abnormal labor pregression

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INTRODUCTION

During normal labor, regular and painful uterine contractions cause progressive dilation and effacement of the cervix, accompanied by descent and eventual expulsion of the fetus.

Parity affects this process: normal labor progress is slower in nulliparous women.

"Abnormal labor," "dystocia," and "failure to progress.

These labor abnormalities are best described as protraction disorders (ie, slower than normal progress) or arrest disorders (ie, complete cessation of progress).

an abnormally long active phase is usually described as protracted

abnormally **long latent phase or second stage** is usually described as prolonged.

prolonged labor is associated with increased risks for operative delivery and maternal and neonatal morbidity.

NORMAL LABOR PROGRESSION

Stages and phases — Interpretation of labor progress depends on the stage and phase.

The three stages and their phases are:

First stage

- Time from onset of labor to complete cervical dilation.
- when contractions started to occur regularly every 3 to 5 minutes for more than an hour
- The time that complete dilation is first identified on physical examination documents
- physical examination to document cervical change is performed intermittently.

The first stage consists of a **latent phase** and an **active phase**.

The latent phase is characterized by gradual cervical change and the active phase is characterized by rapid cervical change.

The labor curve of multiparas may show an inflection point between the latent and active phases; this point occurs at **approximately 5 cm dilation**

In **nulliparas, the inflection point is often unclear** and, if present, occurs at a more advanced cervical dilation, typically at **approximately 6 cm or more**. In any case, this inflection point is a retrospective finding

Second stage = Time from complete cervical dilation to fetal expulsion.

When pushing is delayed, some clinicians divide the second stage into a **passive phase** (from complete cervical dilation to onset of active maternal expulsive efforts) and an **active phase** (from beginning of active maternal expulsive efforts to expulsion of the fetus)

Third stage = Time between fetal expulsion and placental expulsion.

Criteria for normal progress

Emanuel Friedman established criteria for the normal progress of labor in the 1950s, and these criteria were used for assessment and management of labor for decades.

he observed that normal labor should progress at a rate of at least 1 cm cervical dilation per hour, starting at **3 to 4 cm of dilation.**

data derived from women in labor in the 21st century (also described below) suggest that changes in obstetric and anesthesia practices and in women themselves in recent decades have resulted in changes in the average progress of labor.

the active phase of the first stage of labor may not start until the cervix is 5 to 6 cm dilated, cervical dilation in normal labor can be slower than 1 cm per hour and still have a high chance of vaginal delivery with normal perinatal outcomes, and the cervix does not dilate linearly (it is a hyperbolic pattern

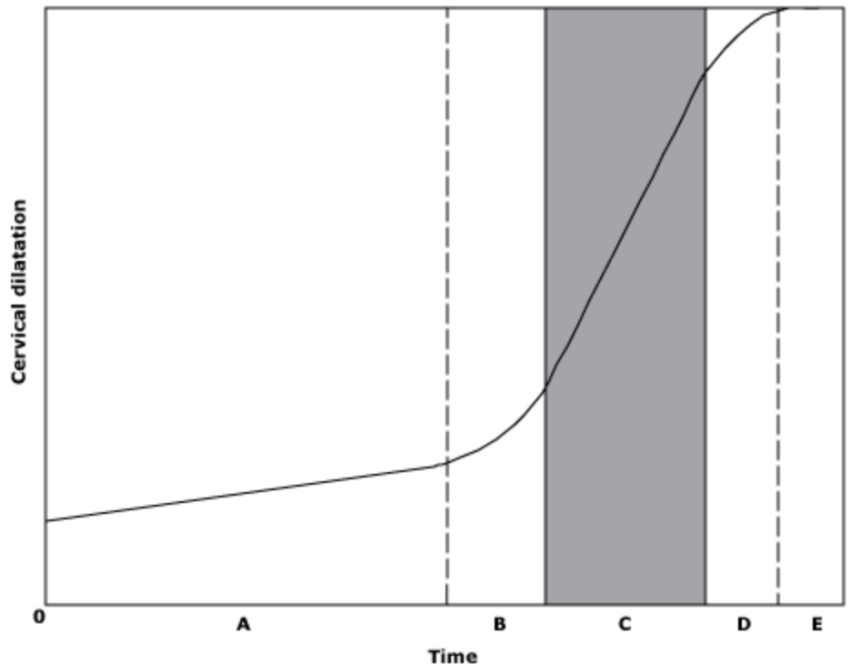
For example, the mean BMI (23 kg/m^2) and baseline cesarean delivery rate (approximately 9 percent) were low compared with the United States population (approximately 29 kg/m^2 and 32 percent, respectively

routine use of partography has not been proven to be beneficial.

Friedman (historic) criteria — Emanuel Friedman conducted his now classic studies defining the spectrum of normal labor by evaluating the course of labor of 500 nulliparous and 500 multiparous women admitted to the Sloane Hospital for Women in New York in the mid-1950s

the transition from the latent phase to active phase appeared to occur at 3 to 4 cm cervical dilation, and the statistical minimum rate (5th centile) of normal cervical dilation during the active phase was 1.2 cm/hour for nulliparous women and 1.5 cm/hour for multiparous women.

