Chapter F
Labor Dystocia

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OBJECTIVES
After completing this chapter, participants will be able to:

1. Define the difference between normal labor and labor dystocia.
2. Describe common etiologies for dystocia.
3. Describe how to diagnose and treat dystocia.
4. Discuss prevention methods.

INTRODUCTION
Caring for women with dystocia, literally “difficult labor,” is one of the greatest challenges of maternity care. While this particular labor difficulty may not have the same emergent need for treatment that other clinical scenarios in the ALSO® course have, maternity providers nonetheless face dystocia frequently and can improve clinical outcomes with appropriate, evidence-based care. This chapter reviews important new concepts in the diagnosis, treatment, and prevention of dystocia.

Dystocia refers to prolonged or slowly-progressing labor, a common situation for nulliparous women as gauged by the number that require augmentation, operative vaginal delivery, or cesarean section. In 2008, about 20 percent of women in the United States received oxytocin augmentation and the primary cesarean delivery rate (cesarean delivery in women without a prior cesarean) in the 27 states reporting this data rose to 23.8 percent (see Figure 1).\(^1\) Dystocia is responsible for between 30 and 50 percent of primary cesarean deliveries in the United States.\(^2,3\) With the overall US cesarean delivery rate at over 32 percent (see Figure 2), attention is focusing on the two labor issues that are the main drivers of the primary cesarean rate, dystocia and non-reassuring fetal heart tracing.\(^3,5\)

The wide variation in cesarean rates for these indications among low-risk women suggests, as with any medical outcome with substantial variability, the need for more thoughtful, evidence-based care for a woman with labor dystocia.\(^3,5,6\) All maternity care providers need expertise in the care of women experiencing dystocia.
Data are not available to delineate national trends in rates of primary cesarean section and vaginal birth after cesarean (VBAC) from 2005 onward, due to differences in adoption of the revised (2003) birth certificate form. The above data are provided to help understand recent patterns of use but should not be used to compare figures from year to year due to the changing cohorts using the revised 2003 form.
RETHINKING LATENT LABOR

Understanding normal and abnormal labor progress requires understanding latent or prodromal labor, so as to avoid performing cesareans during a prolonged latent phase that is mistaken for active labor. Latent phase labor occurs when there are regular painful contractions that result in minimal or slow cervical change. Another definition is that latent phase of labor begins with maternal perception of painful contractions and ends when the rate of dilation begins to accelerate.⁸

Recent studies suggest that normal labor may have a longer latent phase and thus a wider time range and a less clear-cut transition to active labor than previously defined by Friedman in the 1950’s.⁸ Re-analysis of data from the large National Collaborative Perinatal Project from the 1960s, when fewer obstetric interventions were practiced has allowed the normal course of natural spontaneous labor to be better defined. This reanalysis found that the active phase of labor, when rapid dilation begins, may not start for multiparous women until at least 5 cm of dilation and for nulliparous women at an even greater dilation that is harder to define.¹⁰ Similar data in today’s women suggest that the active phase of labor may not occur for multiparous women until closer to 6 cm dilation.¹¹

Not only is the start of active labor later and harder to define than previously thought, the rate of change in active dilation, while accelerating in active labor, may also be longer than in prior studies. In Laughon’s study, after 6 cm dilation, nulliparous women took an average of 2.2 hours to reach full dilation, with the 95th percentile standard deviation at 10.1 hours, or less than 0.5 cm per hour compared to Friedman’s outer limit of progress for nulliparas of 1.2 cm per hour in active phase.¹¹ (See Table 1)

Table 1. Stages of Labor: Normal Variation

<table>
<thead>
<tr>
<th></th>
<th>Nulliparous</th>
<th>Multiparous</th>
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<tbody>
<tr>
<td>Rate of dilation in active labor</td>
<td>Median 1.8 cm/hr (95% SD 0.4 cm/hr)</td>
<td>Median 2.5 cm/hr (95% SD 0.4 cm/hr)</td>
</tr>
<tr>
<td>2nd stage duration</td>
<td>Median 0.9hr (95% SD 3.1 hr)</td>
<td>Median 0.3hr (95% SD 1.7 hr)</td>
</tr>
</tbody>
</table>

Adapted from Laughon 2012 and Sponge 2012

The clinical dilemma is that many women are inadvertently admitted prior to progressive labor yet held to traditional dilation expectations of active labor,¹² thus resulting in a misdiagnosis of labor dystocia with a resultant cascade of interventions that increase the risk of cesarean section. Clinicians need to recognize that cervical dilation is not linear, particularly early in labor for nulliparous women.¹⁰

To prevent, the mis-diagnosis of labor dystocia in women who are still in the latent phase, the clinician can avoid admitting women too early to the hospital.¹³ Such a practice reduces by more than half the risk of needing augmentation of labor or epidural analgesia.¹⁴ As alternatives to admission in latent labor, clinicians can encourage adequate hydration, rest, emotional and physical support, and if needed, pharmacologic sedation such as antihistamines or opiates such as morphine.¹⁵

For women who are admitted before active labor, patience is the critical factor. This is especially important before 6 cm of dilation. Options for care for women admitted between 3 and 6 cm of
dilation include an antepartum unit for rest and support, including the availability of pharmacologic treatment for exhaustion as discussed above. There should be clear maternal or fetal indications to augment labor during the latent phase to justify the risks associated with oxytocin augmentation such as uterine tachysystole, fetal intolerance of labor and increased rates of operative intervention. As discussed below, latent labor may be longer in women undergoing labor induction than in women in spontaneous labor. Cesarean for dystocia should not be done if women are still in latent labor.

