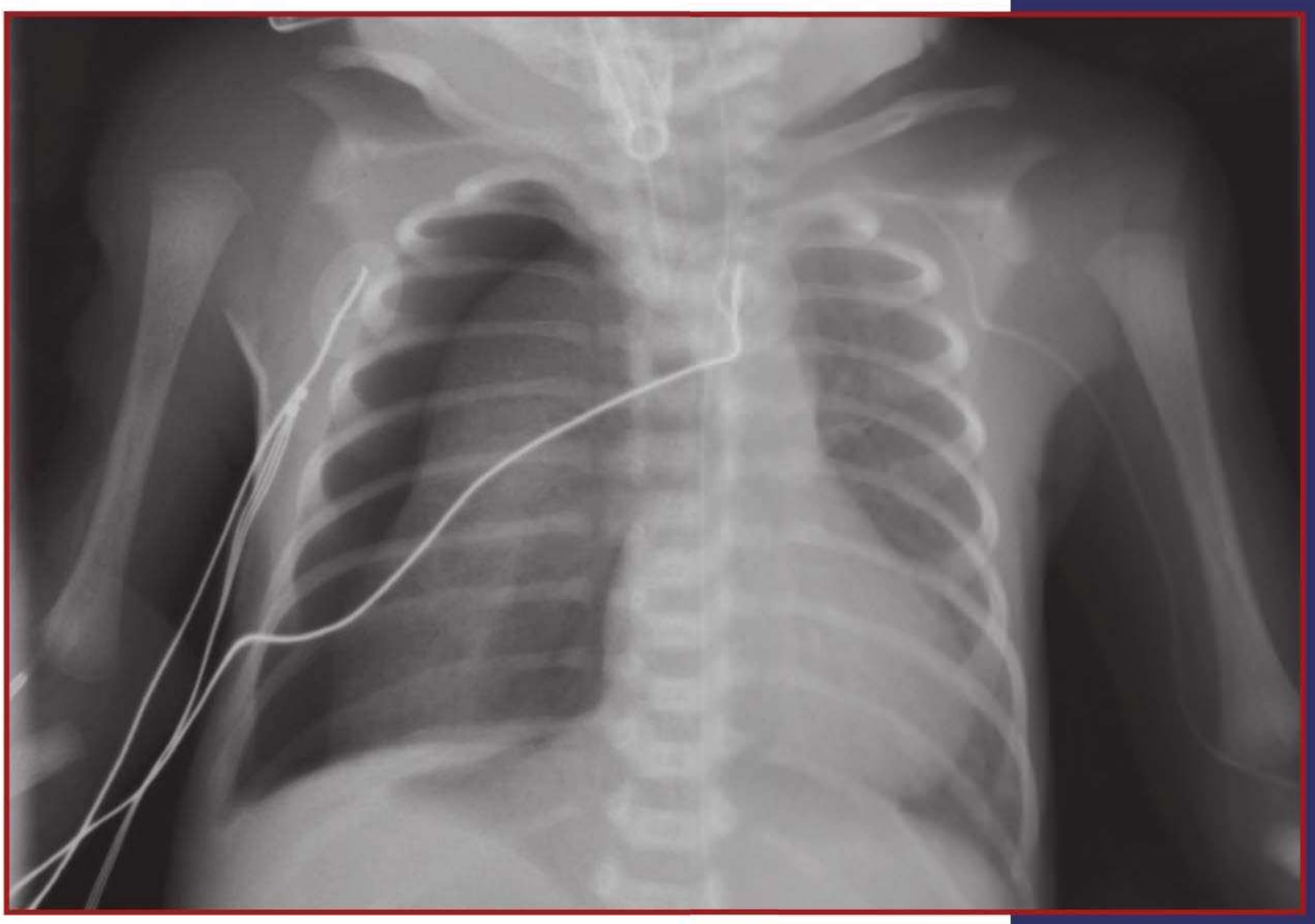
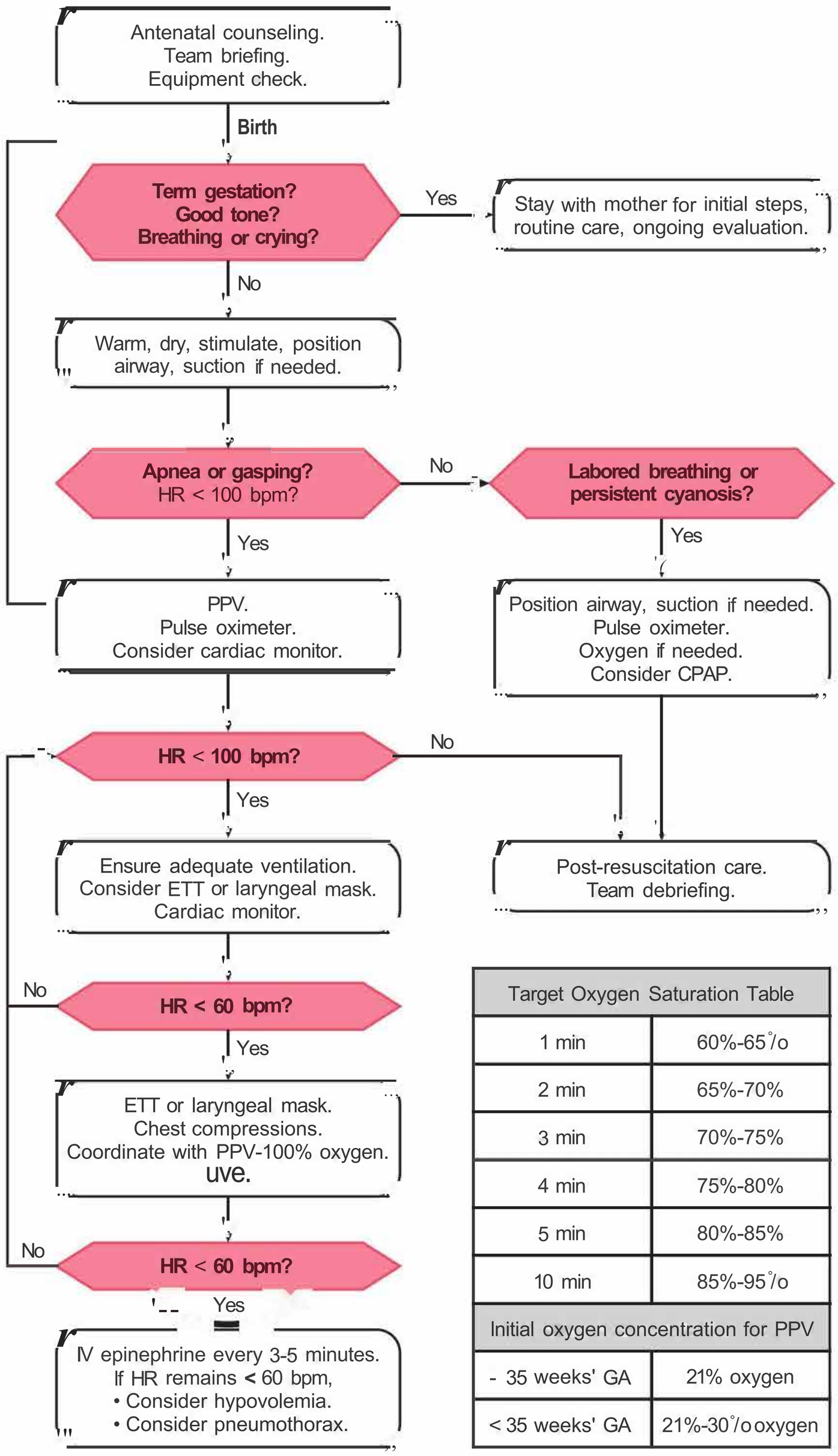
10

Special Considerations

What you will learn

- When to suspect a pneumothorax or a pleural effusion
- How to manage a life-threatening pneumothorax or pleural effusion
- How to manage a newborn with an airway obstruction
- How to manage congenital lung abnormalities that may complicate resuscitation
- How to manage the newborn with complications from maternal opiate or anesthetic exposure
- How to manage a newborn with myelomeningocele
- How to manage a newborn with an abdominal wall defect





Target Oxygen Saturation Table	
1 min	60%-65%
2 min	65%-70%
3 min	70%-75%
4 min	75%-80%
5 min	80%-85%
10 min	85%-95%
Initial oxygen concentration for PPV	
- 35 weeks' GA	21% oxygen
< 35 weeks' GA	21%-30% oxygen

Key Points

O Suspect a pneumothorax if a baby fails to improve despite resuscitative measures or suddenly develops severe respiratory distress. In an emergency, a pneumothorax may be detected by decreased breath sounds and increased transillumination on the affected side.

f) Suspect a pleural effusion if a newborn has respiratory distress and generalized edema (hydrops fetalis).

Q A pneumothorax or pleural effusion that causes cardiorespiratory compromise is treated by aspirating the air or fluid with a needle-catheter-stopcock assembly attached to a syringe and inserted into the chest.

8 If thick secretions obstruct the airway despite a correctly positioned endotracheal tube, attempt to remove the secretions using a suction catheter (SF-8F) inserted through the endotracheal tube. If the obstruction persists, directly suction the trachea with a tracheal aspirator attached to the endotracheal tube. In most circumstances, establish an open airway and ventilation that inflates the lungs before proceeding to chest compressions.

