

Cardioversion

What is an electrical cardioversion?

Cardioversion is a brief procedure where an electrical shock is delivered to the heart to convert an abnormal heart rhythm back to a normal rhythm. Most elective or "non-emergency" cardioversions are performed to treat [atrial fibrillation](#) or [atrial flutter](#), benign heart rhythm disturbances originating in the upper chambers (atria) of the heart. Cardioversion is used in emergency situations to correct a rapid abnormal rhythm associated with faintness, low blood pressure, chest pain, difficulty breathing, or loss of consciousness.

Why do I need a cardioversion?

Each normal heartbeat starts in an area of the heart known as the sinus node which is located in the upper right chamber of the heart (right atria) [see figure one ~ normal conduction). The sinus node contains specialized cells that send an organized electrical signal through the heart resulting in a perfectly timed, rhythmic heartbeat. In patients with atrial fibrillation, however, the atria fibrillate (or "quiver") due to chaotic electrical signals that circulate throughout both atria. This typically results in a fast and irregular heartbeat. While some patients have no symptoms, others may experience shortness of breath, lightheadedness and fatigue. Depending on your specific medical history and symptoms, your physician may recommend a cardioversion to return your heart to a normal rhythm.

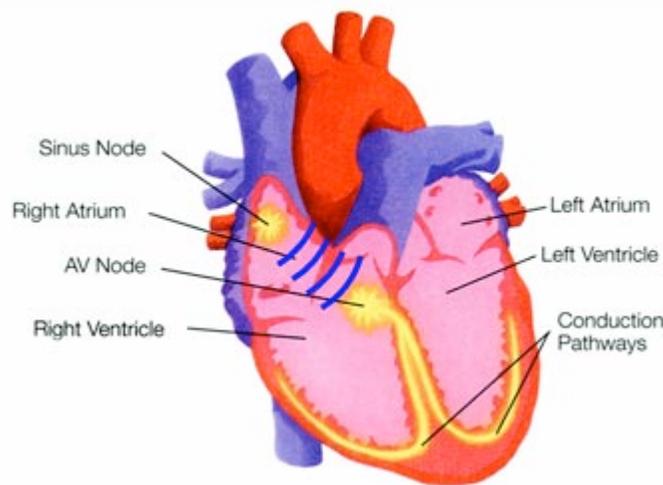


Figure 1A: normal conduction

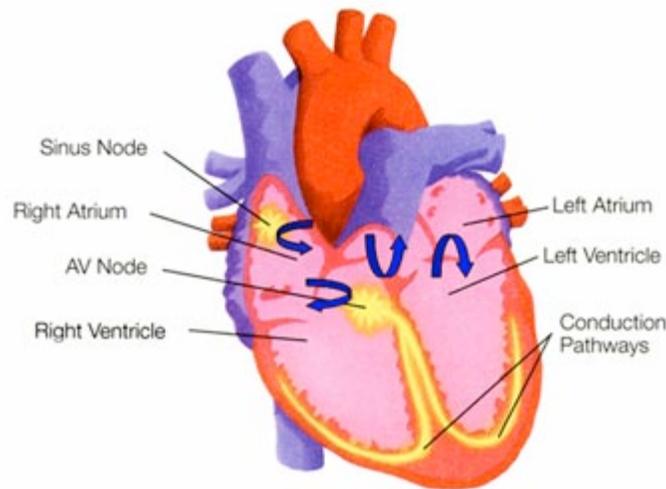


Figure 1B: Atrial Fibrillation

What are the different types of cardioversion?

Cardioversion can be "**chemical**" or "**electrical**". **Chemical cardioversion** refers to the use of antiarrhythmia medications to restore the heart's normal rhythm. Antiarrhythmia medications work by modifying the heart's electrical properties to reduce the frequency of abnormal heart rhythms and to help restore a normal rhythm. Your doctor may decide to start your antiarrhythmia medication as an outpatient, or he or she may choose to admit you to the hospital to give you an intravenous (IV) or oral antiarrhythmia medication while your heart rhythm is closely observed. The decision of whether or not you need to be admitted to the hospital depends on your symptoms, the specific medication your doctor chooses, and your underlying heart disease.

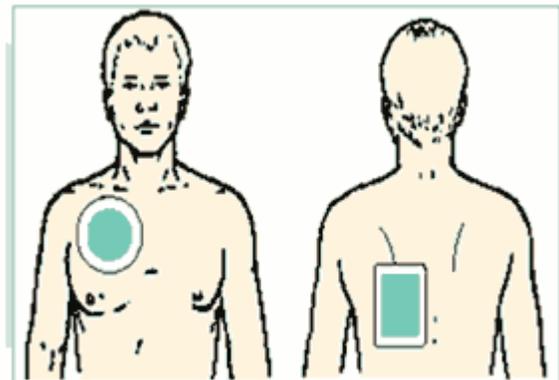


Figure 2: Pad placement

Electrical cardioversion (also known as "direct-current" or DC cardioversion) is a procedure whereby a synchronized (perfectly timed) electrical shock is delivered through the chest wall to the heart through special electrodes or paddles that are applied to the skin of the chest and back [Figure 2]. The goal of the cardioversion is to disrupt the abnormal electrical circuit(s) in the heart and to restore a normal heart beat. The shock causes all the heart cells to contract simultaneously, thereby interrupting and terminating the abnormal electrical rhythm (typically fibrillation of the atria) without damaging the heart. This split second interruption of the abnormal beat allows the heart's electrical system to regain control and restore a normal heartbeat.

