Robert’s Story

Andrew Schorr:
Atrial fibrillation is the most common cardiac arrhythmia. Luckily, there are many new treatment options and some that don't involve medicine. Coming up, a leading cardiologist from Northwestern Memorial Hospital will discuss catheter ablation for the treatment of atrial fibrillation, and you'll meet a man who has benefitted from it. You'll learn how it works and who is it right for. All coming up next on Patient Power!

Hello and welcome to Patient Power sponsored by Northwestern Memorial Hospital. I'm Andrew Schorr. Each time we connect you with a leading expert at Northwestern, and many have been in the heart field, the cardiology field at the Bluhm Cardiovascular Institute. One of the systems of the heart of course is the electrical system, and it can go awry, if you will, where there can be electrical impulses that are having a heart beat in an irregular way, an arrhythmia. It can beat too slow or it can beat too fast. It can beat ineffectively. Well, atrial fibrillation is that, when it is just not beating right, and the body is not getting the blood it should.

One person who experienced that is Robert Potoker, 60 years old, who lives on the northwest side of Chicago. Let's go back about 11 years, Robert. What were you feeling?

Robert:
I felt horrible. I was walking around, I had no energy. It was like punching through a paper bag. I just did not feel good.

Andrew Schorr:
Now, you were a fellow who liked to be active. Could you be active with when you felt so sick?

Robert:
No, not really, and I had two younger children under two, so it was quite a strain.

Andrew Schorr:
Now, when someone is tired it can be many conditions. So you go to the doctor, and what did they think it could be at first?
Robert: My doctor thought it might be asthma because I was wheezing. As it turned out, it was congestive heart failure.

Andrew Schorr: And going along with that, eventually you get a diagnosis from a cardiologist that you trusted that it was atrial fibrillation, as I was describing. So there are a lot of drugs that deal with that. So did you start taking pills?

Robert: I did. I started taking medication, and it was effective for a substantial amount of time.

Andrew Schorr: Many years. So could you get back to your normal activity?

Robert: Yes, I could. The medication was effective, and it served its purpose for quite a long time.

Andrew Schorr: So you’d start on one, but sometimes one drug peters out and then they try another. Did you go through that whole cycle?

Robert: I did. Initially, the drug I was taking, which was fairly effective, had long-term side effects. It was a powerful drug with certain toxic issues, so at a certain point my cardiologist and I decided that I really needed to come off it and try another drug.

Andrew Schorr: All right. And you did try another drug and then another drug. Were they as effective? Did they buy you more time?

Robert: They were not as effective. As a matter of fact, they were increasingly ineffective, and it's quite possible that even if I had stayed on the original drug it also would have been ineffective given the passage of time. When I originally talked with my cardiologist we talked about the probability that an ablation might be appropriate at some time in the future.

Andrew Schorr: Let’s mention this, so an ablation where they go up I guess through the groin, right, with a catheter, get to the heart muscle and can sort of zap different electrical pathways to try to have it beat correctly, right?

Robert: That’s absolutely correct.
Andrew Schorr:
All right. Now, we're going to tell that story in a second and meet your doctor, the electrophysiologist from Northwestern who became your doctor. So how do you then find out if you need an ablation? Where is the best place to go? What did you or your wife do to try to see what your best options were?

Robert:
Well, my wife is great on the internet. She took the process of my getting an ablation very seriously. She did a lot of research, and she came across Dr. Bradley Knight's name on the internet, and she strongly suggested that I contact him, and we did.

Andrew Schorr:
And it was great as we hope in Chicago that you could find somebody who is really renowned who is nearby, and you did.

Robert:
Correct. Absolutely.

Andrew Schorr:
So you go to Dr. Knight, and knowing that drug therapy is sort of the first line typically for atrial fibrillation in many cases what did he want to do before considering whether you had the ablation?

Robert:
His recommendation was that we try one more medication that had recently been approved and see whether that might solve the problem. We did that, and it was also ineffective as the more recent drugs had been, and we all figured out that an ablation was really recommended. That was Dr. Knight's considered opinion.

Andrew Schorr:
Now, let's just describe your situation then. How much of the time would you say your heart was beating irregularly then?

Robert:
At the time the decision was made to do the ablation I was not functioning normally about 75 to 85 percent of the time. I was very, very tired, had no energy, wanted--had to stay in bed. I could not exercise.

Andrew Schorr:
Wow. No way to live, and you have kids and an active life you'd like to have, so it really was no quality of life at all.

Robert:
That's correct.
Andrew Schorr: So you have the ablation. You go into the hospital. Did you stay overnight before the procedure, after the procedure?

Robert: I did not stay overnight before the procedure. I came in early in the morning, and the procedure was done the same day, stayed overnight, and I left early in the morning the next day.

Andrew Schorr: All right. Now, this was just about three months ago. So, Robert, did you notice a difference after the procedure?

Robert: I noticed an incredible difference. You know, immediately after the procedure I was no longer in atrial fib. I felt great. It was like night and day. It felt like a miracle.

Andrew Schorr: And you continue to feel well?

Robert: I feel great.

Andrew Schorr: And what about your level of activities? What do you do now?

Robert: I'm able to exercise, which is important for my general health and weight control. I go to the gym a couple times a week. I do heavy cardio and weight workouts. And I had not been able to exercise when I was feeling bad in atrial.

Andrew Schorr: So it's really been a 180-degree turnaround.

Robert: It's been a godsend. I tell Dr. Knight that he's a miracle worker. I really feel that way.

Andrew Schorr: Well, let's meet this miracle worker, and we're talking about Dr. Bradley Knight who is the medical director of electrophysiology and the medical director of electrocardiography at the Bluhm Cardiovascular Institute at Northwestern Memorial Hospital.