A prolonged second stage for nulliparas and multiparas was defined as 2.5 hours and one hour


Cervical dilatation
0
A
B
C
D
E
Time

This change has been attributed to changes in patient characteristics (eg, higher mean body mass index), anesthesia practices (more use of neuraxial anesthesia),

First stage

Progress – Zhang and colleagues obtained data on normal labor patterns by evaluating contemporary data from the Consortium on Safe Labor, which included information on 62,415 singleton pregnancies with spontaneous onset of labor, cephalic vaginal delivery (≥88 percent spontaneous), and normal neonatal outcome

The data were collected retrospectively from the electronic medical records at 19 medical centers in the United States.

Contemporary estimates of median and 95th percentile in hours by parity

	Parity 0 Median number of hours (95th percentile)	Parity 1 Median number of hours (95th percentile)
Change in cervix		
From 4 cm to 5 cm	1.3 (6.4)	1.4 (7.3)
From 5 cm to 6 cm	0.8 (3.2)	0.8 (3.4)
From 6 cm to 7 cm	0.6 (2.2)	0.5 (1.9)
From 7 cm to 8 cm	0.5 (1.6)	0.4 (1.3)
From 8 cm to 9 cm	0.5 (1.4)	0.3 (1.0)
From 9 cm to 10 cm	0.5 (1.8)	0.3 (0.9)
Duration of second stage		
Second stage with epidural analgesia	1.1 (3.6)	0.4 (2.0)
Second stage without epidural analgesia	0.6 (2.8)	0.2 (1.3)

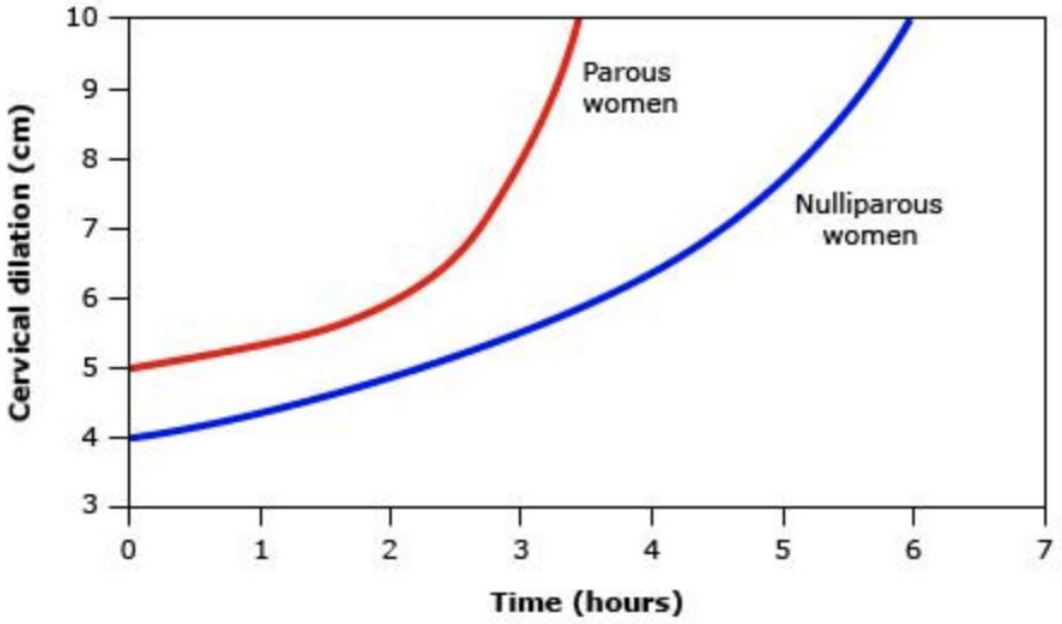
Note the 95th percentile for duration of time to dilate from 4 to 6 cm is almost 10 hours in nulliparous women.

The shape of the normal labor curve generated from Zhang's data is different from the Friedman curve.

The Friedman curve depicts a relatively slow rate of cervical dilation until approximately 4 cm (ie, latent phase), which is followed by an abrupt acceleration in the rate of dilation (ie, active phase) until entering a deceleration phase at approximately 9 cm

Zhang's labor curves also demonstrate an increase in the rate of cervical dilation as labor progresses, but the increase is more gradual than that described by Friedman: Over 50 percent of patients did not dilate >1 cm/hour until reaching 5 to 6 cm dilation, and a deceleration phase at the end of the first stage of labor was not observed

there is no abrupt change in the rate of cervical dilation indicating a clear transition from latent to active phase and there is no deceleration phase at the end of the first stage of labor.


Cervical dilation (cm)
10
9
8
7
6
5
4
3
0
1
2
3
4
5
6
7
Time (hours)
Parous women
Nulliparous women

While the presence or absence of a deceleration phase at the end of the first stage of labor is not of major clinical significance, defining the transition from latent to active phase (ie, transition from slower to more rapid cervical dilation) is clinically important for diagnosing labor abnormalities.

Contemporary data suggest that the normal rate of cervical change between 3 and 6 cm dilation **is much slower than** described by Friedman, who reported minimum dilation should be at least 1 cm/hour

both nulliparas and multiparas who go on to deliver vaginally **can take more than six hours to dilate from 4 cm to 5 cm and more than three hours to dilate from 5 cm to 6 cm**

Beyond 6 cm dilation, rates of cervical dilation are more rapid in both nulliparas and multiparas.