0 Respiratory distress associated with the Robin sequence can be improved by placing the baby prone and inserting a small endotracheal tube (2.5 mm) into the nose so the tip is in the pharynx. If this <loes not result in adequate air movement, a laryngeal mask may provide a lifesaving airway. Endotracheal intubation is frequently difficult in this situation.

O Respiratory distress associated with bilateral choanal atresia can be improved by inserting a modified feeding nipple or pacifier, with the end cut off, into the baby's mouth or an endotracheal tube into the mouth with the tip in the posterior pharynx.

O If a congenital diaphragmatic hernia is suspected, avoid positive-pressure ventilation with a face mask. Quickly intubate the trachea in the delivery room and insert an orogastric tube with continuous or intermittent suction to decompress the stomach and intestines.

O If a mother received opiates in labor and her baby is not breathing, provide airway support and assisted ventilation until the baby has adequate spontaneous respiratory effort.

- Avoid placing newborns with myelomeningocele (spina bifida) on their back. Position the newborn lying on their side, on their stomach, or on a "doughnut,, made from towels or latex-free foam.

- Place the lower body and abdomen of a newborn with gastroschisis or omphalocele in a sterile, clear plastic bowel bag and secure the bag across the baby,s chest. Position the baby on the right side to optimize bowel perfusion.

This lesson reviews less common circumstances that you may encounter during neonatal resuscitation. Because these scenarios do not occur frequently, it is important to be able to recognize them and be prepared to respond quickly and efficiently. As you read the following case, imagine yourself as part of the resuscitation team.

Case: A newborn with tension pneumothorax

A woman is admitted in labor at 40 weeks' gestation with clear fluid and a Category 111fetal heart rate pattern. An emergency cesarean birth is planned. Your resuscitation team assembles in the operating room, completes a pre-resuscitation team briefing, and prepares equipment and supplies for a complex resuscitation. After birth, the umbilical cord is clamped and cut and a limp, apneic baby is handed to the team. One team member begins documenting the resuscitation events as they occur.

The initial steps are performed, but the baby remains limp without spontaneous respirations. You begin positive-pressure ventilation (PPV) with a face mask, but the heart rate <loes not improve. You perform the ventilation corrective steps and achieve chest movement after increasing the ventilating pressure; however, the baby's heart rate remains 40 beats per minute (bpm). Team members place a pulse oximeter sensor on the baby's right hand and cardiac monitor leads on the baby's chest. An endotracheal tube is rapidly inserted for continued PPV, but there is no improvement in heart rate. Your team increases the oxygen concentration (FIO_2) to 100% and begins chest compressions while an umbilical venous catheter is prepared and inserted. The baby's heart rate <loes not improve after 60 seconds of coordinated compressions and ventilation. A <lose of intravenous epinephrine is given through the umbilical catheter, followed by a normal saline flush, but the baby's condition still <loes not improve. The team reevaluates the insertion of the endotracheal tube and the efficacy of ventilation and compressions while considering special circumstances that may complicate resuscitation. Listening to the chest, you recognize that breath sounds are absent on the right side. Your team suspects a life-threatening tension pneumothorax. Rapid

transillumination of the chest confirms the suspicion and a team member quickly prepares a catheter-over-needle aspiration device. Chest compressions are stopped while a catheter is inserted and air is aspirated from the chest. Upon decon1pression of the pneumothorax, the baby's heart rate rapidly improves. The team continues PPV and the FiO_2 is adjusted based on pulse oximetry. A small amount of air continues to flow through the catheter aspiration system and the baby is transferred to the nursery for a chest x-ray and additional treatment. Shortly afterward, you update the parents and conduct a debriefing to review your team's preparation, teamwork, and communication.

How do you identify a newborn with an air or a fluid collection around the lung?

Abnormal air or fluid collections that prevent the newborn's lung from fully expanding within the chest can lead to severe respiratory distress and persistent bradycardia.

Pneumothorax

It is not uncommon for small air leaks to develop as the newborn's lung fills with air. When air collects in the pleural space surrounding the lung, it is called a pneumothorax (Figure 10.1). Although a pneumothorax may occur spontaneously, the risk is increased by PPV, particularly in preterm babies, babies with meconium aspiration, and babies with other lung abnormalities.

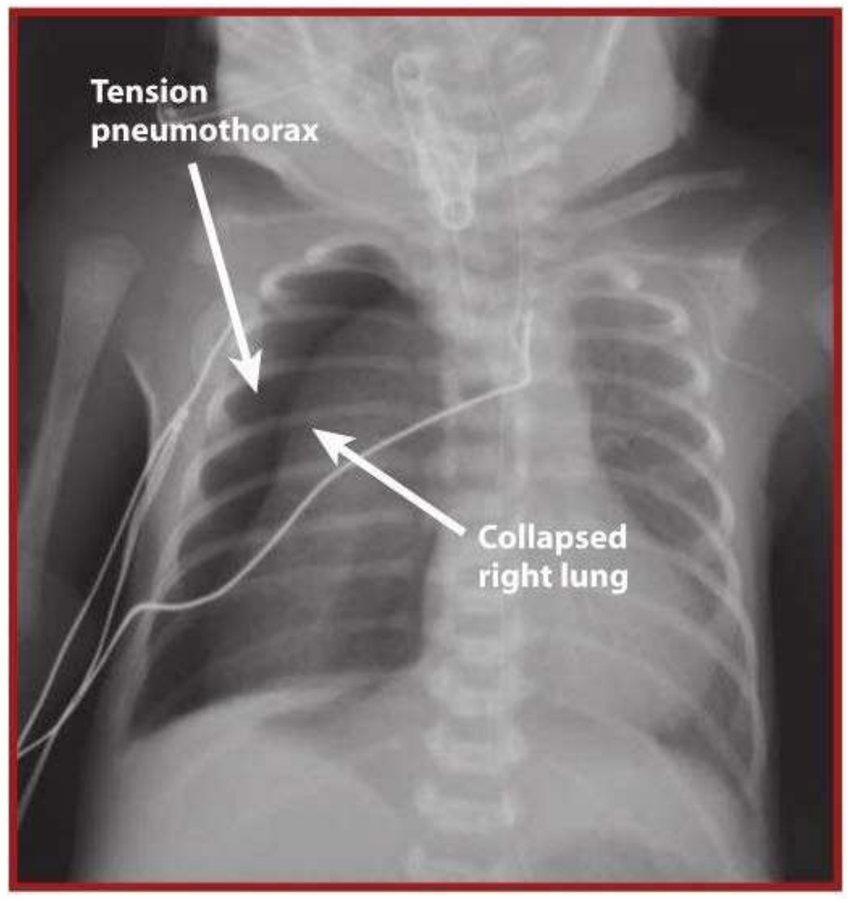


Figure 10.1. Pneumothorax causing collapse of the right lung

A small pneumothorax may be asymptomatic or cause only mild respiratory distress. If the pneumothorax becomes larger, the pressure from the trapped air can cause the lung to collapse. If the pneumothorax becomes large enough, it can interfere with blood flow within the chest causing severe respiratory distress, oxygen desaturation, and bradycardia. This is called a tension pneumothorax. It is a life-threatening emergency and requires urgent treatment to evacuate the air.

You should consider the possibility of a pneumothorax if a baby fails to improve despite resuscitative measures or if a baby suddenly develops severe respiratory distress. Breath sounds may be diminished on the side of the pneumothorax, but breath sounds can be misleading because they are easily transmitted across the baby's chest and can sound normal even in the presence of a pneumothorax. On the other hand, decreased breath sounds on the left side may be caused by an endotracheal tube inserted into the right main bronchus (Table 10-1).

Table 10-1 • Causes of Diminished Breath Sounds

- Inadequate ventilation technique
- PPV device leak or equipment failure
- Malpositioned endotracheal tube
- Pneumothorax
- Pleural effusion
- Tracheal obstruction
- Congenital diaphragmatic hernia
- Pulmonary hypoplasia or agenes1s
- Enlarged heart

Transillumination of the chest is a rapid screening test that may be helpful. In a darkened room, hold a high-intensity fiber-optic light against the chest wall and compare the transmission of light on each side of the chest (Figure 10.2). During transillumination, light on the side with a pneumothorax will appear to spread further and glow brighter than the opposite side. In a life-threatening situation, a positive transillumination test can help to direct immediate treatment. Be careful when interpreting the results of transillumination in very premature babies because their thin skin may cause the chest to appear bright even in the absence of a pneumothorax. If a transilluminator is not immediately available and the baby is in severe distress, you may proceed with emergency treatment based on your clinical suspicion. If the baby is stable, the definitive diagnosis of a pneumothorax is made with a chest x-ray.