Dr. Knight, you hear Robert's story, it must you make you feel great.
Dr. Knight:
Hi, Andrew. Yes, it makes us feel great. Patients like him really are what motivate us to keep trying to develop techniques to help patients with his heart rhythm problem.

What is Atrial Fibrillation?

Andrew Schorr:
Let's understand the heart. So often we talk about blood flow to the heart and heart attack or clots breaking off and even getting to the brain and stroke, but tell us about rhythm and the electrical system of the heart. That's a critical piece, too.

Dr. Knight:
Yeah, the plumbing, so to speak, and coronary disease are a huge problem in the United States, but a very separate issue is heart rhythm disorders, which are also very common. Atrial fibrillation is the most common heart rhythm problem in the United States. Probably 5 percent of patients over age 65 have atrial fibrillation.

Andrew Schorr:
What does that mean? Define the term for us.

Dr. Knight:
Well, let's start with a normal rhythm. Normally when the heart beats the electrical system starts in the top chamber of the heart. So the top chamber, the atrium, think of the atrium as a chamber that collects people in a building or collects blood in the heart, the atrium depolarize or contract. That sends a signal to the bottom chamber of the heart, and then that beats. So the atrium contracts and then the ventricles, the bottom pumping chambers contract, and that's a normal heart rhythm. The heart rate tends to be between 60 and 90 beats a minute when people are sitting at rest.

Atrial fibrillation is when the atria, the top chambers of the heart, fibrillate. They beat very rapidly. They fire very rapidly. The rate of heartbeat in the top chambers of the heart is three, four hundred beats per minute. That sends a signal down to the ventricles or the pumping chamber and a few of those signals make it down to the pumping chamber and the heart rate then can be anywhere from 80 beats per minute or as high as up to 180 beats per minute. So the heart rhythm is irregular and typically very fast, and that leads to a rapid, irregular pulse.

Andrew Schorr:
Now, I've heard this term "quiver." Is the heart sort of quivering?

Dr. Knight:
Yeah, it's beating so fast that if you were to look at it, if you were to open someone's chest during heart surgery who is in atrial fibrillation, the atria look like a bag of worms. They're just kind of quivering around with very disorganized contraction or pumping action.
**Symptoms & Risk Factors of Atrial Fibrillation**

**Andrew Schorr:**
Oh, my. Now, Robert felt bad for a long time. It just was really hard for him. He had mentioned to me that it was just everything was tough. So let's talk about what the symptoms are of atrial fibrillation.

**Dr. Knight:**
That's a good question because it's remarkable how diverse the symptoms can be. There are patients who are identified as being in atrial fibrillation who are completely unaware of it, which is hard to imagine, but patients that are unaware of their heartbeat being irregular and even fast. The opposite extreme are patients that as soon as they go into atrial fibrillation even for a few minutes end up coming to the hospital and the emergency room.

The typical symptoms though are due to the rapid or irregular heartbeating. So people will feel palpitations. They'll feel an awareness of the heartbeat. They'll feel their heart beating fast. They may get short of breath or develop chest pain. If the heart is not pumping properly people can get what's called congestive heart failure or fluid accumulation. But then people can have more subtle symptoms such as fatigue or exercise intolerance or, like Mr. Potoker, not able to do some of the things of usual activity.

**Andrew Schorr:**
Now, he also mentioned wheezing, and his initial doctor thought, well, maybe it's asthma. Could that go along with it, a symptom like wheezing?

**Dr. Knight:**
Yeah, wheezing can be a sign of heart failure actually. There are patients who also just have asthma who have lung disease which precipitates or causes atrial fibrillation. But, yes, wheezing can be a manifestation of atrial fibrillation.

**Andrew Schorr:**
Now, what about age? Is it more common in older people?

**Dr. Knight:**
Yeah, that's a very good point to emphasize. This tends to be a disease that gets more common as patients get older. So as I mentioned before, about five percent of people over age 65 have atrial fibrillation, but the number one risk factor or predictor for developing atrial fibrillation is age, and that's part of the reason why this is becoming a very prevalent problem. It's almost an epidemic at this point because of the aging of our population.

**Andrew Schorr:**
So does it get missed sometimes? It's becoming more and more common, and it happened the first doctor Robert went to, not a cardiologist, said, well, asthma, perhaps. And he was fatigued, and that could be a hundred different conditions.
So do you have any concern as a specialist that there are people out there with it, not only they don't know it but it may not be picked up medically right away.

**Dr. Knight:**
Well, that's a good question because if you are not in atrial fibrillation at the time it's difficult to pick up. When patients are in atrial fibrillation and they are examined by a doctor their heart rate tends to be irregularly irregular, kind of a chaotic rhythm, and usually that would be identified. Often the heart rate is fast. An EKG, or electrocardiogram, is really the test that would need to be done to confirm that the rhythm is atrial fibrillation.

But there are patients who go in and out of the rhythm, so you may go into atrial fibrillation that lasts for an our every month, and if you’re not in atrial fibrillation when you see your doctor the only way to detect that or to make the diagnosis is to have them wear a monitor at home.

**Prognosis**

**Andrew Schorr:**
Now, as you discuss this it sounds kind of chronic, but could it be a potentially fatal condition?

**Dr. Knight:**
It's rare that atrial fibrillation is lethal, but it really has a big impact on quality of life, and most of our therapies and treatment options we offer patients are geared toward making them feel better rather than trying to make them live longer.

There is another important aspect to this that we haven't talked about that's beyond symptoms and mortality, and that's stroke. Atrial fibrillation, when I described the atrium fibrillating like kind of a bag of worms, when they don’t contract like that the atrium can form clots, and if that clot leaves the left atrium, leaves the heart and goes to the brain, that can cause a stroke. So stroke is a real concern when there’s patients who may not be diagnosed with atrial fibrillation who could develop a stroke.