This suggests that before 6 cm, slow cervical dilation reflects the shallow slope of the latent phase portion of the contemporary normal labor curve, not a protracted active phase.

At ≥6 cm dilation, nearly all women should be in active labor, so slow cervical dilation beyond this point (ie, less than approximately 1 to 2 cm/hour) is a deviation from the slope of the contemporary normal labor curve and is abnormal if it persists

Duration

Zhang observed that the median (95th percentile) times for the cervix to dilate from 4 to 10 cm in nulliparas and multiparas were 5.3 hours (16.4) and 3.8 hours (15.7), respectively

In contrast, Friedman reported the corresponding mean (95th percentile) durations in nulliparous and parous women were 4.6 hours (11.7) and 2.4 hours (5.2), respectively

epidural use has increased dramatically since the 1960s, increased use of epidurals does not fully account for the difference.

Second stage

Descent – At full cervical dilation, fetal station is typically ≥0. nulliparous women in the second stage, Zhang found that the median (95th percentile) time interval for fetal descent from station +1/3 to +2/3 was 16 minutes (three hours)

The median (95th percentile) time interval for fetal descent from station +2/3 to +3/3 was 7 minutes (38 minutes).

Fetal station at full cervical dilation tends to be higher in multiparous women than in nulliparous women, and descent tends to be faster

Duration

– Zhang observed that the median (95th percentile) duration of the **second stage** in nulliparous and parous women with epidural anesthesia was 1.1 hours (3.6) and 0.4 hours (2.0), respectively

Without epidural anesthesia, the median (95th percentile) was 0.6 hours (2.8) and 0.2 hours (1.3), respectively

epidural anesthesia increased the 95th percentile for the second stage by 0.8 hours in nulliparous women and 0.7 hours in parous women compared with no epidural anesthesia

Diabetes, preeclampsia, fetal size, chorioamnionitis , duration of the first stage , maternal height, and station at complete dilation may also play a role in predicting the duration of the second stage, but standards that account for these characteristics are not available

ASSESSMENT OF LABOR PROGRESS

Digital examination — Cervical examinations to document cervical dilation, effacement, and fetal station are usually routinely performed:

- On admission
- At two- to four-hour intervals in the first stage
- Prior to administering analgesia/anesthesia
- When the parturient feels the urge to push (to determine whether the cervix is fully dilated)
- At one- to two-hour intervals in the second stage
- If fetal heart rate abnormalities occur (to evaluate for complications such as cord prolapse or uterine rupture or fetal descent)

Partogram

Results of cervical examinations can be documented on a partogram (or partograph), in addition to the medical record.

The partogram is a graphical **representation of the patient's cervical dilation over time in comparison with the expected lower limit of normal progress.**

Right deviation from this curve suggests a protraction or arrest disorder.

Although useful for visualizing labor progress, routine use of partograms has not been proven to significantly improve obstetric outcome, and no partogram has been proven to be superior to others in comparative trials

Ultrasound

Although not widely used clinically, intrapartum transperineal ultrasound examination can document fetal descent and rotation in the second stage when performed serially, and assess the presence and extent of caput

Ultrasound examination appears to be more objective and reproducible than digital examination.

One technique is to measure **the angle between the symphysis pubis and the leading part of the fetal skull (called the angle of progression)** by transperineal ultrasound in the second stage

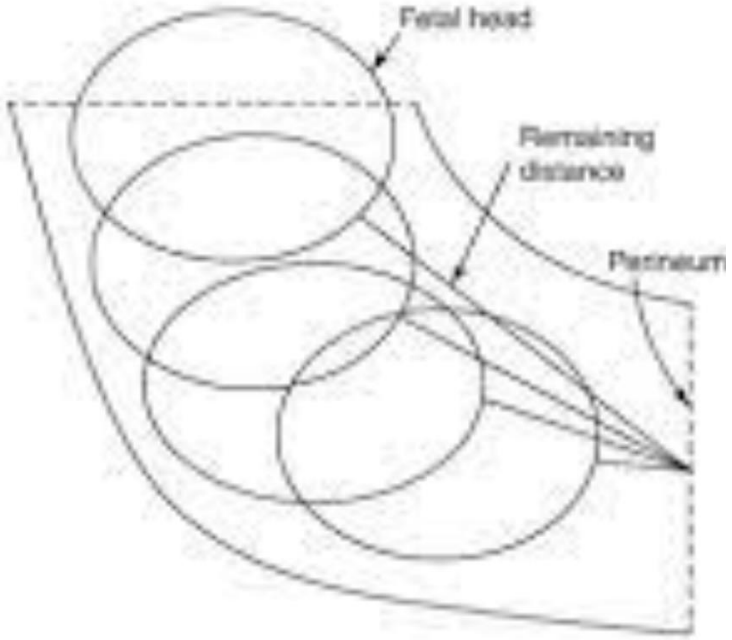
Station can be determined from angle of progression using a formula , and tables are available .

