Malpositions and malpresentations of the fetal head

Vikram S Talaulikar
Sabaratnam Arulkumaran

Abstract
In normal labour, the fetal head presents with the occiput in lateral position in early stages of labour followed by anterior rotation in advanced labour. Malpositions of fetal head result when the occiput persists in a lateral or posterior position while malpresentations occur due to extension of the fetal head causing brow or face to present. Malpresentations of fetal head are usually diagnosed in labour and are associated with difficult labour and increased risk of operative intervention. Regular systematic clinical examinations to monitor progress of labour and fetal wellbeing are necessary once the diagnosis is confirmed. Although vaginal delivery is possible in many cases, caesarean section becomes necessary when the malposition or malpresentation persists and labour fails to progress.

Keywords brow; face; malposition; malpresentation; occipitoposterior; occipitotransverse; slow progress of labour

Introduction
Normal mechanism of labour involves a well flexed fetal head that engages into maternal pelvis so that the occiput comes to lie near one of the lateral aspects of maternal pelvis at the onset of labour. As labour advances, progressive flexion and descent of fetal head cause the occiput to rotate anteriorly when the head reaches the pelvic floor. When this sequence of changes in the position of fetal head is altered, a malposition or malpresentation occurs. Malpositions or malpresentations of the fetal head are usually diagnosed in labour and while in many cases vaginal delivery is possible, they are associated with a more difficult labour and increased operative interventions with attendant risks to both the mother and the baby.

Definitions
The term ‘presentation’ refers to the part of the fetus which is presenting to the pelvic inlet. It can also be defined as the part of the fetus occupying the lower pole of the uterus. Nearly 95 percent of fetuses at term present with vertex. Other presentations (which are classified as malpresentations) include breech, face, brow, shoulder or compound presentation. Vertex refers to a diamond shaped area of the fetal head that is bounded by each parietal eminence and the anterior and posterior fontanelles (Figure 1). It presents the smallest diameters of the fetal head to the maternal pelvis (Figure 2).

‘Denominator’: is the fetal reference point used in defining position. It is usually a prominent bony landmark at the circumference of the presenting part e.g. occiput for vertex, sacrum for breech, mentum (chin) for face and acromion for shoulder presentation. For a brow presentation the denominator is not fixed and either the sinciput (area of anterior fontanelle) or occiput can be used.

‘Position’: refers to the relationship of the denominator to the fixed points on the maternal pelvis such as pubic symphysis, iliopectineal eminence, sacroiliac joints and sacrum. For vertex presentations, the occiput can occupy following positions in labour — occipitoanterior, occipitotransverse or occipitoposterior.

‘Attitude’: refers to the degree of flexion or extension of the fetal head with respect to the trunk. A well-flexed fetal head presents the most favourable diameters to the maternal pelvis. If the fetal neck is deflexed, the leading part of the fetal head lies more anteriorly and a brow presentation can occur while if there is complete extension of the fetal neck, the face then becomes the leading part producing face presentation (Figure 3a—c).

Figure 1
Diamond shaped area of the fetal vertex bounded by each parietal eminence and the anterior and posterior fontanelles.

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**Fetal head presentations and mechanism of labour**

The three *Ps* of normal labour — Power (Uterine activity), Passage (Maternal pelvis and soft tissues) and Passenger (Position and size of fetal head) all play an important role in successful vaginal delivery. As part of the normal mechanism of labour, the fetal head descends and engages into the maternal pelvis in a transverse plane in the late third trimester or just prior to the onset of or during labour. It most commonly lies in a left occipitotransverse position. As labour advances, with progressive descent and flexion, the occiput rotates to an anterior position once it reaches the pelvic floor. With further uterine contractions and descent, the head is born by extension of the fetal neck followed by restitution. The head then undergoes external rotation as the shoulders continue their internal rotation to come to lie in the sagittal plane for delivery. The baby is then born by lateral flexion of the body. If the fetal head is not well flexed, the presenting diameters to the pelvis are larger and this causes malpositions or malpresentations. The larger diameters can lead to slow progress or arrest of labour. The presenting diameters associated with these different presentations at term are listed in Table 1 and illustrated in Figure 4.

**Clinical presentation and diagnosis**

A thorough and systematic clinical examination is important for diagnosis and further management of fetal head malpositions or malpresentations.

