

# Influence of Exteriorised versus Intra-abdominal Uterine Repair Caesarean Delivery under Spinal Anaesthesia on Intraoperative and Postoperative Complications

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## ABSTRACT

**Introduction:** Caesarean techniques have evolved over time to increase their safety. Intra-abdominal closure of uterine incision seems more physiological. Exteriorisation makes repair easier with a better exposure. But this causes tension to the supporting structures attached to uterus and stretching of vasculature with the risk of intraoperative haematoma or aneurysm later on.

**Aim:** To compare the in-situ repair group and exteriorised repair group caesarean delivery under spinal anaesthesia regarding occurrence of intraoperative and postoperative complications of interest.

**Materials and Methods:** A prospective interventional study was conducted in the Department of Obstetrics and Gynaecology at College of Medicine and Jawaharlal Nehru Memorial Hospital, West Bengal, India, over a period of two years from April 2014 to March 2016. Four hundred women undergoing caesarean section who fulfilled the inclusion and exclusion criteria were recruited in the study. They were randomly allocated into two study groups as per a computer generated random allocation table. In Group A (n=200) uterine incision was closed after uterus was exteriorised and in Group B (n=200) uterine incision was closed keeping it inside the abdomen. Intraoperative and postoperative parameters of interest such as nausea-vomiting, drop in pulse rate, incision closure time, drop in haemoglobin, blood transfusion rate, return of bowel sounds, febrile morbidity, surgical site infection, hospital stay etc., were noted and

compared between the two groups. Numerical variables were expressed as mean and standard deviation and analysed using independent sample t-test. For qualitative variables frequency and percentage were calculated and analysed using Chi-square. Collected data was transferred and analysed using Statistical Package for Social Sciences (SPSS) version 25.0. The p-value  $\leq 0.05$  was considered significant.

**Results:** The demographic profiles like age, parity, gestational age etc. of both the groups were similar. There was a significant difference in uterine closure time ( $9 \pm 2.5$  minutes in in-situ repair group vs.  $10 \pm 2$  minutes in exteriorisation and repair groups, respectively ( $p < 0.001^{**}$ ). Mean drop in pulse rate, incidence of nausea, vomiting were similar in both the groups ( $p > 0.05$ ). Mean drop of haemoglobin was more in the intraabdominal closure group ( $1.5 \pm 1.3$  gm/dL) as compared to the group of closure after exteriorisation ( $1.4 \pm 1.3$  gm/dL) though the difference was not significant statistically ( $p = 0.44$ ). Postpartum blood transfusion rate was 6.5% in exteriorised repair group and 9% in in-situ repair group ( $p = 0.35$ ). Postoperative morbidity like fever, surgical site infection, length of hospital stay was similar in both the groups.

**Conclusion:** Choice of uterine closure method is operator dependent and either method of uterine closure is acceptable when practiced and skill is gained. Exteriorisation is advantageous when excessive bleeding is encountered. Though time taken for closure in in-situ group is statistically more it is similar practically. Bowel sounds returned earlier postoperatively in in-situ group.

**Keywords:** In-situ, Incision, Morbidity, Technique

## INTRODUCTION

The rate of caesarean section has reached an epidemic level globally [1]. It is one of the most common operations a woman has to undergo in her lifetime considering the current trend of obstetrics practice [2]. Constant research to make the caesarean section safer has led to many changes in the traditional practice [3]. To reduce the maternal and neonatal morbidity and mortality, caesarean section is an essential component of essential obstetrics care. According to the latest available data the rate of caesarean deliveries in India is estimated to be 17.2% [1]. The ideal rate of caesarean section is debatable but according to a WHO published report it is to be in a range of 10-15% to meet the need of essential obstetrics care. Outcome of a patient may be influenced by many factors like patients profile, indication for caesarean section, perioperative prophylaxis, operation theatre quality, obstetric team, caesarean technique and postoperative care quality etc., [3]. Methods have evolved over the time to make caesarean safer as we need to do caesarean in large number of women.

