

6

**Interrupted Aortic Arch**

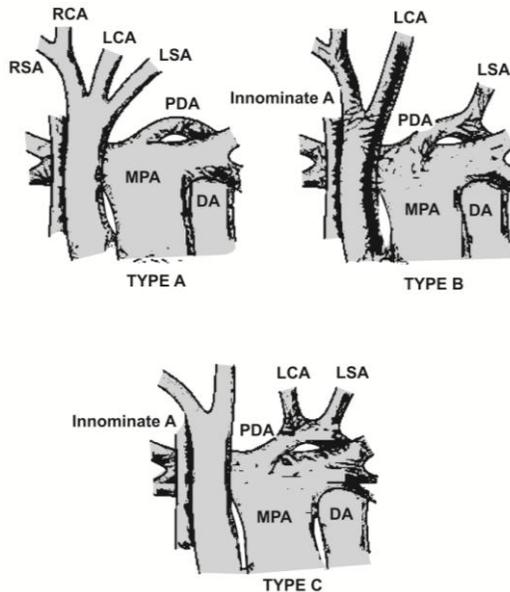
## 6.1 Morphology & Pathophysiology

The interruption of the aortic arch is classified by the site of an interruption in the ascending aorta.

*Type A:* Interruption distal to the left subclavian artery.

*Type B:* Interruption proximal to the left subclavian artery.

*Type C:* Interruption is between the innominate artery and the left common carotid artery (see Figure 6.1).



**Figure 6.1** Diagram showing types of interrupted aortic arch. Type A: interruption of aortic arch beyond origin of the left subclavian artery. Type B: interruption of aortic arch between origin of the left common carotid artery and left subclavian artery. Type C: interruption of aortic arch between origin of the innominate artery and left common carotid artery. Patent ductus arteriosus provides perfusion to the arch of aorta distal to interruption. DA = descending aorta, LCA= left common carotid artery, LSA= left subclavian artery. MPA= main pulmonary artery, PDA= patent ductus arteriosus, RCA= right carotid artery. RSA= right subclavian artery.

Ventricular septal defect is frequently associated in the interrupted aortic arch, especially with Types B and C.

### **6.1.1 Blood Supply to the Arterial Branches in the Aortic Interruption**

*Proximal* to the interruption is provided by the ascending aorta.

*Distal* to the interruption is provided by the patent ductus arteriosus.

### **6.1.2 Arterial Oxygen Saturation in Aortic Interruption**

Proximal to the interruption is normal (matches left atrial oxygen saturation).

Distal to the interruption is lower (matches mixed venous oxygen saturation).

Spontaneous closure of the patent ductus arteriosus in interrupted aortic arch results in hypoperfusion of the lower body and metabolic acidosis. Maintenance of ductal patency (by infusion of prostaglandin E<sub>1</sub>) is extremely important for preoperative resuscitation and preoperative stabilization.

## **6.2 Operative Techniques**

Type A interrupted aortic arch without a VSD or with a small restrictive VSD is usually, repaired much like coarctation of the aorta with end-to-end anastomosis.

Types B and C interruptions are frequently associated with a VSD, and the surgical correction is performed during the neonatal period.

The repair requires CPB (cardiopulmonary bypass), deep hypothermia, and circulatory arrest.

The arterial limb of the CPB circuit is divided into two arms:

1. Perfusion of the proximal aorta is done through one arm.

2. Perfusion of the distal aorta is accomplished through the other arm via cannulation of the patent ductus arteriosus.

On circulatory arrest the arterial cannulas are removed. Direct anastomosis of the upper aortic and lower aortic segments is performed.

Cardiopulmonary bypass is resumed with recannulation of the aorta in the usual way. Associated ventricular septal defect and atrial septal defect are repaired either on a circulatory arrest or after resuming CPB and with a cardioplegic arrest.

## 6.3 Postoperative Management

Hemodynamic instability may occur in the postoperative period due to preoperative pulmonary overcirculation or preoperative resuscitation from the duct closure in type B & type C.

Pulmonary artery hypertensive episodes may occur and need management.

Postoperative arterial oxygen saturation and intracardiac pressures should be normal.

### 6.3.1 Management of Pulmonary Artery Hypertensive Episodes

The pulmonary artery hypertensive episodes are either prevented from occurring or treated during the postoperative period by institution of either one or more of the following measures:

1. Sedation with IV infusions of a fentanyl and a neuromuscular blocking agent.
2. Inhaled nitric oxide.
3. Oxygenation and hyperventilation.

### **6.3.2 Invasive Monitors**

Arterial line, central venous catheter, and LA (left atrial) catheters.

An oximetry catheter may be placed in placed in the pulmonary artery (PA) to monitor PA pressure and cardiac output.

### **6.3.3 Vasoactive Drug Infusions**

Dopamine or dobutamine, epinephrine, milrinone, nitroprusside, and phenoxybenzamine (see Section I Chapters 4 & 16).

### **6.3.4 Postoperative Bleeding**

Rare, but may occur as the suture lines are exposed to systemic arterial pressure.

### **6.3.5 Atrioventricular Conduction Abnormalities**

These may occur due to edema around the conduction tissue from the suture lines during closure of the ventricular septal defect. Temporary pacing (AV sequential pacing) should be available at the bed side (see Section I Chapter 4).