**Abdominal examination:** periodic abdominal examination should be performed in labour to assess descent and position of fetal head. While the descent may be assessed by fifths of the fetal head palpable above symphysis pubis, the relative positions of sinciput and occiput may suggest the attitude of the fetal head. Palpation may also provide a rough estimate of the fetal size/weight and liquor volume.

**Vaginal examination:** vaginal examination often confirms the findings of malposition or malpresentation. When performing a systematic vaginal examination, station of the fetal head should be identified in cm above or below the ischial spines. Placement of sutures and fontanelles should be confirmed by sweeping the fingers across the fetal head. The inverted Y shaped suture lines or overlapping of parietal bones over the occipital bones in labour helps to identify the posterior fontanelle. Anterior fontanelle is felt as a soft diamond shaped depression at junction of four bones. If the anterior fontanelle is felt easily near the centre of the pelvis it indicates the possibility of a deflexed head. If the amount of caput makes examination difficult, it may be possible to feel the fetal ear anteriorly. Care should be taken to feel the pinna and the canal, as the ear can be folded and give a false impression of its position. Also, since the ear is just below the biparietal diameter, it can aid in judging the descent of the head. Synclitism of the parietal bone (level of parietal eminences in the pelvis) should be assessed by feeling the relationship of the sagittal suture to the transverse plane of the pelvic cavity. Anterior asynclitism, in which the anterior parietal bone is more easily felt and the sagittal suture is further back in the transverse plane, is normal. Posterior asynclitism however may be a sign of disproportion (Figure 5). Excessive ‘Caput’ (soft tissue swelling of fetal scalp) and ‘Moulding’ (over riding of fetal skull bones) may suggest possibility of obstructed labour due to cephalopelvic disproportion.

In case of brow presentation, the orbital ridges and sinciput will form the prominent findings while in case of face presentation...
great care should be taken to avoid damaging the orbits which may be felt along with nose, mouth and malar bones.

**Signs of obstructed labour**

If the presenting part is too large for the pelvis, arrest of labour can occur. It is very important to be vigilant for signs of obstructed labour and perform a timely operative delivery to avoid adverse maternal or neonatal outcomes. Obstructed labour is characterized by signs such as — arrest of cervical dilatation/descent of fetal head, oedematous poorly applied cervix, increasing caput and moulding, formation of Bandl’s ring which may be visible or palpable per abdomen. Caput is a soft tissue swelling of the fetal scalp and increase in its size with progress of time is a subjective assessment. The degree of moulding is expressed as 1+ (apposition of the parietal bones at the suture but no overlap), 2+ (overlap of parietal bones but reducible with gentle pressure), 3+ (overlap of bones with difficulty in reducing with gentle pressure).

The mother will be exhausted and show signs of dehydration such as tachycardia, pyrexia and oliguria. While in a primigravid woman, obstruction may be followed by the uterine inertia (weak or no contractions), in a multigravida the major risk is of violent uterine contractions leading to ruptured uterus.

**Partogram**

Progress of labour should be closely monitored because slow progress of labour is the commonest manifestation of fetal malpositions in labour. The partogram is a very useful tool which can help in timely diagnosis and action for dystocia.

**Obstetric outcomes associated with malpositions or malpresentations of the fetal head**

Fetal malpositions or malpresentations are associated with the following:

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**Different types of fetal head presentations, attitudes and anteroposterior diameters (transverse diameter is the biparietal — 9.5 cm)**

<table>
<thead>
<tr>
<th>Presentation</th>
<th>Attitude</th>
<th>Anteroposterior diameter</th>
<th>Length cm</th>
</tr>
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<tbody>
<tr>
<td>Vertex</td>
<td>Flexed vertex</td>
<td>Suboccipitobregmatic</td>
<td>9.5</td>
</tr>
<tr>
<td>Vertex</td>
<td>Semi-deflexed vertex</td>
<td>Suboccipitofrontal</td>
<td>10.5</td>
</tr>
<tr>
<td>Vertex (occipitoposterior position)</td>
<td>Deflexed vertex</td>
<td>Occipitofrontal</td>
<td>11.5</td>
</tr>
<tr>
<td>Brow</td>
<td>Semi-extended</td>
<td>Mentovertical</td>
<td>13</td>
</tr>
<tr>
<td>Face</td>
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Table 1

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**The presenting anteroposterior diameters associated with different presentations of fetal head**

(a) Suboccipitobregmatic – 9.5 cm (vertex);
(b) Occipitofrontal – 11.5 cm (occipitoposterior);
(c) Mentovertical – 13 cm (brow); and
(d) Submentobregmatic – 9.5 cm (face).