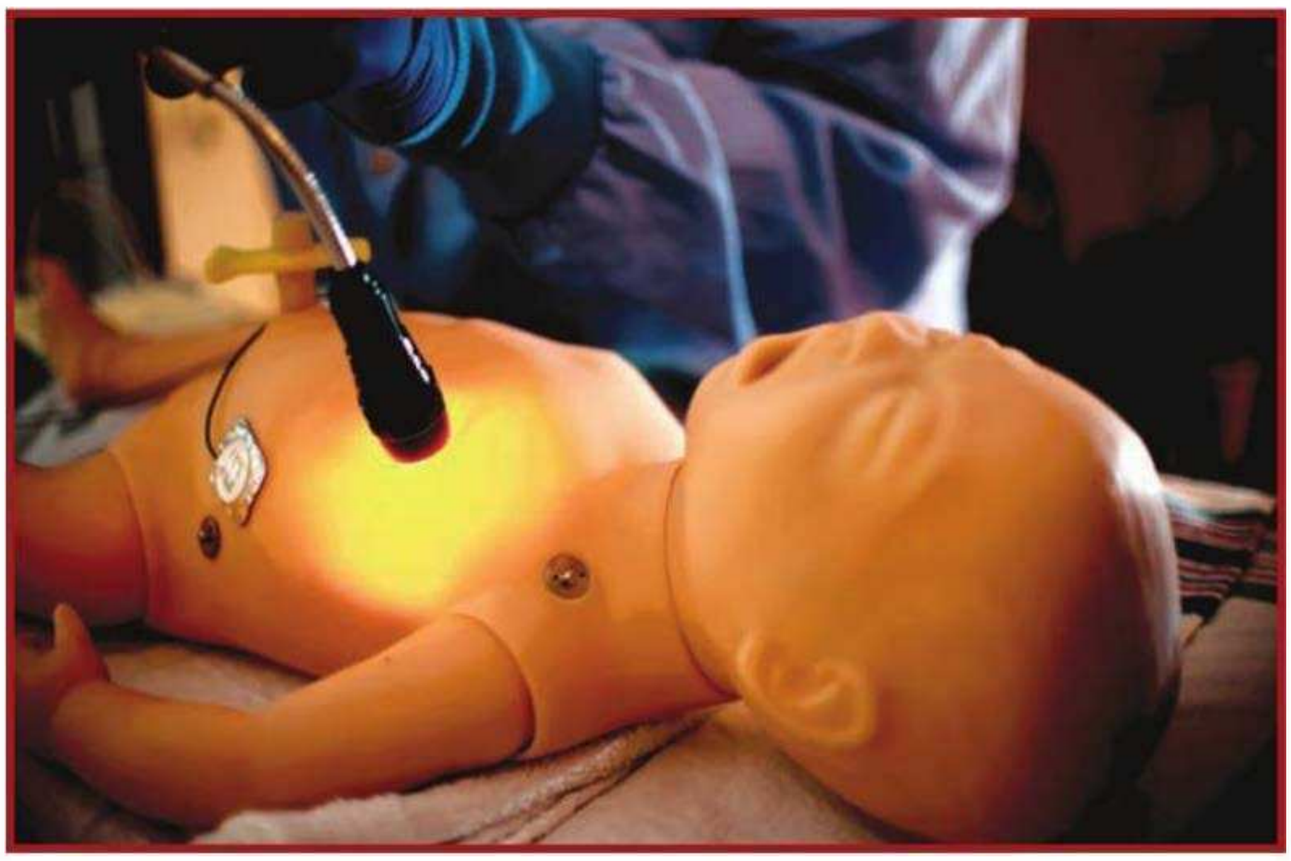


Figure 10.2. Positive transillumination of a left-sided pneumothorax. The light spreads and glows across a wide orea.

A small pneumothorax usually will resolve spontaneously and often <loes not require treatment. The baby should be monitored for worsening distress. If the baby is maintaining normal oxygen saturation, supplemental oxygen is not indicated and <loes not result in faster resolution of the pneumothorax. If a pneumothorax causes significant respiratory distress, bradycardia, or hypotension, it should be relieved urgently by inserting a catheter into the pleural space and evacuating the air. If the baby has ongoing respiratory distress, insertion of a thoracostomy tube attached to continuous suction may be required.

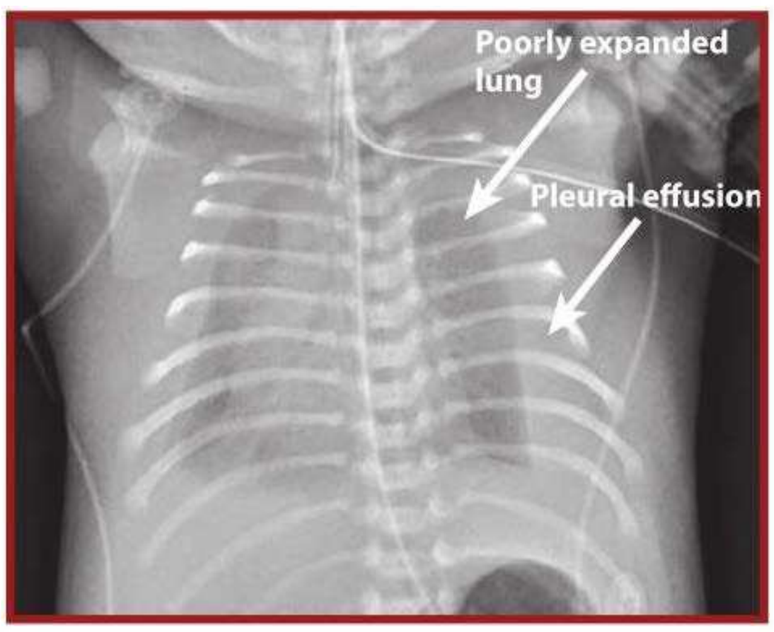


Figure 10.3. large bilateral pleural effusions

Pleural effusion

Fluid that collects in the pleural space is called a pleural effusion (Figure 10.3). Similar to a pneumothorax, a large pleural effusion can prevent the lung from expanding. The fluid may be caused by edema, infection, or leakage from the baby's lymphatic system. Frequently, large pleural effusions are diagnosed before birth by ultrasound. There may be a history of severe fetal anemia, twin-to-twin transfusion, cardiac arrhythmia, congenital heart disease, congenital infection, or a genetic syndrome. You should suspect a pleural effusion if a newborn has respiratory distress and generalized body

edema (hydrops fetalis). Excess fluid may also be present in the baby's abdomen (ascites) and around the baby's heart (pericardial effusion). Because the fluid collection interferes with lung expansion, breath sounds may be decreased on the affected side. The definitive diagnosis of a pleural effusion is made with a chest x-ray or ultrasound.

A small pleural effusion may not require treatment. If respiratory distress is significant and <loes not resolve with intubation and PPV, you may need to inserta catheter into the pleural space to drain the fluid. If a large pleural effusion is identified before birth, the obstetrician may remove fluid before delivery. In addition, emergency drainage may be required after birth. If time allows, a baby with a large pleural effusion identified by antenatal testing should be born in a facility where emergency airway management and fluid drainage by an experienced team is immediately available in the delivery room.

How do you evacuate a pneumothorax or pleural effusion?

The air or fluid is aspirated by inserting a catheter into the pleural space on the affected side. This procedure is called *thoracentesis.* Ideally, thoracentesis should be performed using sterile technique with appropriate anesthetic for pain management; however, modifications may be required during emergency aspiration of a tension pneumothorax.

O Take a brief "time-out" and confirm the side that you plan to aspirate.

f) Aspiration site and positioning.

a. For a pneumothorax, the aspiration site is either the fourth intercostal space at the anterior axillary line or the second intercostal space at the mid-clavicular line (Figure 10.4). Using a small blanket roll, position the baby on their back (supine) with the affected side directed slightly upward to allow the air to rise to the upper (superior) portion of the chest.

b. For a pleural effusion, the aspiration site is the fifth or sixth intercostal space along the posterior axillary line. Place the baby on their back (supine) to allow the fluid to collect in the lower (posterior) portion of the chest (Figure 10.5).

8 Prepare the insertion site with topical antiseptic and sterile towels.

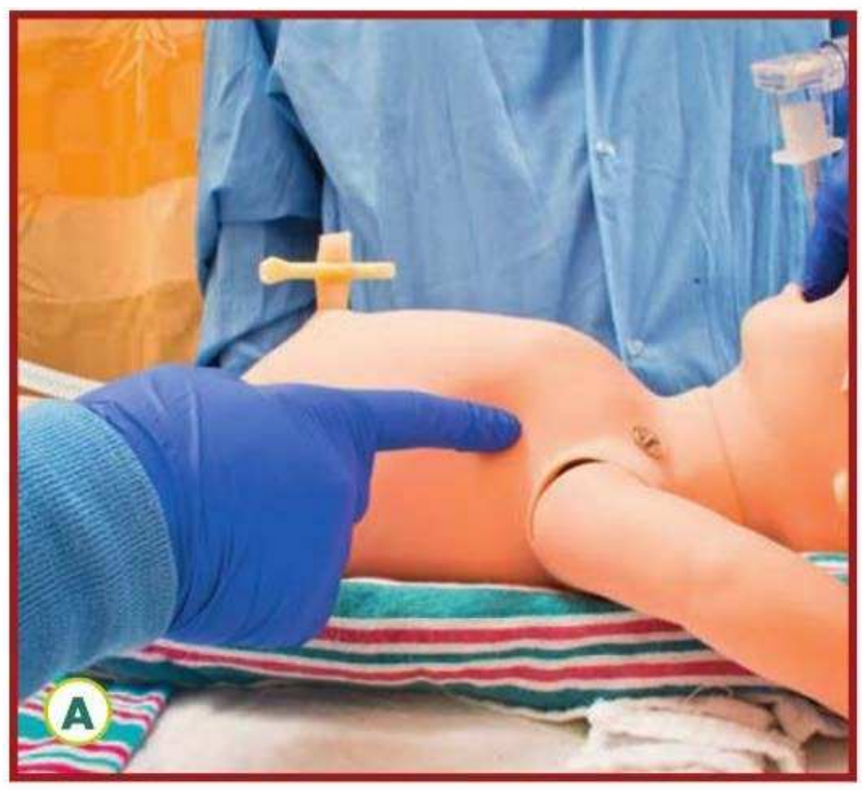


Figure 10.4. Locations for percutaneous aspiration of a pneumothorax. Fourth intercostal space at the anterior axillary line (A), second intercostal space at the mid-clavicular line (B). Cardiac monitor leads and skin temperature sensor not shown.

