

Fetal Malpresentation and Malposition

Diagnosis and Management



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KEYWORDS

- Fetal malposition • Fetal malpresentation • Occiput posterior • Manual rotation
- Assisted vaginal delivery

KEY POINTS

- Fetal malpresentation includes breech, shoulder, compound, face, and brow presentations.
- Risk factors for fetal malposition include multiple fetal and maternal factors, including fetal size, amniotic fluid volume, fetal anomalies, maternal habitus, and pelvic structure.
- Breech presentation is the most commonly encountered fetal malpresentation and may be managed with external cephalic version or planned cesarean delivery. Planned vaginal delivery for breech presentation is associated with adverse perinatal outcomes and is therefore only considered in selective cases with experienced providers and well-informed patients.
- Fetal malposition includes occiput posterior and occiput transverse, is a commonly occurring problem in obstetrics, and can be diagnosed in active labor by clinical examination or bedside ultrasound.
- Most occiput posterior and occiput transverse cases will spontaneously rotate to occiput anterior at the time of delivery; however, persistent occiput posterior and occiput transverse may be managed with manual or digital rotation, which has high success rates and minimal adverse effects.

INTRODUCTION

Spontaneous vaginal delivery is most common when a cephalic-presenting (head down) fetus is in the occiput anterior position. When the fetal head is occiput anterior and flexed, the fetal head diameter is minimized and the presenting shape optimized to fit through the pelvis. Most fetuses at term present head down and flexed with the fetal occiput anterior. When the fetus deviates from this presentation or position, it can

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provide a challenging clinical situation for even experienced providers. When a fetus is in a noncephalic or nonvertex presentation, it is considered malpresentation. Fetal malposition is a term used to describe a fetus that is rotated so that it is in the occiput posterior or occiput transverse positions. Both of these conditions are associated with increased rates of adverse maternal and perinatal events, including cesarean delivery. In a time when reduction of primary cesarean deliveries remains a priority for providers, health care systems, and patients, identifying these conditions along with the opportunities and pitfalls associated with diagnosis and management is an area of active discussion in clinical practice.^{1,2}

FETAL MALPRESENTATION

Fetal presentation refers to the fetal anatomic part proceeding first into and through the pelvic inlet. Most commonly, the fetal head is presenting, which is referred to as cephalic presentation. Once cervical dilation has occurred and the fetal fontanelles may be appreciated, if the head is flexed, the presenting anatomy of the fetal head is just in front of the posterior fontanel, also known as the fetal vertex. The fetal vertex is really an area, not just a point, and is bounded anteriorly by the anterior fontanel and posteriorly by the posterior fontanel. Most commonly, women in active labor will have a fetus in the vertex presentation. Any circumstance where the fetal presenting part is other than the vertex is considered malpresentation, including breech presentation, transverse and oblique lie with shoulder presentation, face and brow presentation, and compound (hand or arm) presentation. The prevalence, complications, diagnosis, and management of each are reviewed.

Breech Presentation

Breech presentation refers to a fetus with the feet or buttocks presenting in the pelvic inlet and is the most common type of malpresentation.^{3,4} It is further categorized by the presenting fetal part in relationship to the maternal pelvis:

- Frank breech: the fetus is in a pike position with the buttocks presenting and the hips flexed, but knees extended.
- Complete breech: the fetus has both knees and hips flexed so the feet are near the buttocks, but the buttocks are presenting.
- Incomplete breech: the fetus has either one or both knees flexed and one or both hips flexed resulting in either the feet or the knee below the buttock.
- Footling breech: a type of incomplete breech wherein the fetus has one or both feet presenting.

Diagnosis is made if breech presentation is suspected on Leopold examination or digital examination if the cervix is dilated and may be confirmed by ultrasound. Breech presentation affects approximately 3% to 4% of deliveries with the incidence decreasing with advancing gestational age.⁴⁻⁶ In addition to prematurity, fetal factors associated with breech presentation include aneuploidy and congenital anomalies, growth restriction, multiple gestation, and female fetal sex.⁷⁻⁹ Maternal characteristics include uterine anomalies, uterine fibroids, prior cesarean delivery, older maternal age, multiparity, prior pregnancy with breech presentation, and placenta previa.^{6,10,11}

Significant outcomes associated with breech presentation under current practice in the developed world are largely associated with mode of delivery as well as the underlying fetal and maternal conditions predisposing to breech presentation. However, it should be noted that there is an independent association with breech

presentation and stillbirth compared with cephalic-presenting fetuses.^{12,13} Risks associated with laboring or rupture of membranes in a breech presentation are significant and portend adverse outcomes for the fetus, including severe morbidity and mortality. The risk of adverse obstetric outcomes with breech presentation includes cord prolapse and prolonged cord compression in the setting of rupture of membranes. If the fetus delivers vaginally with the breech presentation, there is a risk for head entrapment as well as for birth trauma associated with maneuvers for delivery of the later coming head.^{14,15}

