

NORMAL

ATRIAL FIBRILLATION

What Should You Know About Heart Valves & Atrial Fibrillation?

I. Introduction from Adam Pick, HeartValveSurgery.com founder

Dear Patients & Caregivers,

As patients with heart valve disease and atrial fibrillation can be confused about their diagnosis, treatment options, surgeon selection and outcomes, Northwestern Medicine and HeartValveSurgery.com held a live, online webinar titled, "What Should You Know About Heart Valves & Atrial Fibrillation?"

During this live event, Dr. Patrick McCarthy, the chief of cardiac surgery, and Dr. James Thomas, director of the Center for Heart Valve Disease, at Northwestern Medicine, shared critical information about heart valve disorders and AFib.

The webinar was an overwhelming success with over 390 patient and caregiver registrations from all over the world. During the webinar, Drs. McCarthy and Thomas shared their clinical experiences, videos and patient success stories.

For those patients and caregivers who were unable to attend this event, I prepared this eBook to help you learn more about valvular disorders and atrial fibrillation.

If you have any questions, please email me at adam@heartvalvesurgery.com.

Keep on tickin!



Adam Pick

Patient, Author & HeartValveSurgery.com Founder

P.S. If you would prefer to watch the video playback of this webinar, [click here](#).

II. Featured Webinar Speakers

The featured speakers for this webinar include:



Dr. Patrick M. McCarthy

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[See Dr. McCarthy's profile](#)



Dr. James Thomas

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III. Written Transcript & Presentation Slides

In addition to providing you the written transcript of the “Timing Heart Valve Surgery.” webinar, we will also provide you the presentation slides shared during the online event.

Webinar Introduction

Speaker: Adam Pick

 HeartValveSurgery.com

Patient Webinar
“What Should You Know About Heart Valves & Atrial Fibrillation?”
The Webinar will begin at 5:00 PM CST

Webinar Speakers

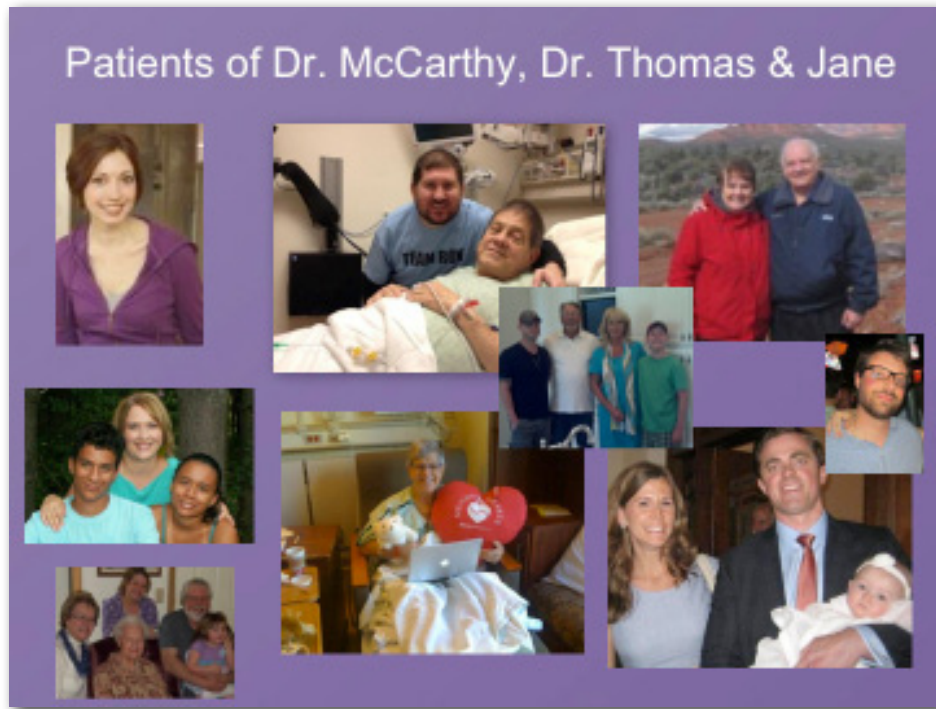
 Dr. Patrick McCarthy Cardiac Surgeon Northwestern Medicine	 Dr. James Thomas Cardiologist Northwestern Medicine	 Jane Kruse, RN, BSN Valve & AFib Coordinator Northwestern Medicine	 Adam Pick Patient & Website Founder HeartValveSurgery.com
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Adam Pick: Hi, everybody, my name is Adam Pick, and I'd like to welcome you to the webinar titled, "What Should You Know About Heart Valves and Atrial Fibrillation?" If I have yet to meet you, I'm a former patient, and I'm also the founder of www.HeartValveSurgery.com. Our mission is to educate and empower patients with heart valve disease. This webinar, which has had over 390 registrations from patients in countries all over the world, is designed to support that mission. During the webinar, all participants will be in what we call, "Listen Only" mode. That being said, you may submit questions during the webinar. Simply post your questions in the Control Panel on your screen. We will do our best to address those questions during the Q&A section of the webinar. Lastly, at the end of the webinar, we're going to ask you to take a very quick five-question survey about this event.

Now, I am thrilled to introduce the featured speakers for this session. [Dr. Patrick McCarthy](#) is the executive director of the [Bluhm Cardiovascular Institute](#), and the chief of cardiac surgery at [Northwestern Medicine](#) in Chicago. Dr. McCarthy has achieved national and international recognition in the fields of complex adult cardiac surgery including valve repair, and valve replacements, and atrial fibrillation. He has performed amazingly over 10,000 heart operations during his career and of those, more than 4,000 involved valve therapy. [Dr. James Thomas](#) is a world-renowned cardiologist and the director of the Center for Heart Valve Disease at Northwestern Medicine. Dr. Thomas has more than 500 peer-reviewed publications and is past president of The American Society of Echocardiography.

Also, joining us today is [Jane Kruse](#) who many of you know as Northwestern's valve and AFib clinic coordinator. Jane will helping us out during the Q&A section of the webinar. I could go on, and on, and on about the careers of Dr. McCarthy,

Dr. Thomas, Jane, and their achievements in cardiac care.

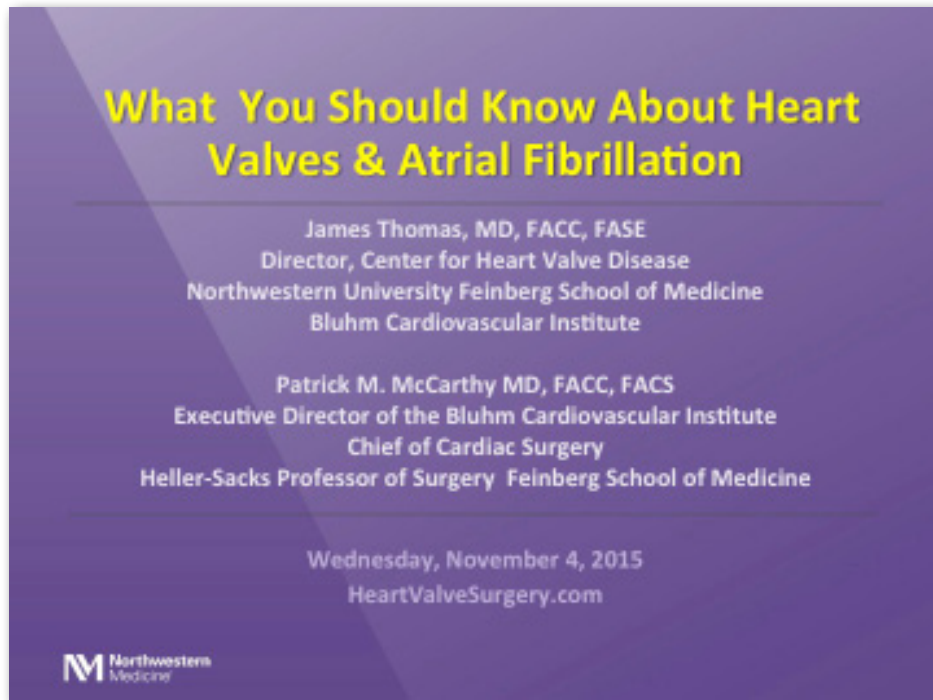


Instead, I will simply tell you that this team is celebrated by our community and for good reason. Since launching this website in 2006, Northwestern has successfully treated many, many, many patients from this website including; Robert Winter, Sarah Bloomfield, Ron Roban, Gene Cook, Sharon Knickerbocker, Lisa Woods, Mark Roto, John Defazo, Carol Rice, Charlotte Hartfall, and Debbie Cross.

Personally, I'm humbled that Dr. McCarthy, Dr. Thomas, and Jane, are taking time away from their very business practices at Northwestern to share their experiences and clinical research during this educational webinar. To start, I'd like to introduce you to Dr. Patrick McCarthy.

Introduction

Speaker: Dr. Patrick McCarthy



Dr. McCarthy: Thanks, Adam, and once again, thank you for all that you do for the patients. I know that it is really important for them to have this amount of education. Frankly, ten years ago before you launched HeartValveSurgery.com, I think we had to answer at least twice as many questions, but now you've informed everybody and brought them all up to speed, and that really helps a lot. I'm joined with Jim Thomas, my old friend and colleague from the Cleveland clinic days where I was for 14 years. Jim and I have known each other for decades now, so we're really thrilled to have him here at Northwestern with us.


Also, I wanted Jane Kruse here because Jane really runs the pre-operative evaluation for patients, but then also the post operative monitoring, which is so important for patients with atrial fibrillation -- because, unlike a valve repair, where you just fix it and then the valve is going to say the same, atrial fib needs a little managing the first few months.

Patient Case Study

Speaker: Dr. Patrick McCarthy

Heart Valve Surgery Community Member

- 53 yo otherwise healthy woman
 - Mitral regurgitation—diagnosed in 20’s, symptoms 2006
 - Tricuspid annulus dilated
 - Patent foramen ovale
 - Atrial fibrillation—2013 with ER visit, cardioversion
- Mitral valve repair, tricuspid valve repair, left atrial MAZE 2014 with excision of left atrial appendage, closure of patent foramen ovale
- Doing well off Coumadin and antiarrhythmic medication

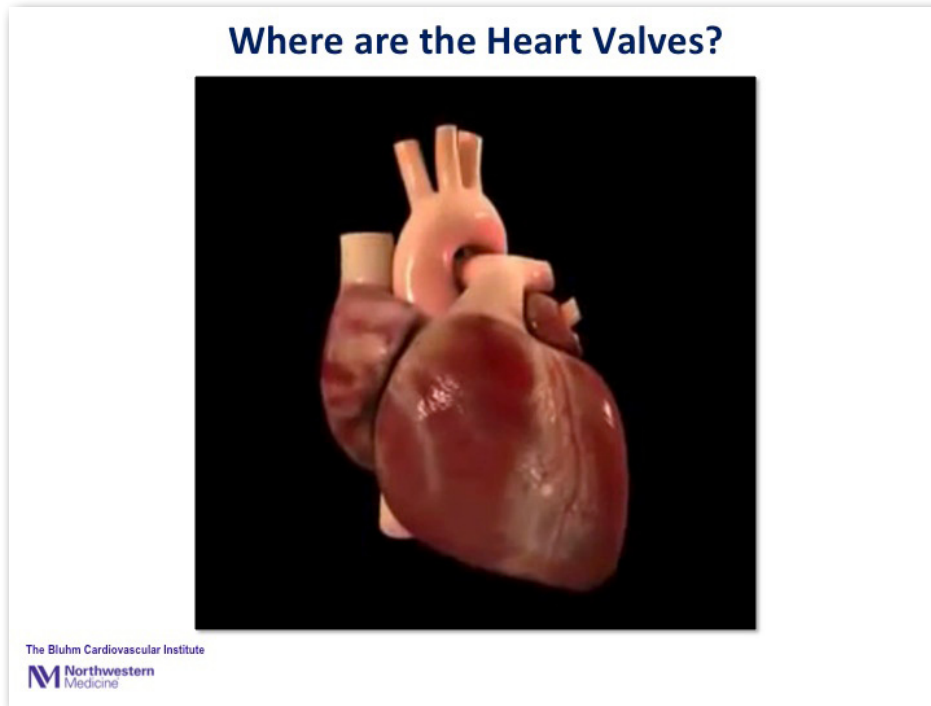
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Dr. McCarthy: I thought that what we would do is just start with a little brief synopsis of a patient just to make this grounded so that people can relate to it. I chose one of the community members who I won't name. It's a 53 year old woman who had [mitral regurgitation](#) who's had it for decades, since she was in her 20s, and it had become symptomatic sometime in the late 2000s. Also, her tricuspid annulus had become dilated. She had a patent foramen ovale. Many of you may have heard of that. It's present in about 20% of patients. It's a small opening between the two atrium. Then, eventually she developed [atrial fibrillation](#) and went to the ER and cardioverted.

