

Irregular Heartbeats: Restoring the Rhythm

*******Irregular Heartbeats: Restoring the Rhythm (Part 1)*******

Narrator

Erika Madrid, Sally Seskin, and Jack Sammons. These three very different people all share a similar problem with their hearts, an irregular heartbeat.

A healthy heart beats to a steady rhythm. That rhythm begins in the right atrium, where the sinus node, a special group of cells that form the heart's natural pacemaker, generates an electrical signal, causing the atria to contract, and pushing their supply of blood down into the ventricles. That rhythm begins in the right atrium, where the sinus node, a special group of cells that form the heart's natural pacemaker, generates an electrical signal, causing the atria to contract, and pushing their supply of blood down into the ventricles. The AV node passes the electrical signal into the ventricles, causing them to contract and pump their blood supply out to the body.

Unfortunately, in some instances this normal sequence of events may get out of rhythm, which may cause the heart to not only beat erratically but also pump less effectively or sometimes, not at all.

For most people, these arrhythmias will be mild and infrequent enough to be ignored. But some arrhythmias can be debilitating, even life-threatening.

Barry Ramo, MD, New Mexico Heart Institute

The very worst kind of arrhythmia is one in which the heart irreversibly goes into a type of rhythm disturbance that it can't recover from and in that situation it causes the problem of sudden cardiac death.

Narrator

Keep in mind; most arrhythmias are not fatal, although they can be uncomfortable and alarming. Meet 75-year old Sally Seskin. Five years ago, Sally suffered a mild heart attack. She's recovered well, but the attack left a rather disturbing reminder: an arrhythmia that sends her reeling at least once or twice a year.

Sally Seskin, Patient

It feels like your heart's going to come out of your chest. It's just rocking and it feels like it's going to pop out and it's not stopping, and then all of a sudden it becomes calm and you're fine.

Narrator

Sally's diagnosis? Atrial fibrillation: an erratic, uncontrolled and rapid beating of the atria.

Todd Florin, MD, Mount Sinai Medical Center

Atrial fibrillation is the most common heart rhythm, it's the number one arrhythmic cause for hospitalization.

Narrator

Atrial fibrillation becomes increasingly common as people age. Here's what happens.

Rather than a single signal coming from the sinus node, multiple areas of the atria may take on that role. As a result the atria may beat more than 300 times per minute, rather than the normal 60 to 100 beats. Because of this irregular rhythm blood is not pushed into the ventricles in an effective manner and tends to stagnate.

Although all arrhythmias can occur at unpredictable times, there are certain triggers that may set them off. These include:

- Excessive caffeine, tobacco or alcohol
- High stress
- Rigorous exercise, though certainly, in most cases, the benefits of exercise far outweigh the risks, and

- Inappropriate medications, some medications, like cough & cold medicines or diet pills, can do more harm than good

Raymond Woosley, MD, University of Arizona

There have been about seven drugs taken off the market, non-cardiac drugs that were actually having effects on the heart and causing arrhythmias. And there are about 50 drugs now that we know that can have effects on the heart and very few of them are actually cardiac drugs.

Narrator

So, patients with arrhythmia should ensure that their doctors and pharmacists are aware of every medication they take including, herbal or dietary supplements and hormones. Of course, not every trigger is avoidable.

Sally Seskin, Patient

I can be driving and it could happen. Sometimes you know, somebody cuts you off in excitement, and that can start it off.

Narrator

In long-standing atrial fibrillation, blood tends to pool in the recesses of the atria and form blood clots. These clots can break off, called emboli and travel through the bloodstream. If the clot travels to the brain, it can cause a stroke. In fact, about 15 percent of strokes occur as a result of atrial fibrillation.

Todd Florin, MD, Mount Sinai Medical Center

The single most important thing in the vast majority of patients with atrial fibrillation is that they be on appropriate anti-coagulation, appropriate blood thinners.

Narrator

So, in addition to exercising regularly, Sally takes an anti-coagulant medication every day. She wants to give herself the best chance to be around to see her 9 grandchildren grow up.