**DIAGNOSIS OF DYSTOCIA**

Contemporary studies lead to new definitions of arrested labor.

### Table 2. Definitions of Failed Induction and Arrest Disorders

<table>
<thead>
<tr>
<th>FAILED INDUCTION OF LABOR</th>
<th>FIRST-STAGE ARREST</th>
<th>SECOND-STAGE ARREST</th>
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<tbody>
<tr>
<td>Failure to generate regular (eg. Every 3 min) contractions and cervical change after at least 24 hr of oxytocin administration, with artificial membrane rupture if feasible</td>
<td>6 cm or greater dilation* with membrane rupture and no cervical change for 4 hr or more of adequate contractions (eg. &gt; 200 Montevideo units) or 6 hr or more if contractions inadequate</td>
<td>No progress (descent or rotation) for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 hr or more in nulliparous women with an epidural</td>
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<td>3 hr or more in nulliparous women without an epidural</td>
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<tr>
<td></td>
<td></td>
<td>3 hr or more in multiparous women with an epidural</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 hr or more in multiparous women without an epidural</td>
</tr>
</tbody>
</table>

*Since women may still be in latent labor, additional time and interventions may be needed in order to diagnose an arrest of active labor before 6 cm dilation (see Figure 1 for suggested management).

Once the clinician ascertains that a woman has reached active labor (5 to 6 cm of dilation), the rate of change may accelerate (Table 3), although patience about the rate of dilation remains important.

### Table 3. Duration of Each Centimeter Change in Cervical Dilatation for Nulliparous Women with Spontaneous Onset of Labor*

<table>
<thead>
<tr>
<th>Cervical Change (cm)</th>
<th>Median (h)</th>
<th>95th Percentile (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 to 4</td>
<td>1.8</td>
<td>8.1</td>
</tr>
<tr>
<td>4 to 5</td>
<td>1.3</td>
<td>6.4</td>
</tr>
<tr>
<td>5 to 6</td>
<td>0.8</td>
<td>3.2</td>
</tr>
<tr>
<td>6 to 7</td>
<td>0.6</td>
<td>2.2</td>
</tr>
<tr>
<td>7 to 8</td>
<td>0.5</td>
<td>1.6</td>
</tr>
<tr>
<td>8 to 9</td>
<td>0.5</td>
<td>1.4</td>
</tr>
<tr>
<td>9 to 10</td>
<td>0.5</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Thus, clinical dystocia can be defined at different points depending on how dilated a woman is: for instance, if she is less than 5 cm dilated, dystocia is the diagnosis if she is progressing less than 0.3 to 0.4 cm per hour. If she is 8 cm dilated, dystocia occurs if she is progressing less than 0.7 cm per hour. As part of making this diagnosis, the clinician needs to address the following questions:

- Are contractions adequate?
- Is there a malposition or malpresentation?
- Is there cephalopelvic disproportion due to suspected macrosomia or a contracted pelvis?
- Are there other co-existing clinical issues such as chorioamnionitis or non-reassuring fetal monitoring that impact on the treatment choices?

### TREATMENT OF ACTIVE-PHASE DYSTOCIA

#### First Stage Active-Phase Dystocia

Treatment strategies for women with slowly-progressing labor traditionally have included amniotomy, pharmacologic augmentation with oxytocin, or both.

**Amniotomy alone:** A meta-analysis showed that women of any parity undergoing amniotomy alone were less likely to have non-progressing labor than women who did not (RR 0.75, 95% CI 0.64 to 0.88); similarly, women who underwent amniotomy routinely were less likely to need oxytocin augmentation (RR 0.73, 95% CI 0.57 to 0.95). Nulliparous women who had amniotomy had a slightly shorter second stage of labor than those who did not (but only by one to ten minutes). However, routine amniotomy alone in spontaneous labor did not change overall first stage labor length, or cesarean section rates.¹⁷

**Pharmacologic augmentation:** Oxytocin alone may not change outcomes, either. Although the overall duration of labor may shorten in women who receive oxytocin early in labor for slow labor, this intervention alone does not ultimately change the cesarean rate.¹⁸

**Both amniotomy and pharmacologic augmentation:** Combining amniotomy with oxytocin may be the most effective augmentation strategy. In trials of prevention strategies for labor dystocia, early augmentation with both amniotomy AND oxytocin was associated with a modest reduction in the number of caesarean births (RR 0.87; 95% CI 0.77 to 0.99) and a shortened duration of labor (average mean difference (MD) - 1.28 hours; 95% CI -1.97 to 0.59). In this analysis, the number needed to treat (NNT) to prevent one cesarean by using amniotomy and oxytocin together early in labor was 65.¹⁹

For women with protracted or arrested active phase labor, the clinician can evaluate the strength and frequency of uterine contractions by abdominal palpation or an intrauterine pressure catheter (IUPC), which allows calculation of Montevideo units (MVU) (see Figure 2). Two hundred or more MVU in 10 minutes is considered evidence of adequate contractions.²⁰ Using an IUPC may be most important if contractions seem to be of sufficient frequency and duration but are not causing the expected cervical change. However, a meta-analysis concluded that the use of an IUPC does not appear to change labor duration or cesarean rates.²¹ The use of an IUPC may increase the risk of maternal fever²² so should not be routine.
If contractions are inadequate, administering intravenous oxytocin increases contraction frequency, duration, and strength. There are numerous approaches to dosage, dosing interval, and duration of oxytocin treatment. Low-dose regimens, which attempt to mimic the known steady-state pharmacodynamics of oxytocin, start at 1.0 to 2.0 mU/min and increase by 1 to 2 mU/min every 30 minutes to maximum doses of 36 mU/min. High-dose regimens were compared to the low-dose regimens in a prospective cohort study of 15,054 women. This study defined high-dose oxytocin as a starting dose of 4 mU/min with incremental increases of 4 mU/min up to maximum of 36 mU/min. High-dose oxytocin resulted in shorter labors in both nulliparous and multiparous women but did not decrease cesarean section rates.

