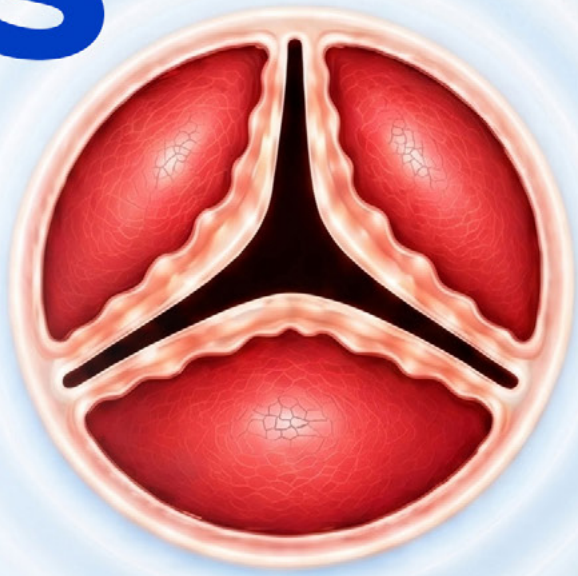
HeartValveSurgery.com

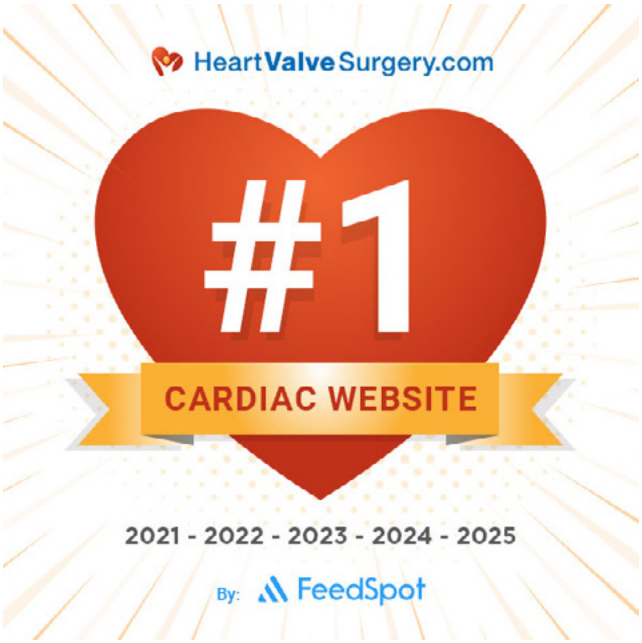
LONG-TERM HEART VALVE SUCCESS

Expert insights.
Latest advances.
Better outcomes
for life.

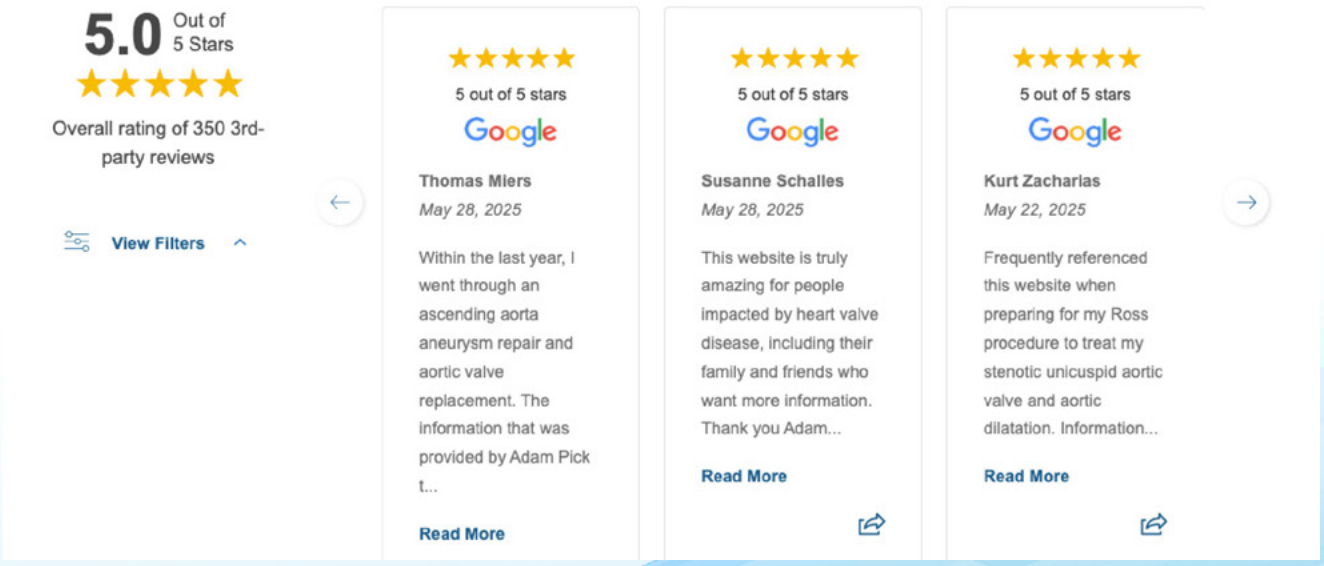


HeartValveSurgery.com Named #1 Heart Website!

