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Original Research Article

Comparison of Feto-Maternal Outcomes of Conventional Method vs Reverse Breach Extraction Method in Delivering Deeply Engaged Foetal Head at Caesarean Section

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Abstract: *Cesarean section in the presence of a deeply impacted fetal head during the second stage of labour presents a significant obstetric challenge. It is associated with increased maternal and neonatal complications. Optimal surgical technique is crucial in minimizing adverse outcomes, yet the ideal extraction method remains a topic of debate.* ***Objective:*** *To compare the maternal and neonatal outcomes of the conventional (push) method versus the reverse breech extraction method during emergency cesarean sections performed for obstructed labour.* ***Methods:*** *This randomised controlled trial was conducted in the Department of Obstetrics and Gynaecology Unit II, Lahore General Hospital, Lahore, from August 2019 to March 2020. A total of 110 women undergoing emergency cesarean section for obstructed labour were enrolled and randomly assigned to either Group A (conventional method) or Group B (reverse breech extraction method) using the lottery method. Key outcomes assessed included maternal blood loss, extension of uterine incision, and neonatal intensive care unit (NICU) admission. Data were analysed using appropriate statistical tests, and a p-value of <0.05 was considered significant.* ***Results:*** *The mean age of participants in Group A was 27.22 ± 5.08 years, and in Group B was 28.36 ± 4.52 years. The reverse breech group demonstrated significantly lower mean blood loss (842.64 ± 123.14 mL) compared to the conventional group (p < 0.001). Extension of uterine incision occurred in 32.7% of cases in Group B versus a higher proportion in Group A (p = 0.004). NICU admission was also significantly less frequent in Group B (5.5%) compared to Group A (p < 0.05).* ***Conclusion:*** *The reverse breech extraction method during emergency cesarean section for obstructed labour is associated with reduced intraoperative blood loss, lower incidence of uterine incision extension, and fewer NICU admissions. This technique offers a safer alternative to the conventional method and should be considered in managing deeply impacted fetal heads during obstructed labour.*

Keywords: Blood loss, Cesarean section, Incision extension, NICU admission, Obstructed labour, Push method, Reverse breech extraction

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Introduction

Obstructed labour is described as a lack of progress in labour as demonstrated by the cervix's inability to dilate, the foetal portion's failure to descend through the birth canal, or both, despite sufficient uterine contractions (1). Although uncommon in wealthy nations, it is a prevalent obstetric issue in developing nations. (2). Obstructed labour is a significant contributor to maternal and newborn morbidity and mortality on a global scale (3). When the station is below the ischial spines, the foetal head is deemed to be impactional. This is typically the result of a lengthy second stage of labour (4). Although the frequency of deeply impaled heads during caesarean delivery is unknown, it is believed to account for 25% of all emergency caesarean deliveries (5). According to some studies, 3-6% of women worldwide experience obstructed labour during childbirth, and it is thought to be a key factor in both maternal and neonatal morbidity and mortality (6). The reported rates of perinatal mortality range from 150 to 650 per 1000 births, and this issue accounts for 8% of all maternal deaths (7). Uterine rupture and fistula formation are frequently caused by obstructed childbirth. [1] A highly impacted head extraction is complicated and fraught with difficulties (trauma to the fetus, increased risk of infection, uterine incision extension, and excess blood loss (8).

The primary purpose of caesarean sections is to remove the impediment. Cesarean sections, however, may be particularly challenging to perform when labour is advanced and the baby's head is firmly lodged in the pelvis. The lower uterine segment is considerably thinned and extended during obstructed labour, which could result in a high rate of uterine incision extension, which could raise the risk of significant obstetric haemorrhage, harm to the uterine vasculature, trauma to the urinary tract, and a more extended hospital stay (9).

The "standard approach," in which the foetal head is pushed through the vagina, is also known as the push method. The "reverse breech extraction approach," in which the superior pole is delivered first and is also known as the pull method, has been suggested to overcome the difficulty of providing the foetus and reduce maternal and foetal risks during CS for obstruction in labour. (10)

According to a 2012 study by Veisi et al., the uterine incision extension in the push method group was approximately 68% higher than in the pull method group (3.7%). Additionally, the push method's average blood loss (around 571 ml) was much higher than the pull method's average blood loss (around 457 ml). A 2011 study by Frass et al. revealed that using the reverse pull method resulted in 5% more incidences of uterine incision extension than the push method. However, there were no appreciable differences in infectious morbidity and NICU hospitalizations in these trials. Another study conducted in 2014 by Saleh et al. revealed that the push method's extension of incision was substantially higher (20% versus 50%; p = 0.001). The mean blood loss using the pull method was likewise significantly less than that of the push method (1321 +/- 57 ml, p = 0.001) (878 +/- 67 ml vs. 1321 +/- 57 ml, p = 0.001). There was no discernible difference between the groups in terms of NICU hospitalisations or newborn morbidity. However, it is challenging to assess the local impact of these strategies due to a lack of research.

