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# COMPARISON OF BREECH EXTRACTION VS. HEAD PUSH TECHNIQUES FOR DEEPLY IMPACTED FETAL HEADS IN SECOND-STAGE CESAREAN SECTIONS: A RETROSPECTIVE STUDY

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## ABSTRACT

**Background:** Delivering deeply impacted fetal heads during second-stage cesarean sections poses substantial risks, including uterine trauma and maternal hemorrhage. Two common techniques, reverse breech extraction and head push, lack robust comparative data to guide clinical decision-making. **Purpose:** This study aims to compare maternal outcomes of reverse breech extraction versus head push techniques to inform best practices for second-stage cesarean sections. **Methods:** A retrospective cohort study was conducted at Queen Alia Military Hospital over 22 months, involving 105 term singleton pregnancies in cephalic presentation. Data on maternal characteristics, surgical details, and postoperative outcomes were analyzed. Mann-Whitney U, Chi-square, and linear regression analyses were performed to compare outcomes between the techniques. **Results:** Reverse breech extraction was performed in 57% of cases and head push in 43%. Uterine incision extensions were significantly lower with reverse breech extraction (15%) compared to head push (49%, $p < 0.001$). Delivery times were shorter for head push (median: 41 minutes) than reverse breech extraction (median: 59 minutes, $p < 0.001$). Postoperative fever and blood transfusion rates did not significantly differ between techniques. **Conclusion:** Reverse breech extraction, while associated with longer operative times, resulted in fewer uterine incision extensions, suggesting it may be a safer option for deeply impacted fetal heads. Further prospective studies are needed to confirm these findings and optimize delivery strategies.

**KEYWORDS:** Cesarean section, reverse breech extraction, head push technique, deeply impacted Fetal head, maternal outcomes.

## INTRODUCTION

The rate of emergency cesarean sections (CS) has significantly increased over the past two decades, with approximately 21% of these procedures performed during the second stage of labor, after full cervical dilation.[1] Concerns over this substantial increase in CS have been raised by the World Health Organization (WHO). However, CS remains an effective intervention for addressing dystocia and other serious pregnancy complications.[2] The indications for scheduled CS are typically categorized into absolute and relative indications. While emergency CS are warranted in the presence of acute obstetrical complications that pose a threat to the life of the mother or fetus, such as fetal distress or antepartum hemorrhage. Absolute indications for emergency CS include intrapartum factors like labor dystocia, fetal distress, and umbilical cord prolapse.[3,4]

Emergent CS is often complicated by the deeply engaged position of the fetal head, making delivery technically challenging and increasing the risk of complications for both the mother and fetus.[5] Additionally, the risk of mortality associated with emergency CS is three times higher than that of scheduled CS.[6] Major complications also include postpartum hemorrhage defined as more than 1000 mL of blood loss, multiple laparotomy, infections, thrombotic disorders, sepsis, and coagulation disorders, which is more frequent in cesareans performed during labor emergencies (5.2%) compared to those conducted before labor begins (2.6%).[7]

The extraction of a deeply impacted fetal head during a second-stage CS poses substantial risks, including uterine trauma, maternal hemorrhage, and fetal injuries such as skull fractures and brain hemorrhages.[8] The complex nature of these cases necessitates careful selection of the delivery technique to minimize adverse

outcomes. Two primary techniques are commonly used to address this challenge: the reverse breech extraction and the head push method. The head push technique involves pushing the fetal head back through the birth canal into the uterine cavity, which can increase the risk of maternal trauma, such as uterine incision extensions.[9,10] In contrast, the reverse breech extraction entails delivering the fetus by pulling its lower extremities in a breech position, potentially leading to fetal complications, including hip dislocations or nerve injuries.[11]

Despite the frequent use of these techniques, there is limited evidence comparing their maternal. Current clinical guidelines provide insufficient direction on which approach is superior, leading to variability in practice. Comparative studies are essential to provide evidence-based guidance for clinicians managing deeply impacted fetal heads during second-stage cesarean sections. Therefore, in this study, we aim to compare the maternal of the reverse breech extraction and head push techniques, providing insights to inform clinical decision-making and improve outcomes for mothers and neonates undergoing second-stage cesarean sections.