Sally Seskin, Patient

I feel fine with it. If I didn't take it, I don't think I'd be here.

Narrator

Although anti-coagulants do a good job of preventing stroke, they don't control or prevent atrial fibrillation episodes from occurring. Other medications can be taken in conjunction with an anti-coagulant if the episodes are especially frequent or disturbing. But, there's no guarantee these medications will work.

Most patients say they can live fairly comfortably with occasional bouts of atrial fibrillation. But another type of atrial arrhythmia can be more disturbing, and may require more than medication to treat. We'll take a look at that when we return.

*******Irregular Heartbeats: Restoring the Rhythm (Part 2)*******

Narrator

Meet 16-year old Erika Madrid. She was only 11 when she felt her first rapid heartbeat.

Erika Madrid, Patient

It would happen every couple of months or any time of the day it happened just rapidly it'd come and then go.

Narrator

The spells came and went for nearly five years, and sometimes they were debilitating.

Erika Madrid, Patient

When the spells would happen you'd get like a cold sweat and your heart would start beating. It's a terrible feeling to have it, because it feels like you're having a heart attack.

Narrator

Although she wasn't having a heart attack, the near fainting they brought on, and even the fear of the spell's occurrence limited Erika's activities.

Then, right about the time Erika would have liked to have started driving, she required admission to the hospital as a result of a particularly bad spell. Electrocardiographic tests revealed the cause: she was suffering from one of a group of very rapid heartbeats originating in the atria called supraventricular tachycardias.

Electrocardiographic tests revealed the cause: she was suffering from one of a group of very rapid heartbeats originating in the atria called supraventricular tachycardia.

In this irregularity, an irritable area in the atria takes over the job of pacemaker, but sets a pace much too fast.

Todd Florin, MD, Mount Sinai Medical Center

These are not life-threatening heart rhythms in general, but they can be what I refer to as lifestyle threatening, meaning that they can make you feel really awful. All of a sudden, you're happy go lucky individual and your heart starts to race, young people can have their heart rate go up to 220, 240 beats per minute. They feel as if they're going to faint.

Narrator

Erika had two main options to treat her arrhythmia: medication or surgery. If she chose medication, she may have to take it every day for the rest of her life. And the same is true with medication used to control atrial fibrillation, treatment that only uses medication is not always successful.

Erika's other option was a surgical procedure known as cardiac ablation.

Luis Constantin, MD, New Mexico Heart Institute

In cardiac ablation, we are deliberately isolating, and destroying or modifying a very small segment of heart tissue with the idea of curing or modifying a heart rhythm disorder.

Narrator

In the most common kind of an ablation procedure: first a catheter is inserted through a small incision in the patient's groin, then threaded up the large veins to the heart. Once there, it can be placed next to the areas of the heart that are responsible for the arrhythmia. And with a burst of radio frequency energy, destroy the cells causing the problem.

With the exception of the small incision made in the groin, the procedure is relatively painless. Of course, as with any invasive procedure, there are risks.

Todd Florin, MD, Mount Sinai Medical Center

Any time you poke the skin, there's a risk of bleeding, infection, damage to the blood vessels and nerves. All that being said, the track record in good hands, and experienced centers is excellent. Most people accomplish this in a quick outpatient visit and it's one of the few things that we cure.

Narrator

Given her options Erika chose the ablation procedure. Now that her arrhythmia is under control, Erika's looking forward to a bright future.

Erika Madrid, Patient

I want to be a cardiologist

Narrator

Erika Madrid and Sally Seskin both suffered from arrhythmias that originate in the top chambers of their hearts. But the most serious type of arrhythmias are those that begin in the heart's lower chambers, the ventricles. We'll take a look at those when we return.

*******Irregular Heartbeats: Restoring the Rhythm (Part 3)*******

Narrator

At 65 years old, Jack Sammons has already suffered multiple heart attacks, his first at age 40. But while recuperating from a second bypass surgery, Jack found out that clogged arteries were not his only problem.