Appendix 1 lists sample oxytocin orders. Any use of oxytocin is usually combined with the routine use of continuous electronic fetal heart rate monitoring or the use of structured intermittent fetal auscultation every 15 minutes in stage one and every five minutes in stage two. Oxytocin is a drug with the potential for adverse effects, so its use should be reserved for clearly defined indications.

Once oxytocin has been started to augment slow labor, recent studies again suggest the need for a more patient approach in monitoring labor progress. Assuming fetal well-being, the clinician and woman should wait at least four hours of adequate contractions following oxytocin augmentation before operative intervention for arrested dilation: such an approach can significantly lower the cesarean rate for arrest of labor from 26 percent to eight percent. Expectant management for longer time frames (e.g. six hours) is under study to assess the potential for increasing risk of complications such as chorioamnionitis and postpartum hemorrhage as labor duration increases.

In clinical practice, it is sometimes challenging to separate out whether a cesarean section is being done for lack of labor progress or for fetal intolerance to oxytocin needed to effect that progress. Clinicians should follow the NICHD categories of FHR monitoring to classify abnormalities (Chapter E. Intrapartum Fetal Surveillance).
Second Stage Dystocia

Dystocia can also occur in the second stage of labor and is characterized by prolonged duration or arrest of descent. The median duration of second stage lasts longer for nulliparous women than traditionally defined with the 95th percentile at 2.8 hours without regional anesthesia and 3.6 hours with regional anesthesia. For multiparous women, the 95th percentiles for second-stage duration with and without regional anesthesia remained around two and one hour, respectively. Studies on the neonatal and maternal effects of prolonged second stage yield mixed results, although the likelihood of vaginal delivery diminishes once second stage lasts past the time frames noted above. Prolongation of the second stage beyond an arbitrary time limit is no longer an indication for operative vaginal or cesarean delivery. When the second stage is prolonged it is important to evaluate if progress is occurring, chorioamnionitis has developed or there are concerns regarding fetal monitoring.

Second stage dystocia may be due to fetal malposition, inadequate contractions, poor maternal efforts or true cephalopelvic disproportion. Each of these possible causes has potential management options.

Fetal Malposition: The most common fetal malposition is occiput posterior (OP), where the fetus lies with its occiput toward the mother’s spine and its face toward the mother’s pubic symphysis. Persistent OP is associated with prolonged second stage labor and an increased need for oxytocin augmentation. The clinical care of women with persistent OP position, including the technique of manual rotation of a fetus from OP to OA position, is described in Chapter G: Malpresentations, Malpositions, and Multiple Gestation.

For a laboring woman without an epidural, her position during second stage does not appear to affect its duration significantly, but if she stays more upright, this position may reduce the risk of both abnormal fetal heart rate tracings (RR 0.46; 95% CI 0.22 to 0.93) and assisted vaginal delivery compared to the supine position (RR 0.78; 95% CI 0.68 to 0.90), with a possible increased risk of postpartum hemorrhage if upright compared to supine (RR 1.65; 95%CI 1.32 to 2.06). Studies of the effects of upright position for women with an epidural are inconclusive. Thus women in the second stage with or without an epidural should be allowed to assume whatever position is most comfortable for them.

Inadequate contractions: Just as in first-stage dystocia, if contractions have decreased in strength or frequency during the second stage, pharmacologic treatment with oxytocin may be necessary. Thus when fetal descent has slowed in the second stage, the clinician may need to initiate or increase intravenous oxytocin.

Maternal exhaustion: Exhaustion can affect the length of second stage labor. For women with epidural analgesia, an alternative to initiating active pushing at full cervical dilation is allowing the fetus to “labor down” to a lower station, or delaying pushing for up to 60 to 90 minutes until the mother feels an urge to push or the fetus is at the introitus. This may be especially important for nulliparous women. While such delayed pushing may shorten the active phase of labor and lead to more spontaneous deliveries, the overall length of second stage increases along with the risk of maternal fever. If the contractions are farther than three minutes apart then the addition of oxytocin should be considered during the “laboring down” process.
During a long second stage, the clinician should remain vigilant to ongoing assessment of fetal well-being. Preventing vena caval compression by moving the mother out of the dorsal lithotomy position and allowing adequate periods of rest between pushing are two basic strategies to prevent fetal intolerance of second stage labor. Repetitive deep variables in the second stage do not necessarily indicate fetal acidosis. If the fetal heart tracing nonetheless deteriorates with the ominous combination of minimal/absent variability and repetitive late or variable decelerations, the clinician should institute measures of fetal resuscitation as described in Chapter E (Intrapartum Fetal Surveillance) while expediting delivery via assisted vaginal delivery or cesarean section.

**PREVENTION**

Maternity providers can attempt to prevent dystocia with the following antepartum and intrapartum strategies: undertaking prenatal interventions to decrease the incidence of fetal macrosomia, provision of labor support, avoidance of elective induction with an unripe cervix, judicious use of epidural analgesia, and prevention of chorioamnionitis.