**Anterior and posterior asynclitism**

(a) Anterior parietal bone presentation
(b) Posterior parietal bone presentation

PS, pubic symphysis; S, sacrum

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**Figure 4**

**Figure 5**
• Prolonged pregnancy
• Prolonged latent phase of labour
• Primary dysfunctional labour/dystocia (slow progress)
• Secondary arrest of cervical dilatation in labour
• Prolonged second stage of labour
• Obstructed labour
• Operative interventions — dystocia or obstructed labour
leads to increased operative interventions either in the form
of instrumental delivery or caesarean section depending
upon the stage of labour and findings on clinical examination.

Occipitoposterior (OP) position

Normally when the fetal head engages into maternal pelvis, the
occiput usually lies laterally and then undergoes rotation ante-
riorly during labour in four out of five cases. Occipitoposterior
position is thus present in about 20% of fetuses in the early
stages of labour. However, even in these cases, most fetal heads
further undergo spontaneous rotation to occipitoanterior by the
time of delivery. Persistent occipitoposterior position therefore
occurs in approximately 10% of vertex deliveries. Occipitopos-
terior position is associated with a prolonged labour, increased
use of oxytocin, epidural analgesia, higher incidence of operative
deliveries as well as third or fourth degree perineal tears.

Causes
• High inclination pelvis
• Android or anthropoid type pelvis
• Use of intrapartum epidural analgesia (relaxation of the
pelvic floor muscles)
Weak uterine contractions and a relaxed pelvic floor may
contribute to the failure of the occiput to rotate anteriorly.

Mechanism of labour

Unlike the occipitoanterior position where the head is well flexed
and presents the smallest suboccipitobregmatic (9.5 cm) diameter
to the pelvis, in these cases the fetal head is deflexed and hence
presents a larger anteroposterior (occipitofrontal — 11.5 cm)
diameter to the maternal pelvis. OP position may be sub-classified
into right OP, left OP or direct OP (Figure 6). The majority of
occipitoposterior heads will rotate to occipitoanterior in labour.

In cases with persistent OP position — with good uterine
contractions and roomy pelvis, spontaneous delivery can occur
in direct OP position known as the ‘face to pubis’ delivery. In
most other cases of persistent OP positions in the second stage,
vaginal delivery may be achievable either by rotation to occipio-
toanterior position manually or with an instrument or a direct OP
delivery (face to pubis) by use of an instrument.

Diagnosis

Inspection of abdomen may reveal flattening below the level of
umbilicus. On palpation limbs are easily felt anteriorly and it is
difficult to palpate the fetal back. The anterior shoulder is
palpated at some distance from the midline. The prominetions of
sinciput and occiput can both be felt at the same level above the
pubic symphysis suggesting deflexion. Vaginal examination
reveals the anterior fontanelle anteriorly and the posterior
fontanelle near the sacrum.

Prevention

A Cochrane review in 2007 assessed the effects of adopting
a hands and knees maternal posture in late pregnancy or
during labour when the presenting part of the fetus was in
a lateral or posterior position compared with no intervention.
Three trials (2794 women) were included. The authors repor-
ted that the use of hands and knees position for 10 min twice
daily to correct occipitoposterior position of the fetus in late
pregnancy could not be recommended as an intervention.
However, the use of the position in labour was associated with
reduced backache.

Management

As many OP positions will spontaneously undergo rotation to
occipitoanterior during the course of labour, if OP position is

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![Occipitoposterior positions](image)

**Figure 6**

 Occipitoposterior positions

a Right occipitoposterior  
b Left occipitoposterior  
c Direct occipitoposterior

PS, pubic symphysis; S, sacrum

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diagnosed in labour – an expectant management is recommended. Close watch on progress of labour and fetal monitoring is required in view of possibility of prolonged labour. Oxytocin should be used if needed to maintain good uterine activity (3–4 contractions every 10 min lasting more than 45 s). Previous studies have shown that active management of labour with oxytocin augmentation does help with the rotation to the occipitoanterior position. Delivery can occur spontaneously in OP position but if instrumental delivery is required, careful abdominal and vaginal examinations are needed to establish whether this is safe and appropriate. In difficult cases, use of ultrasoundography to confirm position as well as senior help should be sought.