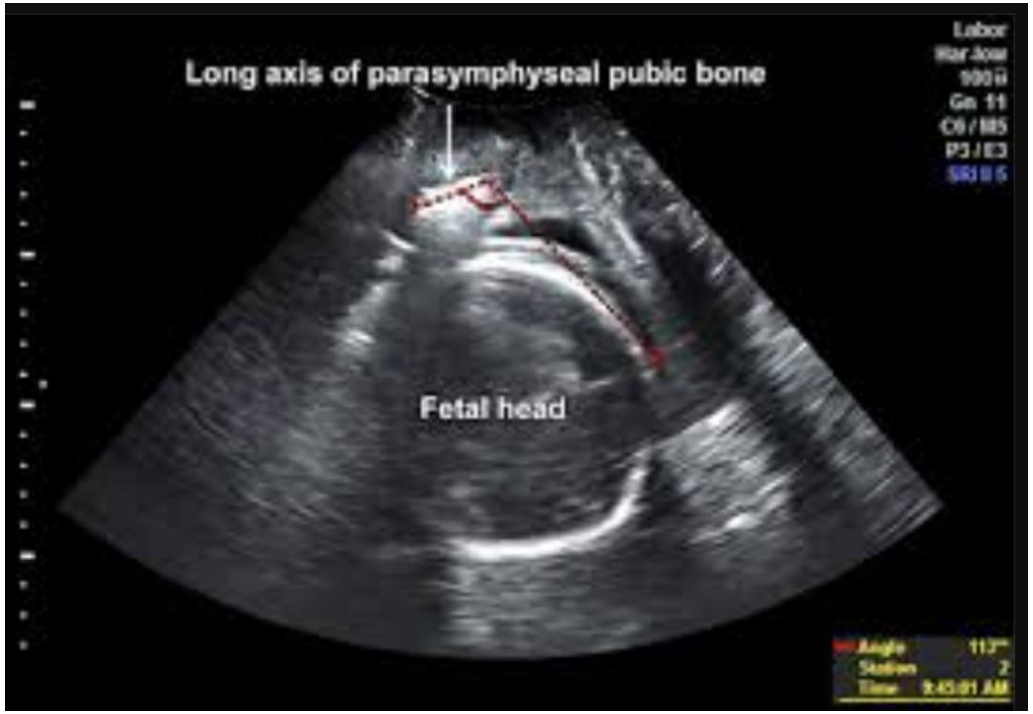
Head to perineum distance (HPD) can also be measured serially with transperineal ultrasound.

An advantage is that caput succedaneum can be measured, but station cannot be determined because the HPD measurement does not account for the curvature of the birth canal

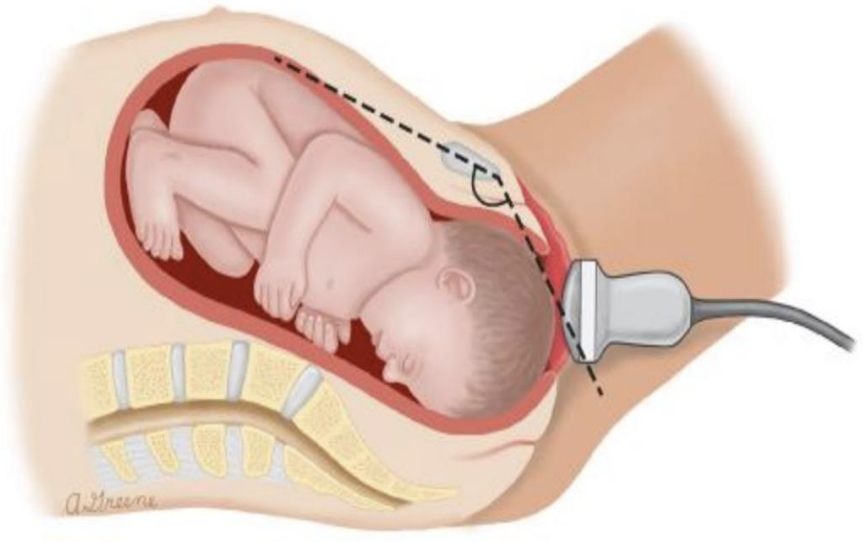
In a study of nulliparous patients in spontaneous labor at term, **HPD of 30 mm and angle of progression of 125 degrees each predicted delivery within three hours** (95% CI 2.5-3.8 hours and 2.4-3.7 hours, respectively) in those delivering vaginally


HPD = 35 mm


Fetal head
Remaining distance
Perineum

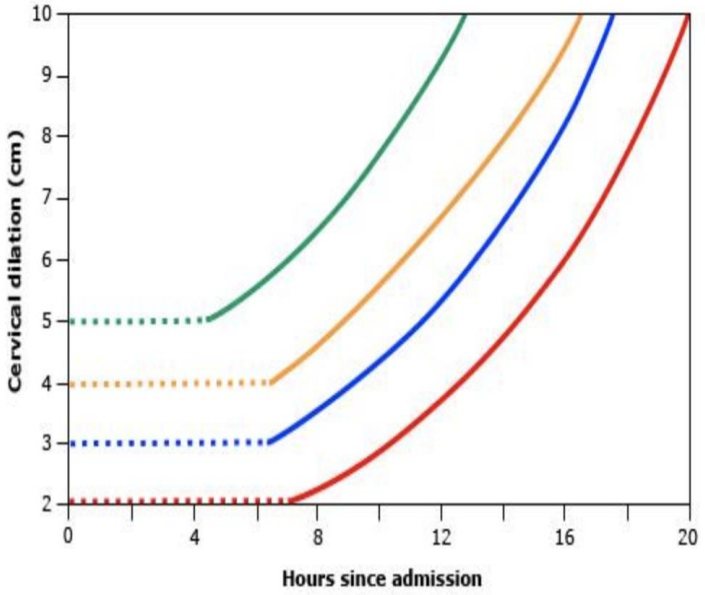

Long axis of parasymphyseal pubic bone
Fetal head

Angle of progression



The angle of progression is the angle between a straight line drawn along the longitudinal axis of the pubic bone and a line drawn from the inferior edge of the pubic bone to the leading edge of the fetal cranium.