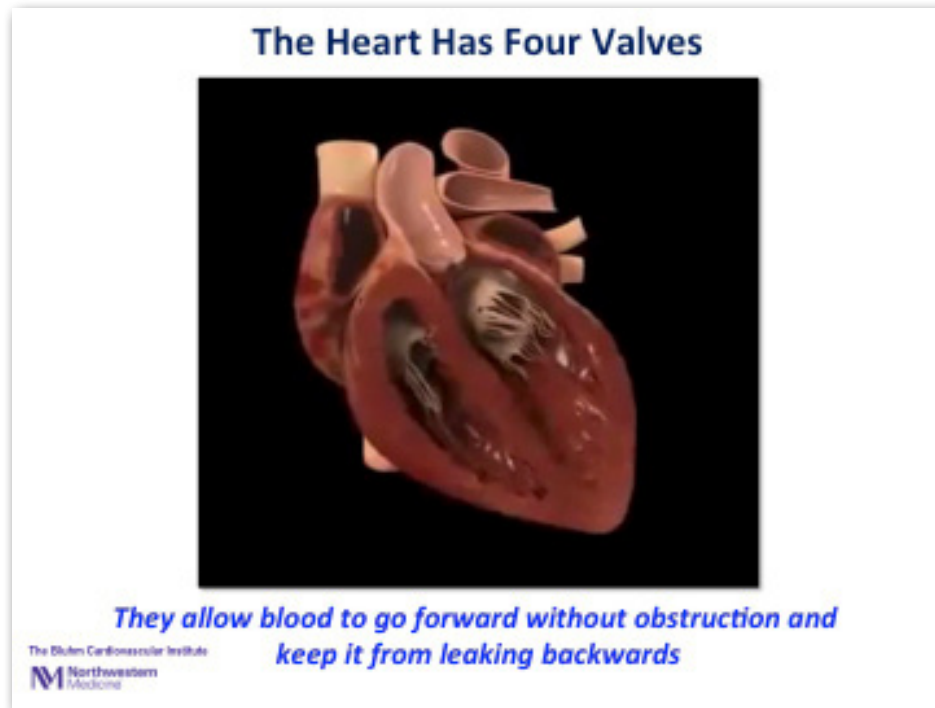
It was a bit of a circuitous course, but eventually she ended up here at Northwestern. Just over a year ago she had mitral valve repair, a tricuspid valve repair. We did a Maze procedure for the atrial fib, and we closed her left atrial appendage and that hole in her heart. A year later, she is doing very well. We just thought that that would be a good example of a patient with multiple valves involved and also atrial fibrillation because that's the kind of patient that we see quite a bit. With that patient to start us off, I'm going to turn this over now to Dr. Thomas who's going to talk to us about the heart and the valves

Heart Valve Anatomy

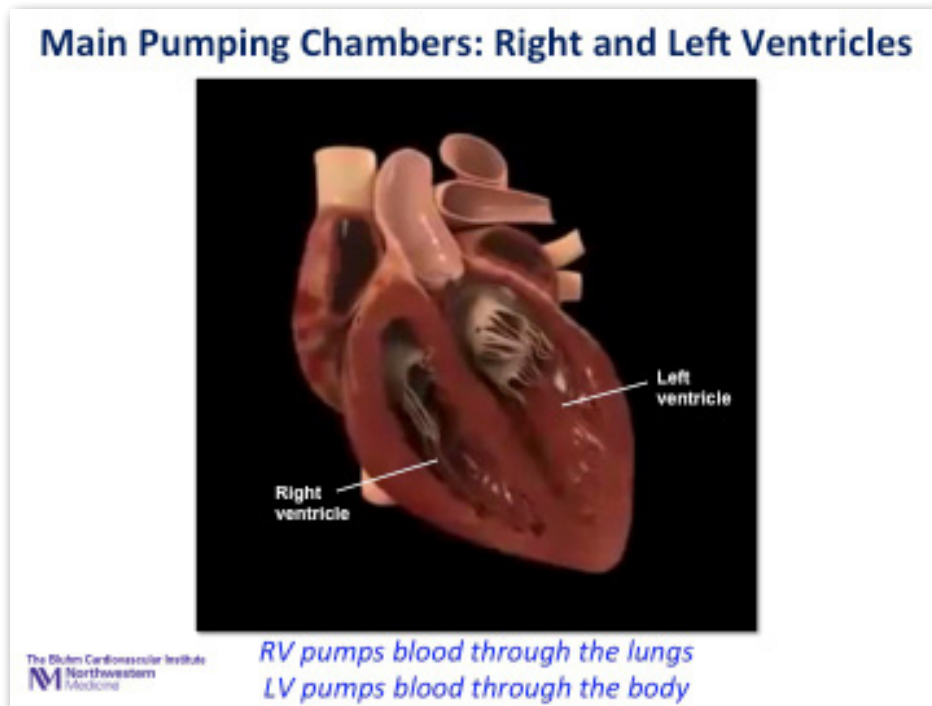
Speaker: Dr. James Thomas



Dr. Thomas: Thanks a lot, Pat, and thanks, Adam, for giving this opportunity to address your community. It's really a valuable service that you do, and we welcome the opportunity. Now, what I'm going to be talking about in the next few minutes is probably pretty basic for a lot of the folks on this site here, but just to bring everyone up to speed; let's consider where are the heart valves? If you'd go on to the next slide there, the heart basically has four valves, and their function is to allow blood to go forward without obstruction through the heart and to keep it from leaking backwards.

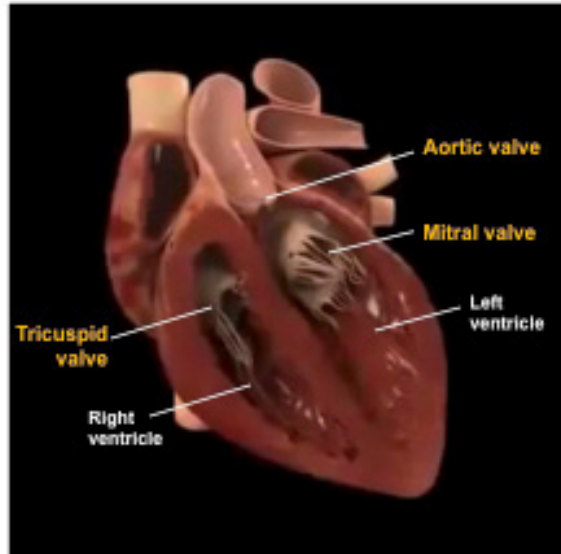


Now, the main pumping chambers of the heart are the right and left ventricle. The right ventricle pumps blood through the lungs. The left ventricle pumps blood through the rest of the body, and you can see there they're obviously turned around here because it's as if you're looking at the heart straight on there. These are where we get into the valves.



These are where we get into the valves. Here you can see the three most commonly diseased valves. You see the aortic valve, the mitral valve, and the tricuspid valve. If we go on, we can talk about those.

Most Common Diseased Valves



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Aortic, mitral and tricuspid valves

Valvular Performance

Speaker: Dr. James Thomas

Heart Valves

In the average year:
Heart valves open and close over
40,000,000 times

By the age of 65:
Heart valves have opened and closed
over 2.6 billion times

The Bluhm Cardiovascular Institute
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Dr. James Thomas: First of all, we have to understand what a remarkable thing it is that the valves do. In an average year, the heart valves open-and-close over 40 million times. This means that by age 65, your heart valves have opened and closed over 2.6 billion times. In the person who has a good, long lifetime, you may get up to 4 billion different openings and closings of all four of your heart valves. It's pretty remarkable that, for the most part, they work for all of us to the very end.

Burden of Valvular Disease

Speaker: Dr. James Thomas

Burden of Valvular Heart Disease

- **Over 3,000,000 Americans with bicuspid aortic valves**
- **After age 75, moderate or severe aortic stenosis in 2.8%, regurgitation in 2.0%**
- **5,000,000 Americans with moderate or severe mitral regurgitation, ~10% risk over 75 years**
- **Worldwide, ~20,000,000 with rheumatic valve disease**

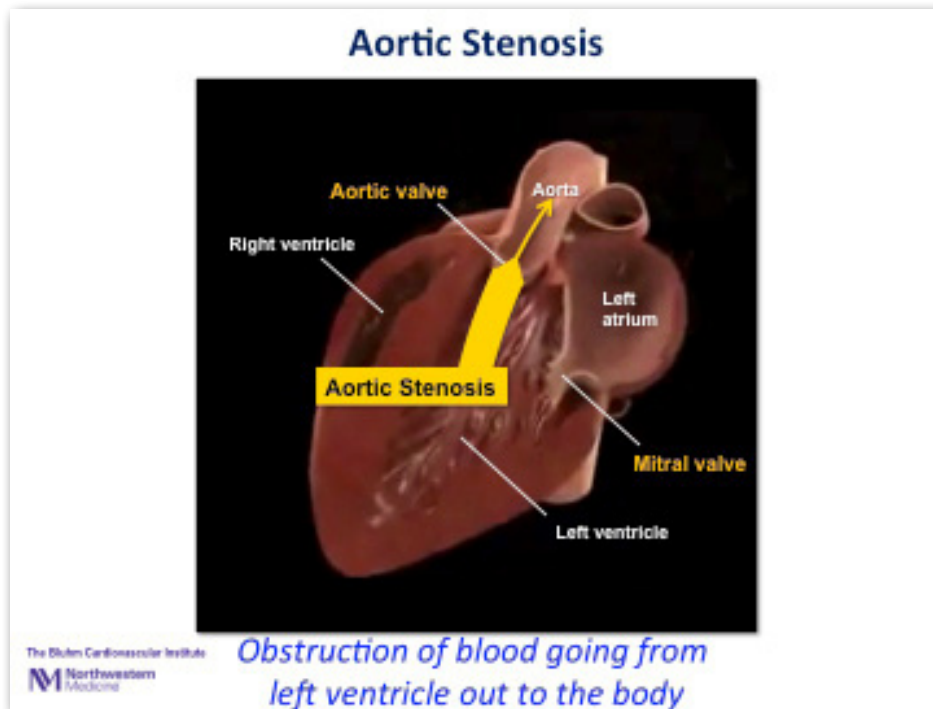
The Bluhm Cardiovascular Institute


There is a huge burden of valvular heart disease among those valves that don't function so well with all those openings and closings. I'm sure many of you are familiar with bicuspid aortic valves, where the aortic valve has only two leaves instead of three. There are over 3 million Americans with bicuspid aortic valves, and it's the most common congenital abnormality.