Given these risks, vaginal breech delivery in singleton pregnancies is not routinely advised in the United States. In light of efforts to reduce primary cesarean deliveries, and with attention paid to subsequent pregnancies, external cephalic version (ECV) may be attempted in women with a breech-presenting fetus. ECV is a procedure in which a breech-presenting fetus is manually rotated to cephalic presentation by applying pressure and direction through the maternal gravid abdomen. ECV is successful in approximately 50% to 65% of cases, and offering this for women without contraindications with breech-presenting fetus is recommended.^{16–18} Favorable characteristics include multiparity, normal amniotic fluid volume, unengaged presenting fetal part, earlier gestation (34–36 weeks), regional anesthesia, and multiparity.^{16–20} Use of uterine tocolysis and regional anesthesia have also been associated with successful ECV.^{17,19,20} Factors associated with unsuccessful ECV include nulliparity, low amniotic fluid volume, maternal obesity, advanced gestation, excessive estimated fetal weight, posterior located fetal spine and anterior or lateral placenta, and ECV attempt at term.^{16–20} In counseling patients, risks of the procedure including placental abruption, cord prolapse, rupture of membranes, and emergency cesarean delivery should be reviewed, although the overall risk of complications is estimated to be approximately 6%.²¹

Delivery planning for women with fetuses in the breech presentation primarily focuses on improving perinatal morbidity and mortality. Current practice is guided by the Term Breech Trial, published in 2000, which is an international randomized controlled trial. The Term Breech Trial randomly assigned complete and frank presenting fetuses to planned vaginal or planned cesarean delivery. Perinatal mortality, neonatal mortality, and serious neonatal morbidity were lower in women with a planned cesarean delivery (relative risk 0.33, 95% confidence interval 0.19–0.59; $P < .0001$).²² Since that time, vaginal breech deliveries have continued to decrease. Follow-up studies have been published and suggest that outcomes at 2 years after birth were not different for women or infants born to either arm of the trial.^{23,24} It has been suggested that the absence of difference at 2 years is due to the study being underpowered to appreciate the differences. Alternatively, it may be that the short-term outcomes examined in the original study with the composite morbidity and mortality outcome overestimated the risk associated with vaginal breech delivery.

Subsequent studies have suggested that attempted planned vaginal breech deliveries with select patients may not negatively impact neonatal outcomes.^{25–27} Suggested criteria for trial of vaginal breech delivery include singleton, nonanomalous pregnancies with frank or complete breech at term with an estimated fetal weight of 2500 to 4000 g, and a flexed fetal head. In addition, clinical examination with or without imaging to assess the adequacy of the maternal pelvis is recommended.^{27,28} Close monitoring of labor progression is necessary, and the provider experience and comfort with vaginal breech deliveries should not be underestimated. Also, women should be appropriately counseled about the risks and benefits of the procedure relative to a planned cesarean delivery.

Transverse and Oblique Lie

Oblique and transverse lie most often result in the fetal shoulder as the deepest presenting part and affects approximately 0.03% of deliveries.²⁹ Diagnosis is made by Leopold maneuver and by ultrasound examination. These presentations are most often seen in conditions whereby the fetus is small, from growth restriction or prematurity, or the uterus is compliant as in the case of high parity. As such, adverse outcomes are associated with oblique and transverse presentation, although the underlying prematurity and low birth weight may serve confounding factors in some cases.³⁰ Cord prolapse is also associated with these presentations, which is associated with adverse outcomes as described with breech presentation.³¹ ECV may be attempted if the condition is diagnosed before rupture of membranes or labor, but cesarean delivery is indicated if active labor or rupture of membranes is present.