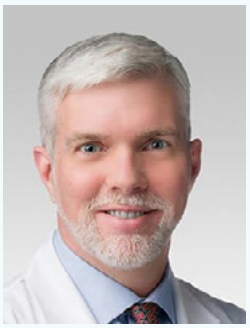
We are happy to announce that HeartValveSurgery.com was just named the #1 Heart Disease Website by Feedspot for the **fifth consecutive year**! Learn more.



To see patient reviews of HeartValveSurgery.com, please visit our new "Patient Reviews" page. See 300+ patient reviews here.



Featured Speakers



Dr. Doug Johnston

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Please note: A complimentary video playback of this eBook is now available on YouTube at this link.

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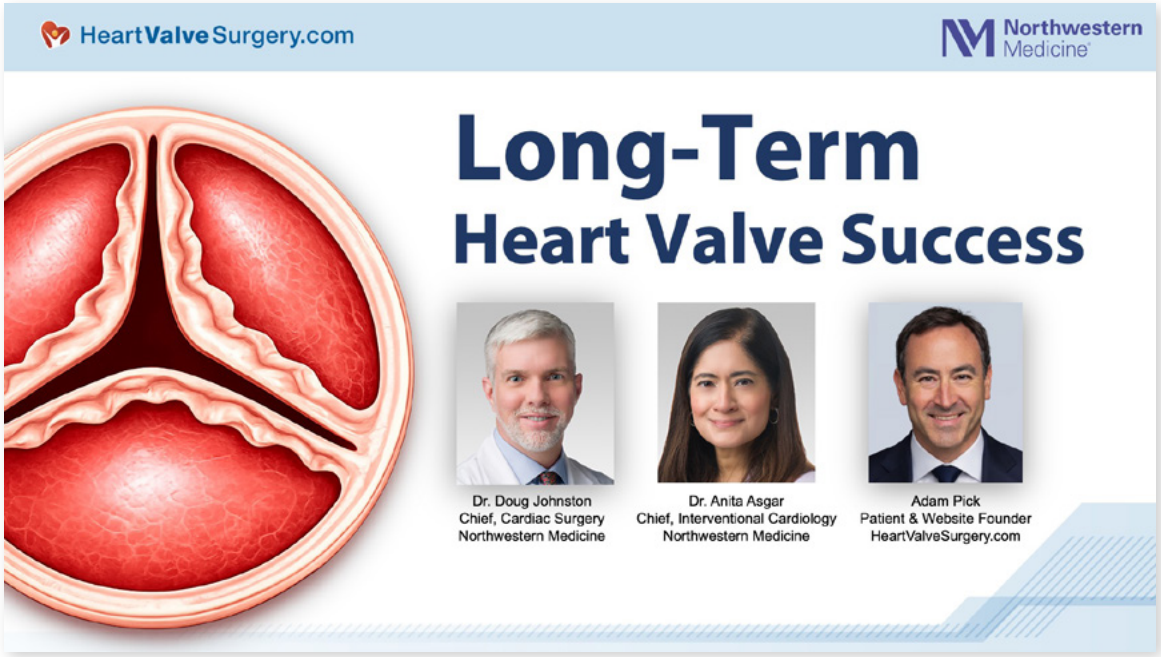
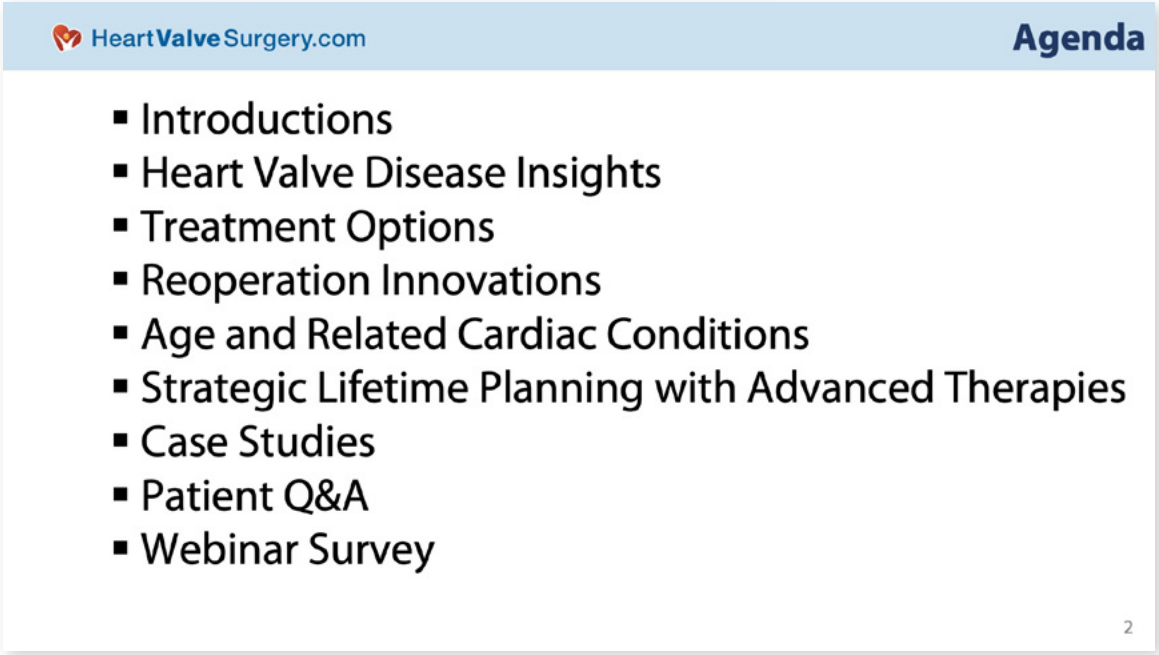
Introduction