Figure 10.5. Location for aspiration of a pleural effusion

9 Insertan 18- or 20-gauge percutaneous catheter-over-needle device* perpendicular to the chest wall and just over the top of the rib. The needle is inserted over the top of the rib, rather than below the rib, to avoid puncturing the blood vessels located under each rib.

a. Por a pneumothorax, direct the catheter slightly upward toward the front of the chest (Figure 10.6).

b. For a pleural effusion, direct the catheter slightly downward toward the back.

0 Once the pleural space is entered, the needle is removed and a large syringe (20-60 mL) connected to a 3-way stopcock is attached to the catheter (Figure 10.7).

a. When the stopcock is opened between the syringe and the catheter, the air or fluid can be evacuated.

b. When the syringe is full, the stopcock may be closed to the chest while the syringe is emptied.

c. After the syringe is emptied, the stopcock can be reopened to the chest and more fluid or air may be aspirated until the baby's condition has improved.

d. To avoid accidental reinjection of air or fluid into the chest cavity, care must be taken when manipulating the stopcock.

e. When evacuating a pleural effusion, maintain a sample of the fluid for diagnostic evaluation.

O An x-ray should be obtained to document the presence or absence of residual pneumothorax or effusion.

*Note: If an appropriate catheter-over-needle device is not available, a small "butterfly" needle may be used. In this case, the syringe and stopcock will be connected to the tubing attached to the needle.

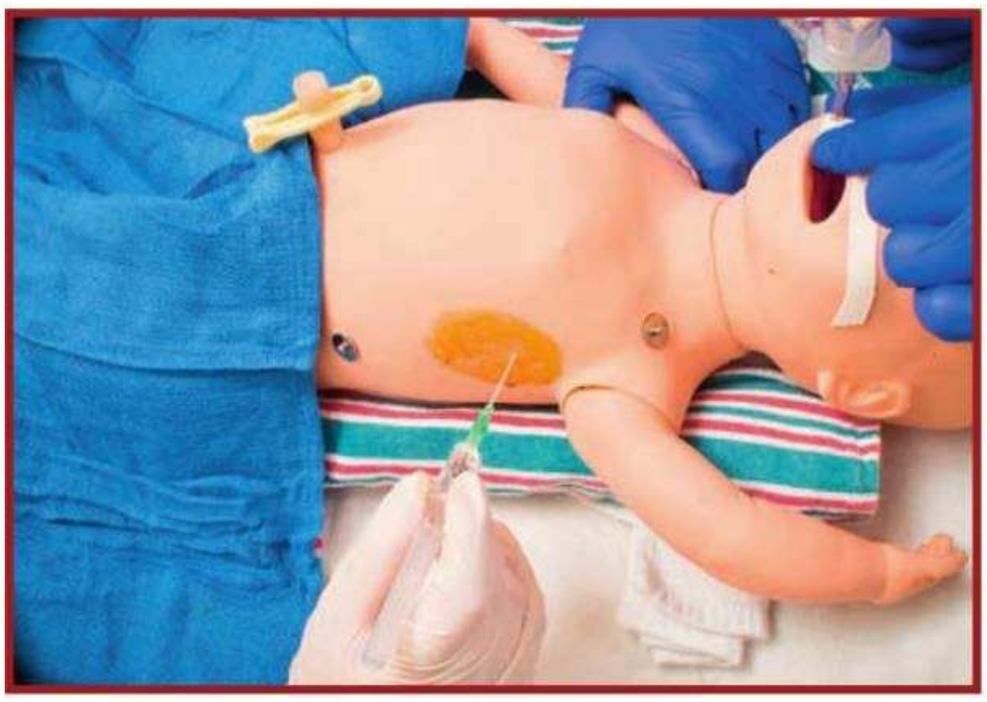


Figure 10.6. Aspiration of a pneumothorax. The needle is inserted over the rib and directed slightly upward toward the front of the chest. Note: The aspiration site is not covered with sterile towels for photographic purposes; however, modified sterile technique is acceptable for emergency aspiration.

Figure 10.7. Syringe and stopcock assembly used to aspirate pneumothorax. The stopcock is opened between the catheter and syringe during aspiration. The stopcock is closed if the syringe becomes full and must be emptied. The sorne assembly is used to drain a pleural effusion.

How do you manage a newborn with an airway obstruction?

Airway obstruction is a life-threatening emergency. The newborn's airway may be obstructed by thick secretions or a congenital anomaly that leads to an anatomic obstruction.

Thick secretions

Thick secretions, such as meconium, blood, mucus, or vernix, may cause complete tracheal obstruction. If you are attempting PPV, but the baby is not improving and the chest is not moving, perform each of the ventilation corrective steps (MR. SOPA) until you have successfully inflated the lungs.

If you have correctly inserted an endotracheal tube for ventilation, but still can11ot achieve chest movement, the trachea 1nay be obstructed by thick secretions. As described in Lesson 5, you may attempt to remove secretions from the trachea using a suction catheter (5F-8F) inserted through the endotracheal tube.

If the secretions are thick enough to completely obstruct the airway, you may not be able to clear them using a thin suction catheter. In this case, directly suction the trachea with a tracheal aspirator attached toan endotracheal tube (Figure 10.8). Set the suction pressure to 80 to 100 mg Hg, connect suction tubing to the aspirator, and attach the aspirator directly to the endotracheal tube connector. Sorne endotracheal tubes have an integrated aspiration device designed for suctioning the trachea. Occlude the aspirator's suction-control port

Figure 10.8. Suctioning thick secretions that obstruct ventilation using an endotracheal tube and tracheal aspirator

with your finger. You may need to gradually withdraw the tube to remove secretions from the trachea and posterior pharynx before reinserting a new endotracheal tube for ventilation. In most circumstances, establish an open airway and ventilation that inflates the lungs before proceeding to chest compressions.

Anatomic obstructions

Robin Sequence

The Robin sequence describes a combination of facial anomalies that occur because the lower jaw (mandible) does not develop normally. The lower jaw is small and set back in relation to the upper jaw. The baby's tongue is positioned further back in the pharynx than normal and obstructs the airway (Figure 10.9). It is common for babies with the Robin sequence to also have a cleft palate. This combination of findings may be isolated or part of a genetic syndrome.

If a baby with Robin sequence has labored breathing, turn the baby onto their stomach (prone). In this position, the tongue may move forward and open the airway. If prone positioning is not successful, insert a small endotracheal tube (2.5 mm) through the nose with the tip positioned deep in the posterior pharynx, past the base of the tongue, and above the vocal cords. It is not inserted into the trachea (Figure 10.10) and a laryngoscope is not required to do this. This helps to relieve the airway obstruction and facilitates spontaneous breathing.

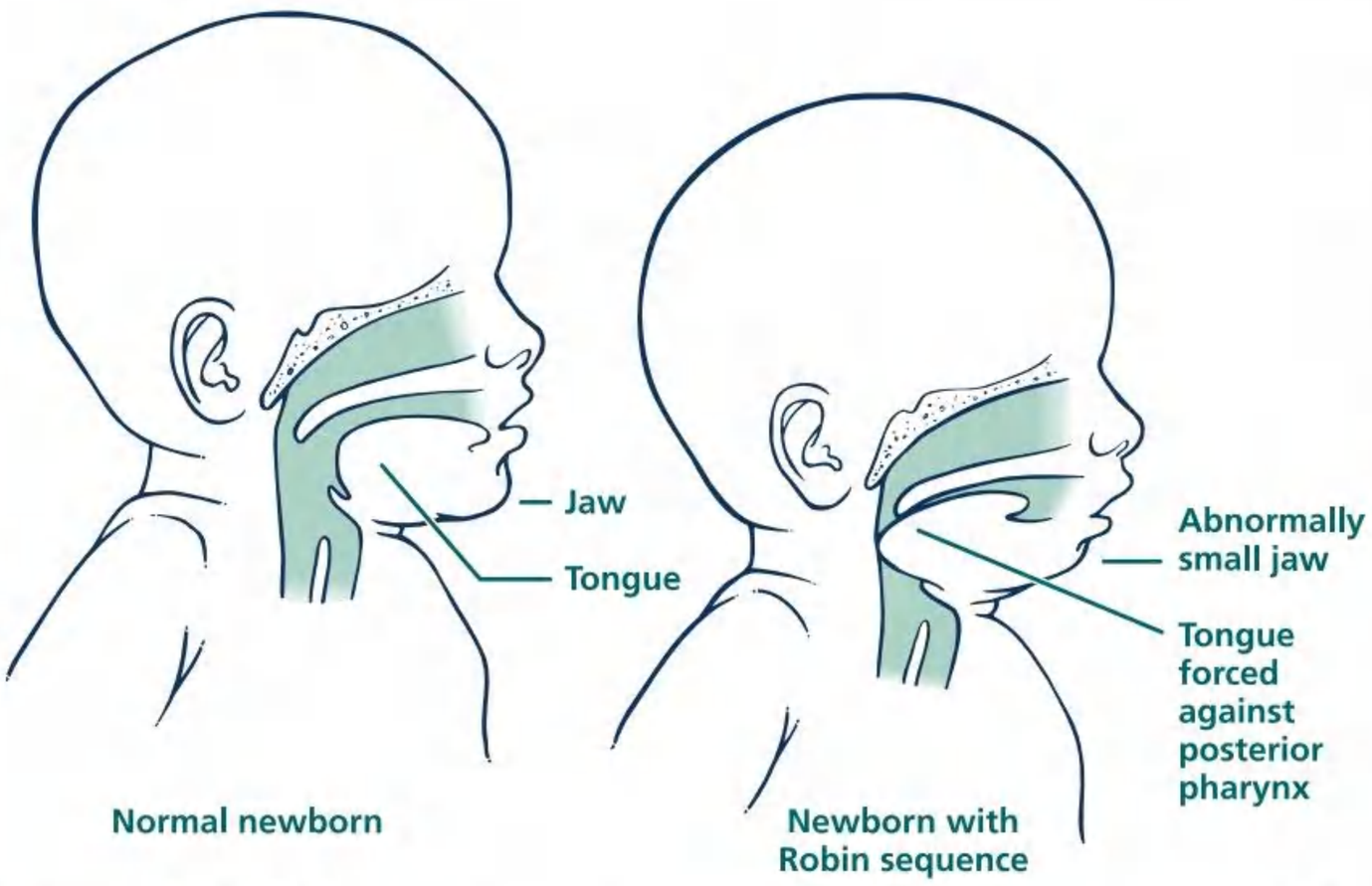


Figure 10.9. Newborn with normal anatomy (left) and newborn with Robin sequence (right)