Contemporary estimates of labor duration by dilation at admission



The 95th percentiles of cumulative duration of labor from admission among singleton term nulliparous women with spontaneous onset of labor, vaginal delivery, and normal neonatal outcomes. Colors represent cervical dilation when women were admitted to the labor unit: green (5 cm), yellow (4 cm), blue (3 cm), red (2 cm).

OVERVIEW OF PROTRACTION AND ARREST DISORDERS

Prevalence — Protraction and arrest disorders are common.

Reported prevalence varies among studies due to differences in the definitions used by authors as well as differences among study populations (eg, gestational age range, personal characteristics [eg, nulliparity and older maternal age have been associated with longer labor]).

Approximately 20 percent of all labors ending in a live birth involve a protraction and/or arrest disorder

The risk is highest in nulliparous women with term pregnancies.

In a prospective Danish study, for example, 37 percent of healthy term nulliparas experienced dystocia during labor

When only the second stage is considered, the prevalence in nulliparous women with epidural anesthesia was 11.5 percent in a systematic review (two studies, n = 5350 women)

Protraction or arrest of labor is the most common reason for primary intrapartum cesarean delivery.

Risk factors

Abnormal progress of spontaneously initiated labor may to related to uterine factors, fetal factors, the bony pelvis, or a combination of these factors

A genetic component has been purported to account for 28 percent of the susceptibility to protracted and difficult labor

Factors that may be associated with protracted labor

Uterine factors (hypocontractile uterine activity)
Older maternal age
Uterine abnormality
Maternal obesity
Neuraxial anesthesia
Bandl's ring
Nulliparity
Tocolytics, uterine relaxants
Infection
Pelvic factors
Pelvic contraction (eg, thin subpubic arch, prominent sacrum)
Short stature (less than 150 cm [4 feet 11 inches])
High station at full dilation
Fetal factors
Fetal anomaly resulting in cephalopelvic dystocia
Non-occiput anterior position
Large for gestational/macrosomia

Graphic 66586 Version 7.0

Hypocontractile uterine activity

— Hypocontractile uterine activity is the most common risk factor for protraction and/or arrest disorders in the first stage of labor.

Uterine activity is **either not sufficiently strong or not appropriately coordinated to dilate the cervix and expel the fetus.**

Diagnosis

Uterine activity can be monitored qualitatively by palpation or external tocodynamometry.

The diagnosis of hypocontractile uterine activity in this setting is subjective, based on the perception that contractions are not strong on palpation and/or **infrequent (<3 or 4 contractions/10 minutes) and/or of short duration (<50 seconds)**

Uterine activity can also be monitored quantitatively by measurement of Montevideo units (MVUs) using an internal pressure catheter (IUPC).

MVUs are calculated by subtracting the baseline uterine pressure from the peak contraction pressure of each contraction in a 10-minute window and adding the pressures generated by each contraction

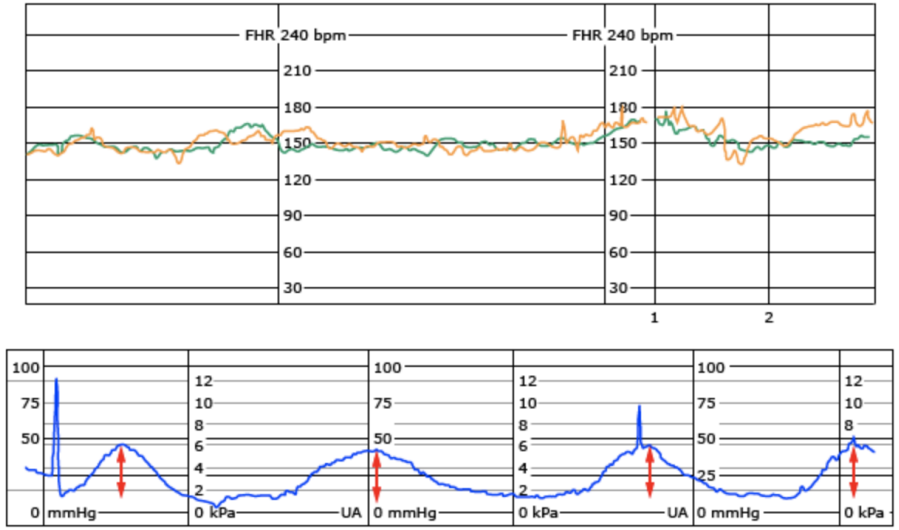
Uterine activity less than 200 to 250 MVUs is considered inadequate

In most women, external and intrauterine devices for monitoring uterine activity perform equally well

routine use of IUPCs does not improve outcome

selective use of an IUPC can be helpful for assessing uterine activity when it is difficult to monitor contractions externally, such as in obese women.