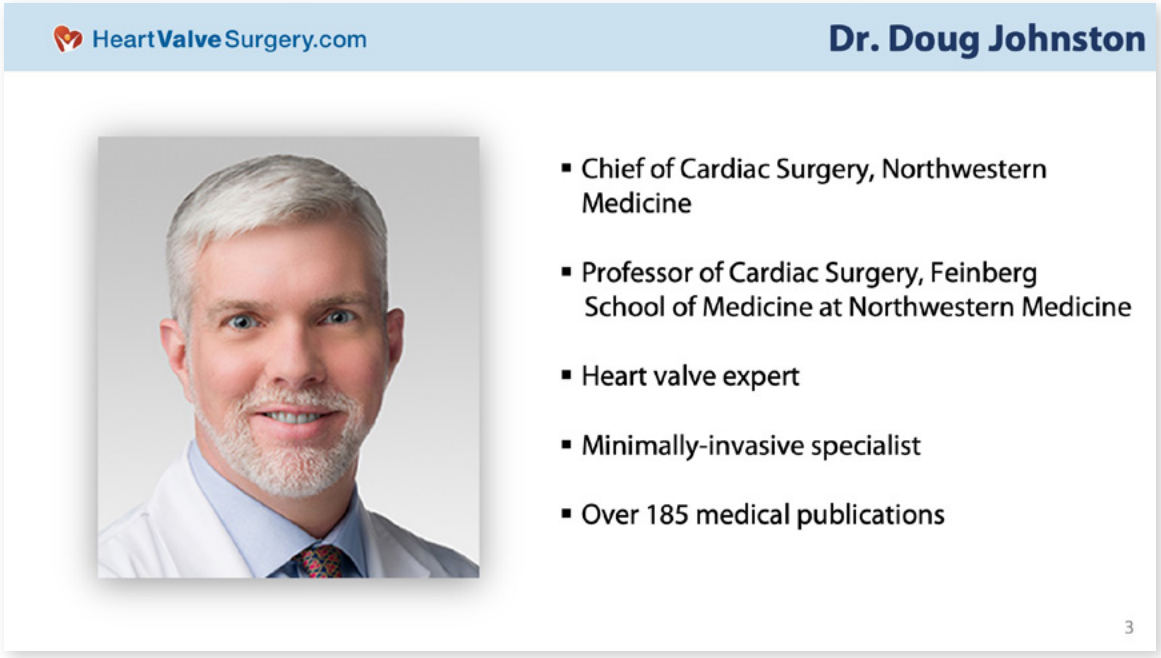


Adam Pick: Hi everybody, my name is Adam Pick. I would like to welcome you to the webinar titled, "Long-Term Heart Valve Success". If I have yet to meet you, I'm the patient who started HeartValveSurgery.com nearly 20 years ago in 2006. The mission of our website is very simple. We want to educate and empower patients just like you. This webinar, which has had over 1,250 registrations from patients and countries all over the world, was designed to support that mission. Now, throughout the webinar, you're going to be in what's known as "listen only mode". But, I encourage you to submit your questions in the control panel on your screen for our live Q&A session. Now, when it comes to the agenda today, it is jam packed with incredibly important information for patients specific to their heart valves.



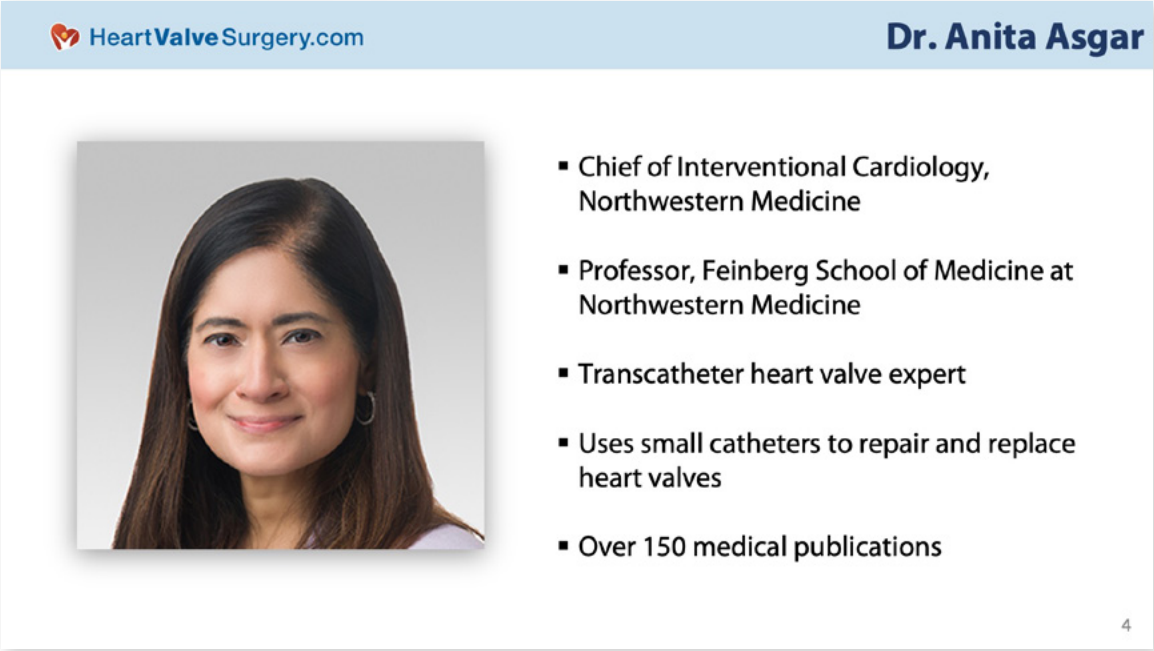
What are we going to talk about today? I'm going to introduce the featured speakers. We're going to look at heart valve disease insights and treatment options. We're going to have a nice dive into reoperation innovations. We're going to talk about age and related cardiac conditions, then have a strategic lifetime planning discussion all about advanced therapies. We're going to have case studies put on top of all of that. That will lead into our patient question and answer session. As we wrap up the webinar, I'm going to ask you to complete an incredibly quick five question survey.