This study compares the results of the push method with the pull method during caesarean sections performed for obstructed labour in terms of the length of the uterine incision, the average blood loss, the mother's infectious morbidity, and the neonatal ICU admission. The reason for this study is that it is the first of its kind in our population, where the incidence of obstructed labour is high due to the negligence of unskilled birth attendants, and blood bank services are scarce for neonatal ICU treatment. Additionally, both infection-related morbidity and infection prevalence are significant. Such research is necessary to develop a safe method of fetal delivery in cases of obstructed labor in our nation. Thus, the objective of this study is to compare the outcome of the conventional versus reverse breech extraction method during emergency caesarean section being done for obstructed labour.

Methodology

This randomised controlled trial was conducted at the Department of Obstetrics and Gynaecology, Unit II, Lahore General Hospital (LGH), over a six-month period from August 31, 2019, to March 31, 2020, following approval of the study protocol. The sample size was determined based on a significance level of 5% and a study power of 80%, assuming an incidence of uterine incision extension of 50% in the conventional extraction group and 20% in the reverse breech extraction group, as reported by Saleh et al. (2014). A total of 110 women were enrolled in the study, with 55 participants allocated to each group. Non-probability consecutive sampling was used to recruit eligible patients.

Women aged 20 to 35 years with singleton, term pregnancies (37–42 weeks of gestation), cephalic presentation, parity up to five, and fetal head at station 0 or +1 undergoing cesarean section for obstructed labour, as diagnosed by a consultant obstetrician, were included in the study. Exclusion criteria were a history of prior uterine scar and any known coagulation disorders.

Eligible participants who met the inclusion criteria and provided informed consent were randomised into two groups using the lottery method. Group A underwent the conventional method of fetal head extraction, in which manual upward pressure from the assistant or digital extraction by the surgeon delivered the fetal head. Group B underwent reverse breech extraction, in which the surgeon inserted a hand through the transverse uterine incision to reach the upper uterine segment, grasped the fetal feet, and delivered the fetus as a breech. Demographic data, including name, age, parity, gestational age, and body mass index (BMI), were recorded. Clinical outcomes, including uterine incision extension, estimated blood loss, maternal infectious morbidity (postoperative fever, wound sepsis, and urinary tract infection), and neonatal intensive care unit (NICU) admissions, were documented using a predesigned proforma.

All patients were followed postoperatively until discharge for assessment of maternal and neonatal outcomes. Effect modifiers such as maternal age, parity, gestational age, and BMI were addressed through stratification during data analysis. Statistical analysis was conducted using SPSS version 24.0. Quantitative variables such as maternal age, gestational age, and blood loss were presented as mean ± standard deviation. Qualitative variables, including uterine incision extension and neonatal NICU admission, were expressed as frequencies and percentages. An independent sample t-test was used to compare continuous variables between the two groups, while categorical variables were analyzed using the Chi-square test. A p-value of ≤ 0.05 was considered statistically significant.