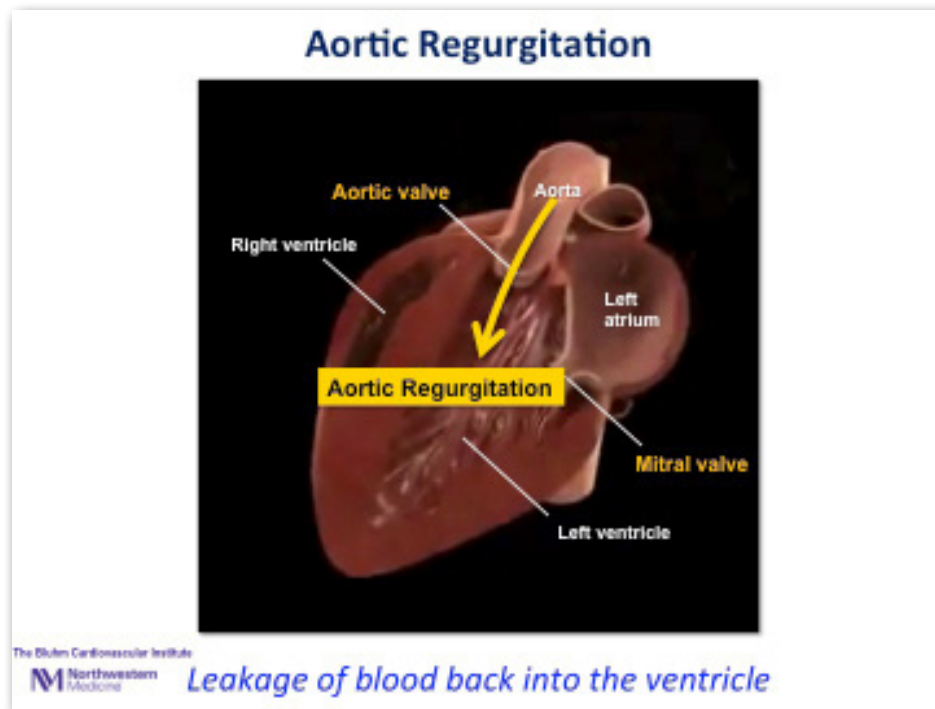
Considering all forms of aortic stenosis, after age 75, moderate or severe aortic stenosis is detected in 2.8% of the population and moderate or severe regurgitation in about 2% of the population. Considering mitral regurgitation, there are about 5 million Americans with moderate or severe mitral regurgitation, ultimately a 10% risk of this in patients over 75 years of age. Now, casting our view more worldwide, there are at least 20 million patients around the world with significant rheumatic valve disease. This is a huge burden for the developing world.

Aortic Stenosis & Aortic Regurgitation

Speaker: Dr. James Thomas



Let's consider first [aortic stenosis](#), which is probably the most common lesion that we have to face here. This is a situation where the aortic valve, which if you remember, is the valve that allows the blood to pass out into the aorta and the rest of the body and prevents it from leaking backwards into the left ventricle, develops an obstruction that makes it harder to pump the blood out into the body.



Aortic regurgitation, as you see here, allows blood to leak back into the ventricle. If we think about how this impacts the heart, for aortic stenosis, this will lead to higher pressures in the left ventricle, as it has to push harder to open that valve. It will lead to an abnormal thickening of the left ventricular wall, because the heart is basically doing extra work on every heartbeat. Ultimately, this can lead to weakening of the left ventricular muscle, leading to symptoms of heart failure. These symptoms can include shortness of breath, chest pressure, lightheadedness, and even passing out.

Aortic Stenosis

Consequences:

- Higher pressures in the left ventricle
- Thickening of the left ventricular wall
- Weakening of the left ventricular muscle (heart failure)
- Symptoms of shortness of breath, chest pressure and/or lightheadness

Aortic Regurgitation

Consequences:

- Enlargement of the left ventricle
- Weakening of the left ventricular muscle (heart failure)
- Symptoms of shortness of breath and/or chest pressure

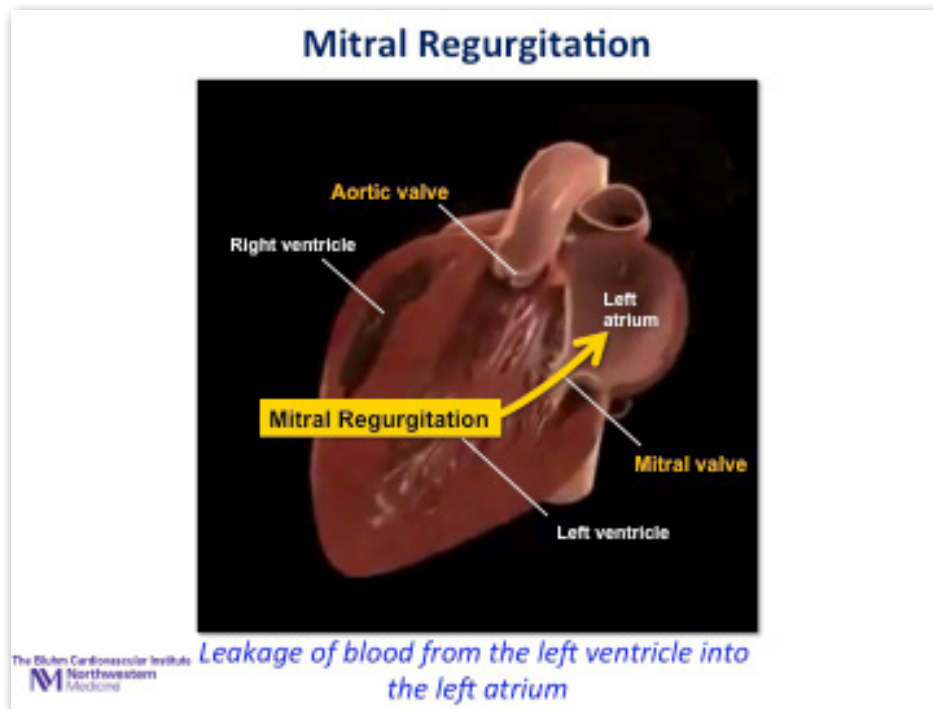
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Aortic regurgitation has its main consequence, enlargement of the left ventricle, as all of that extra blood sloshes back into the left ventricle. This causes the heart to dilate and the walls to thin, and it can lead to weakening of the left ventricular muscle, also resulting in heart failure and symptoms of shortness of breath and/or chest pressure.

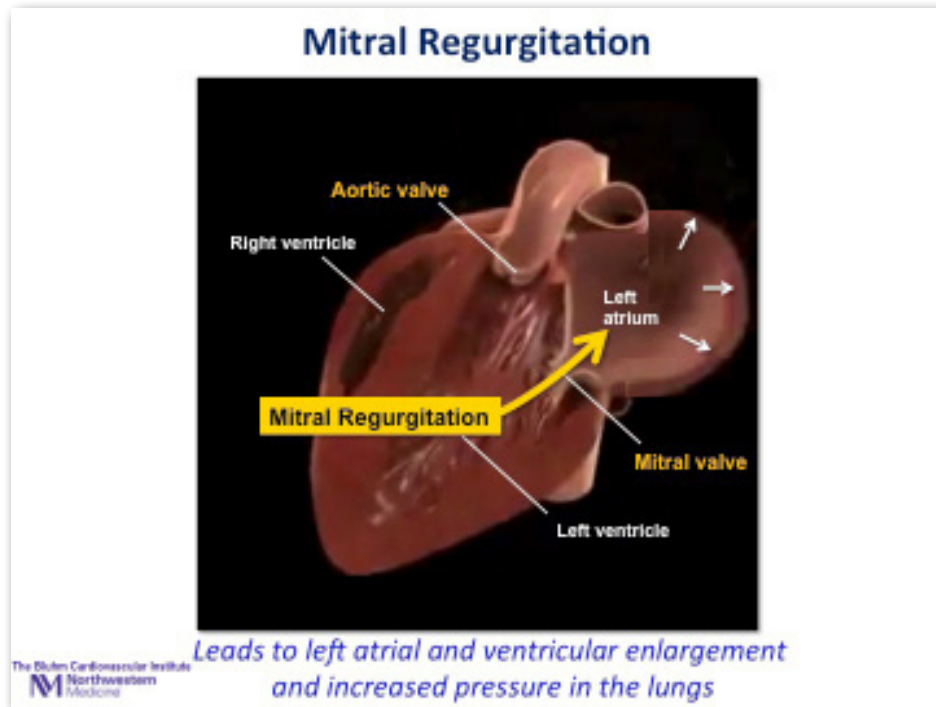
We speak about these two lesions separately, but you have to understand that very commonly they occur together, and you have situations where aortic regurgitation may make the hemodynamic effects of aortic stenosis worse and vice versa. They are often compounding lesions.

Mitral Regurgitation

Speaker: Dr. James Thomas



Consider next, [mitral regurgitation](#), which leads to leakage from the left ventricle into the left atrium. This can be caused either by diseases of the mitral valve itself, like mitral valve prolapse, flail, infection, or rheumatic heart disease, or it can be caused by situations where the left ventricle is distorted, perhaps from a heart attack or some other disease of the heart muscle that stretches out the mitral valve and causes it to leak, even though its actual structure is pretty normal.



With that leakage, you get enlargement of the left atrium as well as the left ventricle and increased pressure in the lungs. The consequences of this are a weakening of the left ventricular muscle, ultimately causing heart failure and elevation of the blood pressure in the lungs, which leads to pulmonary hypertension. It can lead to right heart failure and tricuspid valve regurgitation, and finally it can lead to atrial fibrillation and the risk of strokes from blood clots in the left atria.