Now, when it comes to the featured speakers, I just have to tell you I'm honored and I'm humbled that they're taking time away from their very busy practices. I'll let you know that on the line today, we have not one but two chiefs. This is the first time in our history, and so who are they?



Dr. Doug Johnson is the chief of cardiac surgery at Northwestern Medicine. He's a professor of cardiac surgery at the Feinberg School of Medicine. Dr. Johnston is a heart valve expert. I've known him for 15 years, and when we talk, it's about valves, valves and more valves. His specialty is in minimally invasive therapies. When it comes to research, Dr. Johnston is featured in over 185 medical publications. Dr. Johnston, thanks for being with us today.

Dr. Johnston: Thanks for having me. It's great to be here, Adam.

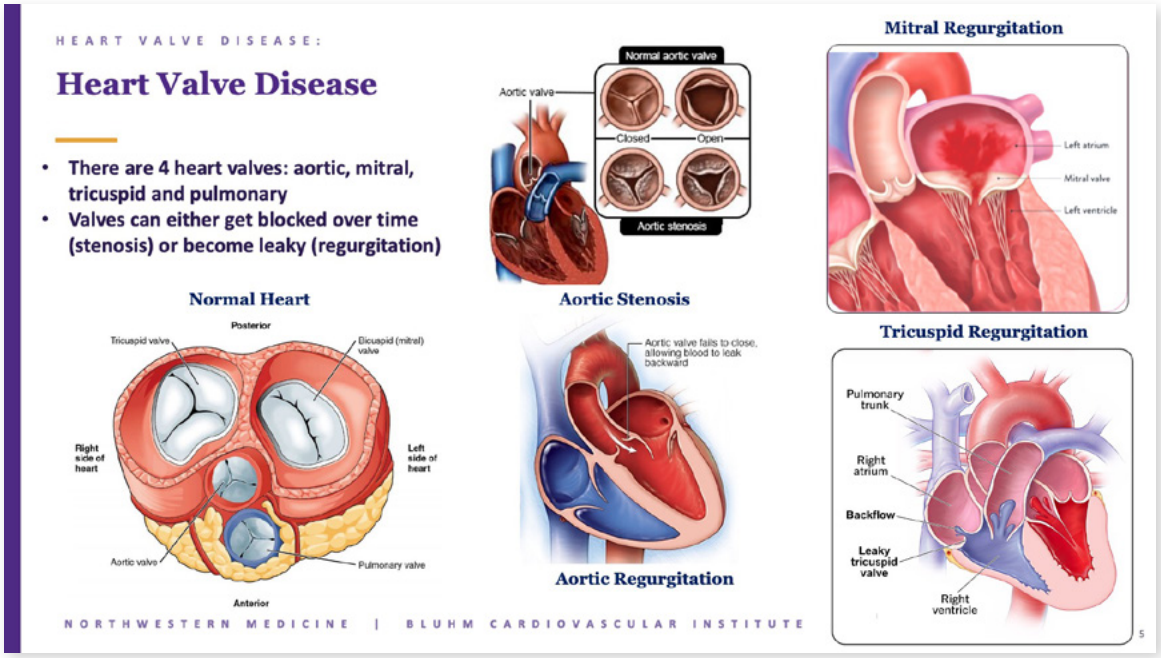


Adam Pick: For the second chief, I would like to introduce you all to Dr. Anita Asgar. She's the chief of interventional cardiology at Northwestern Medicine. She's a professor at the Feinberg School of Medicine. Dr. Asgar is incredibly talented, specific to transcatheter heart valve therapies. What she does is uses these very small catheters to repair and replace heart valves. Dr. Asgar is also very into research and she's been featured on over 150 medical publications.