**Andrew Schorr:**
So it’s not something you want to ignore.

**Dr. Knight:**
No, definitely not something you want to ignore. Even if you're not symptomatic from it, it still needs to be addressed.

**Andrew Schorr:**
Now, could it go along with other conditions? Like you mentioned heart failure, could there be other things going on altogether?

**Dr. Knight:**
Yeah, there are young patients who have what we call lone atrial fibrillation who have no other problems with their heart, but patients who develop atrial fibrillation tend to have something else wrong with their heart. They often will have high blood pressure or hypertensive heart disease. They might have valvular heart disease. They might have had rheumatic heart disease in the past. There are patients who you talked earlier about clots and plaque rupture and coronary disease. Well, patients who have had heart attacks who can develop congestive heart failure also are at risk for developing atrial fibrillation. So I’d say high blood pressure and coronary disease are common causes of atrial fibrillation in addition to just the aging process that occurs to the heart.

**Andrew Schorr:**
Does it run in families at all?

**Dr. Knight:**
It's rare. There is evidence that if you have a first-degree relative with atrial fibrillation you're slightly more likely to develop it, and there are some genetic syndromes, but in general this is more caused by environmental factors and acquired over time.

**Andrew Schorr:**
So to diagnose it typically somebody could listen to your heart. EKG can confirm it.

**Dr. Knight:**
That's right.

**Treatment with Medication**

**Andrew Schorr:**
So the first line typically are medicines, right? So how are we with our array of medicines to try to make the heart rhythm regular?

**Dr. Knight:**
We have medicines that address different aspects of atrial fibrillation, and I think it's very helpful when I see patients and I try to come up with a treatment plan to divide the three treatment options or three cornerstones of therapy into preventing stroke, which we talked about, controlling the heart rate when you’re in atrial fibrillation or ventricular rate control or rate control, and then rhythm control, which means trying to restore and maintain a normal sinus rhythm.

**Andrew Schorr:**
So you have these different approaches. Let’s go into greater detail, and we'll continue through our program. So let’s start. What’s the first cornerstone?

**Dr. Knight:**
Well, I’ll talk about stroke prevention first because even if patients are asymptomatic that's something we definitely need to address. So when we see
patients that are in atrial fibrillation, whether they're in it all the time or whether they're in it intermittently, they are at risk for stroke, and we have to decide what we should do to reduce that risk. So the treatment options that are available currently are blood thinners, such as Coumadin or warfarin, or antiplatelet drugs like aspirin or Plavix. Plavix and aspirin are commonly used for preventing coronary disease as well, and heart attacks.

So Coumadin, which is a pretty strong blood thinner, has some risks of bleeding so we really try to identify the patients with atrial fibrillation who really need it. So we determine the risk of stroke based on other risk factors, and there are a few risk factors we look for. If you have congestive heart failure, if you have hypertension, if you're over age 75, if you have diabetes or if you have had a previous stroke, those are markers of increased risk, and if you have any of those, especially if you have more than one of those or you've had a stroke we tend to prescribe oral anticoagulation with Coumadin or warfarin.

**Andrew Schorr:**
So you want to prevent the worst event first.

**Dr. Knight:**
That's right.

**Andrew Schorr:**
So there you go with stroke, which is a leading cause of disability I think in the United States as well as fatal for many people.

**Dr. Knight:**
And the strokes associated with atrial fibrillation tend to be large, devastating strokes because it's usually a pretty large clot that leaves the heart and occludes a pretty big blood vessel and can lead to a pretty big stroke. Coumadin lowers your risk of stroke by about 70 percent. It's not zero, but it's very effective.

**Andrew Schorr:**
All right. So that's the first cornerstone is deal with the risk of stroke. What's next?

**Dr. Knight:**
The next one would be just to control the heart rate. Some patients have relatively infrequent episodes of atrial fibrillation, or they're in it all the time and the main symptoms are caused by the fast heart rate, and so there's a variety of pretty well tolerated medications that can be given to control the pulse rate. So oftentimes the treatment approach is just to control the heart rate with a beta blocker medicine like metoprolol, Inderal, atenolol. These are medicines that control the pulse rate. There are other calcium channel blockers like diltiazem and verapamil and a drug called digoxin that's been around for a long time. There's about three different
Andrew Schorr: So that's related to the rate. And what's the last cornerstone?

Dr. Knight: The last cornerstone of treatment is rhythm control. But we first when we see a patient have to decide should we go down the route of rate control or rhythm control, and there's some controversy over this, but my bias is that in most patients who are symptomatic the easiest way to control their heart rate and to improve symptoms is to restore and maintain a normal rhythm. There are a subset of patients who are relatively asymptomatic that probably don't need to be put back in a normal rhythm and can be just left in atrial fibrillation with adequate heart rate control.

But rhythm control is a strategy that's very effective in controlling symptoms, and we have a whole bunch of medicines that can be used. There are probably ten antiarrhythmic drugs that are available now to help maintain a normal rhythm. The easiest way to get someone who is in atrial fibrillation, who has been in it persistently into a normal rhythm is to electrically cardiovert them, which means they are sedated with a medication, they're given some anesthetic and a shock is delivered to the chest to restore normal rhythm. That's the best way to get people back into a normal rhythm. That doesn't keep them in a normal rhythm, and so the antiarrhythmic drugs sometimes are needed to help maintain a normal rhythm.

Andrew Schorr: Right. And I think Robert Potoker actually went to the emergency room one time, and I have a feeling something like that happened to him and then he was on medications after that. We're going to take a quick break, and we're going to learn a lot more about rhythm control and all the approaches you have available to you at Northwestern, which is a leader of it in the country when we come back with more of Patient Power right after this.