Mitral Regurgitation

Consequences:

- Weakening of the left ventricular muscle (heart failure)
- Elevation of blood pressure in the lungs (pulmonary hypertension)
- Tricuspid valve regurgitation
- Atrial fibrillation ... and risk of strokes from blood clots in the left atrium

Quantifying Mitral Regurgitation

Speakers: Adam Pick & Dr. James Thomas

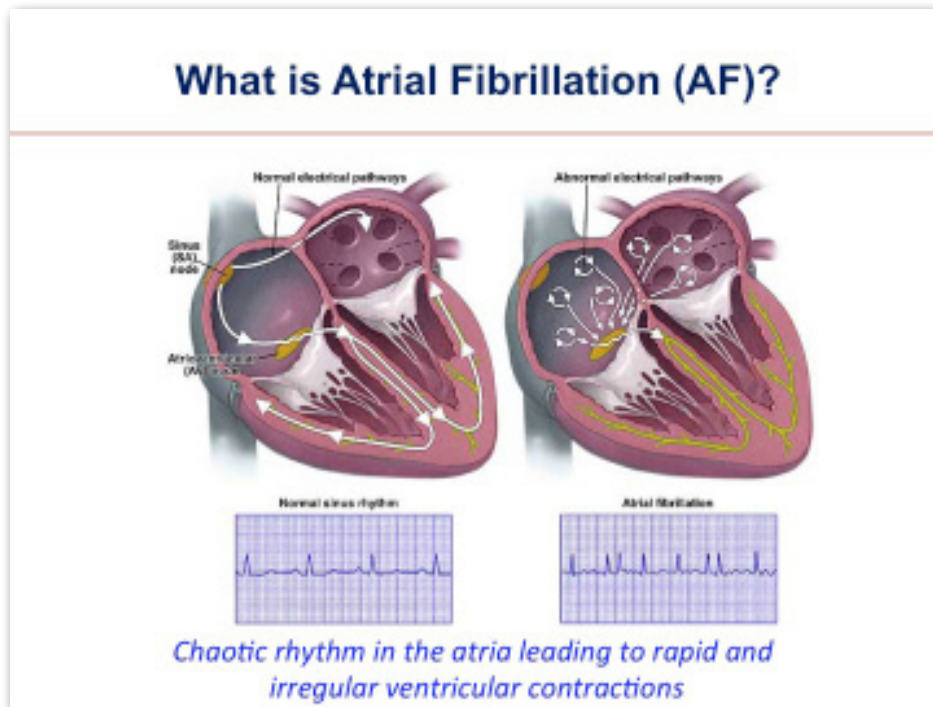
Adam: Dr. Thomas, I've got a real quick question for you. I know it's a question I have and I imagine some of the folks on the call have it. When we hear that there's leaking of blood backwards across the valve, is it possible for you to quantify the amount of leakage that occurs for a patient? Is it half of a pump? is it a quarter of a pump?

Dr. Thomas: Yes, absolutely. We do this routinely every day in the echocardiography laboratory and in the magnetic resonance imaging suite. We can do this in a semi-quantitative way just by looking at the appearance on the echocardiogram, but more and more, we're trying to really quantify it down to the milliliter, and we say that patients who have mild regurgitation may only be leaking 10 or 15 milliliters, that's about a tablespoon, and patients with moderate regurgitation are leaking about an ounce of blood with each pumping cycle. Patients who have severe regurgitation are leaking about 2 ounces, or a quarter cup, per pumping cycle there. These are measurements that guide our indications for when patients may need surgery.

Adam: Wow, that's much more than I expected. Thank you so much.

What Is Atrial Fibrillation?

Speaker: Dr. James Thomas



Dr. Thomas: You can see here, the subject of the second topic of our discussion today is the intersection of atrial fibrillation and valvular heart disease and all the problems that can come from atrial fibrillation.

First of all, let's say, "What is atrial fibrillation?" It's something that is very common, but it's still a little bit mysterious. You can see on the left side of the slide here the normal passage of electricity through the heart. The impulse is initiated in the right atria there and then passes into the left atrium and then down into the ventricles. There's a very steady, regular pumping that occurs in both chambers and promotes maximal efficiency of the heart.

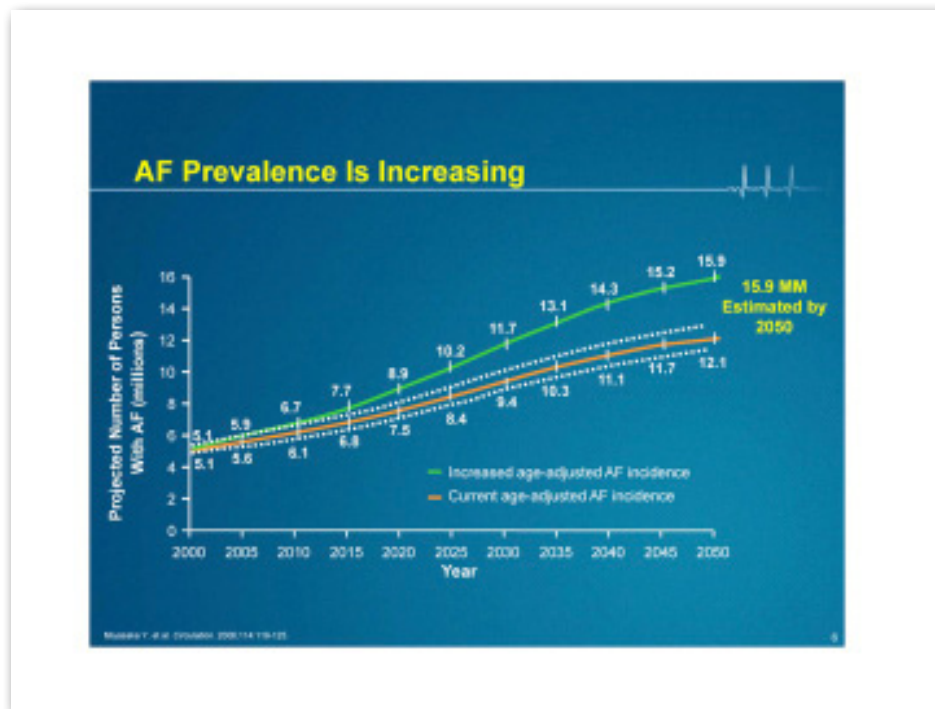
In contrast, look on the right, and you can see that there are all these little rotors of electricity going around in the left atrium that really leads to a chaotic rhythm with very little mechanical contraction at all, and when that passes into the ventricle, it can go very rapidly. The ventricle may have heart rates as high as 180 or 200 beats per minute, and that leads to very inefficient contraction of the heart.

Who Gets Atrial Fibrillation?

- **Atrial fibrillation is usually associated with underlying heart disease**
 - Coronary artery disease
 - Hypertension
 - **Valvular heart disease**
 - Congestive heart failure
 - Pulmonary embolus
 - Emphysema
 - Hyperthyroidism
 - Following coronary bypass surgery
 - Excessive alcohol
 - Advanced age
- **“Lone” atrial fibrillation**

Who gets atrial fibrillation? In most cases, atrial fibrillation is associated with some underlying heart disease such as coronary artery disease, hypertension, congestive heart failure, pulmonary embolus, emphysema or other lung disease, or hyperthyroidism. You can see it following any cardiac surgery, in patients who drink excessive alcohol, or just the ravages of getting older, but one of the most common causes of atrial fibrillation is valvular heart disease, as we're discussing today.

We also have to recognize that there are a certain number of patients who develop what we call lone atrial fibrillation. They have no particularly obvious risk factors. They may have some genetic predisposition to it, but they just develop it on their own.



The prevalence of atrial fibrillation is increasing. You can see on this graph here plotting out over the next 35 years that by 2050, we estimate that there will be almost 16 million patients in the United States with atrial fibrillation. You can see that even now, there's somewhere between 7 and 8 million patients with atrial fibrillation, a very common disease in the American people.

Lifetime Risk for Atrial Fibrillation

Index Age, y	Men	Women
40	26.0 (24.0–27.0)	23.0 (21.0–24.0)
50	25.9 (23.9–27.0)	23.2 (21.3–24.3)
60	25.8 (23.7–26.9)	23.4 (21.4–24.4)
70	24.3 (22.1–25.5)	23.0 (20.9–24.1)
80	22.7 (20.1–24.1)	21.6 (19.3–22.7)

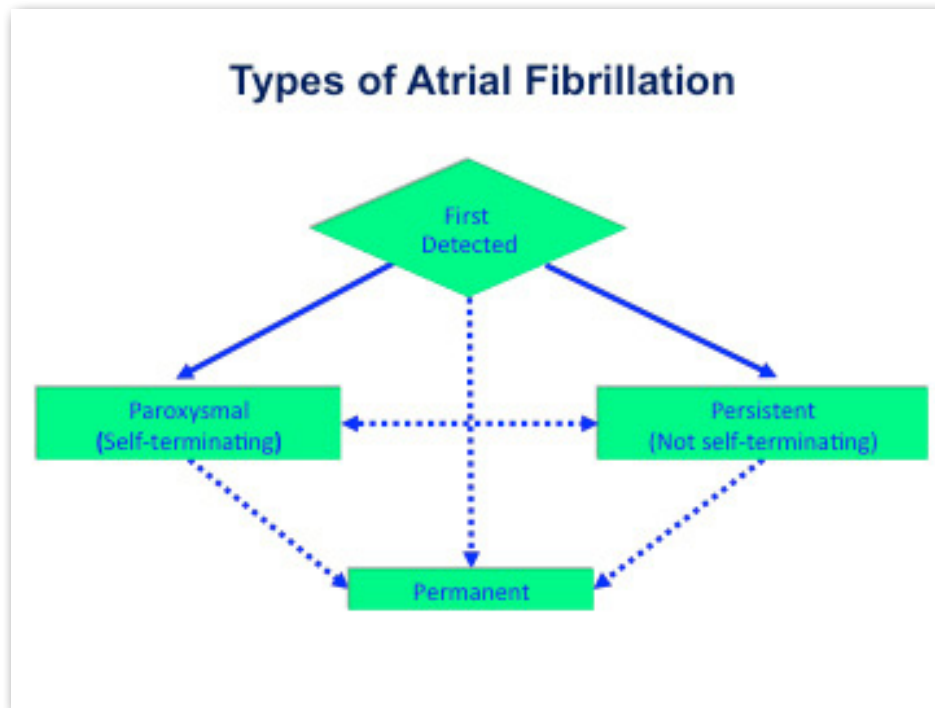
All values are percentages.

Lloyd-Jones et al, Circulation 110:1042, 2004

If we just look at the lifetime risk for developing atrial fibrillation, you can see that among 40-year-old men, they have about a 26% risk of developing AF, and for women, it's about a 23% risk. You may consider it sort of paradoxical that it looks like the risk goes down with age, but it's just that you're selecting out the ones who don't develop atrial fibrillation. If you've made it to 80 and haven't had atrial fibrillation before then, you only have about a 23% risk of having it after that, because you've passed 80 years of the test.

Atrial Fibrillation Types

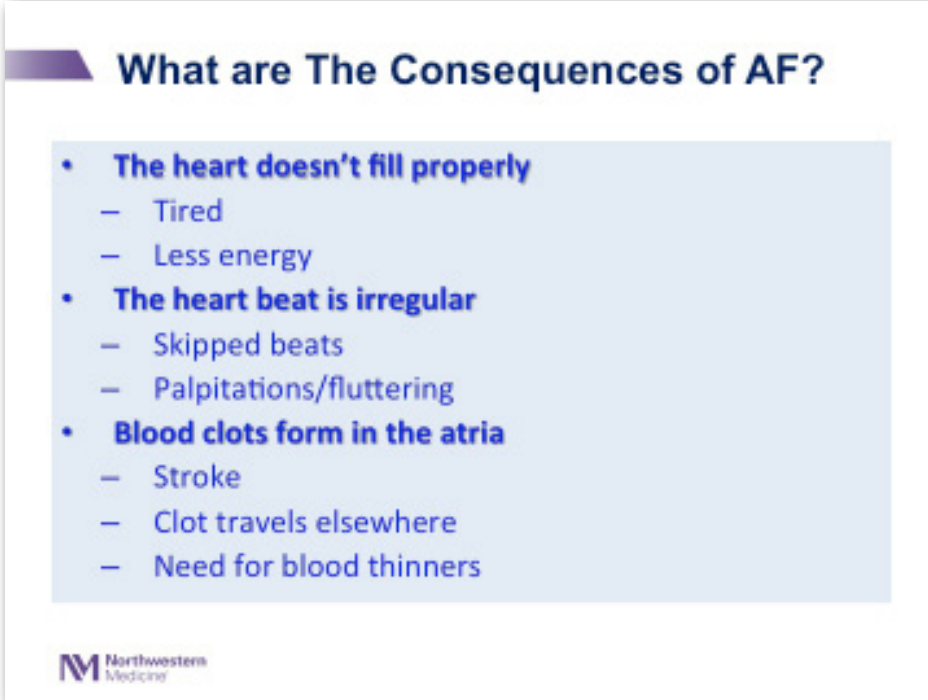
Speaker: Dr. James Thomas



Dr. Thomas: Electrophysiologists have divided the types of atrial fibrillation into three basic categories there: They can be paroxysmal where you get a brief burst of atrial fibrillation, but it basically terminates itself and goes back into the regular rhythm. It can be persistent, where it's not self-terminating, but it can be turned back to the regular rhythm with either medicines or an electrical shock, and then permanent atrial fibrillation, which are the ones that have been in atrial fibrillation without interruption for a long period of time.