If the baby has severe difficulty breathing and requires resuscitation, face-mask ventilation and endotracheal intubation may be very difficult. If none of the previous procedures results in adequate air movement, and attempts at face-mask ventilation and endotracheal intubation are unsuccessful, a laryngeal mask may provide a lifesaving rescue airway.

Choanal Atresia

Choanal atresia is a condition where the nasal airway is obstructed by bone or soft tissue (Figure 10.11). Because newborns normally breathe through their nose, babies with choanal atresia may have difficulty breathing unless they are crying and breathing through their mouth. In most cases, the obstruction occurs only on one side and does not cause significant symptoms in the newborn period.

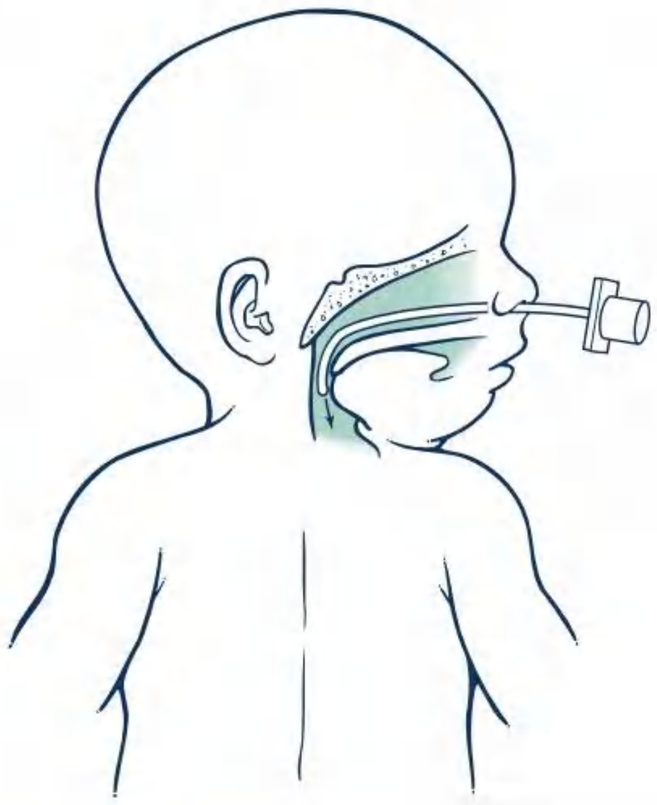


Figure 10.10. Endotracheal tube inserted deep in posterior pharynx for relief of airway obstruction in a newborn with Robin sequence. The tip of the tube is in the nasopharynx, above the vocal cords, NOT in the trachea.

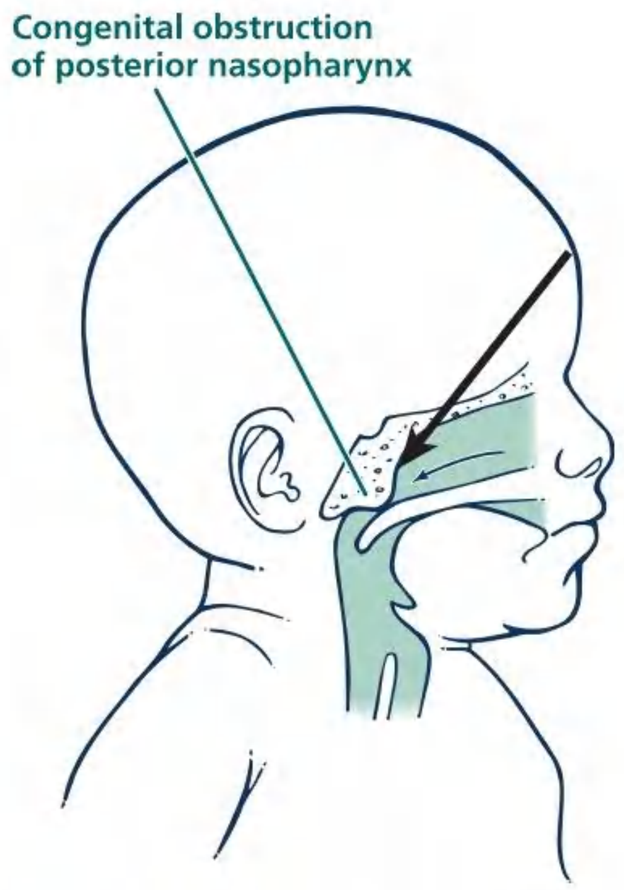


Figure 10.11. Choanal atresia causing obstruction of the nasal airway

Babies with choanal atresia may present with cyclic episodes of obstruction, cyanosis, and oxygen desaturation that occur when they are sleeping or feeding and resolve when they are crying. If the obstruction is bilateral, the baby may have difficulty breathing immediately after birth; however, the presence of choanal atresia should not prevent you from achieving effective PPV with a face mask.

You can test for choanal atresia by passing a thin suction catheter into the posterior pharynx through the nares. If the catheter will not pass, choanal atresia may be present.

If the baby has bilateral choanal atresia and respiratory distress, you can keep the mouth and airway open by inserting one of the following into the baby's mouth: a feeding nipple or pacifier modified by cutting off the end (McGovern nipple) and secured with ties around the occiput (Figure 10.12) or an endotracheal tube positioned with the tip just beyond the tongue in the posterior pharynx. Each of these measures provides temporary stabilization until the baby can be evaluated by a specialist.

Other Rare Conditions

Other conditions, such as oral, nasal, or neck masses (Figure 10.13); laryngeal and tracheal anomalies; and vascular rings that compress the trachea within the chest, have been reported as rare causes of airway compromise in the newborn. Some of these malformations will be evident by external examination. Depending on the location of the obstruction, it may be very difficult or impossible to achieve successful face-mask ventilation or to insert an endotracheal tube.