Face and Brow Presentation

Face and brow presentations occur when the fetus is cephalic presenting, but the fetal neck is extended so that the vertex is not presenting. Both face and brow presentations are relatively uncommon with an incidence of 0.1% to 0.2% of all deliveries and are associated with nulliparity, cephalopelvic disproportion, black race/ethnicity, prematurity, fetal growth disorders (both low birth weight and fetal macrosomia), and fetal anomalies.^{32–34} Both are associated with fetal soft tissue trauma, including bruising and edema at the presenting part as well as increased rates of cesarean delivery.³⁵ Diagnosis is made by digital examination in labor with palpation of facial parts. The chin is not palpable in brow presentation, but it is with a face presentation and is used to further characterize the fetal position that is described as mentum (chin) anterior, mentum transverse, or mentum posterior. In the case of mentum posterior face presentation, vaginal delivery requires neck extension beyond what is physiologically possible for the fetus. Should spontaneous rotation or flexion not occur, manual assistance is not recommended because of considerable risks, including uterine rupture, cord prolapse, and spinal trauma to the fetus.^{34,36} Brow, mentum anterior, and mentum transverse presentations may be monitored in labor, and most will deliver spontaneously; however, early consideration of cesarean delivery for prolonged or abnormal labor is indicated.^{34,37}

Compound Presentation

A fetus presenting with an extremity preceding or adjacent to the fetal head is described as compound presentation. Most often being a hand or arm, a compound presentation affects approximately 0.1% to 0.2% of deliveries.^{38,39} Diagnosis is made on digital vaginal examination with palpation of the involved extremity. Compound presentation is associated with prematurity and low birth weight, high amniotic fluid levels (polyhydramnios), and multiple gestation.^{38,39} Not surprisingly, cord prolapse is also increased in cases of compound presentation. Although uncommon, limb trauma of the presenting fetal part and maternal trauma, including rectal injury, have been described, mostly as case reports in the available, recent literature.^{40–42} Identification of compound presentation early in labor may be managed expectantly because the fetal part may be retracted as the fetal head engages the pelvis and spontaneous delivery may occur. In cases of persistent compound presentation with prolonged labor, gentle reduction with upward pressure of the presenting fetal part may be attempted. In cases of labor dystocia, whereby the fetal limb cannot be moved or concern for injury to the presenting fetal part, cesarean delivery is indicated.

FETAL MALPOSITION

Occiput posterior position is defined as the fetal occiput being oriented to the posterior maternal pelvis. Occiput transverse position is defined as the fetal sagittal suture and fontanelles aligned in the transverse maternal pelvis. The fetal position can be further specified relative to the maternal pelvis, including the right and left side with left occiput transverse and right occiput transverse, and right occiput posterior and left occiput posterior for when the occiput is posterior but deviates from the midline up to 45° in either direction. Persistent occiput posterior is when the malposition is maintained during the second stage until delivery. Although occiput posterior and occiput transverse positions may be observed in early and active labor, the persistence of these positions in the second stage through delivery are associated with adverse outcomes, including cesarean delivery.

Prevalence

Persistent occiput posterior has been estimated to affect between 1.8% and 12.9% of pregnancies and occiput transverse at delivery varied from 0.2% to 8.1% of pregnancies.^{43–48} In the first stage of labor, left occiput posterior is observed more frequently than right occiput posterior, which are both more prevalent than direct occiput posterior.⁴⁹ In the second stage of labor, right occiput posterior is noted most frequently followed by left occiput posterior and then direct occiput posterior.⁵⁰ At what point in labor the malposition is identified is of significance because most occiput posterior and occiput transverse identified in early labor and at the onset of the second stage rotate to occiput anterior without intervention. Persistent malposition at birth has been associated with nulliparity, African American race, maternal age greater than 35 years, short maternal stature, induction of labor and oxytocin augmentation, anterior placenta, advancing gestational age (41 weeks and beyond), and fetal macrosomia (>4000 g).^{43,45,51,52} The presence of a narrow suprapubic arch on ultrasound evaluation has been associated with persistent occiput posterior at birth in one small study.⁵² In addition, women with a prior pregnancy affected by occiput posterior position at birth have an increased risk for persistent occiput posterior in subsequent pregnancies compared with women with prior birth in the occiput anterior position, suggesting the maternal bony pelvis plays a considerable, nonmodifiable role in fetal position.⁵³

The role of epidural anesthesia and the persistence of occiput posterior remain points of discussion. Multiple retrospective studies have suggested an association between persistent occiput posterior and epidural use with authors and clinicians theorizing a causal role mediated by pelvic floor relaxation in the presence of epidural anesthesia.^{43,45} One prospective study examined changes in fetal position during labor in nulliparous women using serial ultrasound examinations and observed the proportion of fetal occiput posterior position was equivalent at time of epidural placement and in early active labor (4 hours after admission) in women who did not have epidural analgesia; however, women who had epidural analgesia had a higher proportion of occiput posterior malposition at delivery (12.9%) compared with those without epidural (3.3%).⁴⁶ These observations led to the theory that epidural analgesia promotes pelvic muscle relaxation and thus inhibits fetal head rotation in labor, contributing to persistent occiput posterior position. However, a meta-analysis of the available randomized clinical trials did not show a statistically significant association, although available data were limited to 4 small trials.⁵⁴ Taking the meta-analysis into consideration, coupled with the observation that multiparous women with and without epidural anesthesia have a relaxed and accommodating pelvic floor and yet have

considerably lower rates of persistent occiput posterior than nulliparous women, others have suggested that this causal theory is not well supported.²