Andrew Schorr: Welcome back to Patient Power. Andrew Schorr here. We're visiting with a renowned electrophysiologist, Dr. Bradley Knight. So he's a cardiologist, he's a specialist in the electrical system of the heart. He's the medical director of electrophysiology at the Cardiovascular Institute at Northwestern Memorial Hospital.

So, Dr. Knight, we were talking about these cornerstones of the management of atrial fibrillation, and the last one we've come to is rhythm control, and you sort of gave us a level of that. And you said that there are a whole range of medicines...
that someone could take to control rhythm. Do we have a wide range that are effective now? Where are we with that, where somebody maybe could just take a pill and that would be good enough?

**Dr. Knight:**
Well, once we decide that a patient might benefit from being back into a normal rhythm the first treatment really is medication. So we have, as I mentioned, probably ten oral antiarrhythmic drugs which are helpful. However, there are major limitations to the effectiveness and safety and side effect profile of these drugs. There is a new oral antiarrhythmic drug that was released and approved by the FDA last year that is really the first new drug in ten years, so there really are relatively limited options. The names of these drugs include, flecainide, propafenone, amiodarone, sotalol, dofetilide, and this new drug called dronedarone or Multaq.

And how we pick which drug is dependent upon the patients, the characteristics of the patient. So if they have congestive heart failure some of these medications are too dangerous to use to maintain a normal rhythm. If someone has a completely normal heart they have a greater list of options that can be tried. So we do try to start with medications first.

Medications, however, rarely eliminate atrial fibrillation. The goals of therapy are to reduce frequency and duration of the episodes. Some of these cause side effects and have to be switched to a different drug. It's sort of a trial and error process of finding an oral drug that can be well tolerated and control a normal rhythm.

**Andrew Schorr:**
What would some of the side effects be?

**Dr. Knight:**
Some of the sides effects can be proarrhythmia, where they actually can worsen the rhythm, and some medications require hospitalization to initiate. So dofetilide, which is Tikosyn, for example, patients need to be admitted to the hospital for the first usually two or three days of initiation to make sure that it's not causing adverse ventricular arrhythmias. Some of the other ones can just cause side effects of bad taste in the mouth or headaches.

The drug that's the most effective probably is called amiodarone, and although it can cause some nausea acutely the main concern with that drug is the long-term risk of organ toxicity. So this drug builds up in your body and can cause damage to the lungs, the liver, and the thyroid, and we really have to monitor patients. Patients can take that drug safely for a long period of time, but the younger the patient the less interested we are in starting amiodarone.

**Andrew Schorr:**
Now, Robert had described how he was on one drug and then that sort of petered out on him, and then he was switched to another and had some success with it. So, and I'm familiar with that with cancer drugs. Cancer cells understand the first
drug and get resistant to it and you move on to a second, but we're not talking about that here. So why would it be that one drug is no longer effective but another one might be?

**Dr. Knight:**
Well, that's a good point. Atrial fibrillation is not kind of evolving resistance, but atrial fibrillation over time tends to progress. So when medication is working initially and over time it tends to be less effective it's usually because the atrial fibrillation or the substrate behind that, the heart disease itself is getting worse over time. But it may be that another medicine, another completely different compound may be effective. But it is true that if a patient takes one or two medications and they're not effective or they become ineffective it's much less likely that they're going to find any drug that's effective.

**Andrew Schorr:**
Now, how long do you have to try drugs to say we gave it a fair shot?

**Dr. Knight:**
It depends on the frequency of the symptoms. So if someone is having atrial fibrillation once a week and you put them on an antiarrhythmic drug and they come back in about six to eight weeks, if they have had an 80 percent reduction in their episodes and are feeling okay with the level of atrial fibrillation that they're having, then that's a reasonable end point. If someone has an episode once every three months then it takes longer to really know if it's working.

**Catheter Ablation: When Medication Stops Working**

**Andrew Schorr:**
All right. So we get to the point with someone where you and your patient conclude, you know, the medicines, we've tried a few, it's just not doing it. Your quality of life is not what it should be. So what are the options then?

**Dr. Knight:**
So if medicines don't work there is a variety of what we call nonpharmacological options or nondrug options. Probably the most commonly used treatment option that's not a drug is called catheter ablation. This is a very exciting new option for patients that's only been around for about ten years. It's based on the understanding that was sort of discovered in the late 1990s that there's a certain area of the heart where atrial fibrillation tends to come from more than other areas, and those are the areas around the pulmonary veins. The blood when it comes back to the heart from the lungs goes into the heart through four pulmonary veins into the left atrium, and the tissue around those veins, the so-called muscle sleeves of tissue that extend from the left atrium into those veins, tends to be a very ripe area for extra beats that trigger atrial fibrillation and then sort of short circuit or reentrance circuit that occurs around that tissue that maintains the atrial
fibrillation. So these areas have been identified as being fairly critical, especially in some groups of patients. Tends to be the patients with the least amount of heart disease, those pulmonary veins are very important.

Catheter ablation involves going up and cauterizing the tissue around those veins to electrically isolate or electrically eliminate all of these signals around the pulmonary veins with a catheter that we do what is called ablation with.

**Andrew Schorr:**
All right. So let me see if I can picture that for the audience. So you go up through the groin, do you?

**Dr. Knight:**
Yes.

**Andrew Schorr:**
Okay. Like if somebody were going to have heart catheterization for blood flow?

**Dr. Knight:**
Right. So it's done in the same type of environment, an electrophysiology laboratory, much like a cardiac catheterization suite. We go into the veins instead of the arteries. The arteries go up the aorta to the coronary arteries where they can do coronary interventions and angiograms. We go up the veins which all lead up to the right side of the heart. The pulmonary veins I mentioned are on the left side of the heart. So the first step once we get catheters in usually the veins in the groin, we then access the left atrium by taking a needle and crossing the membrane that separates the right and left atrium. So we puncture that septum, that little membrane that separates the two and access the left atrium and put catheters in the left side of the heart then. This is all done on an x-ray table like an angiogram with a bunch of other specialized equipment that help us localize where we are in the heart.

