

Vascular Ring



What Is It?

Vascular ring refers to a group of abnormalities of the aorta (the large vessel that carries blood from the heart to the body) and its branches. It can cause breathing problems and feeding problems in infants and children. True or complete vascular ring refers to conditions in which abnormal vessels form a complete circle around the trachea (the breathing tube that carries air to and from the lungs) and esophagus (the tube that carries food to the stomach). (Please see the diagram below for the positions of the trachea and esophagus.)

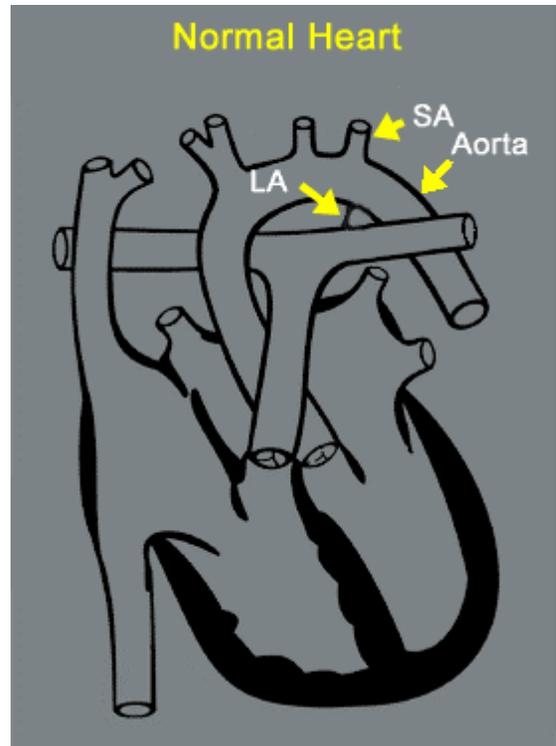
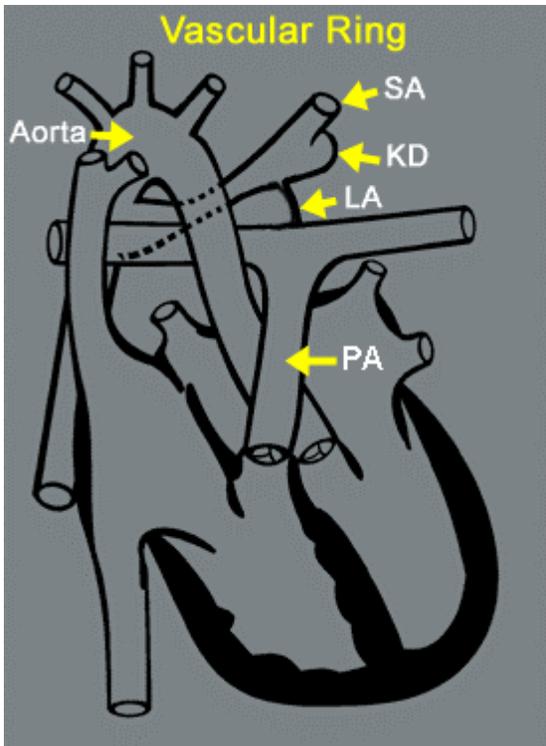
There are two types of complete vascular rings. They are: 1. Double Aortic Arch and 2. Right aortic arch with left ligamentum arteriosum. Double aortic arch is the most common vascular ring (40%). Right aortic arch with left ligamentum arteriosum is the second most common vascular ring (30%).

While the aorta curves to the left after leaving the normal heart, in this defect it curves to the right (see diagram below). This causes the left subclavian artery (SA), which passes from the aorta into the left arm, to wrap around the trachea as it crosses from right to left. There may also be an aneurysm, or an out-pocketing of the left subclavian artery wall, known as Kommerell's diverticulum (KD), in the vicinity of the trachea. This increases the constriction of the trachea.

In addition, the trachea is constricted by the ligamentum arteriosum (LA), which connects the pulmonary artery (PA) to the left subclavian artery (SA). (The ligamentum arteriosum is the remnant of the Ductus Arteriosus, a vessel in fetal circulation that normally closes soon after birth.)

Thus, the so-called Vascular Ring consists of the left subclavian artery (and often its attached Kommerell's diverticulum), the ligamentum arteriosum, and the pulmonary artery - all of which encircle and may constrict the breathing tube and esophagus.