If instrumental delivery is appropriate, the delivery can be assisted by either rotating to the occipitoanterior position or delivering in the occipitoposterior position. Rotational delivery can be achieved manually or using an instrument. Manual rotation involves flexing the fetal head to allow the rotation followed by a traction delivery (using forceps or ventouse). Rotational instrumental delivery is most commonly attempted using vacuum extraction which brings about autorotation of the vertex with the descent. The vacuum cup should be placed over the flexion point of the vertex (3 cm anterior to the posterior fontanelle in the midline over the sagittal suture) and traction applied along the pelvic axis synchronous with the uterine contractions and maternal bearing down efforts.

Kjelland’s forceps can achieve rotation before traction and delivery but safe use of this instrument requires considerable training and supervision. Non-rotational forceps can be used for deliberate delivery in the occipitoposterior position when the head is very low but it should be remembered that there is a higher likelihood of significant perineal trauma with such deliveries. Caesarean section delivery may be needed either in the first stage of labour for failure to progress or CTG abnormalities, or in second stage if vaginal delivery is deemed difficult. To avoid difficulty in delivery at caesarean, the fetal head should be rotated and flexed before delivering in the transverse position.

**Occipitotransverse position**

Occipitotransverse position will arise when the fetal head fails to rotate to an occipitoanterior position and remains in a transverse position. Asynclitism is associated with this malposition. A persistent occipitotransverse position can cause either obstructed labour in the first stage or a ‘deep transverse arrest’ in the second stage of labour. If cervix is fully dilated and the head is below the level of ischial spines, a manual rotation or an instrumental rotational delivery using either the vacuum or Kjelland’s forceps is possible.

**Face presentation**

The incidence of face presentation is reported to be between 1 in 500 and 1 in 1000 deliveries. The face presentation is a result of complete extension of the fetal head and may start as an occipitoposterior position that extends further either before labour or as labour progresses. Most face presentations are therefore secondary and become evident in established labour. During labour, some of the cases of face presentation will flex while the others will persist as face. Although vaginal delivery is feasible in many cases, caesarean delivery is very common once face presentation is diagnosed during labour.

**Causes**

- Tumours of the fetal neck e.g. goitre or cystic hygroma (usually diagnosed on antenatal ultrasound)
- Anencephaly
- Loops of cord around the neck
- Uterine abnormalities
- Prematurity
- Cephalopelvic disproportion
- Fetal musculoskeletal abnormalities
- Multiparity
- Multiple pregnancy

**Mechanism**

The mentum (chin) is the denominator (Figure 7) and the presenting diameter is submentobregmatic (9.5 cm). Most face presentations are chin anterior (mentoanterior) in the maternal pelvis and in such cases spontaneous/assisted vaginal delivery can occur with the fetal head being born by flexion of the neck in 60–90% cases. Mentoposterior faces rotate to anterior spontaneously in 45% of cases but a persistent mentoposterior position will not allow delivery of the skull under the pubic symphysis and will necessitate delivery by caesarean section.

**Diagnosis**

Face presentation is usually diagnosed during labour. On abdominal palpation, a large amount of head is palpable on the same side as the back without a cephalic prominence on the same side as the limbs. In thin women, a sharp angulation may be felt between the fetal occiput and back. Confirmation is usually on vaginal examination when the orbits, nose, mouth and malar bones are palpable. The fetal mouth sucking on the examiner’s finger is a classical sign! It is important to distinguish face from breech by remembering that the malar prominences and mouth form a triangle, whereas the ischial tuberosities and the anus form a straight line.

