Mechanism of the delivery
The fetal position within the uterine cavity should be determined at the onset of labor.

**Fetal Lie, Presentation, Attitude, and Position**

• Fetal orientation relative to the maternal pelvis is described in terms of fetal lie, presentation, attitude, and position.
The fetal position

**Fetal Lie**

The relation of the fetal long axis to that of the mother is termed *fetal lie* and is either *longitudinal* or *transverse*. Occasionally, the fetal and the maternal axes may cross at a 45-degree angle, forming an *oblique lie*, which is unstable and always becomes longitudinal or transverse during labor. A longitudinal lie is present in greater than 99 percent of labors at term. Predisposing factors for transverse lies include multiparity, placenta previa, hydramnios, and uterine anomalies *Williams Obstetrics, 23e*
Fetal Presentation

The *presenting part* is that portion of the fetal body that is either foremost within the birth canal or in closest proximity to it. It can be felt through the cervix on vaginal examination. Accordingly, in longitudinal lies, the presenting part is either the fetal head or breech, creating *cephalic* and *breech presentations*, respectively. When the fetus lies with the long axis transversely, the *shoulder* is the presenting part and is felt through the cervix on vaginal examination. *Williams Obstetrics, 23e*
Longitudinal lie. Cephalic presentation. Differences in attitude of the fetal body in (A) vertex, (B) sinciput, (C) brow, and (D) face presentations. Note changes in fetal attitude in relation to fetal vertex as the fetal head becomes less flexed.
Fetal skull

- Bregma or Anterior fontanelle
- Coronal suture
- Frontal eminence
- Sinciput or brow
- Orbital ridge
- Glabella or root of nose
- Mentum or chin
- Parietal eminence
- Posterior fontanelle
- Lambdoidal suture
- Occipital bone
- Temporal suture
- Temporal bone

Obstetrics Illustrated, 6 e., Churchill Livingstone 2003, Kevin P. Hanretty
Fetal skull

**SUBOCcipito-Bregmatic**
From nape of neck to centre of bregma (9.5 cm)

**MENTO-Vertical**
From point of chin to above posterior fontanelle (14 cm)

**OcCipito-Frontal**
From root of nose to occipital protuberance (11.5 cm)

**SUBMENTO-Bregmatic**
From below chin to centre of bregma (9.5 cm)

**FACE** = root of nose to junction of head and neck

**VAULT** = from orbital ridges to nape of neck (frontal, parietal, occipital bones). It is compressible.

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The fetal position

Breech Presentation

When the fetus presents as a breech, the three general configurations are *frank, complete, and footling presentations*. Breech presentation may result from circumstances that prevent normal version from taking place, for example: hydramnios, high parity with uterine relaxation, multiple fetuses, oligohydramnios, hydrocephaly, anencephaly, previous breech delivery, uterine anomalies, placenta previa, fundal placental implantation, and pelvic tumors.

*Williams Obstetrics, 23e*
The fetal position

*The frank breech* presentation, the lower extremities are flexed at the hips and extended at the knees, and thus the feet lie in close proximity to the head. *Williams Obstetrics, 23e*
The complete breech presentation: one or both knees are flexed. *Williams Obstetrics, 23e*
In the incomplete breech presentation, one or both hips are not flexed, and one or both feet or knees lie below the breech, such that a foot or knee is lowermost in the birth canal. Footling breech is an incomplete breech with one or both feet below the breech.

*Williams Obstetrics, 23e*
The fetal position

Will be refer to all *transverse lies* simply as *shoulder presentations*. Another term used is *transverse lie*, with *back up* or *back down*. *Williams Obstetrics, 23e*
Fetal Attitude or Posture

The fetus becomes folded or bent upon itself in such a manner that the back becomes markedly convex; the head is sharply flexed so that the chin is almost in contact with the chest; the thighs are flexed over the abdomen; and the legs are bent at the knees. In all cephalic presentations, the arms are usually crossed over the thorax or become parallel to the sides.

*Williams Obstetrics, 23e*
Fetal Position

Position refers to the relationship of an arbitrarily chosen portion of the fetal presenting part to the right or left side of the birth canal. Accordingly, with each presentation there may be two positions—right or left. The fetal occiput, chin (mentum), and sacrum are the determining points in vertex, face, and breech presentations, respectively. Because the presenting part may be in either the left or right position, there are left and right occipital, left and right mental, and left and right sacral presentations, abbreviated as LO and RO, LM and RM, and LS and RS, respectively. 

