performing surgery was standardized in all the 200 patients till delivery of the placenta, following which in the exteriorization group uterus was brought out of the peritoneal cavity for repair, while intra-peritoneal repair was done in in situ group. Remaining steps of the closure were also standardized in all 200 patients. All operations were performed under regional spinal anesthesia and oxytocin management were standardized. Surgical antibiotic prophylaxis was standardized.

For every case the following were done preoperatively: Complete detailed personal, obstetric, medical and past history were taken, abdominal ultrasound, routine preoperative investigations(Complete blood picture, Coagulation profile, Liver function tests, Kidney function tests, Fasting blood sugar, ECG), hemoglobin and hematocrits values were measured pre and post-operative.

Operative outcomes were compared between the groups including; mean operative time in minutes, estimated blood loss in milliliters, hypotension reported by the anesthesiologist as a sudden drop of blood pressure (usually more than 20 mmHg).

Post-operative pain assessment was done 6 hours using 10-point Visual analogue scale (VAS). Scores between 0 and 5 defined as no/mild pain; scores between 6 and 10 defined as moderate to severe pain. (50 mg Diclofenac suppositories) per rectum every 8 hours was administered during the postoperative period for pain relief and if the patient requested for additional analgesic doses, it was recorded as need for additional analgesia, abdominal auscultation using stethoscope was done every 4 hours to assess return of bowel function, post-operative nausea and vomiting, apparition of surgical site infections and endometritis were carefully evaluated. Surgical site infection was diagnosed if purulent discharge from the incision or wound breakdown was present. Endometritis was diagnosed by sign of postoperative fever (> 38C° after the first postoperative day) with uterine tenderness, foul smelling lochia and leukocytosis (white cell count >15,000/ml), length of hospital stay was recorded; the time was taken from start of cesarean delivery until discharge from the hospital.

- Primary outcomes for this review were blood loss (blood transfusion, reduction in hemoglobin, estimated blood loss) and the operative time.
- Secondary outcomes included incidence of intraoperative complications (nausea, vomiting, and pain), postoperative Infection (endometritis, wound infection), return of bowel function, length of hospital stay, postoperative pain, fever, use of postoperative analgesics, and hemodynamic instability. Studies were

included if they reported any of our primary or secondary outcomes.

Statistical analysis:

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). The demographic data of included women was presented as descriptive statistics (using range, mean and standard deviation). Demographic data and primary and secondary outcomes of both groups were compared. Student t test or mann-whitney test was used for comparison of numerical data; the data were presented as Mean±SD. Chi-square test was used for comparison of categorical data; the data were presented as frequencies (number of cases) and percentages. A 95% limit and 5% level of significance were adopted. Therefore, a P value of less than 0.05 was considered significant.

RESULTS

The baseline characteristics of the studied groups, both studied groups were similar regarding their age, BMI, gestational age, pre-operative hemoglobin and parity with no statistically significant differences (p-values were >0.05).

Indications for cesarean delivery were comparable in the two groups. The most frequent indication for CS in both groups was previous cesarean delivery followed by fetal distress. Both studied groups were similar regarding the indications of CS with no statistically significant differences (p-values were >0.05).

Uterine incision closure time (minutes) was significantly longer in group A (in situ) group as compared with group (B) (extra-abdominal) group (7.1 vs. 6.2 minutes un both groups respectively); (p-value= 0.048).

A statistically significant difference was observed between the groups (p= 0.026) when the number of Vicryl ampoules used in uterine closure was evaluated and in the incidence of intraoperative Nausea and vomiting groups (p= 0.042).

Both studied groups were similar regarding intra-operative Tachycardia, Hypotension and Extra-analgesics need with no statistically significant differences (p-values >0.05).

The estimated intraoperative blood loss was more in in-situ group as compared to exteriorization which was highly statistically significant difference (p<0.001).

Only one case among the studied females in exteriorization group required blood transfusion while no cases within in-situ group required it with no statistically significant difference; (p-value >0.05) **(Table 1)**.