Maternal and Neonatal Outcomes

Although overall prevalence of occiput posterior in labor is low, the impact on women and neonates is considerable. Compared with neonates delivering in the occiput anterior position, those in occiput posterior have higher rates of multiple adverse short-term outcomes, including 5-min Apgar scores less than 7, umbilical cord gas acidemia, neonatal intensive care unit admissions, and longer hospitalizations.⁴³ In addition, multiple studies have shown increased rates of birth trauma.^{43,55} Interestingly, although it has been described that neonates delivering in the occiput posterior position have a lower rate of shoulder dystocia, they have a higher rate of brachial plexus injuries, which speaks to a cause related to malposition in labor as opposed to birth trauma at the time of delivery.⁵⁶

It has been theorized that multiple factors contribute to these adverse outcomes, including longer labor, and with it higher incidence of chorioamnionitis. The increased rate of birth trauma is thought secondary to increased rates of operative deliveries or from the delivery itself based on the theory that occiput posterior is a manifestation of cephalopelvic disproportion. It is important to note that not all observational studies have been in agreement on the adverse outcomes observed in the short term for neonates, although study design and power differed.^{43,44,51,55}

In terms of maternal complications, morbidity is often associated with duration of labor and mode of delivery. The persistence of occiput posterior to time of delivery has been associated with longer first and second stages of labor and the need for augmentation of labor.^{44,51,55,57} Not surprisingly, the strength of the association of prolonged labor, particularly in the second stage, is greatest when occiput posterior is noticed in the second stage and persists.^{2,55,58} Rates of operative delivery, both cesarean and operative vaginal delivery, are higher in women with persistent occiput posterior and occiput transverse on entry to the second stage of labor with highest rates among nulliparous women compared with their multiparous counterparts.^{44,45,51,55} As expected with higher rates of labor dystocia, prolonged labor, and operative delivery rates, persistent occiput posterior is also associated with higher rates of postpartum hemorrhage or excessive blood loss.^{51,59} In addition, cesarean delivery at the time of prolonged labor (>4 hours), delivery at full dilation, and cesarean in the setting of occiput posterior is associated with unintentional hysterotomy extension, which has associated increased operative time and morbidity.^{59,60} Among women with vaginal delivery, perineal trauma is greater among occiput posterior and occiput transverse deliveries with higher rates of third- and fourth-degree lacerations.^{51,55} Women with occiput posterior also face increased risk of infection with increased rates of chorioamnionitis and wound infection, although similar rates of endometritis.⁵¹

Diagnosis

Given the considerable perinatal morbidity associated with fetal malpresentation, accurate diagnosis is of considerable importance; however, timing of diagnosis is also important. Identification of fetal malposition in labor can occur at any point during the first and second stage of labor. Although most occiput posterior positions will rotate spontaneously to occiput anterior, the vast majority of occiput posterior at delivery is a consequence of unresolved occiput posterior rather than rotation from occiput anterior.^{58,61} Diagnosis historically has been made clinically with a digital vaginal examination to assess the fetal sutures and fontanelles relative to the maternal

pelvis. Unfortunately, early vaginal digital assessment before full cervical dilation has been shown to be inaccurate up to 76% of the time when compared with ultrasound assessment, although this improved with increasing cervical dilation and advancing station.^{49,62,63} In active labor, digital assessment proves more accurate; however, when compared with ultrasound, accuracy remains an issue with reports of 20% to 65% of clinical examinations revealing results inconsistent with concurrent ultrasound.^{9,50,64–66} This inaccuracy is minimized by providing a greater degree of margin of error ($\pm 45^\circ$) and provider experience.

Intrapartum ultrasound relies upon correct identification of the fetal occiput by identifying the falx, orbits, or cerebellum and posterior fossa. This technique is most often taught as a transabdominal approach with the probe in the transverse alignment just superior to pubic symphysis. When the head is deeply engaged in the pelvis, transperineal or transvaginal approach may be used, but the landmarks for determining fetal position are the same. With such considerable superiority of ultrasound in intrapartum assessment of fetal position, if time permits, assessment with ultrasound to confirm position should be used before active management of labor and as a teaching aid for trainees in obstetrics.