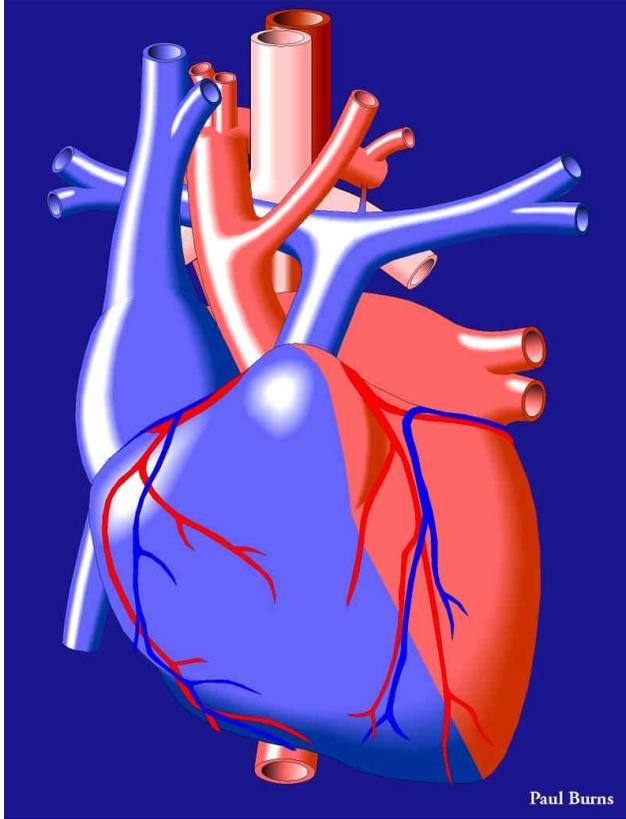
This rare defect affects boys and girls equally.



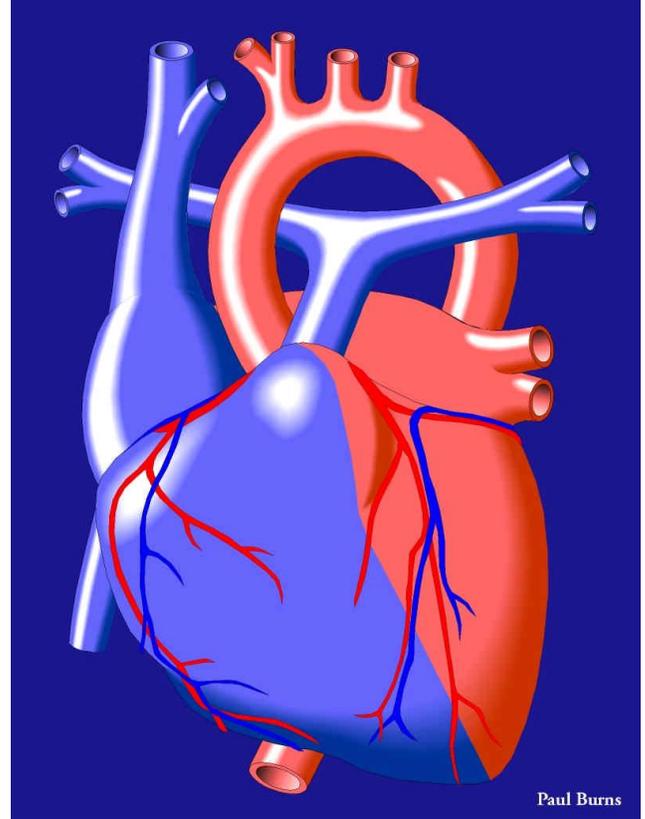
What Are Its Effects?

The symptoms associated with this defect involve the constriction of the trachea and esophagus by the surrounding Vascular Ring. Breathing may be difficult as the wind-pipe is compressed, resulting in stridor - wheezing or other respiratory distress. Solid food may not be easily swallowed as the Vascular Ring narrows the esophagus, and vomiting or choking may occur.

The illustration below shows the vascular structures which encircle the trachea (light pink) and the esophagus (behind the trachea, in dark red).