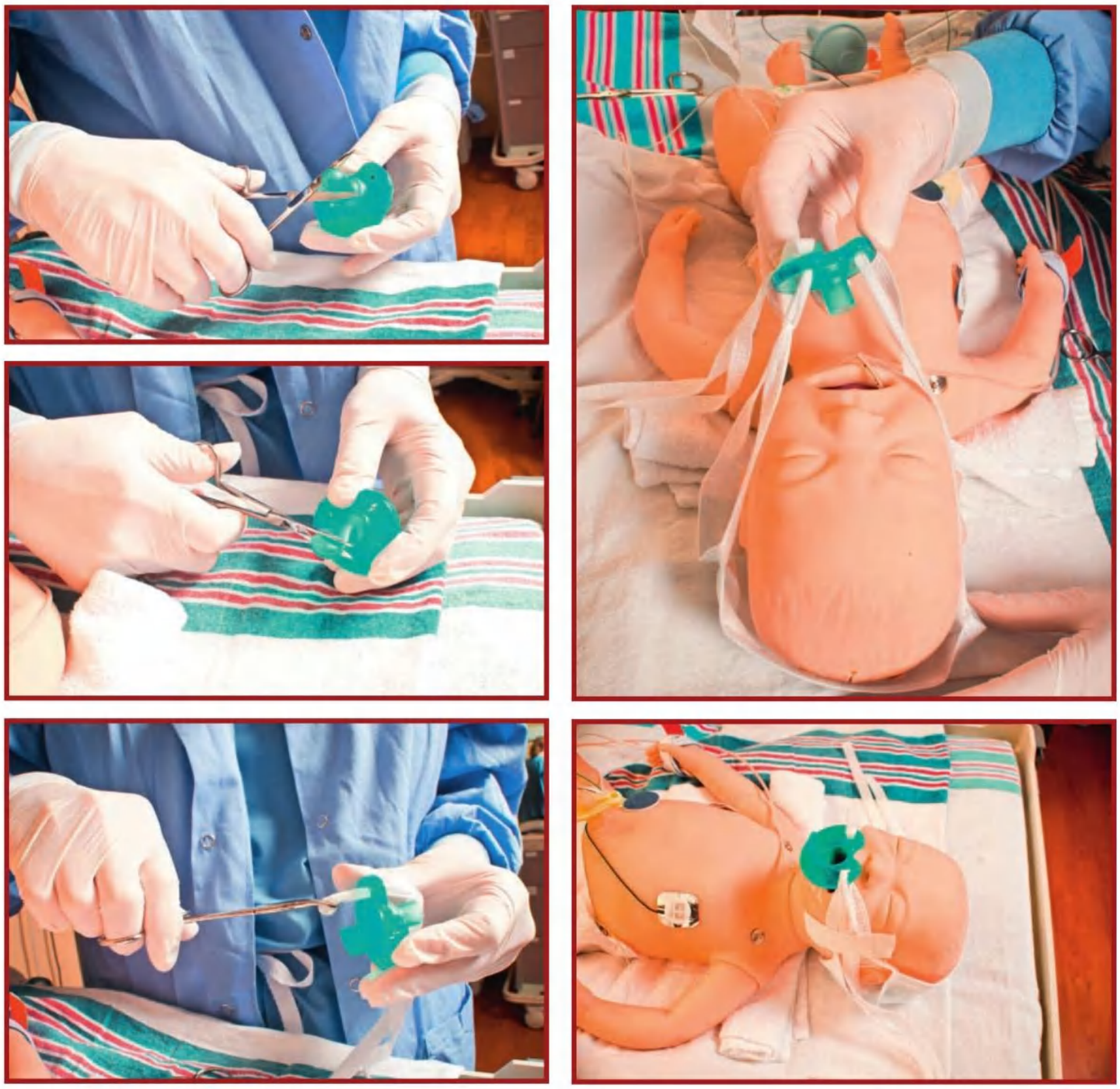


Figure 10.12. Modified pacifier (McGovern nipple) for temporary relief of airway obstruction in choanal atresia

Special expertise and equipment may be required for successful intubation. If the obstruction is above the level of the vocal cords and you cannot ventilate or intubate the baby, insertion of a laryngeal mask may provide a lifesaving rescue airway. If such problems are identified before birth, and time allows, the baby should be born in a facility where emergency management of the airway by a trained multidisciplinary team is immediately available in the delivery room.

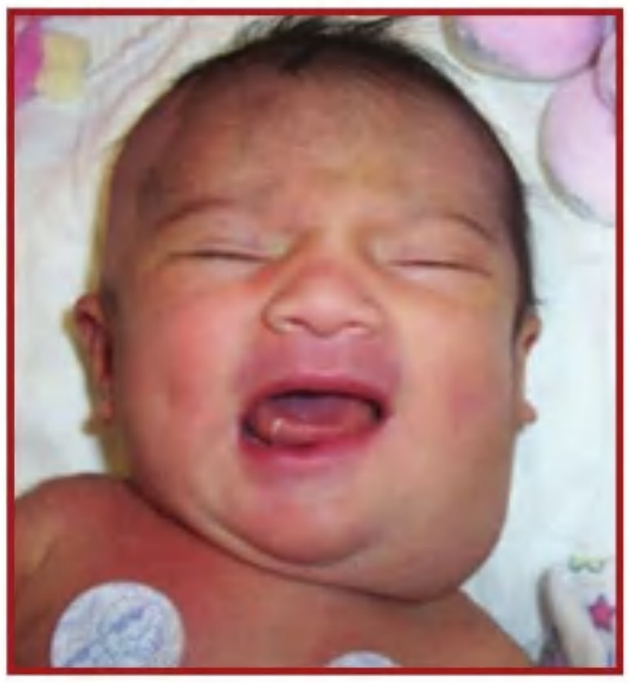


Figure 10.13. Newborn with a neck mass (cystic hygroma). (From Boyle KB, Anderson JM. A newborn who has a neck mass and scalp abrasion. *NeoReviews*. 2006;7[4]:e211-e216.)

What abnormalities of fetal lung development can complicate resuscitation?

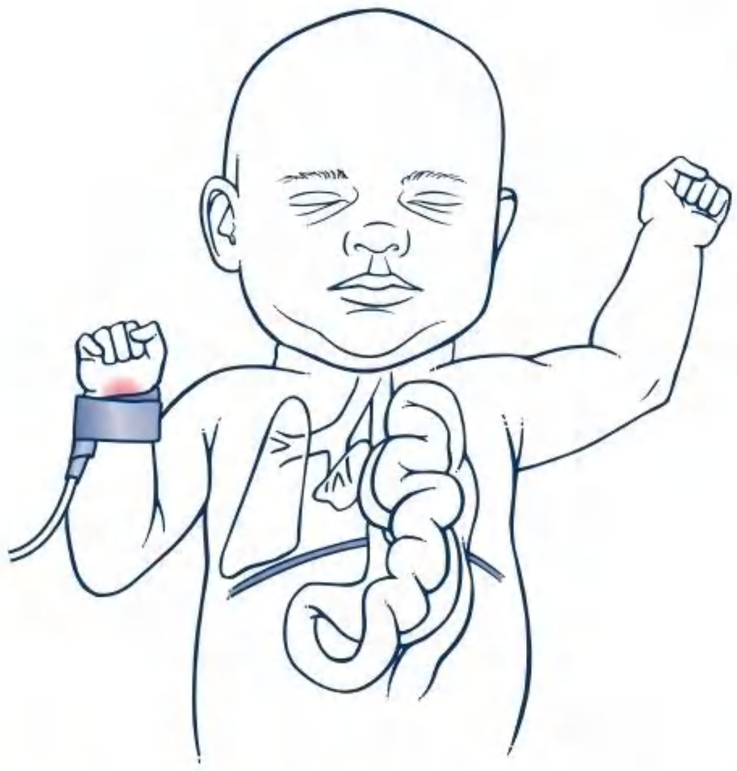
Congenital diaphragmatic hernia

The diaphragm normally separates the abdominal and thoracic contents. When the diaphragm does not form correctly, the intestines, stomach, and liver can enter the chest and prevent the lungs from developing normally (Figure 10.14). This defect is called a congenital diaphragmatic hernia (CDH). The most common type of CDH occurs on the baby's left side. Frequently, the defect is identified by antenatal ultrasound, and the baby's birth can be planned to occur at a high-risk center.

The baby may present with an unusually flat-appearing (scaphoid) abdomen, respiratory distress, and hypoxemia. If PPV is administered by face mask, gas enters the stomach and intestines. As these structures expand within the chest, lung inflation will be increasingly inhibited and breath sounds will be diminished on the side of the hernia. If the ventilating pressure is increased in an attempt to improve inflation, the baby may develop a pneumothorax. Pulmonary hypertension is commonly associated with a CDH and may contribute to severe hypoxemia.

Avoid face-mask PPV for babies with a diaphragmatic hernia.

Promptly intubate the trachea and insert a large orogastric catheter (10F) to intermittent or continuous suction to prevent gaseous distention (Figure 10.15). A double-lumen sump tube (Replogle tube) is most effective.