Consequences of Atrial Fibrillation

Speaker: Dr. James Thomas



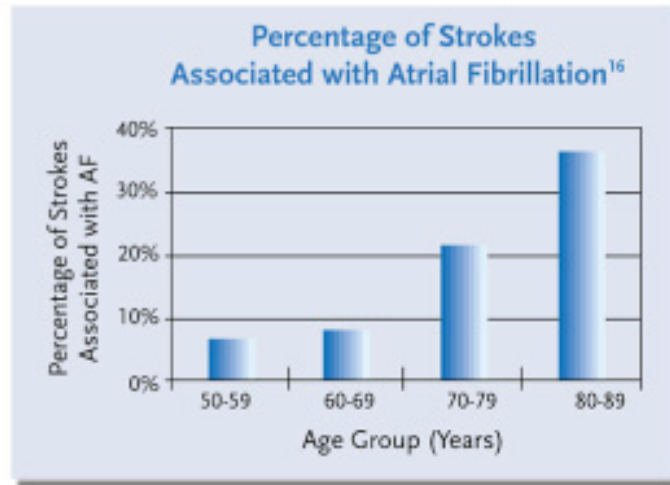
What are The Consequences of AF?

- **The heart doesn't fill properly**
 - Tired
 - Less energy
- **The heart beat is irregular**
 - Skipped beats
 - Palpitations/fluttering
- **Blood clots form in the atria**
 - Stroke
 - Clot travels elsewhere
 - Need for blood thinners

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Dr. Thomas: There are a number of consequences of atrial fibrillation. First of all, the heart doesn't fill properly at the irregular and rapid heartbeat, so the patient may feel more tired and they have less energy. The irregular heartbeat leads to symptoms of skipped beats, palpitations, and fluttering, but really the biggest worry we have is the formation of blood clots in the left and right atria as they fibrillate there. These blood clots can propagate throughout the body. Most worrisome is when they propagate to the brain and cause a stroke, but they can go anywhere in the body. Once you are in atrial fibrillation, most patients will need some form of blood thinner to reduce the risk of clots forming.

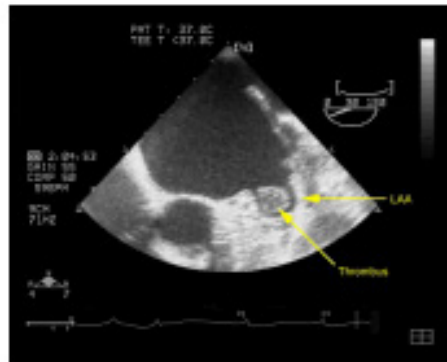
Strokes and Atrial Fibrillation



Wolf P, Abbott RD, Kannel WB. Arch Intern Med 1987;147:1561-1564.

This shows the percentage of strokes that are associated with atrial fibrillation. You can see that as patients get older, a higher and higher percentage of them will have their strokes associated with atrial fibrillation, as there is more and more atrial fibrillation in these age groups.

Blood Clot in Left Atrium



Echocardiography is the best way to identify blood clots in the heart

I'll close with this showing an image of an echocardiogram showing the clot, or thrombus, in the left atrial appendage. Echocardiography is the best way to identify blood clots in the heart, and when we see something like this, we know we have to do anticoagulation or if you have a handy surgeon around, he can address the problem directly. I'll turn this back over to Dr. McCarthy, and he'll discuss some of these surgical approaches to atrial fibrillation.

Clot Removal

Speaker: Dr. Patrick McCarthy

Clot Removal



Dr. McCarthy: Anyone that's squeamish in the audience might want to close their eyes for just a minute. What I'm showing here is this is a picture of one of those blood clots that I took on a video in the operating room, and I think what you can appreciate, is this is a pretty big blood clot. It's almost the length of your little finger, and it's about half an inch wide. We were operating on the patient through the mitral valve and we found this.

It points out that in atrial fib in particular, the strokes can be serious business, because if that breaks off and it goes up to your brain, the strokes in patients with atrial fib are the most fatal that patients have or are most likely to leave them with a significant disability so that they're paralyzed. Strokes from atrial fib in particular can be very dangerous.

Treating Atrial Fibrillation

Speaker: Dr. Patrick McCarthy

How is AF Treated?

- Treat the Underlying Problem (Hyperthyroidism)
- Heart Rate Control Medications
- Antiarrhythmic Medications
- “Catheter” Ablation
- “Surgical” Ablation: The “Maze” Procedure (and close the left atrial appendage)

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Dr. McCarthy: How do we treat atrial fibrillation? The first is, we always look to see if there’s some underlying problem that we can treat. For instance, Dr. Thomas mentioned hyperthyroidism. If we find that, that’s always great, because we can get the thyroid under control and then frequently, the atrial fib goes away, but, of course, as you get older, we don’t know how to treat that. We haven’t come up with that treatment yet.

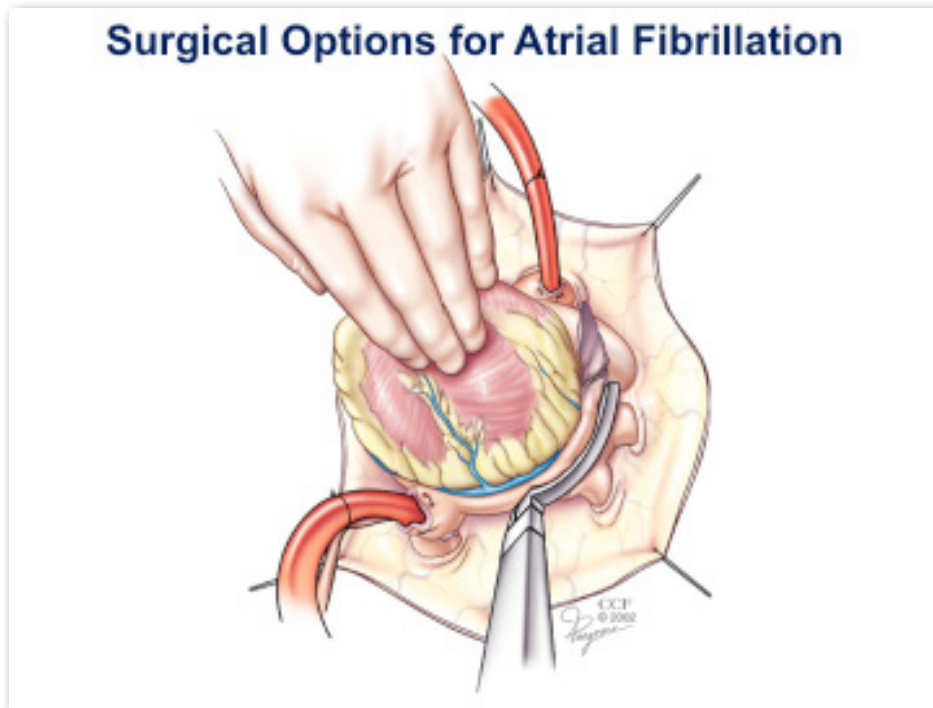
The second thing we do is we control the heart rate. He mentioned that some patients have a really fast heartbeat, and instead of your normal heartbeat of 70 it may be 120, so you go on some medications that slow it down to 80.

Third, sometimes we use antiarrhythmic medications. Those are actually medications that we use to try to get the heart rhythm to go back to normal. It depends on the age of the patient; it depends on the symptoms of the patient, but in some patients that may well be the right answer.

Then, there's what's called catheter ablation. If patients have no other major reasons to undergo surgery, the electrophysiologist, a heart rhythm specialist, can put a catheter up there and do an ablation, which means that they sort of ablate tissue by freezing it or burning it to get rid of the areas where the AFib begins.

The Maze Procedure

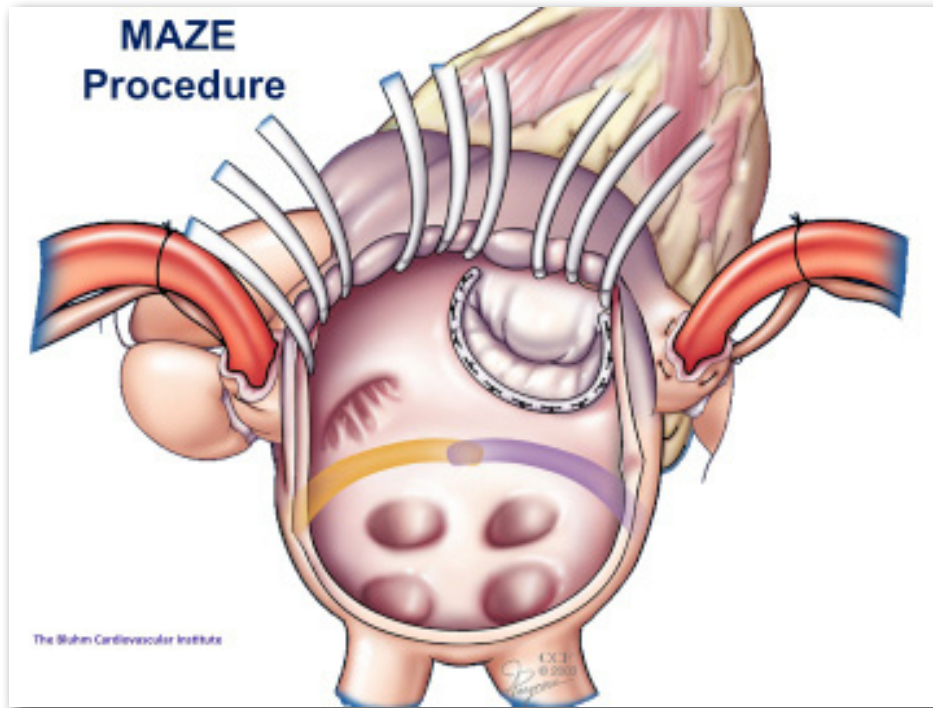
Speaker: Dr. Patrick McCarthy



Dr. McCarthy: What we're going to talk about from now on is surgical ablation, which is frequently called the Maze procedure. At the time, we also close that left atrial appendage where I just saw the blood clot or sometimes actually excise that. We cut that off.