**Andrew Schorr:**
Yeah, I was hoping you have like a GPS device.

**Dr. Knight:**
We have something very similar to the GPS device. There's a company that makes advanced three-dimensional mapping systems, and there is actually something that's usually attached to the patient or sits underneath the x-ray table that triangulates the position of our catheter inside the heart and knows where it is in the heart, and we can take the catheter inside the heart, move it around and touch all the aspects inside that chamber and reconstruct a three-dimensional image of the, in this case, left atrium that we can use in a computer system.
Andrew Schorr:
Wow. Let me see if I've got this right. So in a sense, I don't mean to call you an electrician, it's nothing like that, but in a way like an electrician though you are building an electrical map of that patient's heart.

Dr. Knight:
That's right. That's right. We can get a bunch of information from that system, and we can also integrate additional imaging information from MRIs or CT scans that were done before the ablation, import those and kind of fuse or merge them with our mapping system to get even more information about the anatomical detail of that individual patient.

Andrew Schorr:
Wow. So there's the patient. Now, are they asleep or sedated?

Dr. Knight:
About half the time patients at hospitals are done under general anesthesia. About half the time, which is when I tend to do, is we just sedate the patient with some Versed and fentanyl, which is like Valium and morphine to make them comfortable.

Andrew Schorr:
It's like colonoscopy, where you don't remember it.

Dr. Knight:
That's right. It's very similar to that, but it does take a while so some patients who are at risk for sedation we'll often have under general anesthesia because the procedure can take us anywhere from three to six hours.

Andrew Schorr:
Wow, that's a lot of standing for you. Okay. So there you are, so you get up to the heart, you map the whole heart. You have the additional diagnostic tests you've done so you have a pretty clear picture. Now, we were talking about doing this over a number of years now. Where are we now with state of the art? Do you zap just one place, cauterize it, or do you follow a whole pathway? What's it like now?

Dr. Knight:
That's a good question. Over the last decade the approach has evolved somewhat. We're still using relatively the same tools, and we're very hopeful that in the next couple of years there will become some tools that will be more specific to this procedure, but catheter ablation has been around for about 25 years. We've been ablating single sites with electrodes that we deliver radiofrequency currents through. They cauterize the area that we're trying to ablate or eliminate.

For atrial fibrillation we need to do fairly extensive ablation, and so what we do is to deliver radio waves that cauterize points by point in a contiguous manner to make a circle that probably has a diameter of a couple inches around both of the veins on
the left side and then both of the veins on the right side. So it’s point by point. We cauterize for about 20, 30, 40 seconds at each site to create a contiguous circle.

Over the last ten years what's kind of changed is our improved ability to visualize where we are with intracardiac echo or ultrasound imaging of the heart. These mapping systems have evolved to give us better rendering of the chamber that we're using. We have better tools to cauterize with now. There are catheters that are approved by the FDA now for ablation of atrial fibrillation. One particular catheter drips saline or saltwater out the tip of it to keep the tip cool, which allows us to deliver a little more energy without causing a coagulum or a clot on the catheter.

Let's say that the last ten years the studies have shown that really the main end point of the procedure is to electrically isolate the pulmonary veins. Now, there's also data that, especially in patients who are in atrial fibrillation persistently or longstanding atrial fibrillation, that you often have to do more than just isolate the pulmonary veins, and that's an active area of research now, is whether they need to provide additional cautery in the line fashion or just to go after areas of rapid activity and cauterize. That's an active area of research right now in afib ablation.

Andrew Schorr:
But basically what you're doing is you're cutting wires, in a way, these sort of electrical pathways in the heart.

Dr. Knight:
That's right. Yes. So sometimes you're left with a fairly big area in the pulmonary veins that used to have electrical signals that no longer has any electrical signals.

Andrew Schorr:
But after that though that patient can have a normal heartbeat.

Dr. Knight:
Yes, and normal heart function too. So the area we're cauterizing is not an area that's critical to the contraction or pumping action of the heart in most cases, so this really doesn't lead to any--even though it's fairly extensive cautery, it doesn't lead to any worsening of the heart function. But once we get rid of that atrial fibrillation the heart typically goes back into a normal sinus rhythm. That's the whole goal of the procedure, is to eliminate the atrial fibrillation or at least to dramatically reduce of episodes of the afib.

Andrew Schorr:
I have this image of you sort of cutting out the noise level that's been confusing. It's kind of like somebody is outside your window honking their horn, very distracting. Well, this has been distracting the normal beat of the heart, so you're getting rid of that.
Dr. Knight:  
Right. Getting rid of the loud honking.

Andrew Schorr:  
Yeah, that's a way to think about it. Okay. So here we had Robert Potoker, who had to take a lot of medicines, and while he has some other conditions and he takes medicines for that, he doesn't for his heart rhythm. Is that the idea, is that this can be, I don't know if you could use the word curative but basically you go on. He felt an immediate difference.

Dr. Knight:  
Yeah, there are clearly patients that we can cure. There are clearly patients who have lone atrial fibrillation that we isolate the pulmonary veins who don't have atrial fibrillation ever again. There are other patients that we can greatly reduce the number of episodes that they have, but the goal is to get them usually off their antiarrhythmic drugs. That's usually our measure of success is that if they've been off their antiarrhythmic drugs and they haven't had any atrial fibrillation for a year. There are some patients, though, who will still have some episodes and will need to be back on their medications but are much better off than they were before they had the ablation. And then there is the less fortunate group that does not get benefit from the ablation procedure.