Table (1): Comparison between the two studied groups regarding the basic characteristics, indication for cesarean delivery, intra-operative variables, intra-operative blood loss and blood transfusion rates

Parameter / Groups		Group (A) N=100	Group (B) N=100	P-value
Age (years); mean ±SD		28.7 ±4.2	27.8 ±5.1	0.872
Height (cm); mean ±SD		168 ±7.3	165 ±7.8	0.749
Weight (kg); mean ±SD		79.8 ±4.5	79.3 ±3.4	0.923
BMI (kg/m^2); mean ±SD		28.5 ±3.3	29.3 ±3.5	0.891
Gestational age (wk); mean ±SD		37.5 ±2.3	37.7 ±2.1	0.899
Preoperative hemoglobin (g/dL); mean ±SD		11.00 ±2.8	11.50 ±3.2	0.786
		N (%)	**N (%)**	
Parity	0 (Primipara) ≥1 (multipara)	24 (24%) 67 (67%)	29 (29%) 71 (71%)	0.568
Indication for cesarean delivery	Previous cesarean delivery Fetal distress Dystocia / CPD Mal-presentation	50 (50%) 32 (32%) 9 (9%) 9 (9%)	52 (52%) 30 (30%) 10 (10%) 8 (8%)	0.578
Intra-operative variables	Uterine incision closure time (minutes); mean ±SD	7.1 ±1.80	6.2 ±3.1	**0.048**
	Nausea-vomiting	12 (12%)	24 (24%)	**0.042**
	Tachycardia	31 (31%)	34 (34%)	0.640
	Hypotension	35 (35%)	39 (39%)	0.089
	Extra-analgesics need	21 (21%)	25 (25%)	0.531
	Number of Vicryl ampoules used in uterine closure: 1 >1	 68 (68%) 32 (32%)	 80 (80.0) 20 (20.0)	**0.026**
Blood Loss (ml)	300-500 500-700 700-900 >900	61 (61%) 32 (32%) 7 (7%) 0 (0%)	8 (8%) 62 (62%) 28 (28%) 2 (2%)	**0.001**
Blood transfusion	Required Not Required	0 (0%) 100 (100%)	1 (1%) 99 (99%)	0.586

BMI= Body Mass Index.

Pain assessment 6 hours postoperatively using Visual analogue scale (VAS) reveled higher score among the exteriorization group as compared with in-situ group with highly statistically significant difference (p<0.001). Additional postoperative analgesia was significantly more required among exteriorization group as compared with in-situ group (35% vs. 10% in both groups respectively) with a statistically significant difference (p= 0.023). No statistically significant difference was detected regarding time taken for return of bowel function (p-value >0.05) **(Table 2)**.

Table (2): Comparison between the both studied groups regarding postoperative pain assessment & postoperative analgesia and time taken for return of bowel sounds

Parameters \ Groups	Group (A) N=100	Group (B) N=100	p-value
VAS score: Mean ±SD	3.04 ±1.1	4.89 ±2.1	0.001
Additional postoperative analgesia: N (%) Required Not Required	 10 (10) 90 (90)	 35 (35%) 65 (65%)	0.023
Time taken for return of bowel sounds: 6-8 hours >8 hours	 97 (97%) 3 (3%)	 93 (83%) 7 (7%)	0.400

VAS= Visual analogue scale

The hemoglobin level was decreased significantly in cases that underwent in-situ or exteriorization procedures, but the mean reduction in in-situ group was double that of the exteriorization group which is statically significant. The hematocrit level was decreased significantly in cases that underwent in-situ or exteriorization procedures, but the mean reduction in in-situ group was double that of exteriorization group which is statically significant **(Table 3)**.

Table (3): Comparison between the difference in hemoglobin level (gm/dl) and hematocrit % before and after operation in in-situ and exteriorization groups

Group		Before	After	Reduction
Hemoglobin level (gm/dl)	**In situ** (N=100)	11.1±1.1	9.1±1.1	2.0±0.6
	Exter. (N=100)	10.8±0.9	9.8±1.0	1.1±0.4
	T	1.156	2.579	6.836
	P	0.252	0.012	<0.001
Hematocrit %	**In situ** (N=100)	33.6±3.5	26.9±3.3	6.8±1.8
	Exter. (N=100)	32.8±2.7	29.0±3.2	3.8±1.7
	T	0.991	2.502	6.637
	P	0.325	0.015	<0.001

Regarding post-operative complications; there was statistically significant difference among the both studied groups in nausea and vomiting, and there was no statistically significant difference in other complications as surgical site infection, or fever **(Table 4)**.