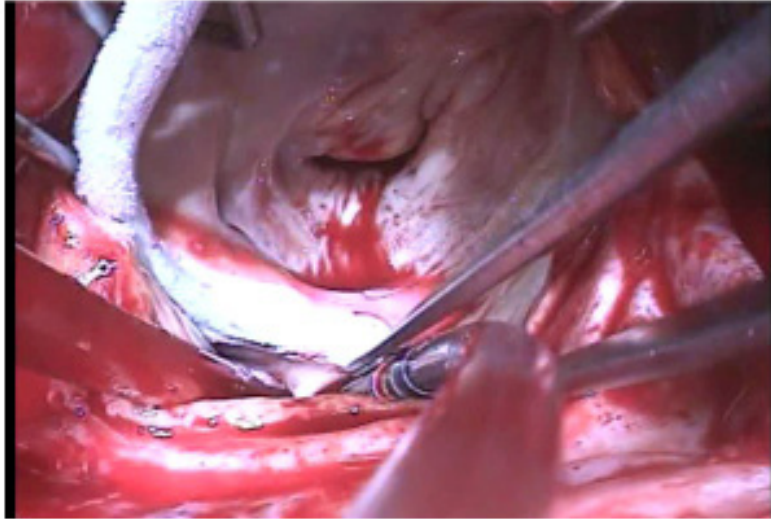
I thought that I would show just a little a bit about how we do this. It used to be -- 25 years ago when the operation was developed -- we would actually do the ablation by picking up some scissors and actually cutting the atrial tissue. If you cut it, the electrical wave front can't travel across the areas that have been cut. That's an ablation in itself.

About 15 years ago, some new technology, this is showing a clamp that was developed, and this passes radiofrequency energy from one side of the clamp to the other, and this is showing that we're clamping the pulmonary veins. That is a very common way that we treat it, is to do an ablation with radiofrequency ablation.



Eventually, by doing different applications of the clamp, you can recreate that Maze procedure. The most important part of everything that we do is shown by the yellow and purple lines. You see the four holes down below at 6 o'clock; those are the four pulmonary veins entering into the left atrium. Not in everyone, but in most patients, that's the source; that's where the atrial fib develops, and so what we want to do is separate that part out from the rest of the atria. The yellow and the purple lines are just showing that we would essentially create an island below where those pulmonary veins are, but after the ablation, any aberrant electrical impulses can't travel across that maze of pathways to the rest of the heart.

Cryoablation "Freezing"



Here's another one. You might want to close their eyes if you get squeamish, but this is actually how we do it most commonly, which is by doing cryoablation, where we actually freeze the tissue to 150 degrees centigrade below 0 for one to two minutes, and so the white there is a cryoprobe that is actually frost that forms on it quickly and up at 12 o'clock is actually a mitral valve in this patient.

What is the Risk for Adding on AF Surgery to an Operation?

National Surgical Data '04 – '06

“We found that the performance of a surgical AF correction procedure appeared to only modestly prolong the duration of the procedure, adding, on average, 9 minutes to cross-clamp time and 9 minutes to cardiopulmonary bypass time.”

Gammie JS, Haddad M, Milford-Beland S, et al. Atrial fibrillation correction surgery: Lessons from the Society of Thoracic Surgeons National Cardiac Database. *Ann Thorac Surg* 2008; 85:909-15 .



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What is the risk of doing this operation? There isn't all that much to the risk of it. Our national database from the Society of Thoracic Surgery did a look-back from 2004 to 2006, and what they found is with the new technology, all that it does is it adds 9 minutes to the time, the cross-quantitative time, which is when the heart is stopped and 9 minutes to the cardiopulmonary bypass time, which is the time on the heart-lung machine. It's actually pretty quick to have this procedure, considering the impact on the rest of the patient's life, we tend to do that.

Who Performs the Maze Procedure?

Speakers: Adam Pick & Dr. Patrick McCarthy

Adam: Dr. McCarthy, if I could just ask you a question. It seems like there's no additive risk here. Is it common then for these concomitant procedures to occur at all cardiac centers? Or, are there some cardiac centers where things like the Maze procedure are done at the same time as valvular procedures more regularly?

Dr. McCarthy: Yeah, that's a good question, and there's going to be a data slide coming up in a little bit, but across the country, if you look at it during mitral surgery, about 50% of the time when someone has a mitral surgery, they may get an ablation, a maze-type operation, if they have atrial fib. It varies widely. There are some places that just don't do it. They're just not that familiar with it; they're not that comfortable with it. We at about 95% of our patients. If they have atrial fib and we're there to do a mitral operation, then we will do it.

There's that 5% are just patients that maybe had atrial fib for 30 years, and we just know it's not going to work, or it may be somebody that had an episode when they were 21 years old, and maybe had a little bit of a long weekend, and a little too much alcohol involved, and that was 30 years ago. It wasn't related to the valve disease. Pretty much if we're there to do a mitral operation, in particular, and somebody has an atrial fib. We'll go ahead and we'll treat it.

How Often Is AFib Treated?

Speaker: Dr. Patrick McCarthy

STS Data '04 – '06

- 11.5% (67,389 pts) pre-op AF (**27% MVR**)
- Ablation 28.1% '04 ↑ to 40.2% in '06
- **52% of MVR**; 24% of CAB; 28% of AVR
- **7% PPM (p=0.016; odds ratio 1.26)**

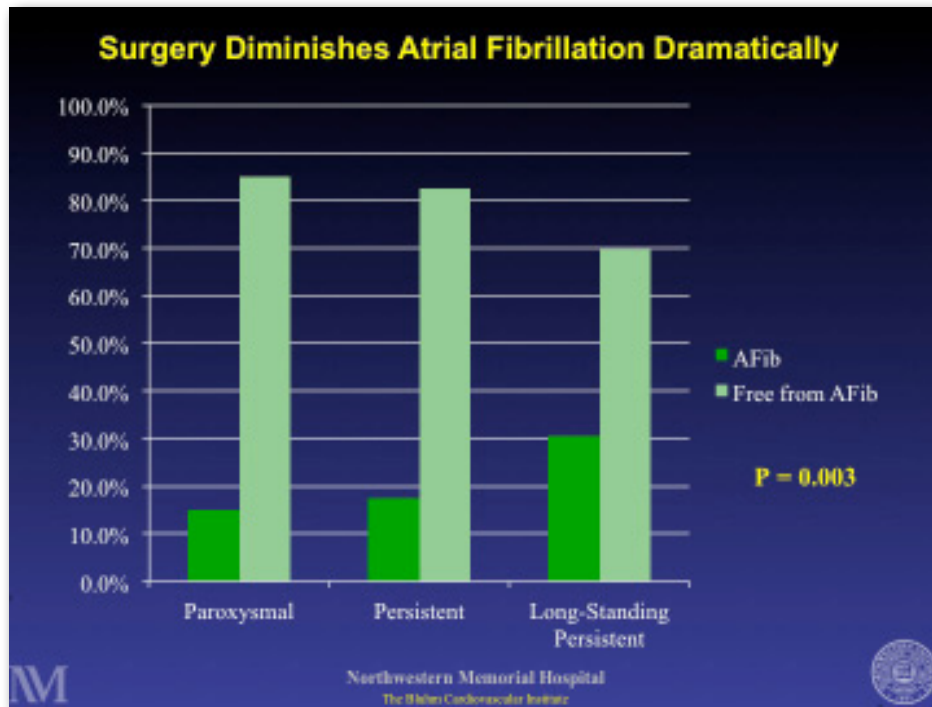
"After adjusting for differences in preoperative characteristics, mitral valve surgery patients with a surgical AF correction procedure **did not** have a significantly higher risk of mortality (adjusted OR 1.00, CI 0.83-1.20) or major morbidity."

Gammie JS, Haddad M, Milford-Beland S, et al. Atrial fibrillation correction surgery: Lessons from the Society of Thoracic Surgeons National Cardiac Database. Ann Thorac Surg 2006; 85:909-15.

Dr. McCarthy: The next slide, Adam, is going to speak to what you had asked about, which is how often do we actually treat this, and how often does it occur? This looked again at our database, and what we found is of patients going in for mitral surgery, 27% of them had atrial fib before surgery. It's very common in patients with heart valve disease. In patients with aortic valve disease, it's less common, but it's still about 5 to 7% of them have it. Ablation at this early phase was 28% and it went to 40% across the US. It's up to about 50% now. It's picking up, but it still isn't all that common.

AFib Surgical Success Rates

Speaker: Dr. Patrick McCarthy

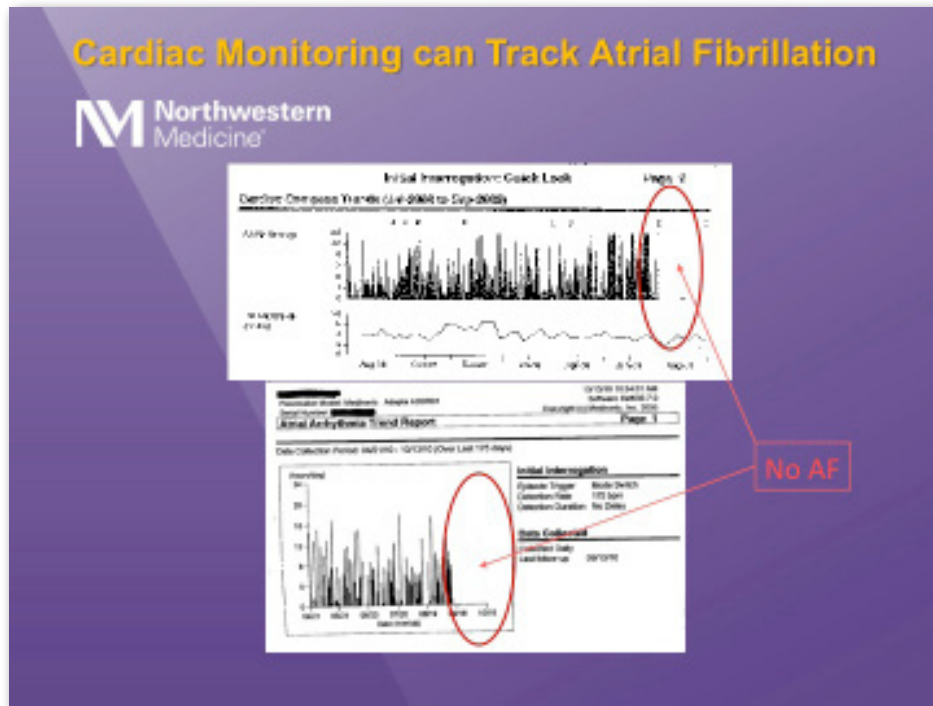


Dr. McCarthy: Then the important one that we found is that okay, well, if I have a – patients are always asking, “How successful is it?” I can tell them the success rate for a mitral valve repair is maybe 98% or more, and tell them what the risks are. Atrial fib ablation is pretty good, but it’s not quite as good. It’s a far more complex problem than mitral valve and aortic valve. Those are just plumbing. This is the electricity now. This is all those different rotors, Dr. Thomas called it. This is a lot more complex to fix.

What we’re making the point here is if they’re paroxysmal, meaning that you have it one day, and then you don’t have it for a week, and then you have it again. Chances of success here at [Northwestern](#) were 85%; contrast to the far right, the long-standing ones, patient may have had atrial fib continuously for five or ten years. Then the chance for success was about 70% overall. The chances of success drop if you’ve been in it for – and I see people in 20, 30 years of atrial fib.