Vascular Ring



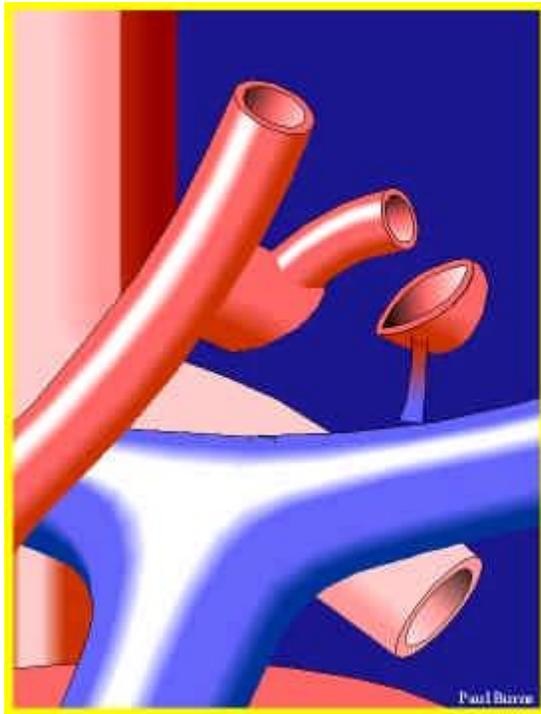
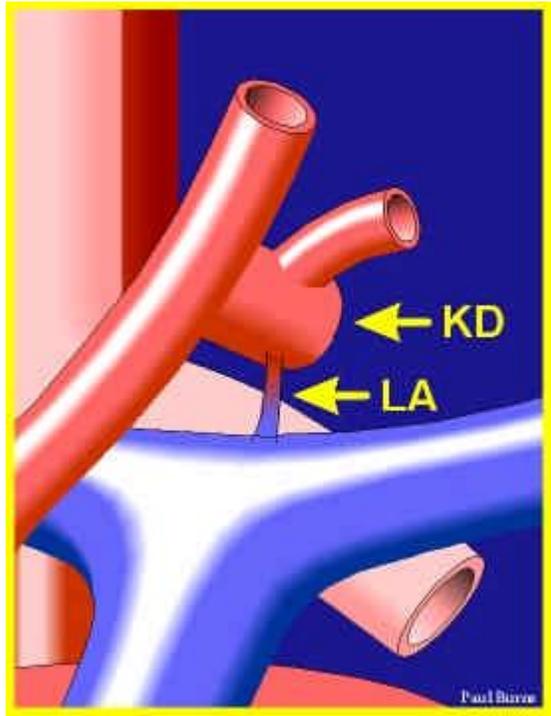
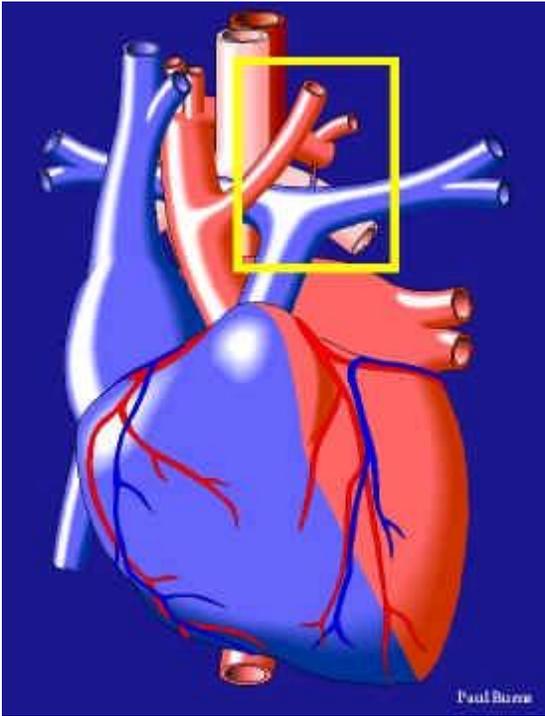
Normal Heart

How Is It Treated?

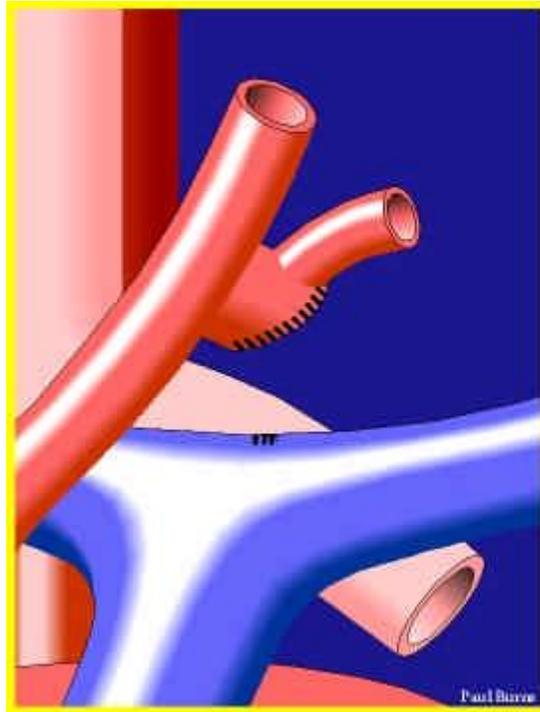
Treatment of this defect involves the division of the the ligamentum arteriosum (LA). In addition, Kommerell's diverticulum (KD) is usually removed from the left subclavian artery, which is then closed with sutures. These procedures break the constricting ring around the trachea and esophagus.

Recovery from the repair of Vascular Ring depends on the nature of the defect and surgical procedure. However, it is usually uncomplicated, requiring a post-operative hospital stay of from 2 to 3 days.

In severe cases, it may take as long as one year for the trachea to assume normal shape after the constriction has been removed and normal swallowing may also take some time to be established.



Surgical Repair of Vascular Ring



In the bottom illustration, the ligamentum arteriosum and Kommerell's diverticulum have been removed and their former areas of attachment to the vessels have been closed with sutures.