Results

The study included a total of 110 women who were equally randomised into two groups: 55 women underwent the conventional method of fetal head delivery, and 55 women underwent reverse breech extraction. The mean age of participants in the traditional group was 27.22 ± 5.08 years, whereas the mean age in the reverse breech group was slightly higher at 28.36 ± 4.52 years. The overall mean age across both groups was 27.79 ± 4.82 years, with an age range of 20 to 35 years (Table 1). In terms of gestational age, the mean gestation in the conventional group was 39.29 ± 1.72 weeks compared to 39.55 ± 1.70 weeks in the reverse breech group. The overall gestational age across both groups was 39.42 ± 1.70 weeks, with a range of 37 to 42 weeks (Table 2). Table 3 presents a subgroup analysis comparing mean blood loss in both study groups across various maternal characteristics. Across all age groups, gestational age categories, parity levels, and BMI groups, the reverse breech extraction group consistently demonstrated lower mean blood loss compared to the conventional group. For instance, in the 20–28 year age group, the mean blood loss was 1078.00 ml in the traditional group versus 831.75 ml in the reverse breech group ($p < 0.001$). Similarly, for gestational ages of 40–42 weeks, the mean blood loss was 1089.08 ml for the conventional group and 825.52 ml for the reverse breech group ($p < 0.001$). In the subgroup of obese patients, the difference was not statistically significant ($p = 0.060$). In contrast, all other comparisons were highly significant ($p < 0.001$), indicating a clear advantage of the reverse breech technique in reducing blood loss. Table 4 shows the frequency of uterine incision extension across stratified subgroups. In general, the rate of extension was higher in the conventional method group across all variables. For example, among women aged 29–35 years, 69.2% in the traditional group experienced incision extension compared to 32.3% in the reverse breech group ($p = 0.005$). Similarly, among those with gestational age 40–42 weeks, extension occurred in 62.5% of conventional cases versus 29.6% in the reverse breech group ($p = 0.019$). Statistically significant differences were also observed in parity 1–3 ($p = 0.011$) and non-obese women ($p = 0.002$). These findings reinforce the benefit of reverse breech extraction in reducing the risk of uterine incision extension. Table 5 compares NICU admission rates between groups. The rate of NICU admissions was consistently lower in the reverse breech group. Among women aged 20–28 years, 20.7% of neonates in the conventional group required admission to the NICU, whereas none did in the reverse breech group ($p = 0.018$). Similarly, among neonates with a gestational age of 40–42 weeks, 25% of those from the conventional group were admitted to the NICU, compared to only 3.7% from the reverse breech group ($p = 0.027$). NICU admissions were also significantly reduced among neonates born to mothers with parity 1–3 ($p = 0.003$). These results suggest a favourable neonatal outcome with reverse breech extraction, particularly in selected subgroups.

Table 1: Descriptive statistics of age (years) in both study groups

Study groups	Age (years)			
	Mean	**S.D**	**Minimum**	**Maximum**
Conventional method	27.22	5.08	20.00	35.00
Reverse breech	28.36	4.52	20.00	35.00
Total	27.79	4.82	20.00	35.00

Table 2: Descriptive statistics of Gestational age (weeks) in both study groups

Study groups	Gestational age (weeks)			
	Mean	**S.D**	**Minimum**	**Maximum**
Conventional method	39.29	1.72	37.00	42.00

Reverse breech	39.55	1.70	37.00	42.00
Total	39.42	1.70	37.00	42.00

Table 3 Comparison of Mean blood loss in both study groups concerning Age groups, gestation age, parity, and BMI

Blood loss (ml)	**Age groups (years)**		**Gestational age (Weeks)**		**Parity**		**BMI**	
	20-28	***29-35***	***37-39***	***40-42***	***1-3***	***4-5***	***Obese***	***Non-obese***
Conventional method	219.80	199.86	184.82	252.34	223.34	197.12	107.29	205.51
Reverse breech	124.60	123.40	114.63	131.35	126.13	111.94	107.29	126.69
Conventional method	1078.00	1217.00	1186.00	1089.08	1124.30	1221.36	1009.46	1185.26
Reverse breech	831.75	851.06	859.14	825.52	827.08	877.41	842.25	842.70
	4.874	8.459	8.059	4.755	7.261	5.905	1.999	9.575
P-value	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	0.060*	<0.001**

***Highly Significant* **Significant*

Table No. 4 Comparison of Extension of incision in both study groups concerning Age groups, gestation age, parity, and BMI

Extension of incision	**Extension of incision**	**Age groups (years)**		**Gestational age weeks**		**Parity**		**BMI**	
		20-28	***29-35***	***37-39***	***40-42***	***1-3***	***4-5***	***Obese***	***Non-obese***
Conventional method	Yes	15(51.7%)	18(69.2%)	18(58.1%)	15(62.5%)	25(56.8%)	8(72.7%)	7(53.8%)	26(61.9%)
	No	14(48.3%)	8(30.8%)	13(41.9%)	9(37.5%)	19(43.2%)	3(27.3%)	6(46.2%)	16(38.1%)
Reverse breech	Yes	8(33.3%)	10(32.3%)	10(35.7%)	8(29.6%)	11(28.9%)	7(41.2%)	4(50%)	14(29.8%)
	No	16(66.7%)	21(67.7%)	18(64.3%)	19(70.4%)	27(71.1%)	10(58.8%)	4(50%)	33(70.2%)
p-value		0.179	0.005*	0.086	0.019*	0.011*	0.102	0.864	0.002*