**Obesity**

Maternal obesity, particularly in association with excessive maternal weight gain during pregnancy or with gestational diabetes, increases the risk of fetal macrosomia, which may in turn predispose women to prolonged labor and operative outcomes. Dietary counseling during prenatal care can help overweight and obese women limit their weight gain, and has been shown to decrease the risk of shoulder dystocia, but has not yet been shown to specifically change the rate of macrosomia. Clinicians should thus provide counseling and initiate referrals to nutritionists for these at-risk women. Induction for macrosomia alone is not indicated and has been shown to increase the risk of cesarean compared to expectant care in the nondiabetic woman.

Clinicians should follow the same initial guidelines for recognition and treatment of dysfunctional labor for obese women as for non-obese women. However, patience with slower labor progress in obese women is important. In one study, overweight and obese nulliparas had significantly longer active phases of labor than women of normal weight. Another retrospective study confirmed that obese women have slower progress especially in the early part of active labor. Induction with prostaglandins also appears to take longer in obese women.

**Labor Support**

Meta-analysis of studies of providing trained labor support companions (doulas) demonstrate a decrease in the incidence of dystocia, operative vaginal deliveries, and cesarean deliveries, particularly for first-time mothers. The greatest effect on labor comes when trained lay people rather than hospital employees are used, when epidural analgesia is not routinely used, and when support begins in early labor. A potential low-cost alternative is for women to choose a female friend or family member to receive specific brief labor support training as part of prenatal care and to accompany the woman in labor; in one trial, this strategy led to shorter overall labors although no difference in cesarean rates. For further information about doula programs, see footnote and appendix.
Hydration during active labor may prevent prolonged labor. Two randomized trials of intravenous hydration, one in prolonged labor and one in normal labor, suggested shorter labors, less oxytocin use, and a reduced risk of cesarean in women receiving a higher rate (250cc/hr) of IV fluids than traditionally used (125cc/hr).\(^{46,47}\) However, if women have unrestricted oral intake during labor, such IV hydration may not make a difference in these outcomes.\(^{48}\)

**The role of induction:**

In contemporary obstetric care, almost one quarter of women in the United States undergo induction of labor.\(^4\) The number of births involving induction of labor has more than doubled in the last decade, from nine percent in 1989 to over 23 percent in 2010. Clinicians should avoid induction of women for non-medical indications.\(^{49,50}\)

Elective induction may be partially responsible for the increasing rate of cesarean delivery for labor dystocia. Elective induction may result in a two- to three-fold increased risk of cesarean delivery in nulliparous women with an unripe cervix, despite the use of cervical ripening agents.\(^{51,52,53}\) Cochrane reviews of vaginal misoprostol, vaginal prostaglandin and mechanical methods for cervical ripening found that these agents decrease the length of labor but do not change the overall cesarean delivery rate for dystocia.\(^{54,55,56}\) Oral misoprostol for induction may lead to fewer cesareans, however.\(^{57}\) In contrast, various studies demonstrated a decreased cesarean rate through selective induction of women at or near term with specific risk factors for developing cephalopelvic disproportion or uteroplacental insufficiency.\(^{58,59,60}\) This style of management includes patient-centered care and patience with cervical ripening which may partially explain the favorable cesarean delivery rates. Because of the increased risk of labor dystocia, induction should be done only for clear maternal or fetal indications.\(^2\) Elective induction without medical indication should only be done after 39 weeks’ of gestation\(^{50}\) and is best reserved for multiparous women with a favorable cervix.\(^{51}\)

With the goal of vaginal delivery, induction requires patience in allowing adequate time for progress in latent and active labor. Several studies confirm the clinical safety of allowing women undergoing induction to have a latent phase of labor of at least 12 hours after ruptured membranes of labor.\(^{62}\) Particularly for nulliparous women before 6 cm of dilation, induced labor takes longer than spontaneous labor, with one retrospective study concluding that each cm of dilation before 6 cm could take between two and 5.5 hrs longer with induced labor than for spontaneous labor.\(^{63}\) Thus a “failed induction” should be diagnosed only when a woman has not had regular (every three minutes) contractions with cervical change after at least 24 hours of oxytocin administration,\(^2\) assuming fetal well-being throughout this time.

**Epidural Anesthesia:**

Although meta-analyses consistently find no difference in cesarean delivery rates among women receiving low-dose epidurals compared to parenteral opioids,\(^{64}\) epidural analgesia does impact labor progress and other outcomes. Women receiving epidurals are more likely to require oxytocin augmentation in the first stage of labor, have longer second stages, have a six-fold increase in the incidence of maternal fevers, have increased incidence of persistent OP malposition, and undergo more operative vaginal deliveries.\(^{64,65}\)
Whether administering epidural analgesia early in labor (prior to 4 to 5 cm dilation) increases the risk for cesarean delivery has been controversial. Epidural analgesia is not a single entity, and randomized controlled trials that have specifically investigated early versus standard placement are either small or do not use contemporary low-dose techniques. The study most commonly cited to support the use of “early epidurals” actually compared a combined spinal epidural analgesia (CSE) technique (intrathecal opioid given at two centimeters cervical dilation) to epidural given at 4 cm or later. This study found no significant differences in labor duration or rates of cesarean delivery.

