

Heart failure

Congestive heart failure (CHF) occurs when the heart can no longer meet the metabolic demands of the body at normal physiologic venous pressures. Typically, the heart can respond to increased demands by means of one of the following:

1. Increasing the heart rate, which is controlled by neural and humoral input
2. Increasing the contractility of the ventricles, secondary to both circulating catecholamine's and autonomic input
3. Augmenting the preload, mediated by constriction of the venous capacitance vessels and the renal preservation of intravascular volume.

Etiology:

◆ Increased Preload

- L to R shunts (VSD, PDA, AV fistula)
- severe anemia

◆ Increased Afterload

- Hypertension
- Congenital (aortic stenosis, Coarctation of aorta)

◆ Decreased Contractility

- myocarditis, pericarditis with tamponade
- cardiomyopathy (dilated or hypertrophic)
- Kawasaki syndrome (early phase)
- metabolic: electrolyte, hypothyroid
- myocardial contusion
- toxins: dig, calcium channel blockers, beta blockers

◆ Dysrhythmia

Clinical features:

Infants: irritable, poor feeding (early fatigue), failure to thrive, respiratory symptoms, diaphoresis.

Always consider in patients with respiratory symptoms

- often misdiagnosed as respiratory illness / infection

◆ Low cardiac output

- Fatigue or low energy or poor feeding
- Pallor
- Sweating
- Cool extremities
- Poor growth
- Dizziness
- Altered consciousness
- Syncope

Signs of CHF include the following:

◆ Tachycardia

◆ Venous congestion

Right-sided

- Ascites
- hepatomegaly
- Pleural effusion
- Edema
- Jugular venous distension

Left-sided

- Retractions
- tachypnea
- Nasal flaring or grunting
- Rales
- Pulmonary edema

Viral myocarditis:

Leading cause of dilated cardiomyopathy and one of the most common causes of CHF in children

Etiology: echo and coxsackie viruses

Hallmark is CHF

Failure to respond to bronchodilators in wheezing child

Diagnosis:

History and clinical signs and symptoms

ECG

CXR

Echocardiography

Treatment:

1. Preload reduction:

Furosemide 1 mg/kg/dose PO or IV May increase to qid

Hydrochlorothiazide 2 mg/kg/d PO divided bid May increase to qid

Metolazone 0.2 mg/kg/dose PO Used with loop diuretic, may increase to bid

2. Inotropic drugs:

Digoxin

Preterm infants: 0.005 mg/kg/d PO divided bid or 75% of this dose IV

<10 y: 0.010 mg/kg/d PO divided bid or 75% of this dose IV

>10 y: 0.005 mg/kg/d PO qd or 75% of this dose IV

Dopamine 5-28 mcg/kg/min IV Gradually titrate upward to desired effect

Dobutamine 5-28 mcg/kg/min IV Gradually titrate upward to desired effect.

3. Afterload reduction

Captopril 0.1-0.5 mg/kg/d PO divided q8h-

Enalapril 0.1 mg/kg/d PO divided qd/bid, not to exceed 0.5 mg/kg/d

4. Improvement of nutrition.

Reference:

- [Nelson Textbook of Pediatrics 20th 2015](#).
- Gavin Greenfield, Peggy Thomsen, Pediatric Cardiac Emergencies.