Educational Topic 22: Abnormal Labor

Rationale: Labor is expected to progress in an orderly and predictable manner. Careful observation of the mother and fetus during labor will allow for early detection of abnormalities so that management can be directed to optimize outcome.

Intended Learning Outcomes:
A student should be able to:

• List abnormal labor patterns
• Describe the causes and methods of evaluating abnormal labor patterns
• Discuss fetal and maternal complications of abnormal labor
• List indications and contraindications for oxytocin administration
• Describe risks and benefits of trial of labor after Cesarean delivery
• Discuss strategies for emergency management of breech presentation, shoulder dystocia and cord prolapse.

CASE: Charlene is a 31 year-old G1 woman at 40 weeks and 6 days gestation as determined by in vitro fertilization dating, who presents with a chief complaint of contractions. Her prenatal care has been uncomplicated. Her past medical history is unremarkable. She has been having contractions about every 5-7 minutes for about 10 hours, and she is exhausted. She denies leaking of fluid or vaginal bleeding.

A cervical exam reveals her cervix to be about 2cm dilated, 100% effaced, with a vertex presentation at −3 station. Fetal heart tones are in the 140s with an external monitor. A tocodynamometer confirms uterine contractions about every 5 minutes. Her vital signs are stable and her physical examination is otherwise unremarkable.

Dipstick urinalysis reveals no protein, glucose or ketones. A blood specimen for type and hold is sent to the laboratory per hospital policy. CBC is within normal limits.

Charlene is admitted to labor and delivery where an IV line is placed. Two hours later, there has been no change in the cervical exam and she asks for pain medicine. Narcotic medication is ordered and she soon falls asleep. The fetal heart tones remain stable and the contraction frequency has decreased.

Charlene is awakened about two hours after the narcotic dose by painful contractions that appear on the monitor about every 3 minutes. A cervical exam reveals a change to 5cm dilation, 100% effacement. The fetus is at −2 station with
some caput noted. The membranes are artificially ruptured, revealing copious amounts of clear fluid; fetal scalp electrode and intrauterine pressure catheter are placed. Charlene requests an epidural, and the anesthesiologist places one.

The epidural functions well and the intrauterine pressure catheter show uterine contractions every 7-10 minutes. The strength of the uterine contractions average out to approximately 100 Montevideo units (MVU’s). The fetal heart tracing remains reassuring. After another two hours, the cervix is unchanged and the station has remained at –2. Oxytocin is started by intravenous pump. The uterine contractions become more frequent, every 2-4 minutes, and the contractions measure out at 200 MVU’s over 10 minutes. Her temperature has climbed slightly, to 99.8°F. Two hours later the cervix is still 5 cm dilated and she has a temperature of 101°F; the fetal heart rate is reassuring, but the baseline has increased to the 160’s. A Cesarean section is planned.

COMPETENCY-BASED DISCUSSION & KEY TEACHING POINTS:
Competencies addressed:
• Patient Care
• Medical Knowledge
• Systems-Based Practice

1. What is the reason for this patient’s Cesarean section? What are some patterns of abnormal labor? What are the causes of abnormal labor?
   • This patient has arrest of dilation.
   • Abnormal labor patterns include protraction disorders, when labor is prolonged (multiparous rate < 1.5 cm/hr and nulliparous rate < 1.2 cm/hr in active phase) or arrest disorders, when labor has stopped. Both of these patterns can occur in the active phases of labor. There is no prolonged latent phase designation, however 14 hours for multiparous and 20 hours for nulliparous are considered the upper limits of normal for latent labor.
   • During the latent phase, labor disorder is difficult to diagnose because of the variation in latent phase duration. A prolonged latent phase is defined as more than 20 hours in a nulliparous patient and more than 14 hours in a multiparous patient.
   • During the active phase, arrest of dilation has been traditionally diagnosed when there has been no cervical change over two hours (without anesthesia) and three hours (with anesthesia). However, there is recent evidence that this should be extended to four hours. Second-stage arrest is diagnosed when there is no descent despite 1 hour of pushing. It is often suspected when the fetus has not been delivered after 2 hours of pushing in a patient with no regional anesthesia or after 3 hours of pushing in a patient with regional anesthesia.
   • Abnormal labor can be caused by three factors: issues with Power, Passenger and Passage. Power refers to contraction strength and pattern as well as maternal effort of pushing. Passenger refers to issues with the fetus including abnormal lie, presentation, position and attitude. Additionally, fetal size can impede progress through the pelvis. Passage refers to maternal skeletal or soft tissue abnormalities that obstruct the birth canal. The shape or inadequate size of the pelvis may impede fetal descent into the birth canal making a successful vaginal delivery less likely.

2. How do you evaluate labor?
   • Labor is evaluated by monitoring cervical change over time. This is best done by graphically documenting this change and comparing it to a normal Friedman curve, which graphically describes normal labor using time, cervical dilation and fetal station as its axes.
• Contraction frequency is monitored either with an external tocodynameter or internally with an intrauterine pressure catheter. The intrauterine pressure catheter additionally allows accurate measurement of the adequacy of uterine contractions. These measures are reflected in Montevideo units, which is a calculation of the intensity of contractions over 10 minutes and is considered adequate at 200 or more MVUs. When Montevideo units are adequate and/or when sufficient time has been allowed to observe cervical change and when no change has been forthcoming, intervention must be considered. If the cervix is not yet fully dilated, labor augmentation with oxytocin administration and/or amniotomy can be considered. If the cervix has been completely dilated and effaced, maternal pushing efforts have not resulted in delivery, and the fetal vertex is at a +2 or greater station, vacuum or forceps delivery may be considered. In any other situation, Cesarean delivery is the alternative.