Table (4): Comparison between the both studied groups regarding post-operative complications

Post-operative Complications	Group (A) N=100	Group (B) N=100	*p-value*
Nausea and Vomiting	6 (6%)	12 (12%)	**0.042***
Surgical Site Infection; N (%)	3 (3%)	2 (2%)	0.558
Endomyometritis; N (%)	2 (2%)	1 (1%)	0.864
Fever	8 (8%)	5 (5%)	0.461

DISCUSSION

In this prospective randomized study, we compared the intra-operative advantages and disadvantages and postoperative morbidity following uterine exteriorization versus in-situ repair during cesarean delivery; and to determine any surgical benefits and problems associated with the practice of exteriorization of the uterus to facilitate repair at cesarean delivery. Two hundred pregnant women with indication for caesarean delivery were randomized as 100 patients each in the in-situ group and in the exteriorization group.

The demographic profile and baseline clinical data like age, height, weight, BMI, gestational age, parity and indications for cesarean delivery were comparable in the two groups with no statistically significant differences.

In the present study, as a primary outcome, a significant trend towards more time (minutes) taken for the closure of the uterine incision in the in-situ group was observed; uterine incision closure time (minutes) was significantly longer in group A (in situ) group as compared with group (B) (extra-abdominal) group; (7.1 vs. 6.2 minutes un both groups respectively). This may be attributable to the better visualization, wider field which facilitates a comfortable range of movement for obstetricians and easier repair of uterine incision following exteriorization. Similar to our results, *Chauhan and Devi (2018)* .

El-Khayat et al. (2014) and *Shiya et al. (2015)* reported significantly less duration of surgery in the exteriorization group as compared to in-situ group in their studies. However; *Abdellah et al. (2018)* reported similar duration of surgery in their groups of women who underwent either uterine exteriorization or in-situ repair without a statistically significant differences.

In our study we didnet calculate the total time of the surgical procedure, but we noticed that both exteriorization of the uterus and its repositioning consume time, whish despite being a little but it appears that it counteract the time saved by the repair of the uterus outside the abdominal cavity when compared with the other studies.

Published data are inconsistent with regard to blood loss when comparing both techniques. In the present study as a primary outcome, intraoperative blood loss was more in in-situ group as compared to exteriorization which was highly statistically significant difference. Uterine exteriorization was suggested, in some studies, to reduce operative blood loss and subsequently decrease the need for blood transfusion *(Orji et al., 2010* &

Walsh and Walsh, 2010). This may be explained by an improved visualization of the uterus during its repair but also by facilitating uterine venous drainage, thus, leading to decreased blood loss *(Jacobs-Jokhan and Hofmeyr, 2010).* However, our results are opposite to the reported in many other trials in the same context who found that no significant differences existed between these two techniques regarding blood loss, hemoglobin and hematocrit levels *(Mohr-Sasson et al., 2020* and *Abdellah et al., 2018).*

As secondary outcomes; in the present study, the incidence of intra-operative nausea and vomiting were significantly higher in the exteriorization group than in the in-situ group. This finding cane in accordance with *Abdellah et al. (2018),* where the incidence of intraoperative nausea and vomiting was clinical trial. This observation also is in line with previous studies by *Mireault et al. (2020),* in their randomized clinical trial where intraoperative nausea and vomiting was significantly higher in women undergoing cesarean delivery who were randomized to exteriorization of the uterus for repair of the uterus, compared with women randomized to in situ repair. On the opposite side, the incidence of intraoperative nausea and vomiting was nearly similar in both studied groups in the *Chauhan and Devi (2018)* study where the incidence of intraoperative nausea and vomiting was 14% in group 1 and 10% in group 2, which was not significant. The same observation also was reported by *(El-Khayat- Mohr-Sasson et al., 2020* and *et al., 2014).*

Nausea and vomiting during CD were commonly related to fundal and peritoneal traction during exteriorization *(Walsh and Walsh, 2010).* The differences in results between the present study and those reported significant difference may stand due to the relative small sample size in our study, also these two studies considering intraoperative nausea and vomiting as a primary outcome of our study considered intraoperative nausea and vomiting as a secondary outcome.

