

WHAT YOU SHOULD KNOW ABOUT ATRIAL FIBRILLATION

Atrial fibrillation (a fib) is an irregularly irregular heart rhythm. Normally the heart has two areas of specialized tissue called the Sino-atrial(SA) and Atrio-ventricular(AV) nodes. The SA node is responsible for “sparkling” the heart to beat at a regular rate. The SA node is sensitive to chemicals, hormones, and nervous stimulation. This node is located in the right atrium (one of the top chambers of the heart). The AV node is between the top chambers (the atria) and the bottom chambers (the ventricles) of the heart. This node is responsible for conducting the electrical impulse from the atria to the muscular ventricles which do most of the pumping of blood to the body and lungs. Sometimes abnormal areas of irritation develop in the atria (usually the left atrium) that can lead to atrial fib taking over for the SA node. Rather than contracting symmetrically to pump blood into the ventricles, the atria in atrial fib beat more like a bag of worms. In addition to losing the “pumping” ability, the electrical stimulation of the AV node becomes erratic and is frequently very rapid.

Atrial fib can also be caused by other conditions such as mitral valve stenosis (narrowing) or regurgitation (leaking backwards), both of which can cause the left atrium to distend and stretch out. This is called atrial dilatation and can irritate the tissue to induce atrial fib. Other contributing issues can be due to drugs or chemicals like caffeine. Thyroid conditions and certain rare tumors can also hormonally or chemically induce atrial fib. Even underlying coronary artery disease can be the culprit. These conditions should be investigated in any one with new onset atrial fib by your doctor or cardiologist before treatment options should be considered.

So why is atrial fib such a problem? Several problems can result from this arrhythmia; some are minor but some are major and can result in a stroke or even death. Some problems are a result of the atrial fib and some are caused by side effects of the drugs used to treat atrial fib. A poorly controlled rapid heart rate can cause the ventricles to dilate and eventually lead to congestive heart failure. Because the atria don't contract in atrial fib, blood can stagnate in the atrial chamber and specifically in the left atrial appendage (a blind pouch off the left atrium). This stagnant blood is prone to clot. If the clot breaks loose it will migrate to some part of the body like the brain, an arm or leg, or the intestines. This clot can stop the flow of blood to that "end" organ leading to a stroke, a cold, potentially gangrenous limb, or dead intestines; any of which can be potentially fatal or lead to limb loss or intestinal loss. In reality, this particular complication of a fib is not too common but can be devastating when it does occur.

In order to prevent these clots from forming in the heart, all patients with atrial fib should be on a blood thinner. Coumadin or its generic name, warfarin (a drug used in rat poison!) is the drug currently of choice to thin the blood and prevent clots from forming in the stagnant atria. This drug MUST be monitored carefully with a simple blood test done in your primary doctor or cardiologist's office. This test is called an INR (international normalized ratio). An older test called a Protime (PT) is no longer used as there is considerable variation between testing centers. The INR should be maintained between 2 and 3.5. These blood tests may need to be done weekly or less frequently depending on how stable your results are. Studies have shown that patients treated in a Coumadin clinic overseen by a nurse specialist or doctor are more likely to maintain their INR's in the therapeutic range and are less likely to fall out of range. Too low an

INR may result in those nasty clots. Too high an INR may lead to bleeding complications (that's how it kills rats!).

The medical terms for these two categories are thrombo-embolic (clot forms and breaks off going to the body) and hemorrhagic (bleeding) events. The odds of one or both of these complications occurring over a ten year span in a patient with chronic atrial fib are four in ten or greater. The mortality rate in patients over five years in atrial fibrillation may be as high as 20-25%. Of course many patients, if not most, are over the age of 60 and may die from other unrelated problems. Because of this, the cardiologists have decided that therapy to control the heart rate or attempt to keep patients out of atrial fib (rhythm control) may not be the right idea and that some form of "cure" should be considered, especially for those younger who may clearly have more than ten years to live. Also many people just plain don't tolerate their atrial fib. They feel lousy because they have lost up to 20% of their cardiac output (the amount of blood pumped to the body per min.) because the atria don't normally contract to help pump blood.

That takes us to the next problem: drugs and their sometimes awful side effects. For years atrial fib was treated with Coumadin to prevent the clots and digoxin (trade name Lanoxin) to control rapid heart rates. Now other drugs are being used and they may work in some people. The problem is that they have frequent and adverse side effects. Amiodorone (trade name Pacerone or Cordorone) is an effective drug used commonly but takes the wind out of your sails so to speak. It can turn your digits blue and can be toxic to the lungs, liver, or thyroid gland when taken for prolonged periods or at higher doses. Sotolol (trade name Betapace) really works sometimes but can cause potentially fatal ventricular arrhythmias. One must be in the hospital being monitored for several days to start this drug. Several other drugs such as propaferone (trade name Rythmol) are also used but they all have serious side effects. So what else is out there?