Repair of uterine incision is an important step in caesarean section. Many complications including the haemoperitoneum, relaparotomy and maternal death may be associated with this step if not done carefully. Repair of uterine incision can be done keeping it inside the abdomen or taking the uterus outside of the abdominal cavity. There are pros and cons attached with either method of repair. The proponents of the exteriorised repair of uterine incision have said certain advantages like proper and easy exposure and easy and quick repair, less blood loss, easy to tackle the extension of angle, easy identification of atonicity of uterus and adnexal mass etc. The opponents claim that exteriorisation may cause increased discomfort, pain, nausea of the patient under spinal anaesthesia [4]. Merit of a method over the other is still a matter of controversy. Therefore, the aim of the present study was to compare the in-situ repair group and exteriorised repair group in caesarean delivery under spinal anaesthesia regarding the occurrence of intraoperative and postoperative complications.

## MATERIALS AND METHODS

This was a prospective interventional study done over a period of two years from April 2014 to March 2016 in the Department of Obstetrics and Gynaecology of College of Medicine and Jawaharlal Nehru Memorial Hospital, Kalyani, West Bengal, India. The scientific review committee and thereafter the Ethical Committee of the Institute approved this study following due procedure {Ref No:F78/Pr/COMJNMH/I.E.C/42/ (6) dated: 26-04-2013}.

**Inclusion criteria:** Mother undergoing elective or emergency caesarean section at  $\geq 37$  weeks of gestation with longitudinal lie under spinal anaesthesia were included in the study.

**Exclusion criteria:** Patients with haemoglobin  $\leq 8$  gm/dL, more than one caesarean section, previous pelvic surgery, eclampsia, antepartum haemorrhage, chorioamnionitis, heart disease, pregnancy with fibroid or ovarian tumours etc., were excluded from the study.

A sample size of 400 cases was selected based on convenience sampling as it is a reasonable sample size.

### Study Procedure

By a computer generated random allocation table all the patients then were randomised into two groups. Study group (Group A) consisted of 200 mothers for whom repair of uterine incision was done after exteriorisation of the uterus out of abdomen. And the control group (Group B) consisted of 200 mothers for whom uterine closure was done keeping the uterus intra-abdominal.

All the caesarean sections were done by an experienced obstetrician in a single admitting unit conversant with both the techniques of uterine closure. Standard perioperative antibiotic prophylaxis and premedication, spinal anaesthesia using 24 G needle and 0.5% bupivacaine, standard caesarean technique and same postoperative fluid and pain management were followed in both the groups. In both the groups intravenous oxytocin 10 units were given after clamping the cord and placental removal was done by cord traction. Manual removal of placenta was done only if it was necessary.

**In Group A,** uterus was exteriorised to repair lower segment uterine incision. Vicryl no-0 was used and closure was done in two layers with continuous suture.

**In Group B,** uterine repair was done in two layers with vicryl no 1-0 keeping the uterus intra-abdominal.

Demographic variables like age, parity, gestational age at delivery, type and indications of caesarean section were recorded on a prepared chart. Intraoperative nausea vomiting, alteration of pulse rate, pre and postoperative haemoglobin, drop in haemoglobin, blood transfusion rate, return of bowel sounds, febrile morbidity, surgical site infection and hospital stay were noted for the comparison.

Time taken to close the uterine layer only was measured in both the groups as an indirect assessment of the operative difficulty by the surgeon. Postoperative return of bowel sounds was checked after eight hours and noted. Fever morbidity was considered if patient developed rise of temperature of  $104^{\circ}\text{F}$  on two occasions 12 hours apart excluding the first 24 hours. Surgical site infection was checked on day four of surgery and redness, swelling, discharge from wound or wound gap were noted. The length of hospital stay was counted from the day of caesarean section to the day of discharge and recorded. Requirement of blood transfusion, preoperative and postoperative haemoglobin level in a case was checked to assess indirectly the amount of blood loss.

## STATISTICAL ANALYSIS

Collected data was transferred and analysed using SPSS version 25.0. For numerical variables like age, parity, length of hospital stay, return of bowel sounds the mean and standard deviation values

were calculated. Independent sample t-test was then used to find the difference between the means of the two groups. For qualitative variables like blood transfusion and surgical site wound infection frequency and percentage were calculated and Chi-square test was used to find out association of categorical variables. Level of significance was 5% and p-value  $\leq 0.05$  was taken as statistically significant.