Management

The first step in the management of occiput posterior and occiput transverse position is diagnosis and timing of diagnosis. Although identification of the fetal position should generally be performed in the active phase of the first stage, there are not generally interventions that have demonstrated benefit because most commonly the fetus will rotate to occiput anterior on its own. Multiple efforts have been made to identify maternal positions to reduce the rate of occiput posterior at time of delivery; the most extensively studied is a maternal hands and knees position with or without pelvic rocking. Although this has been proven successful in reducing maternal discomfort in the first stage of labor, it has not resulted in a reduction of persistent occiput posterior at the time of second stage or delivery.^{67–70} More recently, lateral decubitus and hip abduction both individually and in combination with hands and knees have been trialed without significant impact on fetal position.^{71,72}

If occiput posterior or occiput transverse is suspected at full dilation, close surveillance is initiated with efforts made to confirm position with ultrasound if available and to monitor progress in the second stage. Delayed pushing has been evaluated in small studies, but has not proven beneficial in minimizing occiput posterior at time of delivery.⁵⁵ Considering that even in the second stage most occiput posterior and occiput transverse presenting fetuses will spontaneously rotate,⁷³ if fetal heart tracing is reassuring, the authors' practice is to continue close monitoring for approximately 60 minutes for nulliparous women and 30 minutes for multiparous women before reevaluating progress. If delivery is not imminent, occiput posterior or occiput transverse is still suspected, and confirmation with bedside ultrasound has not occurred, then the authors recommend proceeding with ultrasound. At this point, they discuss with the patient a trial of manual or digital rotation.

In published reports evaluating manual or digital rotation, success rates are high, ranging from to 74% to 90%.^{57,74–76} Full cervical dilation, maternal age less than 35, and multiparity were positively associated with successful rotation.^{74,76} Conversely, nulliparity and maternal age greater than age 35, as well as Asian race/ethnicity, induction of labor and epidural use, labor dystocia as indication for rotation, and subsequent attempt after initial failure were associated with failure of manual rotation.^{74,76} None of these studies observed an increase in adverse neonatal

outcomes compared with expectant management, and in one study, a reduction in neonatal Apgar scores less than 7 at 5 minutes was associated with manual rotation.⁵⁷ Of the studies examining cesarean rate, severe perineal laceration (defined as anal sphincter involvement), postpartum hemorrhage, and chorioamnionitis were reduced with a practice of manual rotation, whereas increased rates of cervical laceration were associated with manual rotation in one study.^{57,73}

In the event of failed manual rotation, or if expedited delivery is indicated, rotational forceps or forceps from the occiput posterior position may be considered. Although the number of skilled providers offering rotational forceps has decreased substantially in the last 50 years with the concurrent increase in cesarean delivery, there have been recent calls for increasing training opportunities citing the high rates of success with the procedure.^{2,77} Recent publications including retrospective cohort studies and prospective observational studies suggest that rotational forceps with subsequent spontaneous or forceps-assisted delivery from occiput anterior when compared with forceps-assisted delivery from occiput posterior position resulted in reduced perineal trauma and did not result in significant increases in adverse neonatal outcomes.^{78,79} Compared with cesarean delivery from the second stage, rotational forceps were associated with reduced rates of postpartum hemorrhage and reduced neonatal intensive care unit admissions.⁸⁰

Vacuum-assisted vaginal delivery from the occiput posterior position may also be offered. Although associated with a lower rate of anal sphincter injury compared with forceps-assisted deliveries from occiput posterior, the success rate with vacuum-assisted delivery is generally lower than with forceps-assisted deliveries from both occiput posterior and anterior positions.⁸¹ Given the concern for increased risk of neonatal trauma, including significant laceration as well as the high failure rate, rotational vacuum deliveries, particularly with rotation of greater than 45°, are discouraged by some professional societies.⁸² Finally, cesarean delivery, particularly in the setting of labor dystocia and persistent occiput posterior or occiput transverse position, may be offered. As previously discussed, unintentional laceration and postpartum hemorrhage are greater at the time of cesarean delivery following prolonged second stage and in the setting of occiput posterior, so efforts should be made to improve vaginal delivery rates and, in the event of cesarean delivery, to anticipate these complications.

SUMMARY

Fetal malpresentation and malposition are commonly encountered in modern obstetrics and have considerable clinical consequences. Accurate identification of the fetal presentation and position is critical to appropriate management. Ultimately, the options available to patients are provider dependent and rely on an informed discussion of the risks and benefits. Appropriate comparison groups and future pregnancies should be considered when considering outcomes. As others have noted, making efforts to provide training opportunities to providers most likely to manage these challenging situations is necessary to continue optimizing and individualizing care for women and neonates.

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