Jack Sammons, Patient

I was exercising on my treadmill and felt dizzy and the next thing I knew, I was waking up face down on the treadmill because I had passed out.

Narrator

Jack fainted because his weakened heart had developed a life-threatening arrhythmia called ventricular tachycardia. In ventricular tachycardia, the heart's primary pumps, the lower chambers, are stimulated to pump too fast.

Because the ventricles pump too rapidly they are unable to completely fill with blood in between beats. This means less oxygen-rich blood flows through the body, and dizziness, weakness and fainting may result.

A still more dangerous type of arrhythmia is called ventricular fibrillation. Because of erratic electrical signals within the ventricles, the heart no longer beats in any coordinated fashion. Blood flow from the heart stops, resulting in what is called sudden cardiac death.

John Seger, MD, Texas Heart Institute

When the heart develops ventricular fibrillation, there is no blood pressure generated, so there's no blood going to the brain. Usually within 10 to 12 seconds this will lead to loss of consciousness and fainting. If the rhythm then isn't corrected, it will lead to death.

Narrator

Sudden cardiac death. Typically a patient who is felled by sudden stoppage of the heart, also known as cardiac arrest, feels no pain, but merely collapses from lack of blood flow to the brain. Sudden cardiac death is not a heart attack in the traditional sense, although it may occur along with a heart attack.

Todd Florin, MD, Mount Sinai Medical Center

A heart attack is when the arteries that feed oxygen and blood and nutrients to the heart are occluded by a blood clot. When that takes place, the heart muscle dies; that's a heart attack.

John Seger, MD, Texas Heart Institute

Usually, there's enough of the remainder of heart muscle left to take over for that and allow adequate pumping function to continue. A cardiac arrest is different. A cardiac arrest is an electrical abnormality where the heart goes into a rhythm which is not capable of generating a blood pressure.

Narrator

And, those areas of the heart that are injured and irritated as a result of a heart attack often are a focus themselves for abnormal impulses that can trigger ventricular fibrillation.

Patients are most vulnerable to these potentially fatal arrhythmias during the several days immediately following a heart attack. The 24-hour a day monitoring of patients in coronary care units is precisely to be on the lookout for these serious rhythm disturbances.

Because ventricular fibrillation is an electrical problem, the only way to correct it is with an electrical shock or defibrillation. When an external defibrillator is readily available, that can be accomplished quickly.

Unfortunately, thousands of patients die every year in this country because a defibrillator was not available in time.

That's why the therapy of choice for people like Jack is something called an Implantable Cardioverter Defibrillator, or ICD. Essentially a portable emergency room, an ICD is a small battery-powered automatic defibrillator that's implanted under the skin.

After Jack Sammons' last fainting episode, he and his doctors decided they couldn't risk the chance of another attack. So, Jack had an ICD implanted.

Jack Sammons, Patient

About a week after I got out, I started back on the treadmill, gradually working up and now it's 25 minutes a day and I feel stronger; I'm recovering well.

Narrator

Jack's ICD will monitor his heart rate 24 hours a day. If it detects an arrhythmia like ventricular tachycardia, it can deliver low-energy pulses to help the heart get back on track before Jack faints. If, however, the ICD detects lethal ventricular fibrillation, it can deliver a high-energy shock, much like that delivered by an external defibrillator.

Todd Florin, MD, Mount Sinai Medical Center

It's capable of shocking somebody, and it does it immediately. It takes a look, it sees your heart rhythm, it charges up, it takes another look and it dispenses with the therapy in under 10 seconds.

Narrator

And when it comes to preventing sudden death, time is of the essence. In the absence of an ICD, fewer than 5% of victims will survive an episode of ventricular fibrillation.

Todd Florin, MD, Mount Sinai Medical Center

And the single biggest determinate in terms of living or dying in that point in time, is how quickly you can get that shock to the patient. Every second that goes by, the chances of survival go down.

Narrator

With his ICD in place, Jack's chances of surviving an episode of ventricular fibrillation have gone from less than 5% to better than 90%.