## RESULTS

Demographic parameters and other parameters mentioned below were compared between the two groups. The mean age of Group A was  $23 \pm 3.75$  years and of Group B was  $23.5 \pm 3.82$  years. The other various parameters compared were not statistically significantly different between the two groups as depicted in the [Table/Fig-1].

Variables	Group A (Exteriorised) n=200 n (%)	Group B (Intra-abdominal repair) n=200 n (%)	p-value
Age (in years) <sup>†</sup>	23±3.75	23.5±3.82	p=0.18 (95% CI-0.24 to 1.24)
Parity			
Primi	115 (57.5%)	105 (52.5%)	p=0.31 (95% CI-4.71 to 14.58)
Multi	85 (42.5%)	95 (47.5%)	
Gestational age (in weeks) <sup>†</sup>	38.1±1.9	38.3±1.3	p=0.22 (95% CI-0.12 to 0.52) <sup>‡</sup>
Elective caesarean <sup>†</sup>	42 (21%)	48 (24%)	p=0.47
Emergency caesarean <sup>†</sup>	158 (79%)	152 (76%)	(95% CI-5.19 to 11.14)
Indications for CD			
Previous caesarean <sup>†</sup>	74 (37%)	80 (40%)	p=0.53 (95% CI-6.49 to 12.41)
Foetal distress <sup>†</sup>	64 (32%)	60 (30%)	p=0.66 (95% CI-7.02 to 10.98)
Non progress of labour <sup>†</sup>	32 (16%)	31 (15.5%)	p=0.89 (95% CI-6.68 to 7.68)
Others <sup>†</sup>	30 (15%)	29 (14.5%)	p=0.88 (95% CI-6.51 to 7.51)

**[Table/Fig-1]:** Comparison of age, parity, gestational age, type and indication of caesarean between the two groups.

<sup>†</sup>t-test; <sup>‡</sup>Chi-square test

The uterine incision closure time in Group A (exteriorised repair group) was  $9 \pm 2.5$  minutes and in Group B was  $10 \pm 2.0$  minutes which was found to be statistically significant (p-value  $< 0.001^{**}$ ).

The bowel sound returns in less than eight hours time in 75% cases in Group A and in 90% cases in Group B which was statistically significant (p $< 0.001^{**}$ ) [Table/Fig-2].

Parameters	Group A (Exteriorised) n=200 n (%)	Group B (Intra-abdominal repair) n=200 n (%)	p-value
Nausea-vomiting <sup>†</sup>	22 (11%)	16 (8%)	p=0.30 (95% CI-2.85 to 8.91)
Pulse rate drop below 60 bpm <sup>†</sup>	9 (4.5%)	6 (3%)	p=0.43 (95% CI-2.49 to 5.65)
Uterine incision closure time (in mins) <sup>†</sup>	9±2.5	10±2.0	p<0.001** (95% CI 0.55 to 1.4)
Preoperative haemoglobin (gm/dL) <sup>†</sup>	10.8±1.4	10.7±1.3	p=0.45 (95% CI-0.36 to 0.16)
Postoperative haemoglobin (gm/dL) <sup>†</sup>	9.4±1.2	9.2±1.3	p=0.11 (95% CI-0.44 to 0.04)
Mean drop in haemoglobin <sup>†</sup>	1.4±1.3	1.5 ±1.3	p=0.44 (95% CI-0.15 to 0.35)
Blood transfusion cases <sup>†</sup>	13 (6.5%)	18 (9%)	p=0.35 (95% CI-2.88 to 7.96)
Return of $\leq 8$ hours bowel sound <sup>†</sup> >8 hours	150 (75%)	180 (90%)	p<0.001** (95% CI 7.61 to 22.29)
	50 (25%)	20 (10%)	
Febrile morbidity <sup>†</sup>	10 (5%)	14 (7%)	p=0.40 (95% CI-2.83 to 6.95)

Surgical site infection <sup>‡</sup>	12 (6%)	14 (7%)	p=0.68 (95% CI-4.03 to 6.080)
Hospital stay (in days) <sup>†</sup>	4.5±1.2	5±1.1	p=1.00 (95% CI-0.22 to 0.22)

**[Table/Fig-2]:** Comparison of various intraoperative and postoperative events between the two groups.

<sup>†</sup>t-test (mean±SD); <sup>‡</sup>Chi-square test

The other parameters compared between the two groups like intraoperative nausea-vomiting, drop in pulse rate below 60 beats per minute, drop in haemoglobin, febrile morbidity, surgical site infection rate and hospital stays were found to be similar as shown in [Table/Fig-2].