Maternal request is sufficient indication for pain relief during labor, and epidurals are associated with significantly lower pain scores compared to systemic opioids. Clinicians should individualize whether and when to administer epidural analgesia. Women with significant pain early in labor should not be required to reach 4 to 5 cm prior to epidural placement. Conversely, a woman who is informed and prepared to handle labor pain with lesser interventions should not be subjected to the expectation of a “routine epidural.” Clinicians should also support the availability of other pain-relief options such as water immersion, nitrous oxide, and sterile water injections that may have less impact on labor duration.

If a woman is having severe “back labor,” feeling her contractions most intensely in her back, this may indicate a persistent OP position. If changing maternal position does not relieve this discomfort, another option for pain relief before resorting to regional anesthesia is to try sterile water injections (Appendix 2). How effective such injections are in reducing pain or changing cesarean rate is debatable; one review found studies inconclusive, while another with slightly different trials included, found that sterile water injections for low back pain in labor reduced pain for up to two hours and reduced the risk of cesarean (RR 0.51 (95% CI 0.30, 0.87) compared to alternative therapies (although the overall cesarean rate was below 10 percent in the comparison therapy group).

**Infection**

Chorioamnionitis is associated with an increased incidence of labor dystocia (adjusted odds ratio 2.3, CI 2.0 to 2.7, for first stage labor and OR 1.8, CI 1.5 to 2.2, for second stage labor) and cesarean delivery (adjusted OR 1.8, CI 1.5-2.1). In the setting of premature rupture of the membranes at term (TPROM), the two factors with the greatest association with an increased risk of chorioamnionitis are the length of time between the first digital vaginal exam and delivery and the total number of vaginal examinations over five. Clinicians should delay the initial digital vaginal exam and substitute a sterile speculum exam in the patient with TPROM who is not laboring. Attempts should be made to limit the total number of vaginal exams after rupture of membranes to five or less, although more recent studies suggest less risk than previously thought.

**Ambulation**

Women who walk or remain upright during the first stage of labor report greater comfort and ability to tolerate labor compared to women who remain recumbent. A randomized trial comparing women assigned to walk in early labor to those receiving usual care showed no differences in the duration of the first stage, need for oxytocin augmentation, use of analgesia, or rates of operative vaginal or cesarean delivery. Although walking in labor did not decrease dystocia in this study that had several methodologic issues, ambulation can offered safely as there were no harmful effects for mothers or infants.
Quality Improvement

Finally, certain aspects of clinician style and healthcare systems may prevent labor dystocia and resultant cesarean section. These include caregiver continuity during the assessment of early labor,\(^{33}\) encouraging a “pronatalist” cultural attitude toward natural childbirth,\(^{81,82}\) requiring consultation with a second clinician prior to non-emergent cesarean deliveries for dystocia,\(^{81}\) and providing regular feedback to clinicians regarding their cesarean delivery rates.\(^{83}\) One small study also suggests a lower first-stage cesarean rate when a woman has her primary prenatal provider attending her in labor rather than an on-call hospitalist.\(^{84}\) Finally, improving quality of care as part of overall maternity safety has led to a plateauing of cesarean rates.\(^{85}\)

In summary, labor dystocia is common and requires the maternity clinician to have excellent clinical assessment skills and thorough knowledge of both non-pharmacologic and pharmacologic strategies to prevent and treat non-progressing labor.

Labor Dystocia in Low Resource Settings

Obstructed labor is the cause of eight percent of maternal deaths,\(^{86,1}\) primarily in developing countries. Management of obstructed labor in low-resource settings may be complicated by a number of factors including distance to health facilities, decreased availability of oxytocin and other medicines to induce and augment labor, lack of forceps and vacuum and inadequate access to safe cesarean. Use of a modified partogram is recommended by the World Health Organization (WHO) with alert and action lines to help determine when to intervene and when to transfer a patient if cesarean delivery is not a safe option locally. A 2012 Cochrane Review of six studies including 7,706 women found that using a partogram did not result in a significant decrease in cesarean or assisted vaginal delivery rate or APGAR scores less than seven at five minutes.\(^{87,2}\) Modified partograms in low-resource settings will need to be revisited, due to the recent literature summarized in this chapter, suggesting that active labor may not begin until approximately 6 cm.

Obstructed labor without access to safe cesarean delivery results in complications rarely seen in high-resource settings including maternal and fetal death and obstetric fistula (including communication between bladder, vagina and rectum). Obstetric fistula can lead to urinary and/or rectal incontinence that can have profound social and psychological in addition to physical consequences.

In settings without access to safe cesarean, symphysiotomy can expedite delivery avoiding some of the above complications. Additional details regarding labor dystocia in low-resource settings can be found in the Labor Dystocia Chapter Addendum of the Global ALSO Manual (www.aafp.org/globalalso). The Global ALSO Manual also has a chapter and workshop on symphysiotomy.
SUMMARY TABLE OF RECOMMENDATIONS

Strength of Recommendation A

1) Amniotomy should be reserved for slowly progressing labors as it reduces the risk of dysfunctional labor but is associated with variable fetal heart rate decelerations. Routine amniotomy is not recommended.\textsuperscript{17-19}

2) Clinicians should support having women receive continuous labor support from a labor companion as the use of such a “doula” has been shown to help women use less analgesia, have lower rates of operative vaginal and cesarean delivery, and feel more satisfaction with their childbirth experiences.\textsuperscript{43}

3) Clinicians should use epidural analgesia with care as epidurals are associated with a prolongation of the second stage of labor and an increase in oxytocin use and operative vaginal delivery, compared to opioids or no analgesia.\textsuperscript{64}

Strength of Recommendation B

4) Active labor may not start until 6cm of dilation, so cesarean for dystocia should be avoided before this dilation.\textsuperscript{2}