Cardiotocography showing calculation of Montevideo units



Montevideo units are calculated by subtracting the baseline uterine pressure from the peak contraction pressure of each contraction (arrows) in a 10-minute window and adding the pressures generated by each contraction.

FHR: fetal heart rate; bpm: beats per minute; mmHg: millimeters of mercury; kPa: kilopascals; UA: uterine activity.

Maternal obesity

Increasing maternal body mass index (BMI) correlates with an increasing length of the first stage of labor.

In one study, for example, the median time to dilate from 4 to 10 cm in nulliparous women with BMI <25 kg/m^2 and >40 kg/m^2 was 5.4 and 7.7 hours,

The authors concluded more time should be allowed for labor progress in obese patients. Maternal obesity is not independently correlated with the length of the second stage of labor

Cephalopelvic disproportion

— **A disproportion in the size of the fetus relative to the maternal pelvis** can result in failure to progress in the second stage and has been termed cephalopelvic disproportion (CPD).

This is usually due to fetal malposition (eg, extended or asynclitic fetal head, occiput posterior or transverse position [discussed below]) or malpresentation (mentum posterior, brow) rather than a true disparity between fetal size and maternal pelvic dimensions.

true CPD may occur if the fetus has a large surface anomaly (eg, teratoma, conjoined twin), the maternal pelvic bone is very small or deformed (eg, after pelvic trauma), or the fetus is extremely large (although vaginal deliveries have been described in infants weighing 13 to 17 pounds and more).

Diagnosis

Cephalopelvic disproportion is a subjective clinical assessment based on physical examination and course of labor.

the clinician is generally unable to predict maternal pelvis-fetal size/position discordance leading to arrest of labor requiring cesarean delivery.

Clinical and radiologic assessments of the maternal pelvis and fetal size (ie, pelvimetry) are inexact and poorly predict the course and outcome of labor

Radiographic pelvimetry is not recommended

Ultrasound evaluation of fetal position is accurate, but common malpositions such as occiput posterior (OP) usually rotate intrapartum.

Non-occiput anterior position

— The length of the second stage appears to correlate with the degree of rotation away from occiput anterior (OA). Among nulliparous women under neuraxial anesthesia who began pushing at full dilation, the mean duration of the second stage for OA, occiput transverse (OT), and OP positions was 2.2, 2.5, and 3.0 hours, respectively, and the cesarean delivery rates were 3.4, 6.9, and 15.2 percent,

Many fetuses actually **enter labor in either OP or OT** position and then undergo spontaneous rotation of the fetal head during labor.

Protraction and arrest disorders associated with malposition occur when rotation to OA does not occur or is slow to occur during labor

Bandl's ring

— An hourglass constriction ring of the uterus, called Bandl's ring, has been estimated to occur in 1 in 5000 live births and is associated with obstructed labor in the second

The constriction forms between the upper contractile portion of the uterus and the lower uterine segment. It is not clear if it is the cause or the result of the associated labor abnormality.

It may also occur between delivery of the first and second twin

Diagnosis

— Diagnosis is typically made at cesarean delivery.

At the time of laparotomy, a transverse thickened muscular band can be observed separating the upper and lower segment of the uterus.

Findings included thinning of the lower uterine segment, a thick upper uterine segment, and a prominent ring compressing the fetus unaffected by contractions.

Neuraxial anesthesia

— The potential impact of neuraxial anesthesia on uterine activity and fetal malposition has received a lot of attention as a possible source of increasing rates of protracted labor, arrest, and cesarean delivery.

Randomized trials have not documented a major impact on the incidence of protraction and arrest disorders.

In a 2011 systematic review of randomized trials, use of neuraxial labor anesthesia did not increase the duration of the first stage of labor compared with non-neuraxial anesthesia or no analgesia or increase the risk of cesarean delivery

There were small but statistically significant increases in the duration of the second stage of labor and use of oxytocin

Women receiving neuraxial anesthesia were more likely to undergo operative vaginal delivery

FIRST STAGE PROTRACTION AND ARREST

Protraction — The diagnosis of a protracted active phase is made in women at ≥6 cm dilation who are dilating less than approximately 1 to 2 cm/hour, which reflects the 95th centile in contemporary women

Women with cervical dilation <6 cm are considered to be in latent phase.

The same table serves as a guide for diagnosing a prolonged latent phase

it may take six to seven hours to progress from 4 to 5 cm and three to four hours to progress from 5 to 6 cm during a normal latent phase, regardless of parity

Arrest

Active phase arrest is diagnosed at cervical dilation ≥6 cm in a patient with ruptured membranes and :

- No cervical change for ≥4 hours despite adequate contractions (usually defined as >200 Montevideo units [MVU])
- No cervical change for ≥6 hours with inadequate contractions

Given the slowness of the latent phase, latent phase arrest is not considered a clinical entity.