*Williams Obstetrics, 23e*
Varieties of Presentations and Positions

For still more accurate orientation, the relationship of a given portion of the presenting part to the anterior, transverse, or posterior portion of the maternal pelvis is considered. Because the presenting part in right or left positions may be directed anteriorly (A), transversely (T), or posteriorly (P), there are six varieties of each of the three presentations. Thus, in an occiput presentation, the presentation, position, and variety may be abbreviated in clockwise fashion as:

*Williams Obstetrics, 23e*
**Varieties of Presentations and Positions**

*Longitudinal lie. Vertex presentation.*

A. Left occiput anterior (LOA).

B. Left occiput posterior (LOP).
Varieties of Presentations and Positions

**Longitudinal lie. Vertex presentation.**

A. Right occiput posterior (ROP).
B. Right occiput transverse (ROT).
Varieties of Presentations and Positions- vertex presentation
Longitudinal lie. Face presentation. Left and right mentum anterior and right mentum posterior positions.
Varieties of Presentations and Positions

**Longitudinal lie.**
**Breech presentation.**
Left sacrum posterior (LSP).
Varieties of Presentations and Positions

Transverse lie. Right acromiodorsoposterior (RADP). The shoulder of the fetus is to the mother's right, and the back is posterior.

Varieties of transverse lie
The acromion or back of the fetus may be directed either posteriorly or anteriorly and superiorly or inferiorly.  

*Williams Obstetrics, 23e*
A thick muscular band forming a pathological retraction ring has developed just above the thin lower uterine segment. The force generated during a uterine contraction is directed centripetally at and above the level of the pathological retraction ring. This serves to stretch further and possibly to rupture the thin lower segment below the retraction ring.

*Williams Obstetrics, 23e*
Diagnosis of the Labor

• Abdominal palpation
• Vaginal examination

• *True labor*
  - Regular contractions
  - Progressive dilatation and effacement of cervix
  - 'Show' (a little blood and mucus discharged from the vagina)
3. Dilatation of the Cervix. This is accompanied by the formation of forewaters or bag of waters.

Cervical dilatation is gauged by vaginal examination and is expressed in the diameter across the cervix.

- 1 finger = 2 cm = 1/2 DILATED
- 2 fingers = 3.5 cm = 1/2 DILATED
- 3 fingers = 5.5 cm = 3/4 DILATED
- 4 fingers = 7.5 cm

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Abdominal examination can be conducted systematically employing the four maneuvers described by Leopold in 1894.

The mother lies supine and comfortably positioned with her abdomen bared.

Problems: if the patient is obese, if there is excessive amnionic fluid, or if the placenta is anteriorly implanted.
The first maneuver permits identification of which fetal pole—that is, cephalic or podalic—occupies the uterine fundus. The breech gives the sensation of a large, nodular mass, whereas the head feels hard and round and is more mobile and ballottable.
The second maneuver is accomplished as the palms are placed on either side of the maternal abdomen, and gentle but deep pressure is exerted. On one side, a hard, resistant structure is felt—the back. On the other, numerous small, irregular, mobile parts are felt—the fetal extremities. By noting whether the back is directed anteriorly, transversely, or posteriorly, the orientation of the fetus can be determined.
Abdominal Palpation—Leopold Maneuvers

The third maneuver is performed by grasping with the thumb and fingers of one hand the lower portion of the maternal abdomen just above the symphysis pubis. If the presenting part is not engaged, a movable mass will be felt, usually the head. If the presenting part is deeply engaged, however, the findings from this maneuver are simply indicative that the lower fetal pole is in the pelvis, and details are then defined by the fourth maneuver.
Abdominal Palpation—Leopold Maneuvers

To perform the fourth maneuver, the examiner faces the mother's feet and, with the tips of the first three fingers of each hand, exerts deep pressure in the direction of the axis of the pelvic inlet. In many instances, when the head has descended into the pelvis, the anterior shoulder may be differentiated readily by the third maneuver.
The VERTEX is the area bounded by the anterior and posterior fontanelles and the parietal eminences.
Locating the sagittal suture by vaginal examination

Source: Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Rouse DJ, Spong CY: 
Williams Obstetrics, 23rd Edition: http://www.accessmedicine.com
Differentiating the fontanels by vaginal examination

Bony pelvis- brim, the relationship of a given portion of the presenting part to the anterior, transverse, or posterior portion of the maternal pelvis is considered
The anteroposterior diameter of the brim and outlet

True conjugate of brim
From sacral promontory to upper and inner border of symphysis pubis

Diagonal conjugate diameter of brim
From sacral promontory to under border of symphysis pubis

Antero-posterior diameter of outlet
Under body of symphysis pubis to end of sacrum or coccyx if fused

Inclination of pelvic brim 50°–60° (usually 55°)
The first stage of the Labor
The *cardinal movements of labor* are:

- engagement with orientation and flexion of the head,
- descent, with internal rotation,
- expulsion with extension and external rotation,