Northwestern Medicine Patient Success Stories

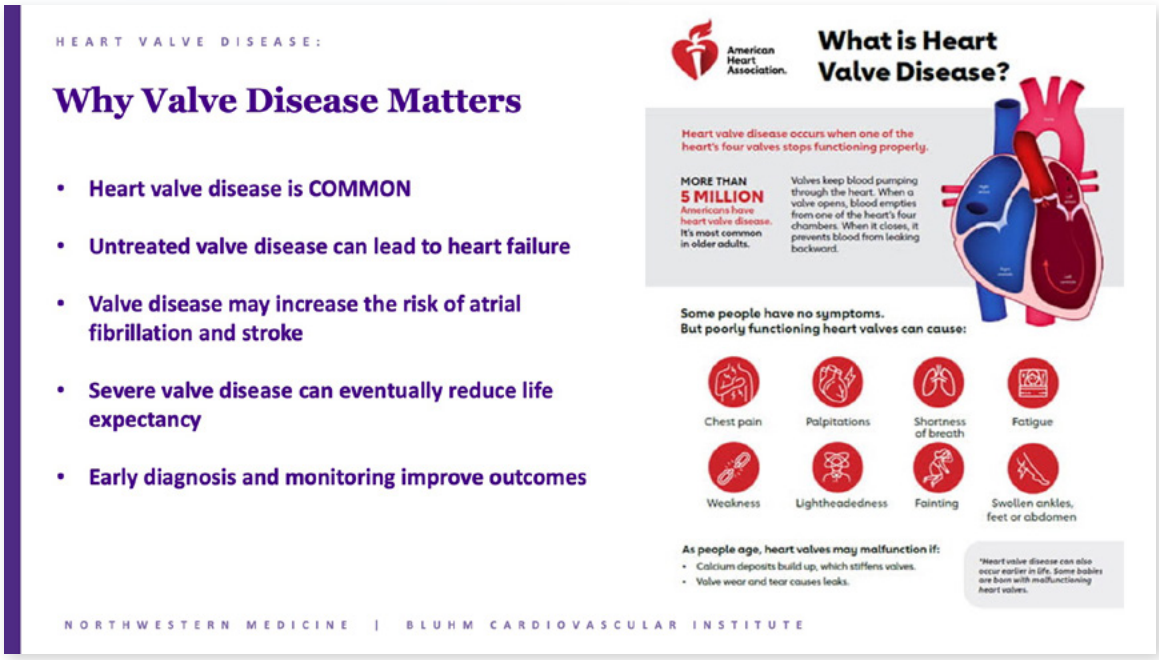
Adam Pick: Now, I could go on and on all about the achievements and accolades of Dr. Johnston and Dr. Asgar, but because our agenda is so incredible, we're just going to show you this. These are the smiling faces of patients from the heartvalvesurgery.com community, whether it's Jesse or Jane, who went to Northwestern and got an extraordinary result, whether it was a transcatheter procedure, a surgical procedure, or ultimately given the lifetime management of the disease, both surgical and transcatheter approaches. I would like to go ahead and welcome Dr. Doug Johnston and Dr. Anita Asgar. I am going to go ahead and kick it off by passing over to Dr. Asgar.

Heart Valve Disease Insights



Dr. Anita Asgar: Thank you. It's a real pleasure to be here, and I'm hoping we can give you some information and have a really productive question and answer period at the end. I'm going to start by talking about heart valve disease and understanding transcatheter options for heart valve disease. Next slide.
I think it's important to start to just level set everyone. In terms of heart valve disease, most of us are familiar with one or two of these valves, but there are actually four heart valves, the aortic, mitral on the left side of the heart, tricuspid and pulmonary on the right side. Things to remember; valves can either get blocked over time and we call that stenosis, or they can get leaky and we call that regurgitation. What you can see in some of these pictures that I have put together in the middle panel on the top, you see the aortic valve and you see what a normal aortic valve looks like; not like a Mercedes-Benz sign. It opens up like a big triangle.