Prolonged latent phase

Management of labor abnormalities before 6 cm dilation

Dilation ≤1 cm over two hours in active phase — For patients (nulliparous or multiparous) in the active phase (cervix ≥6 cm) who dilate ≤1 cm over two hours, we administer oxytocin (if not already started) and proceed with amniotomy (if membranes are not already ruptured) if there has been adequate fetal descent to a safe fetal station (eg, -2 or lower) for amniotomy.

Oxytocin administration for women with slow progress is reasonable even in the absence of documented hypocontractile uterine activity

If the head is high and not well applied to the cervix, we begin oxytocin but delay performing amniotomy.

If oxytocin alone for four to six hours does not result in adequate progress, we consider performing an amniotomy at that time, regardless of fetal head position.

A controlled amniotomy is performed if the head is still high and not well applied to the cervix.

Oxytocin augmentation

— Oxytocin is the only medication approved by the US Food and Drug Administration for labor stimulation in the active phase.

We titrate the dose to obtain an adequate uterine contraction pattern and do not generally exceed 30 milliunits/minute, but others have used cutoffs of 20 or 40 milliunits/minute.

After four hours of adequate uterine contractions (usually defined as >200 MVU if an internal pressure catheter is in place), or six hours without adequate uterine contractions and no cervical change in the active phase of labor, we proceed with cesarean delivery.

If labor is progressing, either slowly or normally, we continue oxytocin at the dose required to maintain an adequate uterine contraction pattern.

Dosing regimen — Numerous oxytocin dosing protocols that vary in initial dose, incremental dose increase, and time interval between dose increases have been studied

Examples of oxytocin infusion protocols

Regimen	Starting dose, milliunits/minute	Incremental increase, milliunits/minute	Dose interval, minutes
Low-dose	0.5 to 1	1	30 to 40
Alternative low-dose	1 to 2	1 to 2	15 to 30
High-dose	6	6 The incremental increase should be reduced to 3 milliunits/minute if hyperstimulation is present and reduced to 1 milliunit/minute if recurrent hyperstimulation. Some clinicians limit to a maximum cumulative dose of 10 units and a maximum duration of 6 hours.	15 to 40
Alternative high-dose	4	4	15

Oxytocin should be administered by trained personnel who are familiar with its effects. It should be administered using an infusion pump that provides precise flow rate to ensure accurate minute-to-minute control. Most clinicians will not administer more than 40 milliunits/minute as the maximum dose.

The decision to use a high- versus a low-dose oxytocin regimen poses a risk-benefit dilemma:

Higher-dose regimens are associated with shorter labor and fewer cesareans but more tachysystole (>5 contractions in 10 minutes, averaged over a 30-minute window).

. We use a high-dose regimen and do not alter our management based on parity

We do not use a high-dose regimen in women who have had a previous cesarean delivery because of risk of rupture

Low-dose regimens were developed, in part, to avoid uterine tachysystole and are based upon the observation that it takes 40 to 60 minutes to reach steady-state oxytocin levels in maternal serum

A 2010 systematic review of randomized trials of high- versus low-dose oxytocin for augmentation of women in spontaneous labor (10 trials, n = 5423 women) found that high-dose oxytocin

- Increased the frequency of tachysystole)
- Decreased the cesarean delivery rate

  and increased the rate of spontaneous vaginal delivery
- Decreased the total duration of labor
- Resulted in similar maternal and neonatal morbidities

Ineffective and less well studied approaches

Misoprostol – Oxytocin with or without amniotomy is the best approach for treatment of a protraction disorder, based on extensive experience and data attesting to safety and efficacy.

Misoprostol is **typically used for cervical ripening and labor induction;** there are limited data on its safety and efficacy for treatment of protraction disorders

low-dose titrated misoprostol may be a reasonable alternative in low-resource settings where safe oxytocin infusion is not feasible.

Ambulation may improve the comfort of the parturient and is not harmful, but there is no convincing evidence that this intervention prevents or treats protraction or arrest disorders

- **Amniotomy alone** –routine amniotomy alone did not clearly shorten the first or second stage in a meta-analysis of randomized trials whereas the combination of amniotomy and oxytocin had beneficial effects

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Active phase arrest

Women with labor arrest in the active phase of the first stage are managed by cesarean delivery.

Some unnecessary cesareans will be performed if arrest is diagnosed too soon, and maternal complications (eg, uterine rupture) are likely to increase if arrest is diagnosed too late.

Prevention of first stage labor abnormalities

Amniotomy – Amniotomy is the most common intervention that has been proposed for shortening the duration of labor.

Routine amniotomy alone versus intention to preserve the membranes (no amniotomy) did not clearly shorten the first or second stage

Neuraxial anesthesia

– Avoiding or delaying neuraxial anesthesia to potentially reduce the risk of labor abnormalities is not recommended.

concern about future labor progress should not be a reason to require a woman to reach an arbitrary cervical dilation, such as 4 to 5 cm, before fulfilling her request to receive neuraxial anesthesia.

PROLONGED SECOND STAGE

Parity, regional anesthesia, delayed pushing, and other clinical considerations all significantly affect the length of the second stage.

diagnosis of second stage arrest in patients without epidural anesthesia:

- Nulliparous women should push for at least three hours,
- Multiparous women should push for at least two hours

diagnosis of second stage arrest in patients with epidural anesthesia:

- Nulliparous women can push for up to four hours
- Multiparous women can push for up to three hours

Factors such as the fetal station, estimated fetal weight, obstetric history, fetal status, maternal pelvis, and adequacy of maternal pushing should all be considered.