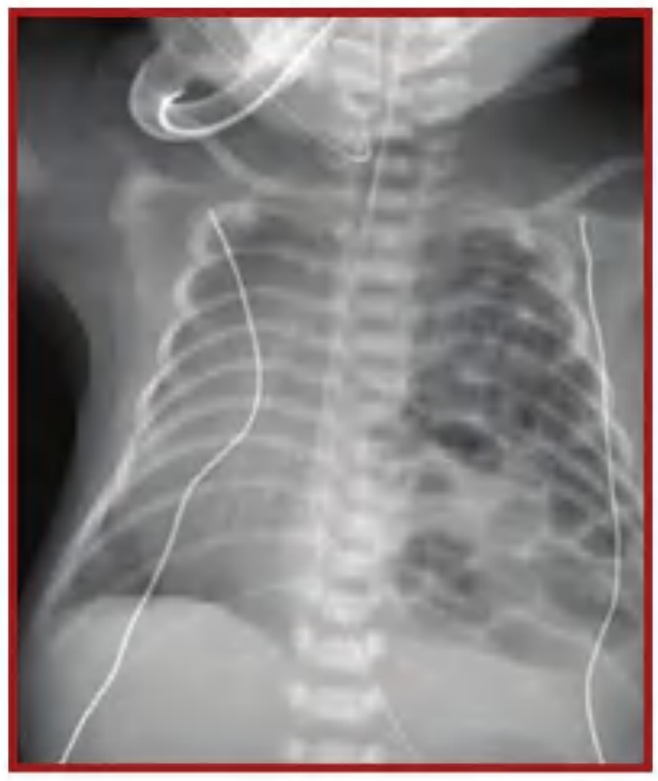


Figure 10.14. Congenital diaphragmatic hernia

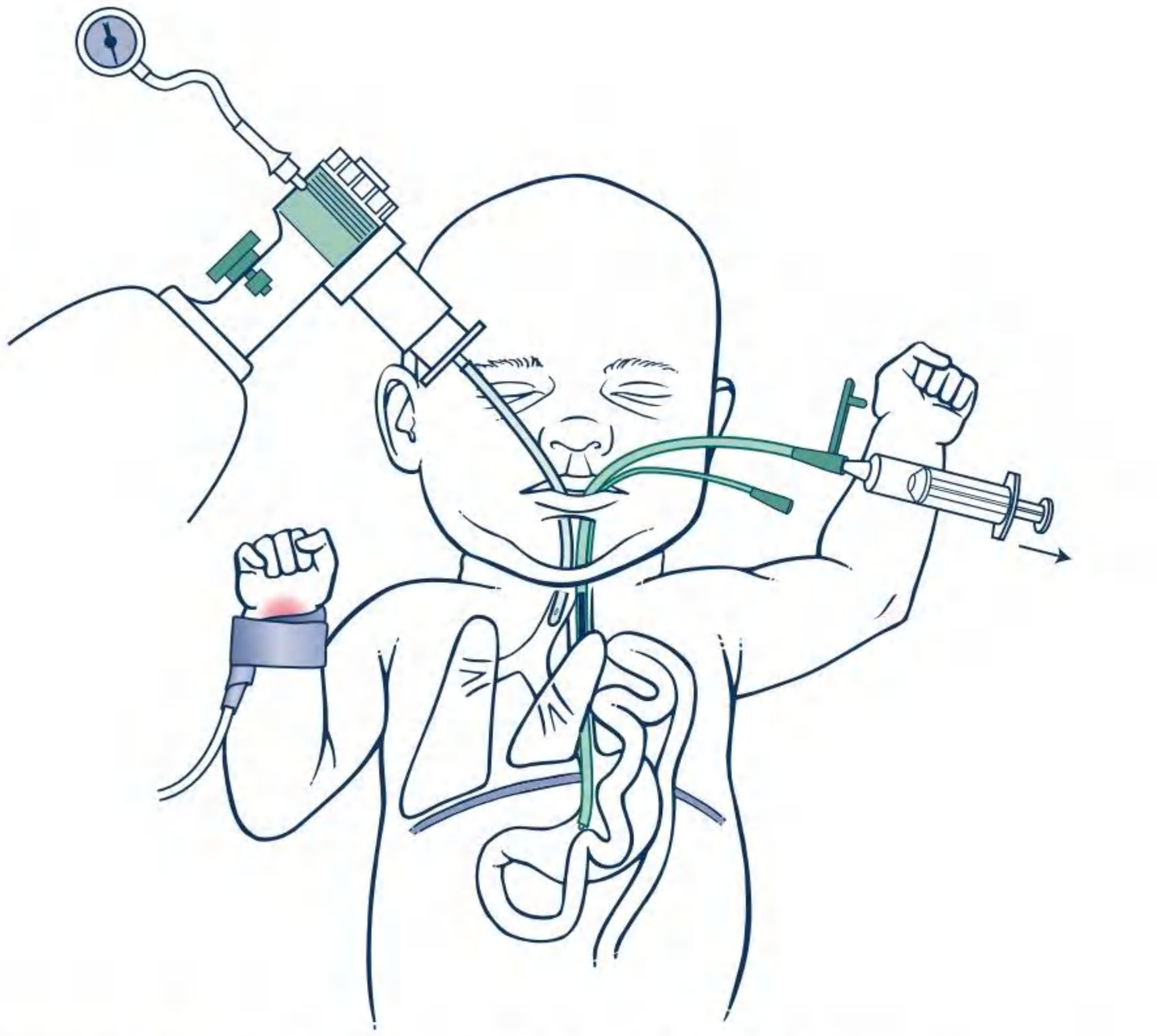


Figure 10.15. Stabilizing treatment for a baby with a CDH. An endotracheal tube is in the trachea and a double-lumen sump tube (Replogle tube) is in the stomach. The sump tube is aspirated intermittently or attached to vacuum suction. Both tubes are secured (tape and cardiac monitor leads not shown).

Pulmonary hypoplasia

Normal lung development requires adequate space within the chest. Any condition that occupies space in the chest or causes a prolonged, severe decrease in amniotic fluid (oligohydramnios) may cause the lungs to be incompletely developed. This is called pulmonary hypoplasia. Examples of conditions causing pulmonary hypoplasia include CDH and obstruction or absence of both fetal kidneys. At the time of birth, the baby's chest may appear small and bell-shaped. If pulmonary hypoplasia was caused by oligohydramnios, the baby may have deformities of the hands, feet, nose, and ears caused by compression within the uterus. High inflating pressures may be required to inflate the baby's lungs, and this increases the risk of developing pneumothoraces. Alternative methods of mechanical ventilation available in high-risk centers may be required immediately after birth. Severe pulmonary hypoplasia may be incompatible with survival.

What if the mother received an opiate during labor and her newborn is apneic or lethargic at birth?

Opiates given to the laboring mother to relieve pain may cross the placenta and decrease the newborn's activity and respiratory drive. If a newborn has respiratory depression after maternal opiate exposure, manage the baby's airway and provide respiratory support with PPV as described in previous lessons. If the baby has prolonged apnea, insertion of an endotracheal tube or laryngeal mask may be required for ongoing respiratory support.

Although the opiate antagonist naloxone has been used in this setting, there is insufficient evidence to evaluate the safety and efficacy of this practice. Very little is known about the pharmacology of naloxone in the newborn. Animal studies and case reports have raised concerns about complications from naloxone, including pulmonary edema, cardiac arrest, and seizures.

What if a baby does not breathe or has decreased activity and the mother did not receive an opiate during labor?

Other causes of neonatal depression should be considered. If PPV results in a normal heart rate and oxygen saturation, but the baby does not breathe spontaneously, the baby may have depressed respiratory drive or muscle activity due to a medication self-administered by the mother, hypoxia, severe acidosis, a structural brain abnormality, or a neuromuscular disorder. Medications given to the mother, such as magnesium sulfate and general anesthetics, can depress respirations in the newborn. There are no medications that reverse the effects of these drugs. Again, the focus is to provide airway support and effective ventilation until the medication's effect has resolved. Transport the baby to the nursery for further evaluation and management while administering PPV and monitoring the baby's heart rate and oxygen saturation.

What special care is required for a newborn with myelomeningocele (spina bifida)?

Myelomeningocele is a type of neural tube defect that affects the spinal cord and vertebrae (Figure 10.16). It most commonly involves the lower back (lumbar area). The defect occurs during the first few weeks of fetal development when the precursor of the spinal cord, the neural tube, does not completely close. A sac of fluid containing part of the spinal cord and nerves may protrude through an opening

in the baby's back. It is important to protect the sac and the neural tissue from trauma. Babies with myelomeningocele may also have hydrocephalus and a defect of the brainstem and cerebellum (Arnold Chiari malformation) that can cause apnea or vocal cord paralysis.

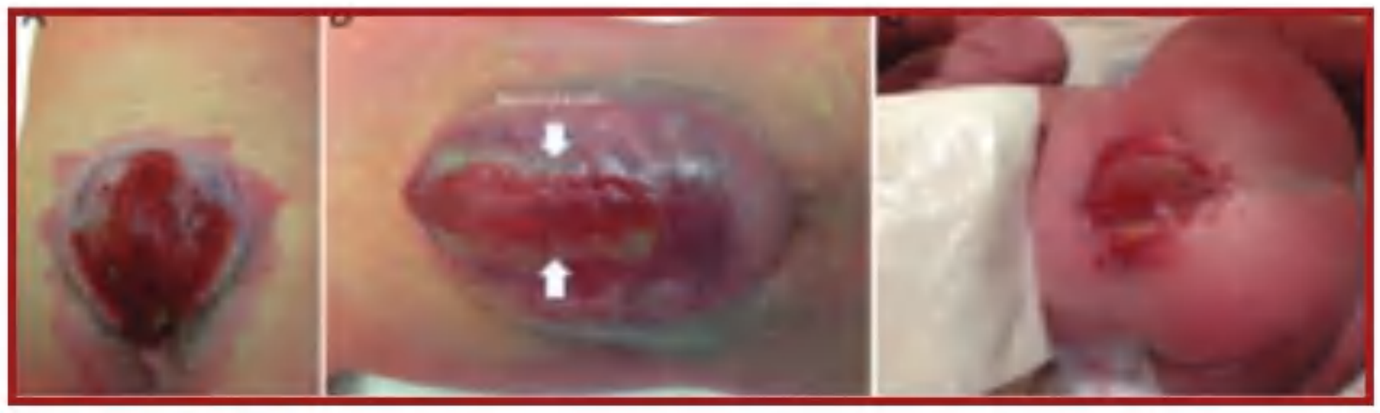


Figure 10.16. Newborns with open myelomeningocele. (From Birgisson NE, Lober RM, Grant GA. Prenatal evaluation of myelomeningocele: a neurosurgical perspective. *NeoReviews*. 2016;17[1]:e28-e36.)

- Before birth, prepare a "donut" with towels or latex-free foam covered with towels in case the baby must be positioned on their back (supine). This will allow the defect to be placed within the "donut hole."
- Newborns with neural tube defects are at risk of developing latex allergy. Use only latex-free equipment and supplies when caring for newborns with a neural tube defect.
- After birth, place the newborn lying on their side or on their stomach (prone) to avoid pressure on the fluid sac and its contents. If it is necessary to place the baby supine for airway management, position the baby on the prepared "donut" with the defect over the open "donut hole."
- Avoid drying or rubbing the defect during the initial steps of newborn care.
- Proceed with resuscitation steps as needed.
- Once the baby is stable, follow local guidelines for covering the lesion. Some experts recommend placing non-latex, transparent plastic wrap across the lesion and wrapping it around the baby's abdomen/waist (with or without a non-adherent, moist gauze between the lesion and the plastic wrap).
- Use caution to avoid rupturing the sac.

What special care is required for a newborn with an abdominal wall defect?

The most common abdominal wall defects found in newborns are gastroschisis and omphalocele. Both are often identified by prenatal ultrasound, and birth can be planned at a high-risk center.

Gastroschisis (Figure 10.17A) is a defect where the baby's bowel protrudes through an opening in the abdominal wall. Most often, the defect is found on the right side of a normal-appearing umbilical cord. Although babies with gastroschisis are often born preterm or small for gestational age, most do not have any other anomalies.