During labor, these movements not only are sequential but also show great temporal overlap. It is impossible for the movements to be completed unless the presenting part descends simultaneously.
Mechanisms of Labor with Occiput Anterior Presentation

1. Head floating, before engagement

The mechanism by which the biparietal diameter—the greatest transverse diameter in an occiput presentation—passes through the pelvic inlet is designated *engagement*. The fetal head may engage during the last few weeks of pregnancy or not until after labor commencement. In many multiparous and some nulliparous women, the fetal head is freely movable above the pelvic inlet at labor onset. In this circumstance, the head is sometimes referred to as "floating." A normal-sized head usually does not engage with its sagittal suture directed anteroposteriorly. Instead, the fetal head usually enters the pelvic inlet either transversely or obliquely.
Asynclitism

Although the fetal head tends to accommodate to the transverse axis of the pelvic inlet, the sagittal suture, while remaining parallel to that axis, may not lie exactly midway between the symphysis and the sacral promontory.
Asynclitism

Normal synclitism

Anterior asym

Posterior asymclitism

Anterior parietal

Sagittal suture

Occipito-frontal plane

Pelvic inlet plane

Posterior parietal

2. Engagement, descent, flexion

Mechanisms of Labor with Occiput Anterior Presentation - descent, flexion

In nulliparas, engagement may take place before the onset of labor, and further descent may not follow until the onset of the second stage. In multiparous women, descent usually begins with engagement.

The chin is brought into more intimate contact with the fetal thorax, and the shorter suboccipitobregmatic diameter is substituted for the longer occipitofrontal diameter.
Flexion
Mechanisms of Labor with Occiput Anterior Presentation

3. Further descent, internal rotation

Internal rotation

This movement consists of a turning of the head in such a manner that the occiput gradually moves toward the symphysis pubis anteriorly from its original position or less commonly, posteriorly toward the hollow of the sacrum.
4. Complete rotation, beginning extension

5. Complete extension

Extension

With progressive distension of the perineum and vaginal opening, an increasingly larger portion of the occiput gradually appears. The head is born as the occiput, bregma, forehead, nose, mouth, and finally the chin pass successively over the anterior margin of the perineum (over the maternal anus).
Internal rotation, extension
Mechanism of labor for right occiput posterior position showing anterior rotation.
Mechanisms of Labor with Occiput Anterior Presentation

6. Restitution (external rotation)

Extension

If the occiput was originally directed toward the left, it rotates toward the left ischial tuberosity. If it was originally directed toward the right, the occiput rotates to the right. Restitution of the head to the oblique position is followed by completion of external rotation to the transverse position. This movement corresponds to rotation of the fetal body and serves to bring its bi-acromial diameter into relation with the anteroposterior diameter of the pelvic outlet. Thus, one shoulder is anterior behind the symphysis and the other is posterior.
7. Delivery of anterior shoulder

Source: Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Rouse DJ, Spong CY: 
Mechanisms of Labor with Occiput Anterior Presentation

8. Delivery of posterior shoulder

Expulsion

Almost immediately after external rotation, the anterior shoulder appears under the symphysis pubis, and the perineum soon becomes distended by the posterior shoulder. After delivery of the shoulders, the rest of the body quickly passes.
Delivery of the Head
Delivery of the Shoulders
Delivery of the Placenta
Cardinal Movements with spontaneous Breech Delivery

- *Engagement and descent of the breech* usually take place with the bitrochanteric diameter in one of the oblique pelvic diameters.

- After rotation, descent continues until the perineum is distended by the advancing breech, and the anterior hip appears at the vulva. By lateral flexion of the fetal body, the posterior hip then is forced over the perineum, which retracts over the buttocks, thus allowing the infant to straighten out when the anterior hip is born. The legs and feet follow the breech and may be born spontaneously or require aid.

- After the birth of the breech, there is *slight external rotation*, with the *back turning anteriorly* as the shoulders are brought into relation with one of the oblique diameters of the pelvis. *The shoulders then descend rapidly and undergo internal rotation*, with the bisacromial diameter occupying the anteroposterior plane.

- Immediately following the shoulders, the head, which is normally sharply flexed upon the thorax, enters the pelvis in one of the oblique diameters and then rotates in such a manner as to bring the posterior portion of the neck under the symphysis pubis. *The head is then born in flexion.* *Williams Obstetrics, 23e*
Engagement, descent and delivery the breech

The bitrochanteric diameter (transverse diameter between the great trochanters of the fetus) is 10 cm. The most common position is the left sacro-anterior (L.S.A.). With labour there is compaction, descent and engagement of the breech (bisiliac diameter).