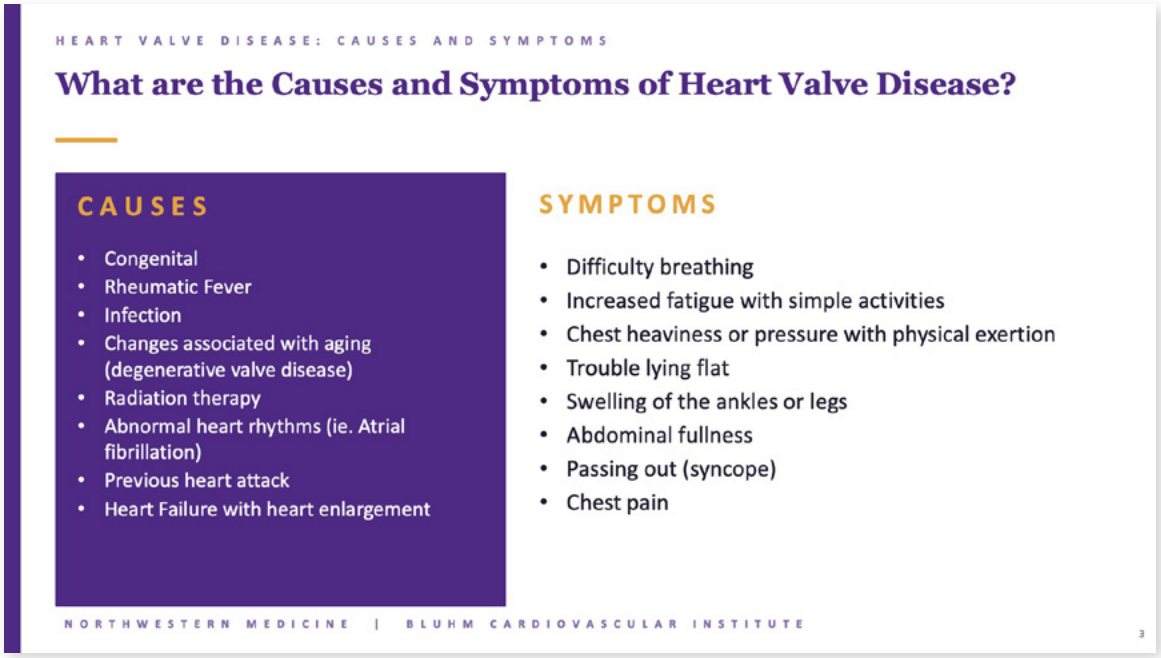
Over time, if you develop aortic stenosis where the valve gets narrowed, it's no longer able to open the way it had done in the previous time. It actually makes your heart have to work harder to push the blood out. In addition to being able to become blocked over time, the aortic valve can also leak. What's happening there, the valve is not actually closing properly. If you think about valves, I always explain to patients, think of valves like doors. They're like doors in the heart that control the blood flow through the heart. What you want is that door to open, but then you want that door to close. By closing, it prevents blood from going in the wrong direction or going backwards. When you have aortic stenosis or a mitral stenosis, the door is not opening. When you have a regurgitation, the door is not closing. In aortic regurgitation, the valve is not closing, and blood is moving backwards into the left ventricle. Mitral regurgitation, again, a leaky mitral valve; and then tricuspid regurgitation, a leaky tricuspid valve. Leaky valves cause blood flow to go backwards. Think of it like a washing machine. Your heart is not particularly efficient.



Why does valve disease actually matter? Maybe many of you have either had experience with heart valve disease or you have a family member who has had experience. Why it matters is because it's very common. if you have untreated valve disease, it can lead to heart failure. Valve disease can also increase your risk of atrial fibrillation or arrhythmias of the heart and stroke. If you have severe valve disease, it can eventually reduce your life expectancy. What is important is really early diagnosis and monitoring to improve outcomes. What a lot of patients will ask me is what are the symptoms? I don't know what I'm looking for. How do I know there's something wrong with my valve? The symptoms can be varied. I've taken this from the American Heart Association. I think this sums it up quite nicely.

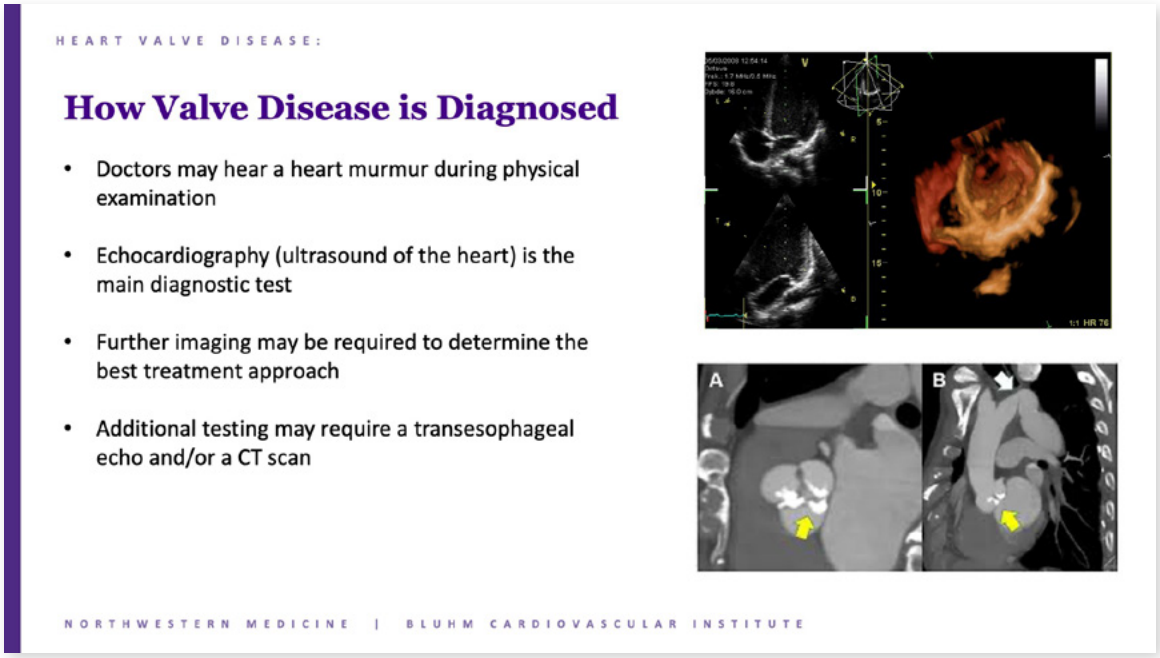
More than 5 million Americans have heart valve disease. It is more common in older adults. Some patients actually have no symptoms whatsoever, but you may have symptoms. Those symptoms can include all of what you see here; chest pain, palpitations, difficulty breathing, fatigue, feeling weak, feeling lightheaded, fainting, or having swollen ankles or feet. What I see from some of my older patients, they come in and they tell me, well, I just thought I was getting older. Everybody is getting older, but that doesn't mean you have to get older and feel bad; and so not all these symptoms that you may be having is just age. Sometimes it really is related to your heart.