## METHODS

### Study Design

We carried out a retrospective cohort at Queen Alia Military Hospital over a 22-month period from January 2023 to October 2024. The study included 105 women with term singleton pregnancies in cephalic presentation who underwent second-stage cesarean sections. Women were eligible if the fetal head was deeply impacted, requiring either the reverse breech extraction or head push technique for delivery.

### Data Collection

We collected through the medical records of included patients data including maternal characteristics such as age, gravida/para status, and cervical dilation at the time of surgery. Surgical details were recorded, including the mode of delivery (reverse breech extraction or head push), operative times, and the presence of uterine incision extensions. Postoperative outcomes, including blood loss, postoperative fever, and the need for blood transfusions, were documented. The main outcome of interest was the incidence of uterine incision extensions. Other outcomes included maternal morbidity indicators, such as blood transfusion rates, and postoperative complications.

### Statistical Analysis

Demographic and clinical data were described using descriptive statistics. Median and interquartile range (IQR) was used to summarize continuous variables. Frequency (percentage %) was used to describe categorical variables. To compare the delivery techniques we implemented Wilcoxon rank sum test for continuous variables. Chi-square tests for categorical variables and Fisher's Exact was used if cell count was less than 5. To study the association between the mode of delivery and operative time, a linear regression analysis was conducted, adjusting for maternal age and cervical dilation. P-value < 0.05 reflected statistical significance. All analyses were conducted using R software package version 4.2.1.

## RESULTS

Our study included 1,051 pregnant women with a median age of 27 years (24–29). Regarding para/gravida status, 69% were primigravida, while smaller proportions fell into other categories: P0 (1.9%), P0+1 (1.9%), P1 (7.7%), P1+2 (1.9%), P2 (3.8%), P3 (3.8%), P4 (1.9%), and PG (7.7%). Pelvic examination showed that 41 (39%) of patients were fully dilated and median dilation was 8.5 cm (7.5–10.0) as shown in **Table 1**.

The main indications for cesarean section were urgent CS in 97 (92%) women, with urgency reasons varied to include failure to progress in 28 (29%) women, and fetal distress or death in 68 (70%) women. Other indications included bad CTG in 3 (2.9%) women, failed vacuum in 2 (1.9%) women, multiple decelerations in 1 (1.0%) woman, poor maternal effort in 1 (1.0%), and transverse lie in 1 (1.0%) woman (**Table 2**). Modes of delivery included abdomino-vaginal delivery in 45 (43%) women and reverse breech extraction in 60 (57%) women. Uterine incision extension was performed in 31 (30%) of cases. The median time of delivery was 46 minutes (41–60). Postoperative complications included postoperative fever in 59 (56%) women and blood transfusion in 7 (6.7%) women, with no recorded blood loss (**Table 2**).

In a comparison of surgical and postoperative characteristics between abdominovaginal delivery and reverse breech extraction (n = 60), the median pelvic exam measurement was significantly lower in the abdominovaginal group (median: 8.00 cm, 7.50–9.00) compared to the reverse breech extraction group (median: 9.50 cm, 8.00–10.00, p-value = 0.041). Regarding cesarean section indications, urgent CS was the primary reason in both groups, accounting for 89% and 95% of cases, respectively. There was no significant differences between regarding other indications (**Table 3**). Uterine incision extension was significantly more common in abdominovaginal deliveries (49%) compared to reverse breech extractions (15%) (p-value < 0.001). The median time of delivery was shorter in the abdominovaginal group (41 minutes, 35–44) compared to the reverse breech group (59 minutes, 46–69, p-value < 0.001) as shown in **Table 3**. Blood transfusion was required in 11% of abdominovaginal deliveries and 3.3% of reverse breech extractions but it was not significant (p-value = 0.14). Postoperative fever occurred in 60% of the abdominovaginal group and 53% of the reverse breech group with no significant difference. No significant blood loss was reported in either group.

A linear regression analysis to examine the association between the mode of delivery and operation time,

adjusting for age and pelvic exam measurements revealed that reverse breech extraction was significantly associated with longer operation times compared to abdominovaginal delivery ($\beta$ = 1.23, 95% CI: 0.71–1.74, $p < 0.001$) as shown in **Table 4**. Age showed a negative t association with operation time ($\beta$ = -0.22, 95% CI: -0.45–0.005, $p$ = 0.056) however it did not reach significant level, indicating a slight trend where increasing age may be associated with shorter operation times. Pelvic exam measurements had no significant association with operation time ($\beta$ = 0.01, 95% CI: -0.22–0.24, $p$ = 0.935).