5) Quality improvement and patient safety strategies that monitor cesarean indications and rates can help lower these rates safely.\textsuperscript{5,85}

6) Clinicians should allow slower labor progress in latent labor in women undergoing induction compared to spontaneous labor assuming fetal tolerance and no other compelling obstetric indication for intervention.\textsuperscript{2,63}

7) Clinicians should allow slower labor progress throughout all stages of labor in obese women compared to non-obese women assuming fetal tolerance and no other compelling obstetric indication for intervention.\textsuperscript{5,41,42}
REFERENCES


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APPENDIX 1

Sample Labor Orders for Oxytocin Augmentation

1. Consider oxytocin augmentation if:
   a) Cervical dilation rate is less than 0.3 to 0.4 cm per hour for a woman up to 5 cm dilation or < 0.7 cm per hour if over 8 cm dilation
   b) Contractions occur less frequently than every three minutes
   c) Contractions last less than 30 seconds
   d) Contractions are not palpable
   e) Intrauterine pressure catheter documents less than 200 Montevideo units (MVU) in a 10 minute period
   f) Amniotomy does not cause labor progress in one to three hours

2. Document the decision to augment in the medical record.

3. Electronically monitor fetal heart rate and uterine activity a minimum of 30 minutes prior to initiation of oxytocin.

4. Measure blood pressure every 15 to 30 minutes.

5. Start primary intravenous infusion of 1000 cc Lactated Ringers solution at a “keep vein open” rate.

6. Add, through the infusion pump, a secondary IV of 1000 cc D5/LR solution with 10 to 20 units of pitocin (20 units preferred to decrease the total amount of fluid administered).

7. Begin oxytocin infusion at 0.5 to 2 mU/minute.

8. Increase oxytocin by 1 to 2 mU/minute every 30 minutes, until an adequate contraction pattern has been reached. After 10 mU/minute has been reached the rate of increase may be 1 to 4 mU/minute.

9. Notify provider before exceeding 20 mlU/minute. The provider should document in the medical record any decision to exceed this dosage. The maximum infusion rate is 36 mU/minute

10. Stop or decrease oxytocin by 50% if any of the following occur:
    a) Tachysystole (more than 5 contractions within 10 minutes averaged over 30 minutes).
    b) Uterine tone between contractions exceeds 15 to 20 mm Hg.
    c) Tetanic contractions occur (contractions lasting over two minutes in length).
    d) Severe variable, late decelerations, bradycardia or tachycardia occur.
    e) Less severe patterns may be managed as if the patient were in spontaneous labor, by administration of a fluid bolus, position change, and oxygen at 6 L/min.
    f) Interventions such as these should be documented in the medical record.

11. Consider augmentation to have failed if
    a) the woman is at least 6 cm dilated with ruptured membranes and has had no cervical change with four hours of adequate contractions (defined as ≥ 200 Montevideo units in 10 minutes) by intrauterine pressure catheter or six hours of inadequate contractions, or
    b) no regular contractions (every three minutes) after 24 hours of oxytocin, preferably with rupture of membranes.
APPENDIX 2

Intradermal Sterile Water Injections
The use of intradermal sterile water injections can be used to treat first-stage “back labor.” Four 0.1 ml intradermal injections of sterile water with a 25 gauge or 27 gauge needle are given to form small blebs in the skin. Two injection sites are over the posterior superior iliac spines; two are 2 to 3 cm below and 1 to 2 cm medial to the first points. The injections cause intense stinging for 15 to 30 seconds, followed within two minutes by partial to complete relief of back pain lasting 45 to 90 minutes. These injections can be repeated if necessary. Using two clinicians, these injections can be easily injected simultaneously to decrease the duration of discomfort.

APPENDIX 3

Various Doula Organizations
This list is not meant to be complete but to provide a resource. Most of the doula certification programs require that a trainee provide labor support for a certain number of births in order to obtain certification.

International Childbirth Education Association — ICEA, www.icea.org
Operation Special Delivery — http://www.operationspecialdelivery.com
• This organization offers free doula services during wartime to pregnant women with partners on deployment in the U.S. military.

http://www.doulas.com/collects doula resources
**Objectives**

Using a case-based approach:
- Discuss the difference between normal labor and labor dystocia
- Describe how to diagnose and treat dystocia
- Discuss prevention methods
- Describe how obesity and induction may affect labor dystocia

---

**History**

- Meredith calls you at 3 a.m.
  - 22 year-old G1P0
  - Gestational age is 40 weeks 1 day by last menstrual period and 11 week ultrasound
- Having off-and-on contractions for two days
  - Now regular every seven minutes
- Pregnancy has been uncomplicated

*What other information would you like?*

---

**Case Continues**

- She reports possibly leaking clear fluid
- You ask her to proceed to Labor and Deliver (L&D)
- On L&D: stable vital signs
- Fern/pool/nitrazine negative; fetus active, EFM reactive, Category I
- Cervix by sterile vaginal exam (SVE):
  - 2 cm dilated, 70% effaced, -3 station (cephalic presentation)

---

*What other information would you like?*

*What will you do now?*

*Is Meredith in labor?*

---

**Case Continues**

- You decide that Meredith is not yet in active labor
- You send her home with reassurance and diphenhydramine for sedation
- Four hours later she returns
  - Contractions are every four to five minutes
  - On SVE: 3 cm dilated, 100% effaced, -2 station