Causes and Symptoms



Dr. Anita Asgar: What are the causes and symptoms of heart valve disease? I'm not going to go through all of these, but just to remind you that some people are born with heart valve disease and it's detected early in life and they're dealing with it through their younger years. When we think about it, we really have to be mindful about how we're going to manage them through their lifetime. Some people have had infections in childhood, particularly rheumatic fever or other infections of the heart valves, and then there are changes that come with aging. As you get older, your valves get older with you and they don't function the way they used to. Patients who have had radiation or chemotherapy for other conditions can actually have heart valve disease or people who have heart failure, who have had a heart attack in the past, all of these things you think may only be affecting one part of your heart can actually be affecting other parts of your heart. These are the symptoms that can be associated with that.

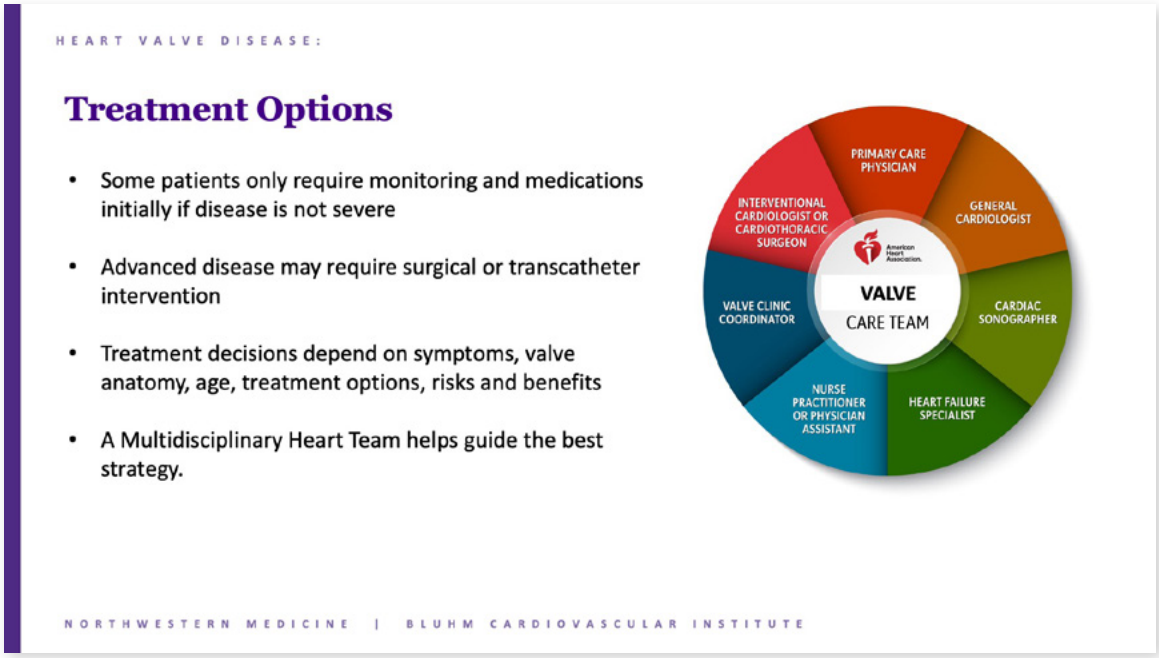
Diagnosing Valvular Disorders



Dr. Anita Asgar: How do we actually diagnose heart valve disease? The most common exams that you're going to have, the first one is a physical exam. Your doctor may listen to your heart and hear a murmur during your physical exam. The next test they're going to ask for is usually an echocardiogram. That is an ultrasound of the heart, and that is the mainstay I would say, of diagnostic testing. That is the test that will tell us how well your heart valves are functioning, but you may need further imaging after that to enable us to decide what is the best treatment. That will most often be a CT scan or another type of echo or transesophageal echo where we put an echo into the stomach and