So the success rate is highly variable, and it really depends on the substrate we're working with, what's the underlying heart condition. So the success rate with one ablation procedure for a patient with atrial fibrillation can range from 40 to 50 percent up to 80 or 90 percent depending on how diseased the atrium is. For patients that don't benefit from that first ablation procedure, often patients can come back for a repeat procedure to recauterize areas that have reconnected.

Andrew Schorr:  
What would the interval be before you would consider doing it again?

Dr. Knight:  
Yeah, that's a good question because the cautery we do can cause a lot of inflammation, and it takes a couple months to heal from. We usually manage the patient over the first couple months with medications if they have any recurrences knowing that after the healing phase in the first two months the patient might benefit long term. So we usually wait about two or three months before we make any decisions about--at least two or three months after the first procedure to determine whether they need another procedure.

Andrew Schorr:  
Do you know you've hit a home run if like with Robert he felt an immediate difference?

Dr. Knight:  
Yes.
Recovery

Andrew Schorr:
Does that mean that that will be lasting, but people would see an immediate difference? How does that work out?

Dr. Knight:
Yeah, it's usually a very good sign. I saw Mr. Potoker a couple months after his ablation procedure. Prior to his procedure he was having atrial fibrillation pretty much every day for hours, and he had had nothing for the two months after his procedure when I saw him. That's usually a very good indicator of long-term good outcome. We are seeing patients who are even four or five years after their ablation procedure who are coming back with recurrent atrial fibrillation. So there are patients that we definitely can cure. In some patients, a sub set of patients, we look at it more as a management strategy. Kind of like cancer, you put them in remission, but they may need attention in the years to come.

Andrew Schorr:
Let's talk about risks.

Dr. Knight:
Yeah, the risk of a major complication from an ablation for afib ranges from probably about three to five percent, and when I see patients in clinic I tell them that the risk of a major complication is about that. The things that can go wrong include damage to the blood vessels in the leg because we're putting catheters down in the groin. We're putting catheters up in the heart, so the risk of perforation of the heart, the risk of that is probably about one percent. And that's usually treated by putting a drain around the sac around the heart, but there are patients who have had to go to cardiac surgery to have that fixed. The risk of dying from an ablation for atrial fibrillation is about one in a thousand, and that's been pretty well documented in the literature.

The other complications we worry about during the procedure are stroke because we're cauterizing in the left atrium and if a clot forms that can leave the heart and cause a stroke. So we do a lot of things to minimize that risk, which include giving strong blood thinners during the procedure and then sending the patients home on blood thinners before their Coumadin takes effect. Almost every patient after they have had an afib ablation needs to be on oral anticoagulation with Coumadin or warfarin for about two months to allow the healing to occur and reduce the risk of stroke.

We talked about groin complications or vascular complications, perforation of the heart and stroke. There are other things that can occur during the procedure that are less common, but because we're cauterizing we can damage things that are nearby where we're cauterizing such as the pulmonary veins themselves, the nerve
that goes to the diaphragm, the phrenic nerve that can cause some diaphragm paralysis. There are other very rare things that can happen with the catheters and trapping the catheters.

And then the esophagus. When you swallow your esophagus goes behind the left atrium in the back of the heart. Any damage to the back of the left atrium to the esophagus can lead to a potential fistula. I think the risk of that is probably about one in a thousand as well, but it can be a lethal complication.

The key, in my opinion, is that you have someone doing the procedure who has experience. I have done over a thousand procedures for atrial fibrillation, and I think having someone who has done a lot of these procedures, that seems to be associated with a lower risk of complications.

Andrew Schorr:
Right. Right. I can understand the interest in using medicines if possible first and not going into this lightly, and if you do--and Robert tells the story of his wife going on the internet and searching for experts in this field and delighted to find you in Chicago, and he thinks you hung the moon, you know. So I know experience counts.

Just one question before we take another break and that is what about age? We mentioned atrial fibrillation is more common as people get older, and so then you wonder, well, at some point are you too old for this procedure?

Dr. Knight:
Yeah, that's a tough issue we run into periodically. I think it's probably true that as patients get older the risk of a complication from ablation gets higher. Now, we tend to do--you know, in a series of patients that have been done and published in the literature the average age is usually in the 60s or 50s. There are patients that we will do an ablation on that are in their 70s, but it is uncommon that we'll take someone who is in their 80s. There's no absolute cutoff, just like anything else we do in medicine, like heart transplants and things, but it really depends on how frail the patient is, what other medical problems they have. You know, we have to make a judgment as to whether the risks are acceptable given the potential to cure their particular type of atrial fibrillation.

Andrew Schorr:
Now, millions of people have diabetes and sometimes any kind of procedure is a little more complicated there. Having diabetes, does that rule someone out?

Dr. Knight:
No, no, not at all. I think that that really is not a factor. The patients that we tend to rule out are frail older patients that might have other medical problems, patients who have been in it so long and their atrium have been so enlarged that the likelihood of success is low. If a patient has a clot inside the heart, that's a patient that really can't safely undergo the procedure from inside the heart.
Andrew Schorr:
All right. We're going to take another break, talk about other options as well and how you work together as a whole cardiology team at the Bluhm Cardiovascular Institute. We'll have that discussion as we continue with Dr. Bradley Knight right after this.

Other Procedures

Andrew Schorr:
Welcome back to Patient Power as we're talking about the rhythm of the heart and a growing problem as we age, and that is atrial fibrillation. It's just not beating right. It can be tied in with other heart problems. And one of the approaches we've been talking about with Dr. Bradley Knight from the Bluhm Cardiovascular Institute at Northwestern Memorial is ablation. So mapping the heart electrically, going in with catheters and getting rid of sort of electrical signals that are confusing the heart really, and then allow it to beat normally.

