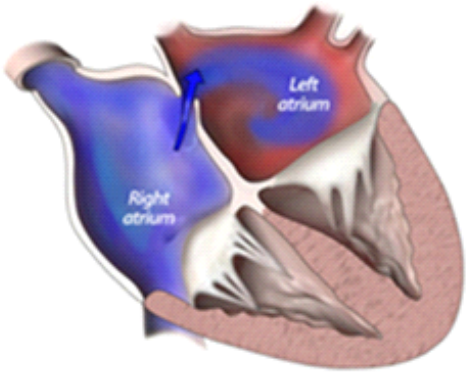
Intracardiac Shunts

How Do the Heart and Lungs Work?

To understand intracardiac shunts, it is important to understand normal cardiac anatomy and physiology. The heart is divided into two sides, left and right. The right side receives venous (low oxygen) blood returning from the rest of the body. The blood is pumped to the lungs to be re-oxygenated. Blood flowing through the lungs is exposed to oxygen from breathing and is returned to the left side of the heart as high oxygen blood. The blood is pumped though arteries to the body.



What Is Intracardiac Shunting?

Intracardiac shunting occurs when cardiac blood flow takes a shortcut within the heart. This is the result of a hole in the walls that normally separate arterial (high oxygen) from venous (low oxygen) blood. This shortcut allows the mixing of arterial and venous blood without the normal pathway being used to re-oxygenate blood through the lungs. This mixing of blood can lead to low oxygen levels or decompression illness (the bends from scuba diving). These holes in the walls are sometimes associated with strokes. More rarely, this can lead to heart rhythm problems, heart failure and pulmonary hypertension.

Most often, these holes exist within the wall of the heart that divides the top chambers of the heart (atria), called the interatrial septum. Less frequently, these holes exist within the lower part of the septum, called the interventricular septum. Defects in the interatrial septum include patent foramen ovale (PFO) and atrial septal defect (ASD). In the lower heart, they are called ventricular septal defects (VSD).

Do All of Us Have Holes in Our Hearts?

All of us have a PFO early in our development. In fact, PFOs are necessary to support our circulation in fetal life.

However, shortly after birth, PFOs close spontaneously in about 70 percent of people. While about 30 percent of the population has a residual PFO after birth, only a small percentage will ever require treatment. In contrast, ASDs are relatively rare, occurring in less than 1 percent of the population.

How Is an Intracardiac Shunt Diagnosed?

PFOs and ASDs are often diagnosed by an ultrasound of the heart (echocardiogram), often with a saline bubble test. An echocardiogram allows for the visualization of the hole, determination of the direction of the shunt, and estimation of the amount of shunt. Other imaging tests include: transesophageal echo (TEE), cardiac CT and cardiac MRI (CMR). These may be done if an echocardiogram is inconclusive or if supportive information is required. Cardiac catheterization (and to a lesser extent, CMR) can be performed to give a more accurate estimation of the degree of shunt when the decision to treat is unclear.

How Is Intracardiac Shunt Treated?

Treatment of intracardiac shunts depends on the kind of defect and presence (or absence) of other medical problems. ASDs almost always require treatment, due to the risk of developing heart failure and high blood pressure in the lungs (pulmonary hypertension). Although ASDs can be treated surgically, most are closed with a device that can be delivered via a minimally invasive procedure using a cardiac catheter.

When PFOs are suspected to cause complications (low oxygen levels, decompression illness or repeated strokes), treatment with a closure device (minimally invasive procedure using a cardiac catheter) is often performed. Although the use of PFO closure devices for low oxygen levels is sometimes controversial, we actively investigate this group of patients. However, it should be noted that, in the absence of complications, most PFOs are thought to be benign and require no treatment.

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