



Complete heart block (CHB) in the fetus can develop due to maternal risk factors such as autoantibody transfer from autoimmune disease (i.e. anti-Ro/SSA and anti-La/SSB antibodies) or structural heart anomalies such as congenitally corrected transposition of the great arteries (CCTGA) or left atrial isomerism (heterotaxy syndrome). Complete heart block, also known as third degree heart block, involves complete atrioventricular (AV) dissociation resulting in profound fetal bradycardia. Fetal heart rates can range from 40 to 90 bpm depending on the ventricular escape rhythm. There is a higher risk of mortality and fetal hydrops in utero if the ventricular escape rate is < 55 bpm and/or there is evidence of impaired left ventricular function. Postnatally, CHB can lead to inadequate cardiac output because the stroke volume is unable to completely compensate for the low ventricular heart rate. It is important to identify signs of symptomatic low cardiac output with poor perfusion and minimize oxygen consumption in the delivery room.

Goals for delivery room and transport:

Monitor for signs of symptomatic low cardiac output or heart failure, especially if there are high-risk factors: poor peripheral or central pulses, gray coloration, delayed capillary refill, unresponsiveness, or signs of hydrops).

If heart failure signs are present, clinical goals include:

- Minimizing oxygen consumption
- Ensure adequate oxygenation and ventilation
- Supporting systemic perfusion
- Critical to monitor the pulse oximetry for perfused beats

Access plan:

1. For most patients, obtain PIV access or low lying UVC if unable to obtain PIV
 - a. Strongly encourage UAC to assess perfused beats
2. For high-risk patients, prepare a low-lying UVC (preferably double lumen) in advance

Medication plan:

1. D10W at 60 ml/kg/day
2. Rescue medications for low cardiac output:
 - a. Epinephrine 0.05-0.1 mcg/kg/min IV infusion
 - b. Second line: Isoproterenol 0.05 mcg/kg/min IV infusion (limited by side effect of hypotension)
3. Medications for sedation/neuromuscular blockade:
 - a. Fentanyl 1 mcg/kg/dose
 - b. Vecuronium (0.1 mg/kg) or Rocuronium 1 mg/kg dose for neuromuscular blockade
4. If concurrent with congenital heart disease, may require prostaglandin (PGE1)

Equipment/supplies:

1. Blood pressure cuff
2. EKG and Pulse oximetry leads for monitoring
3. Defibrillator for external pacing and infant pads
4. 3.0 ET tube (preferably cuffed)
5. If there is concern for cardiac tamponade, may consider pericardial/pleural effusion drainage

Delivery room management plan for High-Risk:

High-Risk indications:

- Ventricular dysfunction (>mild)
- Evidence of hydrops
- Heart rate less than 55 bpm

1. Start NRP per protocol and delayed cord clamping per institutional protocol. This may not be feasible in the setting of fetal distress. Assess for perfusion – Adjust saturation goals if cyanotic heart disease present. In complete heart block, heart rate alone may not be reliable indication for initiating PPV or CPR to assess resuscitation efforts. Assess apnea or respiratory insufficiency to determine need for PPV.
2. If patient is unstable (low cardiac output or poor respiratory effort), proceed to intubation
3. Place emergency low lying UVC line
4. Administer sedation and neuromuscular blockade to minimize oxygen demand (Fentanyl (1-2 mcg/kg) and vecuronium (0.1 mg/kg) or rocuronium (1mg/kg/dose) for neuromuscular blockade
5. If signs of low cardiac output, discuss with cardiology the need for epinephrine (0.05-0.1 mcg/kg/min IV infusion) or isoproterenol (0.05 mcg/kg/min)
6. Place a UAC line for monitoring
7. Obtain an arterial blood gas
8. Give sodium bicarbonate if pH < 7.2 or there is hemodynamic instability
9. Obtain an ECG and rhythm strip
10. Discuss need for transcutaneous pacing if there continues to be signs of low cardiac output

Delivery room management plan for Standard-Risk:

Standard-Risk indications:

- Normal ventricular function
- No evidence of hydrops
- Heart rate greater than 55 bpm in the setting of a structurally normal heart

1. Start NRP per protocol and delayed cord clamping per institutional protocol. This may not be feasible in the setting of fetal distress. Assess for perfusion – Adjust saturation goals if cyanotic heart disease present. In complete heart block, heart rate alone may not be reliable indication for initiating PPV or CPR to assess resuscitation efforts. In CHB HR will not respond to PPV. Assess apnea or respiratory insufficiency to determine need for PPV.
2. Assess for signs of poor perfusion (delayed cap refill, gray coloration, unresponsiveness). If signs of poor perfusion, move to high-risk management plan (above).
3. Assess need for airway support and provide positive pressure as needed
4. Obtain peripheral IV access
5. Obtain an ECG and rhythm strip