Dr. Knight, now, this has been going on for a number of years now, ablation, but there's been a surgical procedure, too, I believe called the maze procedure, and maybe there are even variations on that now. What does that do? Where does that come into play?

Dr. Knight:
That's a great question. The original surgical procedure and probably still the gold standard for atrial fibrillation is what's called the surgical maze procedure. This is an open heart surgery where they actually cut up the atrium in a maze type pattern and sew it back together to create lines of electrical conduction block to eliminate the atrial fibrillation. It's highly effective in curing atrial fibrillation. The major limitation of course is that it's a relatively invasive procedure, so over time there's been an evolution of less invasive or minimally invasive techniques to accomplish something close to that without having to do a full cut and sew maze procedure, and these have different names. There's "minimize" procedures, etc. And they can also be used with catheter ablation.

So at Northwestern we have a program where patients can have a portion of their procedure done surgically and a portion of the procedure done with catheter ablation in a so-called hybrid ablation approach. These minimally invasive procedures really involve access to the chest short of doing a full sternotomy incision. So they can access the left side of the chest with ports and the right side of the heart with ports and on the outside of the heart electrically isolate the pulmonary veins and do some additional ablation from the outside of the heart.

Now, you asked me how this would kind of fit into the picture.

Andrew Schorr:
Right.
Who is a Candidate for Surgical Procedures?

Dr. Knight:
In general, if patients have another indication for heart surgery, they need to have their mitral valve replaced for another indication, it’s a very good option for patients who are already undergoing heart surgery to have either a maze procedure or some modification of that procedure at the same time. And this approach is used in a very high percentage of patients at Northwestern who have atrial fibrillation who are undergoing surgery for another indication. We’re fortunate enough here at Northwestern and at the Bluhm Cardiovascular Institute to have surgeons who have tremendous experience with atrial fibrillation surgery. Dr. Patrick McCarthy is one of the early pioneers of cardiac maze procedures, the full cut and sew maze procedure, and he and his colleagues including Dr. Richard Lee have developed other less invasive approaches for patients. In general, if someone needs cardiac surgery for another indication it’s a very good option for them.

Now, who else would be a candidate for it? We have patients that we have done catheter ablation procedures on, and I mentioned to you that a subset of those patients have to come back for a repeat procedure. If those two options fail, sometimes those patients are good candidates to have a minimally invasive maze procedure done surgically.

Andrew Schorr:
Well, the point is that it sounds like you all work together. So some are cardiac surgeons. You are an electrophysiologist. There are cardiologists with medical approaches that you all agree upon. So do you all put your heads together? Here comes John Doe, and he is presenting with a certain situation where you all work together to see which approach might be right and when?

Dr. Knight:
Yeah, we work very closely as a team. We have the surgical operating rooms on the floor below the electrophysiology laboratories, and the EP labs are in the same suite as the cardiac catheterization room, the recovery unit. Patients stay overnight right next to the EP lab. We have a very consolidated clinical delivery system for these patients, but, as well, on the outpatient side when we evaluate patients in clinic we’re all in the same area in the Bluhm Cardiovascular Institute so that we can review patients that might be candidates for surgery and have them see the surgeons sometimes the same day. So we do work as a team. We even have an atrial fibrillation program as part of the Bluhm Cardiovascular Institute. My colleague, Dr. Rod Passman is the medical director of the afib program in the Bluhm Institute.

Andrew Schorr:
Well, I think it’s comforting for people to have a lot of smart minds looking over their case. Now, we talked about Robert, and we mentioned several times about trying medicines before an ablation procedure. Are there any instances where you do not pass go, if you will, and you go straight to ablation?
Dr. Knight:
That's a great question. There's actually a lot of interest right now in a study that's upcoming that will take patients who have atrial fibrillation and randomize them into a clinical trial of drugs versus ablation as first-line therapy. In general, the standard of care now though is that patients try an antiarrhythmic drug or fail an antiarrhythmic drug or don't tolerate an antiarrhythmic drug before having a catheter ablation, but there are patients that are young and, you know, maybe 35 years old and have atrial fibrillation every day and don't want to take an antiarrhythmic drug the rest of their life, so we do offer it to a select number of patients who really refuse or are not interested in taking long-term antiarrhythmic drugs.

Andrew Schorr:
Now, as I think about all this, maybe this is a dumb question that comes up, but I've got to ask it. So there are maybe several million people who have pacemakers to have their heart beat at the right rate, and you mentioned about somebody being in atrial fibrillation, they may have this cardioverter to get it into the right rhythm. Why couldn't there be an implanted device that just takes care of all this?

Dr. Knight:
Well, a pacemaker in general is designed to pace the heart when it beats too slowly, and there are actually patients that have atrial fibrillation that also have slow heart rates. They tend to come as a pair in some patients, especially as people get older and the electrical system kind of ages. So patients with a pacemaker are able then to take additional medications and not have to worry about slowing the heart rate down. Now, there's an implantable device called a defibrillator which is intended to shock the heart or pace the heart rapidly to terminate life threatening fast rhythms. This is really designed to prevent sudden cardiac death and not to treat atrial fibrillation.

But some of these devices do have the ability to manage or to treat with shocks or rapid pacing atrial fibrillation as well, but the main issue is that when patients are in atrial fibrillation and they are awake they would not tolerate receiving a shock even at a low energy. It tends to be quite painful to convert them. And it's not going to keep them out of atrial fibrillation, it's just going to convert them on that one moment.

The Future

Andrew Schorr:
Wow. Well, you talked about this evolution of what you're able to do in the lab and what you're able to see. Where are we headed?