Patient Monitoring After AFib Therapy

Speaker: Dr. Patrick McCarthy



Dr. McCarthy: Then they want to know how do we measure the success of it? This is a really dramatic example that Jane found, and the little black lines on the left are indicating episodes of atrial fib as were picked up on a pacemaker. The black line indicates that the patient was in atrial fib in a 24-hour day, and it might be that the patient was in for an hour or for 24 hours or something. Then at the red circle is when we did the ablation; we did the maze procedure After that, there's no more atrial fib. You can see before the operation, a lot of atrial fib, pretty much daily, varying from an hour to 24 hours and then afterwards, it's gone. It's ablated, and it stops.

The monitoring is really important afterwards because some people do have a recurrence. If you have a recurrence doesn't mean it didn't work. Means that we need to work at it to try to get rid of it.

Atrial Fibrillation Treatment Guidelines

Speaker: Dr. Patrick McCarthy

HRS / STS Guidelines

“It is advisable that all pts w documented AF referred for other cardiac surgeries undergo a left or biatrial procedure for AF at an experienced center, unless it...will add significant risk...”

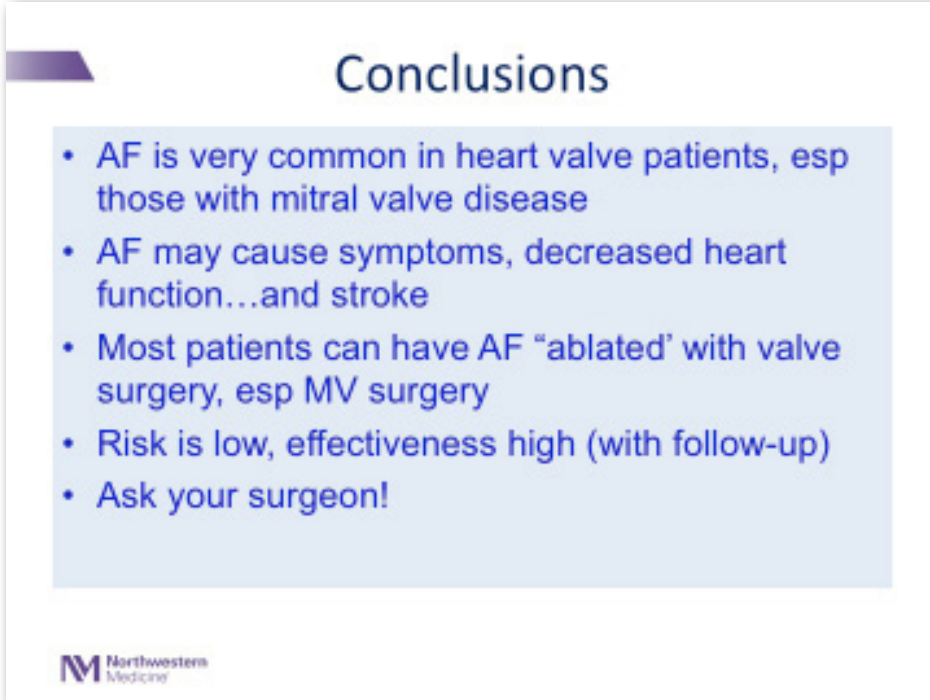
Calkin et al. Catheter and Surgical Ablation of AF. Heart Rhythm 2007;4:816-861

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Dr. McCarthy: With all of the data, I'm skipping all of the high-level cardiology and cardiac surgery that went into it, our societies got together to come up with what we call guidelines or recommendations. What we first published in 2007 was that it's advisable that all patients with documented Afib referred for other cardiac surgery, a mitral valve operation, most commonly, but sometimes aortic or bypass; undergo a procedure, a Maze-type procedure, at an experienced center, unless it will add significant risk. Occasionally, it is – for different reasons, it may add some risk to the patient, so we wouldn't do it. Most of the time, we do it.


Conclusions

Speaker: Dr. Patrick McCarthy



Conclusions

- AF is very common in heart valve patients, esp those with mitral valve disease
- AF may cause symptoms, decreased heart function...and stroke
- Most patients can have AF "ablated" with valve surgery, esp MV surgery
- Risk is low, effectiveness high (with follow-up)
- Ask your surgeon!

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Dr. McCarthy: I think we just have one that is a conclusion before we go onto answer some questions. Afib is very common in heart valve patients, especially mitral patients where it's - in our - it's probably our referral pattern, but 40% of the patients that I see before mitral surgery have atrial fib, and I think it's just their cardiologists refer them because they know that I'm going to treat it.

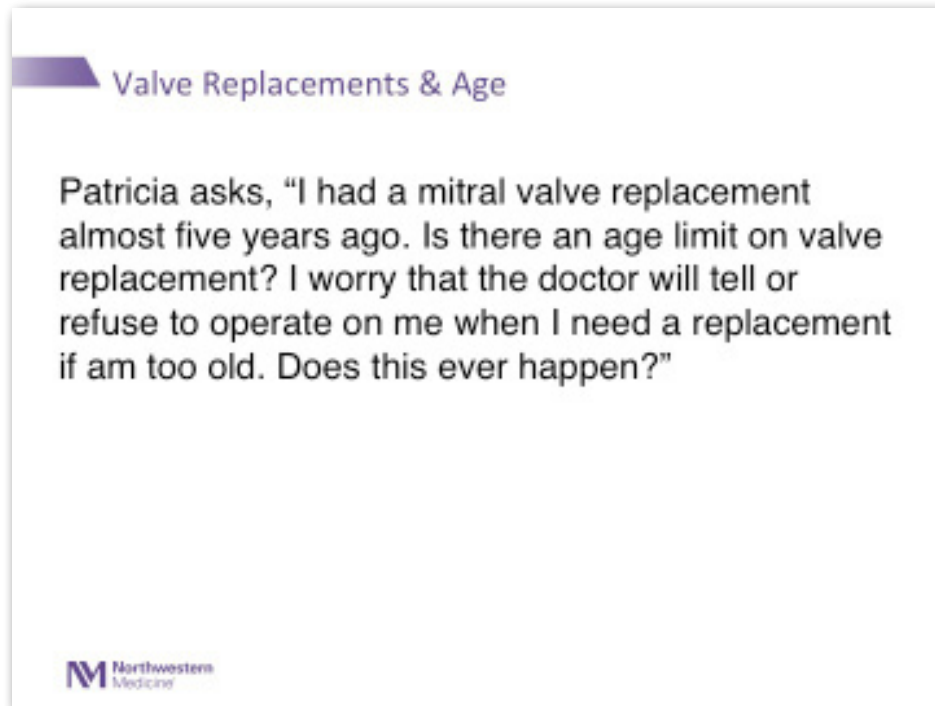
The Afib may cause a lot of different symptoms, decrease heart function, and stroke. Some people don't have symptoms. Some, they just go in to see their doctor, and they get an EKG, and they find out about it. Other people describe it - even I've heard like a percolator, a coffee percolator in your chest, because it's pounding and it's irregular. A lot of young people - Adam, you may be too young to even know what a coffee percolator is, but older people like me know.

Adam: I'm not that young Dr. McCarthy. I definitely remember my nana's percolator.

Dr. McCarthy: That's good, your grandmother's. Most of the patients that go through surgery can have the Afib ablated while we're there, especially with mitral surgery. It adds about nine minutes. The risk is low; the effectiveness is high, but especially if you follow up. If you do have atrial fib and you're going for surgery, it's something to ask your cardiologist and your surgeon about, if they're going to go ahead and treat that while they're in the neighborhood, as we say. Thanks, Adam. I'll be happy to answer any questions.

Questions & Answers

Speakers: Dr. McCarthy, Dr. Thomas & Adam Pick



Adam: Great, Dr. McCarthy, Dr. Thomas, for all your dedication to this space, both on the valvular side and the Afib side. This has been very helpful for me to learn much more. We are going to shift gears into the question and answer section. What I encourage everybody to do is if you have a question, go ahead and ask it using the control panel on the upper right part of your screen. We're going to start the Q&A with a question that came in from Patricia, and she asks, "I had a mitral valve replacement almost five years ago. Is there an age limit on valve replacement? I worry that the doctor will tell or refuse to operate on me when I need a replacement if I am too old. Does this ever happen?"

Dr. McCarthy: Well, I guess I would have to mention that, Patricia, a patient we met several years ago, who needed her aortic valve replaced. She was very symptomatic, and she wanted to see her great-grandchild born, which was due any day. She was 101 years old. It was the very earliest days when we were replacing the valve without surgery, the transcatheter aortic valve replacement. At 101, that certainly was stretching the limit. I certainly replaced heart valves in patients in their 90s, but we replaced her heart valve with that transcatheter. The next day, she was sitting up in her chair. She'd put on her lipstick already when I saw her, and I'm happy to report she's now 106 years old. No, we don't have any upper age limits. Patients go through this at a lot of different ages.

Adam: That is a great story.

Dr. McCarthy: She's one in a million, though.

Post-Op Afib & Medications

James says, "I had Aortic valve replacement in November 2013 and went into Afib 2 days after surgery. I had successful elector-conversion before being discharged from hospital. I was prescribed Metoprolol, Multaq and Warfarin for my continuing Afib treatment and have had no re-occurrence of Afib since discharge from the hospital. What is the outlook for getting off the medications?"



Adam: Now we're moving onto a question about post-op Afib, which is something I hear about patient frequently. James says, "I had an aortic valve replacement November, 2013, and went into Afib two days after the surgery. I had a successful electro conversion before being discharged from the hospital. I was prescribed metoprolol, Multaq, warfarin for my continuing Afib treatment, and I've had no reoccurrence of Afib since discharge from the hospital." That's great. Will he – James asks, "What is the outlook for getting off of the medications?"

Dr. McCarthy: When Afib occurs early after surgery in a patient that has never had it before, it's not that uncommon, and it can be somewhere around 20% to 30%. We think that it is related to inflammation around the heart because we were just in there, and there's an inflammatory response that can trigger atrial fib. Usually before patients go home, it's done, although they're on medication.

Now, most commonly, the way we would treat it would be to stop those medications after about two months and since they're now pretty far away from the inflammatory response early after surgery, for the majority of those patients, it won't recur. For most patients, the outlook for getting off the medications is very, very high. Now in the situation for James, it's possible that doctor's been doing some additional follow-up and found other episodes of atrial fibrillation or found other reasons that he wanted him on Metoprolol, in particular, which is common beta-blocker. If it's as simple as just an atrial fib episode two days after surgery, typically we stop the medications after about two months, and it's unusual that it would recur.

Bicuspid Aortic Valves & Blood Pressure

Joe asks, "I have a bicuspid aortic valve which is not yet ready for surgery. Is low blood pressure a result of valve disease? Will both the systolic and diastolic number normalize after surgery?"




Adam: Here's a question about bicuspid aortic valves and blood pressure, and Joe asks, "I have a bicuspid aortic valve which is not yet ready of surgery Is low blood pressure a result of valve disease, and will both the systolic and diastolic number normalize after surgery?"