**Significant*

Table No. 5 Comparison of NICU admissions in both study groups concerning parity

NICU admissions	**NICU Admission**	**Age groups (years)**		**Gestational age weeks**		**Parity**		**BMI**	
		20-28	***29-35***	***37-39***	***40-42***	***1-3***	***4-5***	***Obese***	***Non-obese***
Conventional method	Yes	6(20.7%)	4(15.4%)	4(12.9%)	6(25%)	9(20.5%)	1(9.1%)	3(23.1%)	7(16.7%)
	No	23(79.3%)	22(84.6%)	27(87.1%)	18(75%)	35(79.5%)	10(90.9%)	10(76.9%)	35(83.3%)
Reverse breech	Yes	0(0%)	3(9.7%)	2(7.1%)	1(3.7%)	0(0%)	3(17.6%)	0(0%)	3(6.4%)
	No	24(100%)	28(90.3%)	26(92.9%)	26(96.3%)	38(100%)	14(82.4%)	8(100%)	44(93.6%)
p-value		0.018	0.513	0.465	0.027*	0.003*	0.527	0.142	0.125

**Significant*

Discussion

When there is no progress in labour despite a powerful uterine contraction, as evidenced by the failure of the cervix to dilate or the failure of the presenting part to descend via the birth canal, the labour is said to be obstructed (12). Obstructed labour is a common obstetric problem in underdeveloped nations and is linked to poor foetal and maternal outcomes, despite being uncommon in wealthy nations. When offered the option to choose between a difficult vaginal assisted delivery and a caesarean section at full cervical dilatation (13). One of the difficulties that obstetricians regularly encounter is how to minimise maternal and newborn morbidity.

Because more instrumental deliveries fail, the percentage of second-stage caesarean sections is increasing. As the foetal head is deeply impacted in the pelvis and carried, an emergency caesarean section and foetal birth are challenging in the advanced second stage of labour and have a higher risk of problems for both the mother and the child (14). There is a considerable danger of injury to the uterine arteries, injuries to the urinary tract, and expansions of the lower segment (15) when severe manipulation is used to deliver the foetal head. To avoid making an incision through the vagina and protecting the uterus and bladder, a somewhat high transverse uterine incision is frequently required. Several modified delivery methods, such as the head push and reverse breech extraction, have been developed to reduce mother and foetal morbidity during caesarean sections. Using a helper hand in the vagina to push the head up toward the uterine incision while the operator tries to pass their hand below the head to dislodge the head from the pelvis (16). The conventional head push technique (push method) is one option for delivering an impacted foetal head in an emergency C-section.

A reverse breech extraction technique (pull method) is an alternative that often involves opening the uterus quickly to reach into the upper section for a baby's leg and gently pulling on the leg till the other leg appears. The foetus's body could then be removed (drawn) out of the uterus using a technique similar to that for a breech delivery after both legs are kept together (17).

For neonatal outcomes, no statistically significant changes have been reported yet. However, two neonates who underwent difficult head pushing foetal delivery had perinatal skull fractures, one of which led to neonatal death. Thus, it may be inferred that when performing an intrapartum caesarean section in an advanced stage of labour, the head pushing method is more likely to result in maternal morbidity than the reverse breech method (18).

A prospective comparative study was conducted in 2014 to compare the outcomes of the two procedures on the mother and the fetus. The study's findings showed that women who underwent reverse breech extraction, compared to those who underwent cephalic delivery, experienced significantly less extension of the uterine incision (20% versus 50%; p = 0.001) than those who underwent head pushing to deliver the affected infant's head. The mean blood loss in the pull group was 878.67 ml versus 1321.57 ml, substantially less than that in the push group (p = 0.001) (19). Similarly, another study (20) concluded that Reverse breech extractions are an attractive and safe alternative to the standard method for intraoperative disengagement of a deeply impacted fetal head to reduce maternal and fetal morbidity. In the current study, the mean blood loss in