Candidates for oxytocin augmentation — After 60 to 90 minutes of pushing, we begin oxytocin augmentation if descent is minimal (ie, <1 cm) or absent and uterine contractions are less frequent than every 3 minutes.

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In the second stage, we are more concerned about a possible physical issue (eg, malposition or malpresentation, macrosomia, small maternal pelvis) as the cause for slowing descent than hypocontractile uterine activity, which is the prominent concern in the first stage

Timing of operative delivery

— In patients without epidural anesthesia, we allow nulliparous women to push for at least three hours and multiparous women to push for at least two hours prior to considering operative intervention.

We avoid operative delivery (vacuum, forceps, cesarean) in the second stage as long as the fetus continues to descend and/or rotate to a more favorable position for vaginal delivery, and the fetal heart rate pattern is not concerning.

Prompt operative intervention is indicated for fetuses with category III fetal heart rate tracings, regardless of labor progress.

Extending the duration of the second stage to four hours in nulliparous women and three hours in multiparous women with epidural anesthesia may increase the chance of achieving a vaginal delivery, without significantly increasing maternal or neonatal morbidity, but evidence is limited to retrospective data

Whether to extend the duration of the second stage beyond four hours in nulliparous women and beyond three hours in multiparous women with epidural anesthesia (or beyond three hours in nulliparous women and beyond two hours in multiparous women without epidural anesthesia) is controversial, as a prolonged second stage has potential clinical challenges and consequences

If a cesarean delivery is necessary, a prolonged second stage may result in the fetal head trapped deep in the pelvis, which increases the difficulty of delivering the fetus. Reverse breech extraction may reduce the risk of a difficult delivery or injury to the uterine vessels.

A prolonged second stage may also further thin the lower uterine segment, increasing the risk of extension of the hysterotomy into the uterine vessels at cesarean.

- Prolonging the second stage appears to increase the risk for postpartum hemorrhage and maternal infection.
- Prolonging the second stage may worsen neonatal outcome.

Obstetric history – A previous vaginal delivery

- Medical/surgical history – No comorbidities likely to impact labor
- Clinical pelvimetry – Pelvis deemed adequate for vaginal delivery based on physical examination
- Maternal height and weight – Gravida is not short and/or obese
- Fetal position – Occiput anterior, minimal caput and molding
- Maternal temperature – Absence of temperature ≥38.0°C (102.2°F) (presumptive chorioamnionitis)
- Estimated fetal weight – Appropriate for gestational age
- Effectiveness of maternal pushing – Effective pushing, mother is not exhausted
- Fetal heart tracing – Category I tracing
- Woman's desire to proceed with labor

If the fetal station is still high, the estimated fetal weight is >4000 to 4500 g, chorioamnionitis is suspected, or significant decelerations are present, we generally proceed with cesarean delivery.

When the fetal heart rate tracing is reassuring and maternal pushing is resulting in progressive descent, we discuss with the patient the options of an operative vaginal (if she is an appropriate candidate or cesarean delivery versus continued pushing..

In our experience, when the duration of the second stage approaches or exceeds two to three hours, unless delivery occurs or appears to be imminent within the next 30 to 45 minutes, we proceed with an operative delivery

Ineffective management interventions

Turning down the epidural – A dense motor block may impair a woman's ability to push, but there is no strong evidence that turning down the neuraxial anesthetic in women with a prolonged second stage is beneficial.

●Changing maternal position – There is no strong evidence that a change in maternal position (eg, upright posture, lateral, or hands and knees position instead of supine) is useful for treatment of a prolonged second stage

Women should be encouraged to labor and give birth in the position they find most comfortable.

●Fundal pressure – Manual fundal pressure does not significantly shorten the duration of the second stage, although available data are low quality

Prevention of prolonged second stage — There is no strong evidence that any intervention will prevent a prolonged second stage of labor.

- Maternal position and technique – Neither appears to affect the length of the second stage.
- Physical activities:

•Pelvic floor muscle exercises – Training the muscles of the pelvic floor may prevent some cases of prolonged second stage.

•Exercise – Exercise during pregnancy improves fitness, but does not affect the length of labor.

it should be noted that women who are not able to push because of a spinal cord injury tend to have a normal, or even short, second stage

MATERNAL AND NEWBORN OUTCOMES ASSOCIATED WITH ABNORMAL LABORS

For the mother, first and second stage protraction disorders have been associated with increased risks for operative vaginal delivery, third-/fourth-degree perineal lacerations, cesarean delivery, urinary retention, postpartum hemorrhage, chorioamnionitis, and endometritis in observational studies

A prolonged second stage has also been associated with obstetric anal sphincter injury, but this is likely related to instrumental intervention rather than the specific length of the second stage

For the neonate, a protracted first stage of labor has been associated with increased risks for admission to the neonatal intensive care unit, respiratory distress syndrome, and confirmed or suspected sepsis

Long term, a prolonged second stage (≥180 minutes) in a prior pregnancy has been associated with a modest increase in risk of spontaneous preterm birth in the subsequent pregnancy in some studies

the increase appears to be largely driven by patients who undergo second stage cesarean delivery

Thank you