Jack Sammons, Patient

As far as I'm concerned, it's ah it's kind of a peace of mind thing because traveling as much as I do, this could happen anywhere and I could be a long way from anybody that knows anything about medicine.

Narrator

Who is a candidate for an ICD? There's a test that can answer that question. Stay tuned to find out more.

*****Irregular Heartbeats: Restoring the Rhythm (Part 4)*****

Narrator

While millions of patients have arrhythmias, only a small percentage need that implanted device. How do health care workers determine who's most at risk?

It depends on how strong the heart is acting as a pump. What doctor's look for is the percentage of blood that's pumped out of the heart with each beat, called the ejection fraction.

Barry Ramo, MD, New Mexico Heart Institute

The ejection fraction is the most important factor in determining whether or not someone is a candidate for an ICD.

Narrator

A heart's ejection fraction can be measured painlessly by an echocardiogram. A healthy heart will pump out 55% to 60% of the blood in the ventricles on each beat. Anything less than that may spell trouble.

Barry Ramo, MD, New Mexico Heart Institute

We know that patients who have an ejection fraction less than 30% have a very high risk for developing sudden cardiac death. Recent clinical trials have shown that by implanting an implantable defibrillator or ICD in these patients, that virtually eliminates the development of sudden cardiac death.

Narrator

For patients who have no idea what their ejection fraction is, there are several red flags that may also indicate a risk for sudden cardiac death.

- For patients who have no idea what their ejection fraction is, there are several red flags that may also indicate a risk for sudden cardiac death.
- Second, family medical history: if a parent, sibling or other close relative died of heart disease or died suddenly of unexplained causes, especially at a very young age, this is a risk factor.
- Third, the patient's personal medical history: those born with a genetic abnormality of the heart such as a heart murmur or cardiomyopathy, or who've suffered damage to the heart from a viral infection or heart disease, heart failure or heart attack, may be candidates for an ICD.

While the presence of any one of these factors, or even a combination of factors, does not necessarily indicate patients are in danger of suffering fatal arrhythmia, patients should let their doctors know what risk factors may apply in their individual cases.

Raymond Woosley, MD, University of Arizona

I think anyone who has palpitations, or anyone with a history of sudden death in their family should see a doctor and really have an electrocardiogram and decide what is the appropriate evaluation of that.

Narrator

An electrocardiogram or EKG records the electrical action of the heart and can easily reveal an irregular heartbeat. This EKG, for instance, shows a normal heartbeat. This one shows a heart in ventricular tachycardia. The heart is racing dangerously, but there is still some organized contraction of the heart muscle which keeps the heart pumping. And this EKG shows a heart in the most serious type of arrhythmia, ventricular fibrillation. Although some arrhythmias will show up on an EKG, many won't because they occur only intermittently.

For those intermittent rhythm problems, patients can wear a portable monitor that works much like an EKG except that they are worn for days or weeks to record the occasional arrhythmia. And newer devices can be used just when a problem occurs.

Todd Florin, MD, Mount Sinai Medical Center

We then have tests that are called event recorders which are little devices about the size of my cell phone that have electrodes on the end of it. And if all of a sudden you start feeling something strange, you take that device, you place it on your chest and press the record button.

Narrator

If these recorders are unable to capture and record an arrhythmia, an in-patient procedure called an electro physiology study may be conducted. This is a procedure performed in the catheterization lab by a cardiac specialist trained in detecting and treating arrhythmias.

Todd Florin, MD, Mount Sinai Medical Center

We actually put wires, catheters, into the heart and stimulate the heart in various places to try and provoke arrhythmias to make a diagnosis and ultimately treat some patients with abnormal heart rhythms.

Narrator

As these techniques for diagnosing arrhythmias become more advanced and the technology for preventing arrhythmias grows more effective and accessible, the incidence of sudden cardiac death in this country will continue to fall. In the meantime, patients should be aware of their symptoms and risk factors, and see their doctors if they're concerned about the health of their hearts.