Dr. Knight:
I think the next step is to come up with some tools to make the procedure safer, more effective, more durable and can be done in a shorter period of time. The procedure duration still is relatively long despite a learning curve. I think when
these procedures first began it was taking people about ten hours to do these cases. Now we can tend to get them done in about three, four or five hours. So there are some tools that are being developed by industry and are being reviewed by the FDA that may allow us to deliver either radiofrequency current to multiple sites at one time, there's some balloon-based technology that will allow us to freeze or heat up the area with a balloon that can be placed in the left atrium. So I think getting a tool, just like a mechanic needs the best tools, we need a tool that's really designed for ablation specifically of the left atrium in atrial fibrillation.

**Andrew Schorr:**
I look forward to your updates along the way. I'm sure you will be helping lead us to better approaches for this.

So let me go to my sort of consumer empowerment section of the program, and that is there are more and more people, as you said, who will be faced with atrial fibrillation, and somewhere they'll have symptoms maybe that they're aware of and they're sitting across from their doctor. What would you say to sort of empower somebody in that situation so that they get the best care and see, if needed, whether the right drugs, newer drugs or an ablation procedure might be right for them?

**Dr. Knight:**
I think that's an important topic. When patients have atrial fibrillation, especially if they know they have atrial fibrillation, it's important to realize that there may be options available to you to make you feel better. So if you're not feeling better, keep going back to your doctor. Most of the treatments for atrial fibrillation are sort of a trial and error basis. We start a drug and if it's working, great, if it's not we try another drug or look at some other options like catheter ablation. If you're not going back to your doctor on a regular basis to tell them, look, I'm still not feeling well, or to update the doctor regularly you're not going to be likely to get some benefit from therapies that are available.

I think it's important to realize that there are people who specialize and do this every day. There are electrophysiologists and cardiologists who are specifically trained to take care of patients with heart rhythm disorders, and we have patients that actually seek us out on their own without really being referred necessarily by their doctor. So there are ways to seek expertise from cardiologists specifically for atrial fibrillation.

**Andrew Schorr:**
Now, one last point is within the field of electrophysiology, though, not everybody does this every day like you do. So what would be questions when you're facing an electrophysiologist to gain confidence in their ability to use state-of-the-art approaches?
Dr. Knight:
Well, we've collected a tremendous team here at Northwestern. We have 11 electrophysiologists here, and most of us perform ablation for atrial fibrillation. I guess the question you want to know if you've met a physician who is proposing to do that is how many procedures have you done. I think volume is very important, just like any surgical procedure. So ask them what their experience is, how long have they been doing this. Specifically ask them what their outcomes are and complication rate, how often they've had complications, because those are things that patients should be able to expect when they ask a physician who is doing this procedure.

Andrew Schorr:
Well, you have given us a whole education on atrial fibrillation, and really we've learned so much on all the approaches. And it's exciting that in a minimally invasive way you can do so much now. I'll have to come by that lab sometime and see it because the imaging you must have of the heart now must be incredible.

Dr. Knight:
Yeah, we have a lot of high-tech pieces of equipment in our EP lab, and you're more than welcome to come join us, hopefully as a visitor.

Andrew Schorr:
Yeah, as a visitor. There you go. Okay. Well, Dr. Bradley Knight, who is medical director for electrophysiology at Northwestern Memorial Hospital and the Bluhm Cardiovascular Institute, thanks for being with us.

Dr. Knight:
Thank you very much. I appreciate it.

Andrew Schorr:
All right. Let's give the last word to Robert. Robert, you've been listening to Dr. Knight, and you shared your personal story earlier. So there are people listening who say, that's me. What would you say to them? Knowing that everybody's situation is different, but first what would you say to somebody, where they're just feeling bad for an extended time, about getting the right diagnosis?

Robert:
Well, I would say that if you've talked with your cardiologist and you do have issues with atrial fibrillation, you know, if you do have an irregular heartbeat and if you and the cardiologist have decided that you should follow a medication regimen and if the medication regimen is not effective and if the two of you together think that an ablation is appropriate, I think you need to talk to Dr. Knight, especially if you live in the Chicago area. He's great. He's world renowned. He has a wonderful history of success in these procedures. He's a miracle worker. I would say if an ablation is appropriate, if that's your cardiologist's recommendation, I would talk to Dr. Knight.
Andrew Schorr:
And if somebody is at a distance obviously the point is seek out an expert in this field, an electrophysiologist who really has tremendous experience at ablation. And what should their expectation be, do you think?

Robert:
Their expectation should be that they will talk with someone, and Dr. Knight, who is very knowledgeable, who has their welfare at his heart, will give you his best advice and if a procedure is appropriate will give you that recommendation and if you choose to have him do it will do a wonderful job. He may be able to deliver a miracle and completely change your quality of life.

Andrew Schorr:
So you've got a bright future now with a ticker that seems to be working right. I'm sure you're pretty excited.

Robert:
I'm really happy about it. I feel great now.

Andrew Schorr:
Wow. Really a great story and I think important for people to think about the electrical system of the heart. People are familiar with pacemakers and defibrillators and those sorts of things, and now we've talked about ablation. And, Robert, are you taking any medicine now?

Robert:
I do take medication for some other medical problems that I have, but I'm not taking medication for my atrial fib.

Andrew Schorr:
That's cool. So the electrical work did the trick.

Robert:
It did.

Andrew Schorr:
Well, we wish you all the best and really thank you for being with us today on Patient Power.

Robert:
My pleasure. Thank you.

Andrew Schorr:
Well, I love these stories, and I'm happy to connect you with people like Robert Potoker who have benefitted from really state-of-the-art care and then also
specialists, as Robert mentioned, people of the quality like Dr. Bradley Knight. I’m Andrew Schorr. Thanks for joining us. Remember, knowledge can be the best medicine of all.

For more information or to schedule an appointment with a Northwestern Memorial physician, please contact our Physician Referral Service at 1-877-926-4664 or visit us online at www.nmh.org.

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