**Table 1: Demographic and clinical characteristics of included patients.**

| Characteristic | N = 105[1] |
|---|---|
| **Age (Years)** | 27.0 (24.0, 29.0) |
| **Para/Gravida** | |
| P0 | 1 (1.9%) |
| P0+1 | 1 (1.9%) |
| P1 | 4 (7.7%) |
| P1+2 | 1 (1.9%) |
| P2 | 2 (3.8%) |
| P3 | 2 (3.8%) |
| P4 | 1 (1.9%) |
| PG | 4 (7.7%) |
| Primigravida | 36 (69%) |
| Unknown | 53 |
| **Pelvic Exam (cm)** | 8.50 (7.50, 10.00) |

[1] n (%); Median (IQR)

**Table 2: CS characteristics of included patients.**

| Characteristics | N = 105[1] |
|---|---|
| **CS indication** | |
| Bad CTG | 3 (2.9%) |
| CTG deceleration | 1 (1.0%) |
| Failed vacuum | 2 (1.9%) |
| Multiple deceleration | 1 (1.0%) |
| Poor maternal effort | 1 (1.0%) |
| Urgent CS | 97 (92%) |
| **CS Urgency** | |
| Failure to progress | 28 (29%) |
| Fetal distress/death | 68 (70%) |
| Transverse lie | 1 (1.0%) |
| Unknown | 8 |
| **CS Mode of delivery** | |
| Abdomino-vaginal delivery | 45 (43%) |
| Reverse breech extraction | 60 (57%) |
| **Uterine incision extension** | 31 (30%) |
| **Time of delivery (Minutes)** | 46 (41, 60) |
| **Blood transfusion** | 7 (6.7%) |
| **Postoperative fever** | 59 (56%) |
| **Blood loss** | 0 (0%) |

[1] n (%); Median (IQR)

**Table 3: Comparison of surgical and postoperative characteristics based on delivery method.**

| Characteristic | Abdominovaginal delivery N = 45 | Reverse breech extraction N = 60 | p-value |
|---|---|---|---|
| **Pelvic Exam (cm)** | 8.00 (7.50, 9.00) | 9.50 (8.00, 10.00) | **0.041** |
| **CS indication** | | | 0.11 |
| Bad CTG | 3 (6.7%) | 0 (0%) | |
| CTG deceleration | 1 (2.2%) | 0 (0%) | |
| Failed vacuum | 1 (2.2%) | 1 (1.7%) | |
| Multiple deceleration | 0 (0%) | 1 (1.7%) | |
| Poor maternal effort | 0 (0%) | 1 (1.7%) | |
| Urgent CS | 40 (89%) | 57 (95%) | |
| **CS Urgency** | | | >0.9 |
| Failure to progress | 12 (30%) | 16 (28%) | |
| Fetal distress/death | 28 (70%) | 40 (70%) | |
| Transverse lie | 0 (0%) | 1 (1.8%) | |
| Unknown | 5 | 3 | |
| **Uterine incision extension** | 22 (49%) | 9 (15%) | **<0.001** |
| **Time of delivery (Minutes)** | 41 (35, 44) | 59 (46, 69) | **<0.001** |
| **Blood transfusion** | 5 (11%) | 2 (3.3%) | 0.14 |
| **Postoperative fever** | 27 (60%) | 32 (53%) | 0.5 |
| **Blood loss** | 0 (0%) | 0 (0%) | |

**Table 4: Linear regression model for the association of mode of delivery with operation time.**

| Predictor | SE | Lower | Upper | p-value |
|---|---|---|---|---|
| **CS Mode of delivery:** | | | | |
| Reverse breech extraction – Abdominovaginal delivery | 1.23 | 0.71 | 1.74008 | **< .001** |
| **Age (Years)** | -0.22 | -0.446 | 0.00577 | 0.056 |
| **Pelvic exam (Years)** | 0.01 | -0.224 | 0.2428 | 0.935 |