An electrical cardioversion is performed in a hospital setting such as an emergency room, intensive care unit, recovery room, special procedure room or Electrophysiology Laboratory. A cardiologist, a nurse and/or an anesthesiologist are present to monitor your breathing, blood pressure and heart rhythm. Special cardioversion pads are placed on your chest and back (or alternatively, both pads can be placed on the front of the chest). The pads are connected to an external defibrillator by a cable. The defibrillator allows the medical team to continuously monitor your heart rhythm and to deliver the electrical shock to restore your heart's rhythm back to normal [Figure 3 ~ AF to SR].

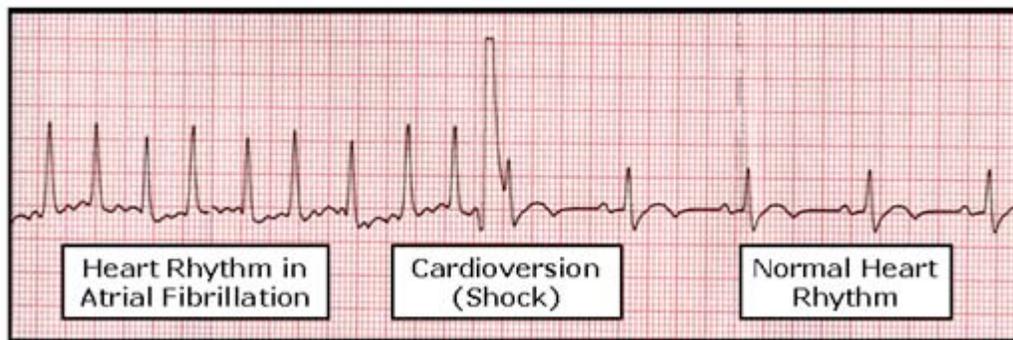


Figure 3: Conversion of Atrial Fibrillation to Normal Rhythm

Since the shock can be painful, an anesthesiologist or specially trained nurse administers intravenous sedation. Once you are asleep (but still breathing on your own), the physician charges the defibrillator to a specified energy level and then delivers the shock by pressing a button on the defibrillator. The shock is transmitted along the cable to the pads on the chest where the energy is delivered across the chest wall to the heart muscle. Additional shocks at higher energy levels can be delivered if the first shock does not restore the rhythm back to normal. Rarely, minor skin redness can occur at the site of the cardioversion pads where the electrical energy was delivered. Patients typically awake quickly without any recollection of the shocks, due to the amnesic effects of the sedatives. Because of residual effects of the anesthetic medications used, patients are advised not to drive or make any important decisions for the rest of the day. A responsible adult should be available to provide transportation home. The anesthetic agents typically used for the procedure are short acting; therefore most patients are able to go home an hour or so after the procedure. A normal heart rhythm can be restored more than 90% of the time, although abnormal rhythms may recur in about half the patients within 1 year. The success of electrical cardioversion often depends on the duration of atrial fibrillation and the underlying cause (heart disease). Cardioversion is not appropriate for every patient with atrial fibrillation.

Are there any other things I should know before my cardioversion?

Because the upper chambers of the heart are fibrillating (quivering) and do not squeeze uniformly in patients with atrial fibrillation, there is a potential risk that blood clots may form. The process of restoring a normal rhythm could potentially dislodge a blood clot from the heart resulting in a heart attack or a stroke. Fortunately, thinning the blood prior to cardioversion can prevent most blood clots. This is a process called "anticoagulation". Anticoagulant medications

include aspirin, heparin or warfarin (Coumadin®). Warfarin is a pill taken daily and dosed according to blood test results. This test, referred to as the **INR** or **International Normalized Ratio**, monitors the "thinness" or "thickness" of the blood and typically should be in the 2.0-3.0 range (a normal INR in someone who is not on warfarin is typically around 1.0). If the INR is too low, there may be at an increased risk of forming a blood clot. If the INR is too high, there may be at an increased risk for bleeding. Heparin is a blood thinner that can be given as an intravenous solution or shots in the skin. It acts more quickly and its effects are reversed more rapidly than Coumadin®. Frequently, patients are placed on heparin until Coumadin® becomes effective, as this may take several days.

Prior to performing a cardioversion, your physician will determine your risk of blood clot formation (and thus, your risk of stroke or heart attack) and choose an anticoagulant medicine. In patients with atrial fibrillation or flutter that has been present for awhile, the blood must be adequately thinned for at least 3-4 weeks prior to the cardioversion to reduce the risk of stroke. Because it takes many hours for blood clots to form, cardioversion can be safely performed without blood thinning medication in patients who have had their heart rhythm problem for less than 48 hours. Occasionally, your physician may recommend a special ultrasound of the heart (called a transesophageal echocardiogram or TEE). During a transesophageal echocardiogram, a special probe is placed in the esophagus. It allows your physician to directly visualize the atria to scan for potential blood clots. Typically, anticoagulation is continued after the cardioversion for an additional 4 weeks to 6 months, even if the cardioversion is successful.

Conclusions

Cardioversion is a safe and effective treatment to restore the heart rhythm back to normal.

Taken from the HRS website