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Engagement, descent and delivery the breech

Descent continues until breech reaches pelvic floor. The anterior buttock rotates forward under the pubis (internal rotation).

Lateral flexion of the fetal body round the pubis allows the anterior buttock to slip forward under the pubis and the posterior buttock to slip over the perineum. The breech is delivered followed by the legs.

A movement of restitution of the hips takes place.
The external rotation, the delivery of the thorax with arms

The shoulders now engage in the same pelvic diameter as the hips — the left oblique. (The bisacromial diameter of the shoulder is 11 cm.)

As descent continues internal rotation of the shoulders occurs in the pelvic cavity bringing one shoulder beneath the pubis and the other into the hollow of the sacrum. The anterior shoulder and arm are born first.

*Obstetrics Illustrated, 6 e., Churchill Livingstone 2003, Kevin P. Hanretty*
The head rotates to bring the neck under the pubis

As the shoulders are being born the head enters the pelvic brim either in the transverse or left oblique of the brim. The engaging diameters of the head are the biparietal and the suboccipito-bregmatic or suboccipito-frontal.

The head descends into the pelvic cavity and rotates to bring the occiput under the pubis.

*Obstetrics Illustrated, 6 e., Churchill Livingstone 2003, Kevin P. Hanretty*
The spontaneous delivery of the head

The occiput is arrested at the pubis and the head is born by flexion. The chin, face and brow are born first, and then the occiput.

Sometimes the occiput rotates posteriorly.

If the head is flexed the root of the nose is arrested behind the pubis and the occiput and vertex are born first followed by the face.

If the head is extended the chin is arrested above the pubis and the occiput and vertex are delivered and the face follows.

*Obstetrics Illustrated, 6 e., Churchill Livingstone 2003, Kevin P. Hanretty*
The Mauriceau maneuver
The midline episiotomy
The mediolateral episiotomy
Summary
1. The fundus is palpated and its contents (here the breech) identified.

2. The hands palpate the contours of the uterus, identifying the back and the limbs.

3. The head should be palpated, and it should be noted whether it is mobile or fixed in the pelvic brim.
Summary of the Mechanism of Labor

The head is presenting in the transverse diameter of the pelvic brim with the Occiput to the Left. There is often Asynclitism prior to engagement, i.e. when one or other parietal bone is the leading part.

The diagram shows the posterior parietal bone leading — this is posterior asynclitism. (If the anterior parietal bone is leading there is anterior asynclitism.)

At the beginning of labour the fetus is in an attitude of Flexion but the neck is not yet fully flexed so the Occipito-Frontal is the presenting diameter.

As labour progresses the fetus becomes compact. The neck is fully flexed and the Suboccipito-Bregmatic becomes the presenting diameter.
Summary of the Mechanism of Labor

**Descent and Engagement** occur.
Engagement is the descent of the presenting diameters through the pelvic brim.
The leading part — the vertex — is now near the level of the ischial spines.

**Descent** continues and the occiput rotates in the cavity of the pelvis anteriorly to the right oblique diameter bringing the occiput to the left obturator foramen anteriorly.

Now in left occipito-anterior (LOA) position.

The LOA position is partly attributed to the presence of the sigmoid colon in the left posterior quadrant of the pelvis.

Note how the neck is twisting.

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Descent continues and the occiput reaches the pelvic floor.

The occiput rotates to the front. This is Internal rotation. The head is now occipito-anterior (OA).

Note twisting of the head and shoulders. The shoulders are in the left oblique of the brim.

It is a maxim that the fetal part which first comes in contact with the pelvic floor rotates anteriorly (Internal rotation).

Rotation is through 45° from oblique and is called Anterior or Short rotation.

The Occiput is now below the symphysis.

Further descent of the fetus pushes the head forwards with a movement of extension and the occiput is delivered.

Increasing extension round the pubis delivers the Bregma, Brow and Face.

Obstetrics Illustrated, 6 e., Churchill Livingstone 2003, Kevin P. Hanretty
Summary of the Mechanism of Labor

Descent and Delivery of the head has brought the shoulders into the pelvic cavity.

The head on delivery is oblique to the line of the shoulders. The bisacromial diameter is in left oblique diameter of the cavity.

The bisacromial diameter is the distance between the acromion processes and is 11 cm.

The head now rotates to the natural position relative to the shoulders. This movement is known as Restitution.

Descent continues and the shoulders rotate to bring the bisacromial diameter into the antero-posterior diameter of the pelvic outlet.

This descent and rotation causes the head to rotate so that the occiput lies next to the left maternal thigh. This is External rotation.

The anterior shoulder now slips under the pubis and with lateral flexion of the fetal body the posterior shoulder is born. The rest of the body follows easily.