*Is Meredith in labor?*
### Stages of Labor: Normal Variation

<table>
<thead>
<tr>
<th></th>
<th>Nulliparous</th>
<th>Multiparous</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rate of Dilation in Active Labor</strong></td>
<td>Median 1.8 cm/hr (95% SD 0.4 cm/hr)</td>
<td>Median 2.5 cm/hr (95% SD 0.1 cm/hr)</td>
</tr>
<tr>
<td><strong>2nd Stage Duration</strong></td>
<td>Median 0.9 hr (95% SD 1.1 hr)</td>
<td>Median 0.9 hr (95% SD 1.7 hr)</td>
</tr>
</tbody>
</table>

Adapted from: Langdon 2013 and Sprague 2012

### Care of Women in Latent Labor

- **Place of care**
  - Home
  - Antepartum unit
  - Admission
- **Labor support**
- **Pharmacologic measures**
  - Sedatives (oral, parenteral)

### Case Continues

- Meredith requests pain relief

**What are your options for pain management?**
**Which options may affect her labor progress?**

### Pharmacologic Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Effect on Labor Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parenteral opioids</td>
<td>Less pain relief, no effect on duration/type of delivery</td>
</tr>
<tr>
<td>Epidural anesthesia</td>
<td>Better pain relief, longer first and second stage, increased risk of operative vaginal delivery, question whether it causes increased cesarean risk</td>
</tr>
<tr>
<td>Nitrous oxide</td>
<td>No effect on duration, type of delivery</td>
</tr>
</tbody>
</table>

### Non Pharmacologic Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Effect on Labor Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Immersion</td>
<td>Shorter first stage, less medication use</td>
</tr>
<tr>
<td>Labor Support</td>
<td>Less dystocia, less operative vaginal delivery, less cesarean</td>
</tr>
</tbody>
</table>

### Case Continues

- After a shower and another hour with her family support, Meredith requests medication
- **SVE: 4cm dilated, 100% effaced, -2 station**

**Where is Meredith on the labor curve?**
**Is her labor protracted at this point?**
**New Definition of First Stage Dystocia**

- Patient must be in active labor (> 6 cm)
- Slow or arrested progress (< 0.3 to 0.4 cm per hour for nulliparous woman)

**Case Continues**

- She has relief from IV fentanyl
- Two hours later, she requests an epidural
- SVE: 6 cm dilated, 100% effaced, -2 station

**Case Continues**

- Two hours after her epidural, you re-examine Meredith
- SVE: 6 cm dilated, 100% effaced, 0 station

Are Meredith’s contractions adequate? Should you augment her labor?

**Risk Factors for Labor Dystocia**

- Induction of labor
- Chorioamnionitis
- Maternal obesity
- Epidural anesthesia
- Fetal malposition
- Fetal malpresentation
- Cephalopelvic disproportion
  - Contracted pelvis
  - Fetal macrosomia

**Six P’s Mnemonic for Dystocia**

<table>
<thead>
<tr>
<th>Power</th>
<th>Uterine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passage</td>
<td>Pelvis</td>
</tr>
<tr>
<td>Passenger</td>
<td>Fetal</td>
</tr>
<tr>
<td>Patient</td>
<td>Maternal</td>
</tr>
<tr>
<td>Psyche</td>
<td>Emotional</td>
</tr>
<tr>
<td>Provider</td>
<td>Iatrogenic</td>
</tr>
</tbody>
</table>

**Treatment for Dystocia**

- Hydration
- Position changes
- Amniotomy
- Oxytocin

What are the risks of amniotomy? What are the risks of oxytocin augmentation?
Treatment for Dystocia

- Amniotomy is more effective when combined with oxytocin augmentation.
- Decision for Meredith: AROM and oxytocin.

Oxytocin Augmentation: Sample Protocols

- Routine
  - Start at 1.0 to 2.0 mIU/min
  - Increase by 1 to 2 mIU/min every 30 min
  - Maximum dose: 36 mIU/min
  - ? More physiologic
- High-dose
  - Start with 2 to 4 mIU/min
  - Increase 2 to 4 mIU/min every 15 min
  - Maximum dose: 36 mIU/min
  - May shorten labor vs high-dose, but caution with tachysystole

Case Continues

- Two hours after AROM and oxytocin, Meredith is having contractions every two to three minutes lasting 45 to 60 seconds
- SVE: 6 cm dilated, 100% effaced, 0 station

What other interventions do you consider now?

Assessing Uterine Contractions

- Abdominal palpation
- Intrauterine pressure catheter (IUPC)
  - When expected cervical change not occurring
  - Goal > 200 Montevideo units (MVU) in 10 min
  - No difference in labor duration or cesarean rates

Case Continues

- After two more hours, the tracing looks like this:

- On exam, SVE is unchanged

What is your diagnosis?
What is your plan at this time?

Patience with Progress

Spontaneous labor

3-6 cm
- No cervical change
- Cervical change
- No cervical change
- Cervical change

Supportive care
- Cervical labor
- Systolic hypertension
- Cervical labor

Cervical change
- No cervical change despite rupture
- Cervical change
- Cervical change
- No cervical change
- Cervical change

No cervical change
- Rupture of membranes
- Cervical labor
- Cervical labor

Indecisive contradictions:
- 4 hours
- 8 hours

Consider cesarean delivery
**Benefit of Watchful Waiting**

- Eighty percent of those not progressing after two hours of adequate contractions still had vaginal delivery when observed for four hours.
- Recommend at least four hours of adequate contractions (instead of two) as decision point for cesarean as long as reassuring monitoring.