Omphalocele is a defect in the abdominal wall that includes the umbilical cord (Figure 10.17B). The baby's bowel is often contained within a large membranous sac that may contain other abdominal organs. The sac may rupture before or after delivery, exposing the abdominal contents. Babies with omphalocele frequently have other congenital anomalies or genetic syndromes.

For both defects, it is important to protect the bowel and abdominal organs from trauma.

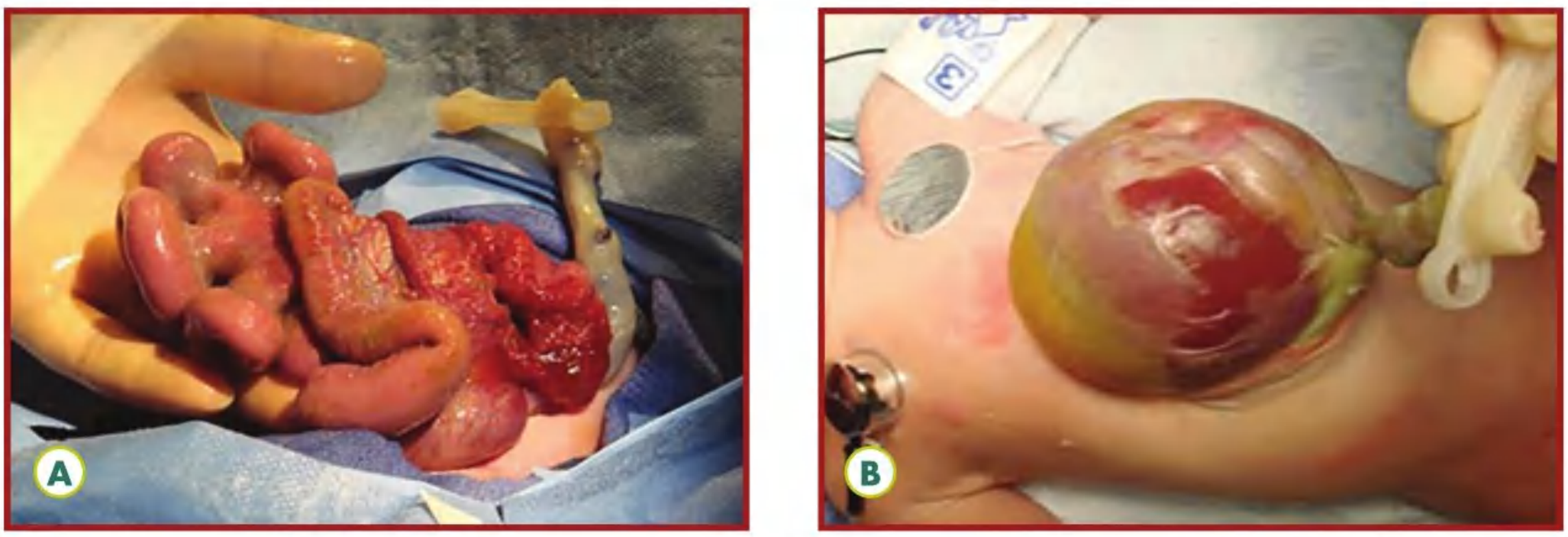


Figure 10.17. Abdominal wall defects. Gastroschisis (A) with no sac covering the protruding bowel. The defect is to the right of the umbilicus. Omphalocele (B) with abdominal contents within a sac. The defect involves the umbilical cord. (From Slater BJ, Pimpalwar A. Abdominal wall effects. *NeoReviews.* 2020;21[6]:e383-e391.)

The following are special considerations for gastroschisis:

- Ask the obstetric provider to clamp and cut the umbilical cord at least 10 to 20 cm (4-8 inches) from the baby because the cord may be used as part of the surgical repair.
- Place the baby and the exposed bowel in a sterile, clear plastic bowel bag and secure the bag across the baby's chest.
- Position the baby and exposed bowel on the right side to optimize perfusion.
- Cardiac monitor leads can be placed on the baby's upper chest and arms.
- Avoid prolonged face-mask ventilation to prevent air from distending the bowel. If assisted ventilation is necessary, consider inserting an endotracheal tube or laryngeal mask.
- Insert a large orogastric catheter (8F or 10F) and use low intermittent or continuous suction to prevent gaseous distention of the bowel. A double-lumen sump tube (Replogle tube) is most effective.
- Minimize handling of the exposed bowel but frequently monitor its color to identify worsening perfusion.
- In an emergency, an umbilical venous catheter can be inserted, however; attempt to leave as much intact umbilical cord length as possible to assist the surgical repair.
- The exposed bowel increases heat and fluid losses. Careful attention to temperature management and fluid administration is necessary.

The following are special considerations for omphalocele:

- Be cautious to clamp and cut the umbilical cord well above the bowel or abdominal organs enclosed within the defect.
- Place the baby's lower body, including the omphalocele, in a sterile, clear plastic bowel bag and secure the bag across the baby's chest.
- Position the baby and omphalocele on the right side to optimize perfusion.
- Cardiac monitor leads can be placed on the baby's upper chest and arms.
- Insert a large orogastric catheter (8F or 10F) and use intermittent or continuous suction to prevent gaseous distention of the bowel. A double-lumen sump tube (Replogle tube) is most effective.
- Handle the omphalocele gently to avoid rupturing the sac or injuring the abdominal contents.

- Assess the baby's respiratory status. Newborns with large omphaloceles may require respiratory support, including continuous positive airway pressure (CPAP) or mechanical ventilation.
- An umbilical venous catheter cannot be used for emergency vascular access. If emergency access is required during resuscitation, an intraosseous needle can be used.

Focus on Teamwork

The special considerations described in this lesson highlight several opportunities for effective teams to use the NRP Key Behavioral Skills.

Behavior	Example
Anticipate and plan. Use available information. Communicate effectively.	Through effective communication with the obstetric team, identify important antenatal risk factors, such as maternal narcotic exposure, abnormal amniotic fluid volume, and the results of prenatal ultrasound examinations. Share the information with your team so that you can anticipate high-risk deliveries and adequately prepare for resuscitation.
Use available resources.	Be aware of what resources are available to stabilize a newborn with a difficult airway. Where is the equipment stored?

Quality Improvement Opportunities

Ask yourself the following questions and begin a discussion with your team if you find a difference between the NRP recommendations and what is currently done in your own hospital setting. Consider using the suggested process and outcome measures to guide your data collection, identify areas for improvement, and monitor if your improvement efforts are working.

Quality improvement questions

1. Who are the health care professionals that can perform an emergency thoracentesis?
2. Is someone with these skills immediately accessible if needed?
3. Is a kit with all necessary supplies for emergency thoracentesis immediately accessible if needed?
4. Do you have latex-free equipment and supplies in your delivery area?
5. Do you have sterile, clear plastic bowel bags in your delivery area?

6. How does your team know that a baby with a serious congenital anomaly will be born?

7. Does your obstetric team have a mechanism for communicating with your resuscitation team and planning for the birth and immediate newborn care?

Process and outcome measures

1. How often are newborns with serious congenital anomalies diagnosed only after birth?

2. How often are newborns at your hospital diagnosed with a pneumothorax?

3. How long does it take to assemble a team qualified to manage an unanticipated newborn emergency?

LESSON 10 REVIEW

1. A newborn's heart rate is 50 beats per minute and has not improved with ventilation through a face mask or properly inserted endotracheal tube. The baby's chest is NOT moving with positive-pressure ventilation. You should (suction the trachea using a 5F to 8F suction catheter or tracheal aspirator)/(proceed immediately to chest compressions).

2. A newborn has respiratory distress after birth. The baby has a small lower jaw and a cleft palate. The baby's respiratory distress may improve if you insert a small endotracheal tube in the nose, advance it into the pharynx, and position the baby (supine [on the back])/(prone [on the stomach]).

3. You attended the birth of a baby that received positive-pressure ventilation during the first minutes of life. The baby improved and has been monitored in the nursery. A short time later, the baby developed acute respiratory distress. You should suspect (a pneumothorax)/(a congenital heart defect) and should rapidly prepare (a needle aspiration device)/(epinephrine).

4. You attend the birth of a baby with antenatally diagnosed congenital diaphragmatic hernia. Promptly after birth, you should (begin face-mask ventilation and insert an orogastric tube in the

stomach)/(intubate the trachea and insert an orogastric tube in the stomach).

5. A mother received an opiate medication for pain relief 1 hour before delivery. After birth, the baby does not have spontaneous respirations and does not improve with stimulation. Your first priority is to (start positive-pressure ventilation)/(administer the opiate antagonist naloxone).

6. After birth, position a newborn with myelomeningocele on their (back)/(stomach or side).

7. After birth, place a newborn with gastroschisis in a sterile, clear plastic bowel bag and position the baby on their (back)/(right side).

Answers

1. You should suction the trachea using a 5F to 8F suction catheter or tracheal aspirator.

2. The baby's respiratory distress may improve if you insert a small endotracheal tube in the nose, advance it into the pharynx, and position the baby prone (on the stomach).

3. You should suspect a pneumothorax and should rapidly prepare a needle aspiration device.

4. Promptly after birth, you should intubate the trachea and insert an orogastric tube in the stomach.

5. Your first priority is to start positive-pressure ventilation.

6. Position a newborn with myelomeningocele on their stomach or side.

7. Position a newborn with gastroschisis on their right side.