the conventional group was 1143.71 ± 220.11 mL, and in the reverse breech group, it was 842.64 ± 123.14 mL; the mean blood loss was statistically less in the reverse breech group compared to the conventional method, p-value < 0.001. We also found lower blood loss in the reverse breech group. In the current study, the traditional method revealed that 10 (18.2%) neonates required admission to the NICU, whereas 3 (5.5%) did not. The frequency of NICU admission was statistically lower in reverse breech, p-value < 0.05. Similarly, another study17 was done to compare the maternal and fetal morbidity and mortality associated with the two methods - "Head pushing versus Reverse breech extraction" - in the delivery of an impacted fetal head at cesarean section in advanced labour. Out of 70 cases, 5(7.14%) in the study group and 26(37.14%) in the control group had uterine artery injury. Traumatic PPH was significantly more common in the control group - 47(67.14%) as compared to 8(11.43%) in the study group, mainly due to extension of incision and uterine artery injury. Atonic PPH, need for hysterectomy, and blood transfusions were more common in the control group. One case of bladder injury was noted in the head push method. The reverse breech extraction method is a safer option for delivering a fetus in a cesarean section in advanced labour when the head is profoundly impacted, as compared to the head push method.

Moreover, Bastani et al. compared the morbidity and mortality of 2 current techniques during cesarean delivery of an impacted fetal head. In a comparative setting, 59 pregnant women with obstructed labour due to an impacted fetal head were recruited. The patients were categorized into two groups according to the method of extraction: the "push" group (n = 30) and the "pull" group (n = 29). The study result has showed that Maternal complications in the push and pull groups were extension of the uterine incision (15 [50.0%] vs 5 [17.2%]); T or J incision (3 [10.0%] vs 4 [13.8%]); blood transfusion (3 [10.0%] vs 1 [3.4%]); wound infection (4 [13.3%] vs 1 [3.4%]); fever (16 [53.3%] vs 3 [10.3%]); and urinary tract infection (10 [33.3%] vs 0 [0.0%]). The incidence of uterine incision extension, fever, and urinary tract infection was significantly higher in the push group (P = 0.008). So, it can be concluded that, owing to a lower rate of abnormal incision and postpartum fever/infection with the pull method, this technique is preferable to the push method (21).

To assess maternal and newborn outcomes related to the "push" and "pull" approaches for impacted fetal head extraction during cesarean delivery, a prospective study was conducted in 2012. The outcomes examined included the length of the procedure, the amount of blood lost during it, the frequency with which the uterine incision was extended, and the occurrence of postpartum fever. Although there was one occurrence of neonatal femur fracture in the pull group, no other significant differences in maternal and neonatal morbidities were observed across the groups. Therefore, when employed for impacted foetal head extraction after caesarean birth, the pull method is associated with reduced maternal morbidity than the push method, despite the possibility of some newborn problems (22). These results do not match up with recent research. Similar to the previous study, another one was carried out in 2009 to compare the maternal and foetal morbidity of two distinct techniques for delivering the infant during caesarean section performed in advanced labour when the foetal head is deeply engaged. When compared to "reverse breech extraction," considerably more women had their uterine incision extended with "cephalic" delivery (22.8% versus 2.2%; p = 0.001). To lessen maternal and foetal morbidity, the use of "reverse breech extraction" is a desirable and secure substitute for the conventional methods for intra-operative disengagement of a severely impacted foetal head (23).

Similarly, another study compared maternal and neonatal morbidity associated with two methods to extract the impacted fetal head during Cesarean delivery. Women who were delivered by the 'pull' method had a significantly lower rate of extensions of the uterine incision (15% versus 50%; odds ratio, 0.17; 95% CI, 0.04-0.74) compared to those who were delivered by the 'push' method. Neonatal outcomes were good in all cases. Hence, in cases with harrowing extraction of the impacted fetal head during Cesarean section, the 'pull' method may result in lower maternal morbidity compared to the traditional 'push' method.[16] In current study we found less incidence of extension of the uterine incision i.e. In conventional group, there were 33(60%) females who had extension of incision and reverse breech group 18(32.7%) females had extension of incision, the frequency of extension of incision was statistically lower in reverse breech group as compared to conventional group, p-value = 0.004.

Conclusion

It is concluded that the reverse breech extraction method provided less blood loss, fewer chances of extension of incision, and fewer NICU admissions during emergency caesarean section being done for obstructed labour. So this method can be opted to manage obstructed labour during an emergency caesarean section with fewer morbidities.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRBEC-MMN-0331d-24)
Consent for publication
Approved
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Not applicable

Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

RF (Consultant Gynecologist)
Manuscript drafting, Study Design,
AR (Consultant Gynecologist)
Review of Literature, Data entry, Data analysis, and drafting an article.
AM (Consultant Gynecologist)
Conception of Study, Development of Research Methodology Design,
II (**Consultant Gynecologist**)
Study Design, manuscript review, and critical input.

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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