**Figure 7** Face presentation.
Management
Malpresentations of fetal head such as face or brow are infrequently encountered and much of the practice recommendations are derived from clinical experience and consensus of expert opinion. When face presentation is diagnosed during labour, the woman should be informed of the findings. She should be made aware that there may be facial swelling and bruising noted in the baby soon after delivery however it is likely to resolve without any permanent damage over the next few days. Regular abdominal and gentle vaginal examinations should be undertaken to monitor progress while avoiding injury to fetal orbits/face. If progress is good and the position is mentoanterior (or rotating round to mentoanterior) then vaginal delivery can be anticipated. If progress is slow or arrests, or if the position remains mentoposterior, caesarean section is indicated. Fetal blood sampling, use of a fetal scalp electrode and ventouse delivery are contraindicated with a face presentation.

If the baby delivers vaginally, the fetal chin descends down the symphysis pubis and the delivery of the head is completed by flexion of the fetal neck bringing the occiput out last causing considerable posterior perineal distension. In second stage with failure to progress, a forceps delivery is possible although usually confined to non-rotational forceps when the mentum is anterior and head is low. Before application of forceps, it is vital to confirm that no head is palpable per abdomen as the vaginal findings can be misleading (because the chin is in the pelvis and the occiput lies posteriorly). It is important to remember that ‘the head is always higher than you think’ and if the sacral hollow feels empty then forceps should not be applied as the occiput must still be in the abdomen. The biparietal diameter is usually approximately 7 cm behind the advancing face so consequently, even when the face is distending the vulva, the biparietal diameter has only just entered the pelvis.

Even with favourable mentolateral or mentoanterior position, if there is failure to progress the safer option for the fetus is caesarean section in the first stage. At caesarean section care should be taken with delivery of the fetal head to avoid extensions of the uterine incision.

Brow presentation
The incidence of brow is between 1 in 700 and 1 in 1500 deliveries.

Causes
- Cephalopelvic disproportion
- Prematurity

In brow presentations, the head is deflexed and presents to the pelvis with the largest anteroposterior diameter (Figure 8). Many brow presentations in early labour are transient proceeding to complete extension (face) or flexion (vertex) as labour progresses.

Mechanism
The fetal head presents with its largest mentovertical diameter (13 cm) to the maternal pelvis and vaginal delivery is not possible in an adequately grown term baby. Spontaneous conversion to either vertex or face presentation by flexion or further extension, respectively, may occur with advancing labour especially if the fetus is small.

Figure 8 Brow presentation.

Diagnosis
It is rare to diagnose brow presentation before onset of labour. On abdominal examination much of the fetal head may be palpable. On vaginal examination, the head has not descended below the ischial spines and the root of the nose, supraorbital ridges and anterior fontanelle are palpable.

Management
The brow discovered in early labour may flex or extend, and early recourse to caesarean section on this finding alone should be avoided. Nonetheless one should be alert to the signs of obstructed labour, and preparations should be undertaken for caesarean section and time allowed to see whether flexion or extension takes place. Failure to progress in the next few hours in labour with persistent brow indicates a caesarean section. In extreme prematurity the fetus may descend as a brow and deliver as a brow or may convert to a face or vertex after it reaches the pelvic floor. As with the face presentation, care is required when undertaking caesarean section to avoid extensions to the incision. The aim should be to flex the head with the delivering hand before delivering it from the wound.

FURTHER READING
Practice points

- Malpositions and malpresentations of fetal head are usually diagnosed in labour.
- Persistent occipitoposterior (OP) position is found in 10% of vertex deliveries and is associated with prolonged first and second stages of labour.
- As many OP positions will spontaneously undergo rotation to occipitoanterior during the course of labour, if OP position is diagnosed in labour - an expectant management is recommended. Oxytocin should be used if needed to maintain good uterine activity (3–4 contractions every 10 min lasting more than 45 s).
- Delivery can occur spontaneously in OP position but if instrumental delivery is required, careful abdominal and vaginal examinations are needed to establish whether this is safe and appropriate.
- Progressive deflexion of the fetal head can result in brow or face malpresentations.
- Most face presentations are secondary and become evident in established labour. During labour, some of the cases of face presentation will flex while the others will persist as face. Although vaginal delivery is feasible, caesarean delivery is very common once face presentation is diagnosed during labour.
- The brow discovered in early labour may flex or extend, and early recourse to caesarean section on this finding alone should be avoided. Failure to progress in the next few hours in labour with persistent brow indicates a caesarean section.