**Case Continues**

- Two hours later, Meredith is feeling an urge to push.
- You examine her.
- SVE shows complete dilation, 0 station, ROP position.

*What are options for second stage care for Meredith?*

---

**Case Continues**

She pushes for about an hour with minimal descent of fetus.

*What could you do to improve the odds of a vaginal delivery?*

---

**Second Stage Options**

- For fetal malposition
  - Consider manual rotation
  - Maternal position change and movement
- No studies in laboring women.
- For inadequate contractions
  - Consider initiating oxytocin.
- For maternal exhaustion
  - If no epidural, push in upright, lateral, hands-knees position
  - Risk of second degree perineal tears, blood loss > 500 ml
  - If epidural, delay active pushing after complete dilation to "labor down" to a lower station (60 to 90 min delay).

---

**Second Stage Dystocia: Cautions**

- In prolonged second stage
  - Assess fetal tolerance of ongoing labor
  - Avoid prolonged dorsal lithotomy position
  - Allow rest between pushing.
- Expedite delivery for concerning fetal monitoring.

---

**Second Stage Dystocia**

- New definitions for second stage arrest of labor.
- No progress (descent or rotation) for
  - Four hours or more for a nulliparous woman with epidural.
  - Three hours or more for a nulliparous woman without epidural, or a multiparous woman with epidural.
  - Two hours or more for a multiparous woman without epidural.
**Case Concludes**

- After four hours of pushing, Meredith delivers a 3700 gram baby boy over an intact perineum, Apgar score 8 and 9
- Mom and baby leave the hospital on day two in good health

**Obesity and Dystocia**

What if Meredith had a prepregnancy body mass index (BMI) of 35?

What could you do to improve her chance of a vaginal delivery?

**Obesity and Labor Dystocia**

- Dietary counseling during prenatal care can help overweight and obese women limit their weight gain
- No evidence yet that such counseling changes risk for macrosomia or cesarean for dystocia
- Overweight and obese nulliparas have significantly longer latent and active phases of labor than normal-weight women

**Case 2**

Jasmine is a 17 year old G1P0 at 41 weeks by last menstrual period (LMP) and early sonogram with an amniotic fluid index (AFI) on routine antenatal testing of 4.0

Decision has been made to admit her now for induction

What other information would you like?

**Case Continues**

- Cervix is soft, midposition, closed, 20 % effaced, presenting part ballotable
- EFM baseline 140, moderate variability, multiple accelerations, no decelerations
- Rare contractions on monitor

What do you recommend?

**Choices for Ripening and Labor Outcomes**

<table>
<thead>
<tr>
<th>Option</th>
<th>Effect on Labor Outcomes*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Vaginal Misoprostol</td>
<td>- Shorten labor</td>
</tr>
<tr>
<td>(off-label)</td>
<td>- No change in cesarean risk</td>
</tr>
<tr>
<td>2. Prostaglandin insert</td>
<td></td>
</tr>
<tr>
<td>3. Mechanical methods</td>
<td>- May lead to fewer cesareans</td>
</tr>
<tr>
<td>4. Oral misoprostol</td>
<td>*Compared to oxytocin alone</td>
</tr>
<tr>
<td>(off-label)</td>
<td></td>
</tr>
</tbody>
</table>
**Induction Cautions**

- Elective induction may result in a two to three fold increased risk of cesarean delivery in nulliparous women with an unripe cervix, despite the use of cervical ripening agents.
- ACOG/AAPC Choosing Wisely
  - Don’t schedule elective, non-medically indicated inductions of labor or cesarean deliveries before 39 weeks, 0 days gestational age.
  - Avoid elective, non-medically indicated inductions of labor between 39 weeks, 0 days and 41 weeks, 0 days unless the cervix is deemed favorable.

**Case Continues**

- Jasmine has cervical ripening with prostaglandin insert
- 12 hours later her cervix is
- 1 cm/50%/−3 with contractions every four to six min, EFM remains Category I

*Are Jasmine’s contractions adequate? Is she having protracted labor?*

**Induced Labor Takes Longer**

- Particularly for nulliparous women before 6 cm of dilation, induced labor takes longer than spontaneous labor

**Case Continues**

- Foley catheter placed
- After four hours, Foley catheter falls out
- Her cervix is now 3 cm/75%/−3

*How would you proceed?*

**Case Continues**

- After four more hours of oxytocin, Jasmine’s cervix is still 3/75/−3

*How would you proceed?*

**Is this a Failed Induction?**

- Failure to generate regular (e.g., every three min) contractions and cervical change after at least 24 hours of oxytocin administration, with artificial membrane rupture if feasible
- Induction should not be defined to have failed in the latent phase unless oxytocin has been administered for at least 24 hours or for 12 hours after membrane rupture
- Consider stopping induction when clinically appropriate (not in this case)
**Prevention of Labor Dystocia**

**Prenatal Care**
- Prevent fetal macrosomia
- Avoid excessive weight gain
- Utilize doulas
- Avoid elective induction
- Review risks and benefits of epidural
  - Avoid "routine" epidural

**Intrapartum Care**
- Avoid admitting during latent labor
- Be alert for chorioamnionitis
  - Delay and limit SME
- Encourage walking and upright posture during labor
- Be patient—follow contemporary labor curves

---

**Summary**

- Labor dystocia is most common indication for cesarean delivery
- Non pharmacologic approaches are an important part of prevention and treatment
- Decrease use of cesarean delivery for failed induction or labor dystocia by using new criteria for lengths of stages of labor and management recommendations