In the present study; a statistically significant difference was observed between the groups ($p= 0.026$) when the number of Vicryl ampoules used in uterine closure was evaluated. The extra use of ampoules is mainly due to the need of doing hemostatic sutures after doing the 2 layers closure of the uterine incision in the in-situ group; however that was rarely resorted to in the exteriorized group.

We also compared hypotension rates between these groups and did not find any significant increase in the rate of hypotension in the exteriorized group. Thus, in-line with many similar studies who evaluated hypotension about these two surgical techniques found that the exteriorized group exhibited a non-significant increase in the incidence of hypotension. Here we demonstrate similar results *Gode et al. (2012).* And *Abdellah et al. (2018)*

In the present study; pain assessment 6 hours postoperatively using Visual analogue scale (VAS) reveled higher score among the exteriorization group as compared with in-situ group with highly statistically significant difference ($p<0.001$). The increased level of pain in the women who had undergone exteriorization of uterus may be attributable to the increased stretch on the

uterine ligaments and parietal peritoneum leading to rise of the complex symptoms of nausea, vomiting and post-operative pain. In *Mohr-Sasson et al. (2020)*, study analysis by grouping reveled a difference in the VAS score for pain assessment that was higher for the exteriorization of the uterus by 2 points (9 versus 7 cm), in the primary CD group; however, both scores were in the "severe pain" reference with no statistically significant difference between them. *El-Khayat et al. (2014)* reported 23% and 33% patients with moderate-to-severe post-operative pain respectively in group 1 and 2 and 10% and 20% patients respectively in group 1 and 2 needed additional analgesia which was statistically significant. A systematic review and meta-analysis by *Zaphiratos et al. (2015)* also mentioned improved post-operative pain outcomes with in-situ repair as suggested by several studies.

In the current study; additional postoperative analgesia was significantly more required among exteriorization group as compared with in-situ group (35% vs. 10% in both groups respectively) with a statistically significant difference (p= 0.023). These results are in accordance with *AbdellAh et al.,* study who found a significant difference in the amount of analgesics distributed after the two surgical techniques *(AbdellAh et al., 2018).*

With regards to time taken for return of bowel function in post-operative period, we found no significant difference between the two groups with return of bowel function within 6-8 hours. This was in accordance with the reported by *Chauhan and Devi (2018)* in their clinical trial. In contrast, *El-Khayat et al. (2014),* strongly favored in-situ repair in this regard and reported mean time to bowel movement to be longer in exteriorization group than in in-situ group (17.0± 2.7 hours versus 14.0 ±1.9 hours; P<0.001). *Orji et al. (2010),* also found there was a longer period for the return of bowel function in the exteriorized group, similar to our findings. Intraoperative bowel manipulation during uterine exteriorization might be a contributing factor to delayed bowel movements. It also might be related to shorter surgery times in the in situ repair group *(Gode et al., 2012). Zaphiratos et al. (2015),* have reported early return of bowel function with in-situ repair.

In the present study we did not find any significant difference in the incidence of postoperative surgical site infection. Similarly, *Chauhan and Devi (2018)* found this incidence to be not significant.

In the present study, duration of hospital stay was observed to be similar in both the groups. However, *Das et al. (2015)* have reported longer stay in in-situ group. Duration of hospital stay was found to be similar in both the groups by *(Bharathi et al., 2017).*

CONCLUSION

The results of this study showed that exteriorization of the uterus has less time consuming in the operation, decrease blood loss and decrease the post-operative drop in the hemoglobin level. On the other hand in-situ uterine repair has much less post-operative complications (nausea, vomiting, pain and febrile illness) than the exteriorization group.

Also we concluded that there is no significant difference between in-situ and

exteriorization groups as regards the number of Vicryl ampoules used in the operation, time of mobilization, time of return of bowel habits, time of oral intake and duration of hospital stay.

Based on the results of this study, exteriorization of the uterus can be recommended as it is better than the in-situ uterine repair in shortening the duration of the procedure, decreasing the post-operative hemoglobin level drop but it increases intra-operative nausea & vomiting and also increases the requirement of post-operative analgesics.