## DISCUSSION

This study was conducted to compare the morbidities in exteriorised repair group and in-situ repair group of uterine incision closure in caesarean delivery involving 200 patients in each group. Participants of both the groups had almost similar demographic pattern in terms of their age, parity and gestational age at caesarean delivery  $p>0.05$ . Lakshmi P et al., found that 85% of exteriorised group and 91% of in-situ group had ages ranging between 21-30 years [4]. In this study, mean drop of pulse rate in the two groups did not show any statistically significant difference 9 (4.5%) in the exteriorised group vs 6 (3%) in in-situ group,  $p=0.43$ . El-Khayat W et al., in their study found intraoperative tachycardia in 8.6% in the extra-abdominal repair group and in 8.8% in in-situ repair group which was not statistically significant ( $p\geq 0.99$ ) [5].

The incidence of intraoperative nausea and vomiting was more in Group A (11%) than in Group B (8%), but this was not statistically significant 22 (11%) in exteriorised and 16 (8%)  $p=0.30$ . In a recent study, Rai A et al., found that the incidence of nausea was more (22/98) in the exteriorised repair group than in the in-situ repair group (2/46) which was statistically significant ( $p=0.007$ ) [6]. Chauhan S and Devi SPK found similar nausea and vomiting in either groups (14% in exteriorised group and 10% in in-situ group,  $p=0.53$ ) [7]. The mean time taken to close the uterine incision in two layers with vicryl 1-0 in Group A was  $9\pm 2.5$  minutes and it was  $10\pm 2.0$  minutes in the Group B. This was statistically significant ( $p\leq 0.0001$ , 95% CI 0.55 to 1). El-Khayat W et al., in their randomised study found significantly more time of total surgery in the exteriorisation group as compared to in-situ group ( $49.9\pm 2.3$  minutes vs  $39.9\pm 1.8$  minutes,  $p\leq 0.001$ ) [5].

In the present study, only uterine closure time could be noted as there could be other factors affecting total surgical time. Islam Elwany MA et al., in their study found statistically significant difference in closure time of uterine incision ( $7.1\pm 1.8$  min in in-situ group vs  $6.2\pm 3.1$  in exteriorised group,  $p=0.04$ ) [8]. Hershey DW and Quilligan EJ in their study noted same duration of surgery in both groups of women who underwent either uterine exteriorisation or in-situ repair [9]. Study by Chauhan S and Devi SPK found a significant trend of more time taken for repair of uterine incision closure in in-situ repair group ( $12.4\pm 2.7$  min in in-situ repair group vs  $11.4\pm 2.6$  min in exteriorised group,  $p=0.05$ ) [7]. Drop of haemoglobin between the two groups in the present study was not statistically significant ( $1.4\pm 1.3$  in exteriorised group vs  $1.5\pm 1.3$  in in-situ group,  $p=0.44$ ). Chauhan S and Devi SPK also noted the same in their study ( $0.37\pm 0.10$  in exteriorised group vs  $0.52\pm 0.18$  in in-situ repair group,  $p$ -value was 0.752) [7]. But in contrast, Zaphiratos V et al., found that exteriorisation may be associated with a slight less drop in haemoglobin (mean drop-0.14 gm/dL (-1);95% CI,-0.22 TO -0.07) and less estimated blood loss [10]. Reason for less blood loss in exteriorised group probably could be easy identification and quick tackling of bleeding from the angle and sinuses of the uterine incision margin.