3. If this patient had refused Cesarean section and proceeded with labor despite an abnormal pattern, what maternal and fetal complications could have occurred?

• The most common complication is chorioamnionitis. Prolonged labor, particularly prolonged rupture of membranes, increases the fetal exposure to normal vaginal bacteria. Signs and symptoms of this are temperature elevation, tender uterus, elevated white blood count and, in extreme cases, purulent amniotic fluid. The fetal response to infection and its consequent temperature elevation is tachycardia and decreased fetal heart rate variability. After delivery, the infant can develop serious infection such as sepsis. Thus it is important to diagnose and treat chorioamnionitis in a timely fashion.
• Protracted labor can also be associated with postpartum hemorrhage stemming from uterine atony. This can occur with successful vaginal delivery or Cesarean delivery.
• Complications of obstructed labor should be discussed

4. What are indications and contraindication for oxytocin administration?

• Oxytocin is used to initiate or augment uterine contraction in order to produce the repetitive, strong contractions that allow for cervical change and descent of the fetus through the maternal pelvis. Appropriate administration can decrease labor duration, chorioamnionitis and need for Cesarean delivery.
• Contraindication to oxytocin include the same contraindications for labor induction including but not limited to abnormal lie, placenta previa and fetal heart rate changes demonstrating fetal intolerance of labor.

5. In her subsequent pregnancies, this patient would like to attempt a vaginal delivery. What are risks and benefits of a trial of labor after Cesarean?

• Patients with a classical Cesarean delivery or T shaped incisions, one in which the uterine was incised vertically through the muscular portion of the uterus, are not candidates for trial of labor after Cesarean (TOLAC) due to the high rate of uterine rupture: 4 – 9% as compared to .5 – 1% for low transverse and low vertical incisions.
• After a low uterine segment transverse Cesarean delivery, there is a 0.5-1% chance of uterine rupture with subsequent labors. Though this risk is low, the outcome could be serious and includes a 10% chance of serious fetal hypoxic brain injury or death. Cesarean delivery is associated with standard surgical risks of bleeding, infection and injury to internal organs, all of which occur at a higher rate than with a vaginal delivery. If the patient desires many more children, each additional Cesarean delivery is associated with increased risk of surgical injury, particularly to the bladder and increased risk of placental abnormalities (placental previa, placenta accreta) with each subsequent pregnancy. These placental abnormalities are associated with the risk of severe fetal and maternal hemorrhage.
• Vaginal birth after Cesarean (VBAC) or successful TOLAC, is generally felt to be associated with lower risk than a repeat Cesarean delivery. The benefits include decreased maternal morbidity and a decreased risk of complications in future pregnancies. If uterine rupture occurs, emergent Cesarean delivery will be necessary which carries with it increased surgical risk than scheduled Cesarean delivery. Catastrophic uterine rupture increases risk of Cesarean hysterectomy.

• Another consideration in weighing risks and benefits includes the likelihood of success. Successful vaginal birth after Cesarean is associated with height, weight and ethnicity of the patient. If the previous Cesarean was performed secondary to abnormal labor, then success rates for TOLAC are lower.

6. How do you manage breech presentation, shoulder dystocia and cord prolapse?

• Breech presentation can be managed in one of two ways. A patient may choose outright Cesarean delivery at 39 weeks gestation. Gestational dating criteria should be confirmed, and ultrasound should be performed immediately preoperatively to confirm persistence of breech presentation.

• External cephalic version (ECV) may also be attempted after 36 weeks gestation. During ECV, the physician applies abdominal pressure on the uterus, causing the fetus to perform a somersault, converting into cephalic presentation. The success rate is approximately 50%. This carries a risk of placental abruption, cord accident, rupture of membranes; thus, fetal monitoring is performed afterwards for a period of time.

• There are three types of breech presentations. Frank breech is the most common (48–73%) where hips are flexed and knees are extended. It has the lowest risk of cord prolapse. Footling / Incomplete breech (12 – 38%) has incomplete deflection of one or both knees or hips. It carries the greatest risk of umbilical cord prolapse. Complete breech (4–11%) has flexed at the hips and the knees.

• Planned vaginal delivery of breech infant can be performed but only if very strict criteria are met. The vast majority of obstetrical units are unable to realistically and safely offer this option to patients.

• In any emergency situation, common strategies include assessing the situation as quickly and efficiently as possible, ensuring the patient, both mother and fetus are stable, asking for help and noting the time the acute situation started.

• Shoulder dystocia occurs when the fetal shoulder gets lodged behind the maternal pubic symphysis after delivery of the fetal head. It is considered an obstetrical emergency because the umbilical cord is compressed at this point in the labor process. Fundal pressure should NOT be applied. Multiple maneuvers can be performed to try to dislodge the shoulder. They should be applied swiftly and the time of diagnosis should be carefully noted. These maneuvers include:
  • McRoberts: maternal hyperflexion of hips and knees
  • Suprapubic pressure
  • Rotational maneuvers
  • Delivery of fetal posterior arm
  • Episiotomy
  • Fracture of fetal clavicle
  • Zavanelli maneuver: replacement of fetal head and subsequent Cesarean delivery

Cord prolapse occurs when the umbilical cord prolapses through a dilated cervix. Risks for this include unstable lie or footling breech presentation. With cord prolapse, the examining physician who diagnoses the prolapse should manually elevate the fetal head via the vagina, taking pressure off the cord. Preparations should rapidly be made to immediately perform a Cesarean delivery, and the physician should continue to elevate the fetal head until immediately before delivery.
REFERENCES