## DISCUSSION

Among 1,051 pregnant women included in our study, the majority of the women underwent cesarean sections due to urgent indications, with fetal distress in 70% of cases and failure to progress in 29% being the most common reasons, reflecting the clinical reality that many cesarean deliveries occur in emergency situations. In a cross-sectional study by Singh et al., the most common indication for emergency CS was fetal distress in 62% of cases and previous CS in 19% of cases.[12] These findings were primarily due to the fact that most unbooked women presented directly in labor with abnormal fetal heart tracings. Fetal distress has a reported a global prevalence of approximately 20%.[13]

Regarding the mode of delivery, the majority of women (57%) underwent reverse breech extraction, while 43% had abdomino-vaginal deliveries. Uterine incision extension was significantly more common in the abdomino-vaginal group (49%) versus 15% in the reverse breech extraction method. This finding suggests that, despite the more complex nature of the reverse breech extraction, it may be associated with fewer surgical complications in terms of uterine injury. Similar to our findings, in a prospective study by Frass et al. investigating the maternal outcomes following CS at the second-stage of delivery in 118 pregnant women showed that uterine incision extension was significantly more common the in the head push group compared to the reverse breech extraction group with an incidence of 5% in patients who underwent reverse breech technique and 40.6% in patients who underwent head push technique.[14]

Furthermore, our findings revealed a significantly shorter deliver time in the abdomino-vaginal group compared to the reverse breech extraction group. This finding could be attributed to the more invasive nature of the reverse breech extraction, which may require more time due to the technique itself and the fetal positioning. Conversely, in a study by et al. showed that the mean operation time was significantly lower in the reverse breech extraction group, this can be attributed to the significantly higher incidence of uterine incision extension in the head push group which increases the operation time compared to the reverse breech extraction.[9,10,15]

Postoperative complications, including fever and blood transfusion requirements, were common but did not significantly differ between the two delivery methods. Postoperative fever occurred in 56% of cases, which is relatively high and warrants further investigation into the possible causes, such as infection or surgical trauma. Although 11% of patients who underwent abdomino-vaginal delivery had blood transfusion while only 3.3% of patients who underwent reverse breech extraction had blood transfusion, however it was not significant, suggesting that blood loss may not differ substantially between the two techniques. In a clinical trial by Nooh et al. showed that 2.1% of patients who underwent reverse breech extraction had blood transfusion which was significantly lower than the rate in patients undergoing the standard technique (11.5%). While 3.1% of patients in the breech extraction technique had fever versus 19.8% in the standard approach technique.[16]

Overall, our study highlights the complexity of managing deeply impacted fetal heads during CS and suggests that reverse breech extraction, while associated with longer operation times, may offer a safer alternative in terms of uterine injury. The lack of significant differences in postoperative complications between the two techniques further emphasizes the need for individualized decision-making based on the patient's specific clinical circumstances.

Our study provides several strong points. We included a large cohort of 105 women over a substantial 22-month period, which increases the robustness and generalizability of our findings. In addition, we included both primary and secondary outcomes, such as uterine incision extensions and maternal morbidity indicators, which provides a comprehensive view of the clinical implications of these techniques. Despite its strengths, our study is limited by the retrospective design, which may introduce biases in data collection and interpretation. Additionally, our study was conducted in a single hospital, which might limit the external validity of our findings to other settings with differing clinical practices or patient demographics. Future studies are needed to validate our findings through multicenter prospective designs to enhance the generalizability and reduce the limitations of retrospective analyses. Randomized controlled trials comparing reverse breech extraction and head push techniques could provide higher-quality evidence. Additionally, exploring the role of adjunctive measures, such as ultrasound guidance or specific instruments, in improving outcomes during second-stage CS could provide significant insights.

In conclusion, our findings suggest that reverse breech extraction may result in fewer uterine incision extensions but at the cost of longer operative times. Although both techniques demonstrated comparable rates of postoperative fever and blood transfusions, our results underscore the need for individualized clinical decision-making and further research to optimize outcomes.

## CONCLUSION

This study emphasizes the complex nature of managing severely damaged fetal heads during second-stage caesarean procedures and offers significant comparative insights into reverse breech extraction and head push approaches. The results show that, in comparison to the head push technique, reverse breech extraction considerably lowers the likelihood of uterine incision extensions, although being linked to longer operating periods. Both approaches revealed similar postoperative outcomes regarding fever and blood transfusion rates. These findings highlight how crucial it is to make

clinical decisions that are relevant to each patient's situation. To confirm these results and improve clinical recommendations, more prospective, multicenter studies and randomized controlled trials are required to guarantee the best possible outcomes for both the mother and the fetus during second-stage caesarean sections.