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دراسة مقارنه لاصلاح الشق الرحمي خارج تجويف البطن مقارنة باصلاحه داخل تجويف الرحم في الولادة القيصرية

إسلام محمد علي علواني، عماد عبدالرحمن التمامي، أشرف حمدي محمد

قسم أمراض النساء والتوليد، كلية الطب، جامعة الأزهر

E-mail: islam_elwany2525@gmail.com

خلفية البحث: إن إخراج الرحم من التجويف البريتوني للبطن كان واحدا من أبرز التقنيات التي تم تطويرها لتسهيل عملية الولادة القيصريه، حيث أن ذلك يسهل من عملية الأصلاح للشق الرحمي نتيجة لإنساع مجال الرؤية و أيضا مجال العمل خارج البطن مقارنة بمحاولة الأصلاح داخل التجويف البريتوني للبطن. كما أن إخراج الرحم يساعد علي سهولة التعرف علي الأماكن النازفة من الرحم و سرعة إصلاحها كما يساعد أيضا علي التعرف علي الرحم الغير منقبض و يسهل سرعة التدخل سواء عن طريق تدليك الرحم أو إعطاء الأدوية القابضة للرحم.

الهدف من البحث: مقارنة بين الفوائد مقابل المخاطر الناتجة عن إصلاح الشق الرحمي داخل التجويف البريتوني للبطن و إصلاحه بعد إخراج الرحم من البطن.

المريضات وطرق البحث: تم إجراء هذه الدراسة البحثية بمستشفي بني سويف التخصصي النموذجي قسم النساء والتوليد حيث أجريت هذه الدراسه علي 200 سيدة حامل تم إختيارهن بطريقة عشوائيه لكي يخضعن لإجراء عمليات قيصريه في مدة حمل 40:37 أسبوع.

وقد تم تقسيم المريضات بشكل عشوائي إلى مجموعتين متساويتين: المجموعة الاولي تضم 100 سيدة من النساء الحوامل اللواتي خضعن الي إصلاح شق الرحم, و المجموعة الثانية تضم100 سيدة من النساء الحوامل اللواتي خضعن الي إصلاح شق الرحم خارج التجويف البريتوني للبطن.

نتائج البحث: نسبة الإنخفاض في نسبة الهيموجلوبين تكون أقل في حالة إصلاح الشق الرحمي خارج البطن عن نسبة الإنخفاض في قيم الهيموجلوبين عند إصلاح الشق الرحمي داخل التجويف البريتوني، علي الرغم من أن قيم نسبة

الهيموجلوبين لجميع الفئات كانت متماثله قبل إجراء الجراحه مما يدل علي أن معدل فقدان الدم يكون أعلي عند السيدات اللاتى يتم إصلاح الشق الرحمي لهن داخل تجويف البطن وذلك نظرا لأن مجال الرؤية أوسع و أوضح خارج البطن. وأما بالنسبة الي تحديد ما إذا كان الوقت اللازم لإصلاح شق الرحم أثناء الولادة القيصرية يتأثر بمكان وجود الرحم أثناء الإصلاح فقد أظهرت النتائج أن الوقت المستغرق يكون أقل في حالة إصلاح الشق الرحمي خارج التجويف البريتوني للبطن و لم يكن هناك فرق معتد به بين المجموعات الموضعية والخارجية فيما يتعلق بمرض الحمى بعد الجراحة ومضاعفات الجرح ووقت التعبئة ووقت عودة عادات الأمعاء ووقت تناول الفم ومدة الإقامة في المستشفى.

الإستنتاج: إخراج الرحم من الخارج يستغرق وقتًا أقل في العملية ، ويقلل من فقدان الدم ويقلل من إنخفاض مستوى الهيموجلوبين بعد الجراحة. من ناحية أخرى فإن إصلاح الرحم في الموقع له مضاعفات أقل بكثير بعد الجراحة (الغثيان والقيء والألم والمرض الحموي) مقارنة بمجموعة المظهر الخارجي.

الكلمات الدالة: تصغير الرحم، إصلاح الرحم في الموقع، عملية قيصرية.