Dr. McCarthy: Thanks so much, Joe. It's an interesting questions and obviously, I can't answer it definitively not knowing a lot more about the case. Assuming you have only mild to moderate stenosis or regurgitation, I wouldn't anticipate that that by itself would be having a lot of impact on your blood pressure. It may be that your blood pressure is low for other reasons. You certainly want to talk to your doctor about that. Sometimes some of the medication that you may be on will be contributing to this, or some patients just happen to run a low blood pressure and in general, that's a good thing. We like low blood pressure, and as long as it's not causing you to be light-headed or pass out when you stand up, that's not really a problem for worry there.

If, in fact, you are more advanced in your disease and have severe aortic stenosis, that could possibly produce a low blood pressure there. Assuming the heart pumps more efficiently afterwards, the blood pressure might come up. That, again, gets into the real details of example what's going on with your case that we just can't predict in a general forum like this.

Mechanical Valves & INR

Sarah asks, "For patient (69 years old) who has artificial mechanical heart valve and pacemaker and on warfarin, what is the recommended INR range to be considered stable? Is it between 2 to 3, or 2.5 to 3.5?"

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Adam: I encourage everybody to keep asking your questions. They're coming in left and right here. We're going to move onto the next one, and this is about mechanical valves and INR. Sarah asks, "For a patient 69 years old who has an artificial mechanical heart valve, and pacemaker, and on warfarin, what is the recommended INR range to be considered stable? Is it between 2 to 3 or 2.5 to 3.5?" and maybe you can talk about what INR is, as well.

Dr. Thomas: That's a great question, and yes, INR stands for international normalized ratio, which is a fancy way of saying how thin is your blood? Basically when you're not taking any blood thinner at all, your INR should be around 1. These are all – you can kind of think that an INR of 2 is your blood is twice as thin as it at rest. That's probably an oversimplification there, but obviously the higher the INR, the thinner your blood and the less likely it is to form a clot but also the more likely you are to have bleeding complications. We don't want the INR too low, or you may form a clot with your mechanical valve, or too high because that increases the risk of bleeding.

Now the two ranges that you put here are the two most common ranges, and they – which one is recommended? For the most part, if you are young, and healthy, and have a mechanical valve, particularly in the aortic position, a range of 2 to 3 is generally recommended. Now for certain older types of heart valves, particularly in the mitral position, or if you have some degree of left ventricular dysfunction, or especially if you have atrial fibrillation on the top of your mechanical valve in the mitral position, you would need the higher range, the 2.5 to 3.5.

Then just recently, the FDA has approved one of the mechanical heart valves in the aortic position, the On-X valve, to be – to have even INRs below 2. You need to discuss with your surgeon and your cardiologist exactly what they recommend in your particular situation. You have to factor a lot of different patient-specific factors in there to say what the right value is. There is at least one mechanical heart valve, you can go a bit under 2 in your blood thinning.

TAVR

Irene asks, “Does the TAVR procedure carry more risk than the conventional open-chest surgical option (e.g. stroke)?”



Adam: Great, thanks, Dr. Thomas. We’re going to move onto a question that we’ve been hearing more and more about with the innovation of TAVR, and Irene asks, “Does the TAVR procedure carry more risk than the conventional open-chest surgical option?” She references one of the risks being stroke.

Dr. McCarthy: That’s a terrific question, and I will say this is very much a moving target. If we get back to the early days of TAVR, just so everyone knows, that’s the transcatheter aortic replacement, a catheter replacement of the aortic valve. It was really intended only for the very highest risk patients, patients who really were too sick to undergo surgery, and we showed that in those patients, they certainly did better than no intervention medical management is basically no management. It was safer than not doing anything to them.

Then in the high-risk patients, it compared favorably to the surgical risks. Now there were certain risks that were slightly higher, at least early on, and one of

those is stroke You can imagine when these valves are put in that there can be some dislodgement of some of the calcium on the valve that can lead to a stroke. Very early on in the first few days, there was a somewhat higher risk of stroke than the surgical patients. If you look out over a year, this difference virtually went away, and there was no real significant difference over the long run there.

As TAVR procedures have gotten safer and new devices have been developed, these risks have gotten even lower and lower. Now we're seeing patients who are not at the very high risk but probably moving towards, in not too long, patients who are more intermediate risk for surgery there. We just have to keep monitoring them very closely because we know in these patients, surgery is very safe. We just have to make sure that the TAVR is maintaining that good safety profile as we move to lower risk patients.

Adam: Great, and we are having a quick follow-on question coming in from Maria Dagastino regarding TAVR, Dr. Thomas and Dr. McCarthy. She writes, "I had an aortic tissue valve replaced in March; doing well. My doctor said it'll last 15 years, hopefully, but my question is will or can the TAVR procedure be used when the time comes?"

Dr. Thomas: Yes, absolutely. She's in luck. Even today, we are doing quite commonly a procedure called Valve-in-Valve TAVR, and that is patients who have old bio-prosthetic valves mostly commonly in the aortic position, but we're also doing them in the mitral position and the tricuspid position. Basically you just put a valve inside that existing valve. Now obviously, if it was a very small valve to begin with, you may not get the full benefit from the TAVR there, and there is some limit to how many times you can do this. It's a little bit like the Russian dolls that are nested inside each other. Eventually you're putting a soda straw in there, and that wouldn't work too well.

I think in 15 years, we'll have some very good options for her so she won't have


to go through the surgery again, and I think Dr. McCarthy has a comment on that.

Dr. McCarthy: Yeah, the other thing I would point out is just how quickly this is moving. Ten to fifteen years ago, we weren't even thinking about this stuff. We weren't even talking about it. TAVR was just beginning, and it just happened to be last week that the FDA now has officially approved valve-in-valve for aortic valves. Everyone out there that has a tissue aortic valve, when it wears out, that might at least be a potential option for them going forward.

For instance, this week at Northwestern, we did three of those, the valve-in-valve. It's becoming every day that we do that. That's actually very optimistic for how patients'll be treated in 15 years.

Pre-op Preparations

Valerie asks, "How is a patient prepared for heart valve surgery and Afib surgery? Are there additional precautions or equipment used or taken?"

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Adam: Wow, that's amazing. Here, this is an interesting question from Valerie,

and she's talking about pre-op preparations. She asks, "How is a patient prepared for heart valve surgery and Afib surgery? Are there additional precautions or equipment used or taken?"

Dr. Thomas: I'm glad we have Jane here for this, because part of her job is patient preparation, to explain to them what to expect, and she's also an expert on the various types of equipment that we talk about.

Jane Kruse: Hi, everybody. In terms of the surgery itself and testing that you may have to go through before heart valve and Afib surgery, there's not a lot of difference in the pre-op testing. If we're not sure that you have an arrhythmia, we may want you to get a heart monitor before your surgery so we can double-check, especially if you're telling us that you're having symptoms of that percolating or that fluttering feeling in your chest.

We do have more information that we go over with patients who are going to have Afib surgery because we want to make sure that you are aware of how important the follow-up is after surgery, and we want to make sure you're able to discuss that with the local doctors that're going to be taking care of you long-term after your surgery. Our follow-up for Afib patients spans the six months to a year after surgery.

In the first three months, medications that you may be on and continue will be stopped after we get some additional monitoring to make sure that the heart rhythm has converted back to normal rhythm and is staying there. It's a series of checking your rhythm at different time points with halter monitors, or vest monitors, or using the implanted pacemakers if you happen to have that to really check the rhythm well before we decide to stop arrhythmic medication; then later, possibly stopping Coumadin if that's a consideration for an individual patient.

There's a lot of communication that needs to happen with the doctors that are


taking care of you and actually, even after that one-year period where you may be off medication, the recommendations are to still get monitoring every six months with a halter monitor through the first two years after surgery. We find that a lot of times, patients are feeling great, and they really don't feel the symptoms of the problems anymore with the valve repaired and the Afib surgery, so they tend to not get that monitoring.

We do want patients to know that if they ever feel symptoms after they've had their procedure, they need to let people know. It's really important to check to see if there's any Afib that's returned. So, that we can do something about that and keep that stroke risk very low.



Atrial Flutter

Damian asks, "Can you please talk about Atrial Flutter?"

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Adam: Great. Thank you, Jane, and thanks for all your incredible help with our patient community. We really appreciate it. Let's see here... Just so you know, we now have over 48 questions that've come in, so we're not going to be able to get to all of these today. We've got time for maybe one or two more, but this one comes in from Damien Tudelka. Hey, Damien. It's been a while since we talked; hope you're doing good. He asks, "Can the doctors speak a little bit about atrial flutter?"

Dr. Thomas: Sure. Be happy to discuss that. Atrial flutter is a different type of irregular heart rhythm that is – it has a different electrical genesis there, and it – in most patients who haven't had cardiac surgery, the hallmark of it is that it makes the atrium beat at about 300 beats per minutes, so a very rapid atrial contraction there, but it is pretty regular at 300. Then depending on how rapidly those beats gets conducted to the ventricle, you may have heart rates at 150, or 100, or 75. It's some percentage of that.

Now the problem with that is that because the rhythm may feel regular, the patient, and even the doctor, if they're listening to them, may detect nothing that says there's an arrhythmia there. It may be a perfectly regular rhythm at 75 and yet if you do an electrocardiogram, you'll find that you're actually in atrial flutter there. It's important to never be completely reassured by a regular pulse. It could be atrial flutter there.

Now, there are different approaches to treating it. There are catheter approaches to it, and there are surgical approaches that are just a different sort of lesion set that the surgeon or the electrophysiologist would do to interrupt that. Pat, do you want to say anything about flutter ablation in your experience?

Dr. McCarthy: First of all, it's not as common as atrial fibrillation. We see it sometimes, but maybe it's about 5% to 10% of the rhythms that we treat. They're closely related. When we actually do the procedure, I put those ablation lines in a little different spot, but a little too technical, I think, for the audience at this point.

Scar Considerations

Nina writes, "My Mitral Valve has gone on to the severe regurgitation stage. I am a fit healthy 51 year old who could wear a bikini. For an open heart procedure, is there plastic surgery to get rid of the scar? "



Hey, Adam, can I mention something you've flipped up a question that was about the scar after surgery and can things be done? There are things like gels that we put on the scar. You can actually pick them up at the pharmacy after your surgery. You should just avoid being in the sun or things the first few months or a year, even, after surgery. One suggestion I'm going to make for your website is a couple of times, my patients had been posting their scar three or four days after surgery. Show them again a year later because a year later, most people, it's a thin white line, and it's really not that noticeable. My suggestion for your website and for your patients would be let's get the follow-up later. About three days later, it looks kind of ugly. But after all the healing is done, most people, you just hardly notice them.

Adam: It's funny you mention that. I'm now almost ten years out from my surgery, and I cannot remember the last time that someone - when I'm out at the beach or at the pool - that anybody's said, "Hey, what's that on your chest?" The scar is now just a very thin, white line. That's a really great point, Dr. McCarthy. With that response, I think we're going to go ahead and conclude the webinar, but please, please, please don't exit just yet.

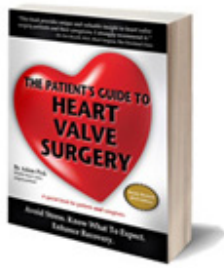
On behalf of the entire community at www.HeartValveSurgery.com and all the patients with valve disease, I'd like to extend an extraordinary thank-you to Dr. McCarthy, Dr. Thomas, Jane, everybody at Northwestern for sharing your expertise with us today. As we end the webinar, I'd also like to thank you, all the attendees who are on the call, for your participation in this very special community event when we can all get together.



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