**REFERENCES**


1. Caesarean section rates continue to rise, amid growing inequalities in access [Internet]. [cited 2025 Jan 7]. Available from: https: //www.who.int/news/item/16-06-2021-caesarean-section-rates-continue-to-rise-amid-growing-inequalities-in-access
2. Caughey AB, Cahill AG, Guise JM, Rouse DJ. Safe prevention of the primary cesarean delivery. American Journal of Obstetrics and Gynecology, 2014 Mar 1; 210(3): 179–93.
3. Smith V, Gallagher L, Carroll M, Hannon K, Begley C. Antenatal and intrapartum interventions for reducing caesarean section, promoting vaginal birth, and reducing fear of childbirth: An overview of systematic reviews. PLOS ONE, 2019 Oct 24; 14(10): e0224313.
4. Wu Y, Kataria Y, Wang Z, Ming WK, Ellervik C. Factors associated with successful vaginal birth after a cesarean section: a systematic review and meta-analysis. BMC Pregnancy and Childbirth, 2019 Oct 17; 19(1): 360.
5. Cornthwaite KR, Bahl R, Lattey K, Draycott T. Management of impacted fetal head at cesarean delivery. Am J Obstet Gynecol, 2024 Mar; 230(3 Suppl): S980–7.
6. van Ham MAPC, van Dongen PWJ, Mulder J. Maternal consequences of caesarean section. A retrospective study of intra-operative and postoperative maternal complications of caesarean section during a 10-year period. European Journal of Obstetrics & Gynecology and Reproductive Biology, 1997 Jul 1; 74(1): 1–6.
7. Grabarz A, Ghesquière L, Debarge V, Ramdane N, Delporte V, Bodart S, et al. Cesarean section complications according to degree of emergency during labour. Eur J Obstet Gynecol Reprod Biol, 2021 Jan; 256: 320–5.
8. Cornthwaite K, Hewitt P, van der Scheer JW, Brown IAF, Burt J, Dufresne E, et al. Definition, management, and training in impacted fetal head at cesarean birth: a national survey of maternity professionals. Acta Obstetricia et Gynecologica Scandinavica, 2023; 102(9): 1219–26.
9. Veisi F, Zangeneh M, Malekkhosravi S, Rezavand N. Comparison of “push” and “pull” methods for impacted fetal head extraction during cesarean delivery. International Journal of Gynecology & Obstetrics, 2012 Jul 1; 118(1): 4–6.
10. Berhan Y, Berhan A. A meta-analysis of reverse breech extraction to deliver a deeply impacted head during cesarean delivery. International Journal of Gynecology & Obstetrics, 2014; 124(2): 99–105.
11. Schwake D, Petchenkin L, Younis JS. Reverse breech extraction in cases of second stage caesarean section. Journal of Obstetrics and Gynaecology, 2012 Aug 1; 32(6): 548–51.
12. Singh N, Pradeep Y, Jauhari S. Indications and Determinants of Cesarean Section: A Cross-Sectional Study. Int J Appl Basic Med Res, 2020; 10(4): 280–5.
13. Nazneen R, Begum R, Sultana K. Rising Trend of Caesarean Section in a Tertiary Hospital Over a Decade. Journal of Bangladesh College of Physicians and Surgeons, 2012 Jan 10; 29.
14. Frass KA, Al Eryani A, Al-Harazi AH. Reverse breech extraction versus head pushing in cesarean section for obstructed labor. A comparative study in Yemen. Saudi Med J., 2011 Dec; 32(12): 1261–6.
15. Lenz F, Kimmich N, Zimmermann R, Kreft M. Maternal and neonatal outcome of reverse breech extraction of an impacted fetal head during caesarean section in advanced stage of labour: a retrospective cohort study. BMC Pregnancy and Childbirth, 2019 Mar 27; 19(1): 98.
16. Nooh AM, Abdeldayem HM, Ben-Affan O. Reverse breech extraction versus the standard approach of pushing the impacted fetal head up through the vagina in caesarean section for obstructed labour: A randomised controlled trial. J Obstet Gynaecol, 2017 May; 37(4): 459–63.