Well that takes us to two other options. You may have seen a cardiologist that specializes in what is called Electro physiology (an EP cardiologist). These folks are truly a

subspecialty. They perform procedures called ablations. Usually they ablate by burning or freezing areas of the heart responsible for all bad rhythms with a catheter inserted from the groin or femoral vein. Their ability to ablate atrial fib is continuing to improve but has several drawbacks. The procedure may take up to 5-6 hours and may only be successful in 70% of patients. A small hole must be created in the wall between the left and right atria (called a trans-septal puncture) which probably is not consequential in most patients. Because this ablation creates a fairly wide scar about 10-15% of patient may develop pulmonary vein stenosis (narrowing) which can be very difficult to treat but is not usually fatal. Adjacent structures like the esophagus or trachea can be injured but these complications are very rare. Because of these drawbacks I have chosen to work with these very specialized doctors to evolve what one may call a hybrid approach to “curing” atrial fib. This means that certain patients may benefit from a combination of these “smaller” procedures to cure their atrial fib without a big open heart procedure.

In the late 1980's a surgeon named James Cox developed a procedure called the Maze procedure for atrial fibrillation. This has now evolved into the “Cox-Maze III” procedure. Originally Dr. Cox and others mapped out the atria and figured out a way to create a scar line in the atria that would not conduct electricity. This required “cutting and sewing” the atrium to create this electrical maze to conduct the electrical impulses in a fashion that would prevent atrial fib in over 90% of patients. Imagine the electrical current having to run through a maze like a mouse (not the rat who got the Coumadin!). Dr. Cox probably deserves a Nobel Prize for this work. Unfortunately this is a very long and technically difficult procedure for treating a condition that historically was treated medically for years. Most surgeons didn't understand the disease and it's implications and, myself included, just didn't buy into such a big open heart procedure for a “medical disease.”

But industry has prevailed and has recognized what a huge volume of patients are out there with atrial fib that are poorly managed with medical therapy alone. Now numerous different technologies exist to “create” those scar lines quickly and more safely. Now doing a full

Cox-Maze III in addition, for example, with a mitral valve repair only adds about thirty minutes to a case and is clearly worth it. Without going into boring detail about the various instruments we have to work with I will describe the route that I believe is most safe and most effective for the surgical treatment of atrial fibrillation.

A big problem with atrial fibrillation is that atrial fib begets atrial fib. In other words once one develops atrial fib, it only gets worse. Without underlying other conditions like mitral valve regurgitation, atrial fib originates in the pulmonary veins (the large muscular vessels bringing oxygenated blood from the lungs to the heart) over 90% of the time. If the atrial fib is caught early the pulmonary veins can be “isolated” by the above mentioned catheter ablation, or surgical ablation using minimally invasive thoracoscopy (three 1-3 inch incisions on each chest done without spreading the ribs) and a device using what is called bipolar radio-frequency ablation (an electrical current passed between two electrodes placed on each side of the vein or atrial wall) that can be momentarily clamped across the pulmonary veins creating a full thickness, very narrow scar which prohibits conduction of atrial fib to the heart. This application is commonly used in open heart surgical procedures to complete a full Cox-Maze procedure in conjunction with other open heart procedures like a mitral valve repair or replacement. The device I am currently using has been developed by a company called Atricure based in Cincinnati, Ohio. As mentioned before, catheter ablation may succeed in 70% of cases with the previously described problems. Catheter ablation also requires the use of iodine based contrast to image the veins under x-ray which can be a problem in patient with kidney problems. Thoroscopic pulmonary vein isolation or ablation may be successful, however, in over 90% of patients but unfortunately requires a general anesthetic and usually takes 2-4 hours. An additional advantage to the thoroscopic pulmonary vein isolation is that the left atrial appendage (that bad pouch where clots form) is stapled off so the risk of a clot forming is reduced significantly. This cannot be done with a catheter ablation procedure. With the surgical approach one may return to work without restrictions usually within 1-2 weeks. The thoroscopic procedure will probably require 2-3 days in the hospital but typically no ICU stay.

The good news is being able to meet the objective of eliminating the need for Coumadin and those other drugs and their side effects. We do recommend that patients stay on Coumadin and their existing drug regimen for 3-6 months even if the procedure is successful from the beginning. Some patient may not see the expected results for that time period because of irritation caused by the surgical ablation resulting in intermittent atrial fib associated with the procedure. The decision to stop some of these drugs earlier may vary depending on the individual, however, and the severity of any side effects they are experiencing.

Obviously the treatment for atrial fib is evolving and, I believe, should be coordinated through your cardiologist, EP cardiologist, and surgeon. If you choose a primary surgical route, the EP cardiologist may have the ability to go back in with a catheter to “mop up” so to speak. If your surgical risk is high then catheter ablation may be the best first treatment alternative.

Please realize that ANY interventional therapies are relatively new, and although approved by the FDA as being safe, they may not be successful in all patients. Hopefully this dialog has been informational and helpful to you in making a well informed decision regarding the treatment of your atrial fibrillation. I will obviously meet with you personally and answer any specific questions you may have.

Thank you.

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