In the present study, bleeding from the angles and margins of uterine incision was checked immediately after handing over the baby and controlled the bleeding even before the separation of the placenta

as every second is important to reduce the bleeding from angle and sinuses. This could be a reason that significant difference in haemoglobin drop was not found in the present study. A single case of lower segment haematoma was found in each of the groups and identification was little delayed in the in-situ repair group. Identification at the beginning and putting a transverse haemostatic stitch perpendicular to the course of blood vessel will prevent haematoma formation. Blood transfusion rates were 6.5% in exteriorisation group compared to 9% in in-situ group and this was not statistically significantly different. But in contrast, Lakshmi P et al., in their study found a significantly high blood transfusion rates (15%) in in-situ group compared to 6% in exteriorisation group ( $p=0.038$ ) [4]. Good exposure and light for proper visualisation are essential for easy control of bleeding.

In the present study, bowel sounds returned within eight hours in 90% cases in in-situ group and in 75% cases in exteriorised group. This was found to be statistically significant ( $p<0.001^{**}$ ). Zaphiratos V et al., also in their study reported early return of bowel movement with in-situ repair group when compared to exteriorised group (mean difference, 3.09 hours, 95% CI; 2.21 to 3.97) [10].

El-Khayat W et al., in their study found longer mean time to bowel movement in exteriorisation group than in in-situ group ( $17.0\pm 2.7$  hours versus  $14.0\pm 1.9$  hours;  $p<0.001$ ) [5]. In contrast, with regards to time taken for return of bowel movement in postoperative period Chauhan S and Devi SPK did not find any significant difference between the two groups. They reported the return of bowel function within 6-8 hours in 92% patients in exteriorisation Group and in 96% patients in in-situ repair group [7]. Febrile morbidity in both the groups was same. In a study by Lakshmi P et al., febrile morbidity was 7% in exteriorised group and 16% in in-situ repair group which was statistically significant [4]. Das S et al., reported febrile morbidity of 6% and 19% in exteriorisation and in-situ group respectively [3]. Edi-Osagie EC et al., did not find any significant difference in febrile morbidity between the two groups [11].

Surgical site infection was noted in 6% in in-situ closure group and 7% in exteriorisation group which was similar statistically. Lakshmi P et al., in their study reported the incidence of surgical site infection slightly more in in-situ group 15% compared to 8% in exteriorisation group however this difference was not statistically significant. Zaphiratos V et al., found surgical site infection in 7% in exteriorisation group compared to 8.7% in in-situ repair group [10]. Similar observation was reported by El-Khayat W et al., which was not significant statistically. In this present study, the duration of hospital stay in both the groups was similar ( $4.5\pm 1.2$  vs  $5\pm 1.1$   $p=1.00$  (95% CI-0.22 to 0.22)). The usual discharge policy of index hospital was not affected by either method or complication of any method. Chauhan S and Devi SPK also did not find any significant difference in hospital stay between the two groups [7]. On the contrary, Das S et al., have reported longer stay in in-situ group [3]. Duration of hospital stay was found to be similar in both the groups by Edi-Osagie EC et al., [11].

## Limitation(s)

A larger sample size would be better to draw any conclusion of morbidity associated with any particular surgical technique. Surgical skill development has its own learning curve and with time technique becomes easier and therefore complications become less and less common with any particular technique. Unless one is well skillful with any technique it is hard to implement based on any study result.

## CONCLUSION(S)

Both the techniques of uterine closure in caesarean section were similar with regards to morbidity studied in this study. Exteriorisation of uterus provides better access to operative surgeon and easy closure of it as reflected in the less incision closure time required in

this group. Tackling of excessive intraoperative bleeding because of better exposure and stretching of vessels may be better in this extra-abdominal repair group. As caesarean mostly done under spinal anaesthesia, nausea vomiting may be troublesome at the time of caesarean section. In-situ repair of uterine incision has got some beneficial effect in this regard. Choice of method is operator dependent and either method of uterine closure is acceptable.

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### PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Dec 19, 2022
- Manual Googling: Feb 14, 2023
- iThenticate Software: Feb 22, 2023 (14%)

### ETYMOLOGY: Author Origin

### AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Dec 28, 2022**  
Date of Peer Review: **Jan 19, 2023**  
Date of Acceptance: **Feb 27, 2023**  
Date of Publishing: **Mar 01, 2023**