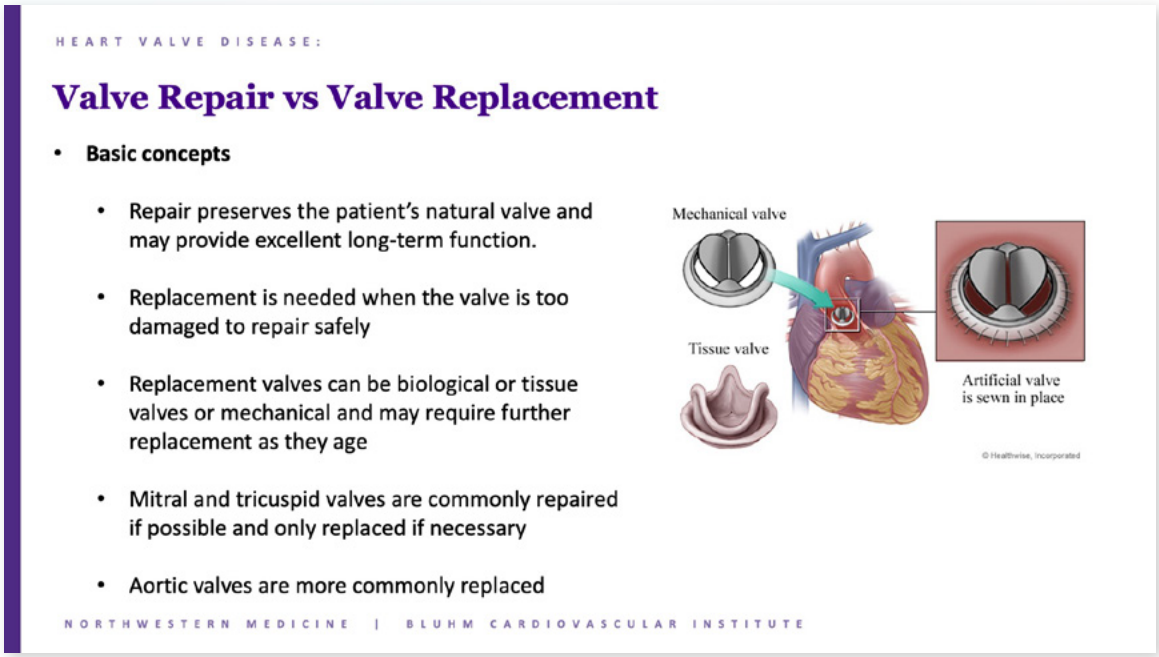
we can see your heart a little bit better. These are some of the tests that you can expect to be ordered if you do have heart valve disease. Here you can see some images of the ultrasound in your top panel. That's the ultrasound of the heart. That's the mitral valve you see in the 3D looking at you there, opening and closing. The second panel is a CT scan. This is what your aortic valve looks like when it's calcified. All that white that you see on the valve leaflets is actually calcium. This is what aortic stenosis looks like to us on a CT scan.

Treatment Options



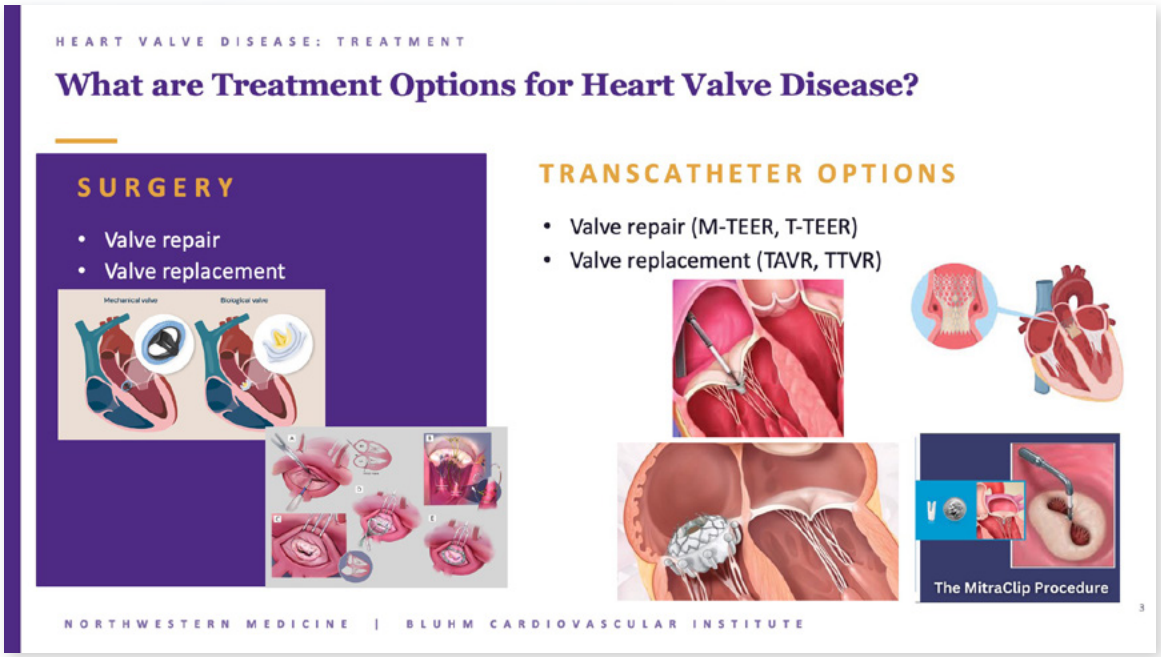
Dr. Anita Asgar: What about treatment options? When you find out you have heart disease or heart valve disease, it's a very stressful thing to find out. Your first questions are going to be what's next? Do I need medications? Do I need surgery? Do I need some treatment or some procedure? In the beginning, some patients may only require monitoring, and we'll talk a little bit more about this; if it's moderate, if there's not an indication to have an intervention right away. Monitoring is very important because disease progresses over time. If you don't need an intervention right away, it doesn't mean that you can forget about it. Think about it again, in 10 years you do need to be monitored for it. If you have advanced disease, you may require an intervention. What you see here in this

image is really what is the valve care team? I put valve in here, but these are all the people that are involved. When we talk about a heart team, these are all the members of the heart team that are thinking about, that are involved in the care, that are part of the investigation and management. Really how we decide on what treatment depends on your symptoms, what does the valve look like, age, treatment options, risks and benefits. What we feel as a community as the best way to guide treatment is to have this multidisciplinary heart team approach where everybody gets together. Think of it as your board of directors; these are the people that are getting together to try to figure out what's the next best thing for you.



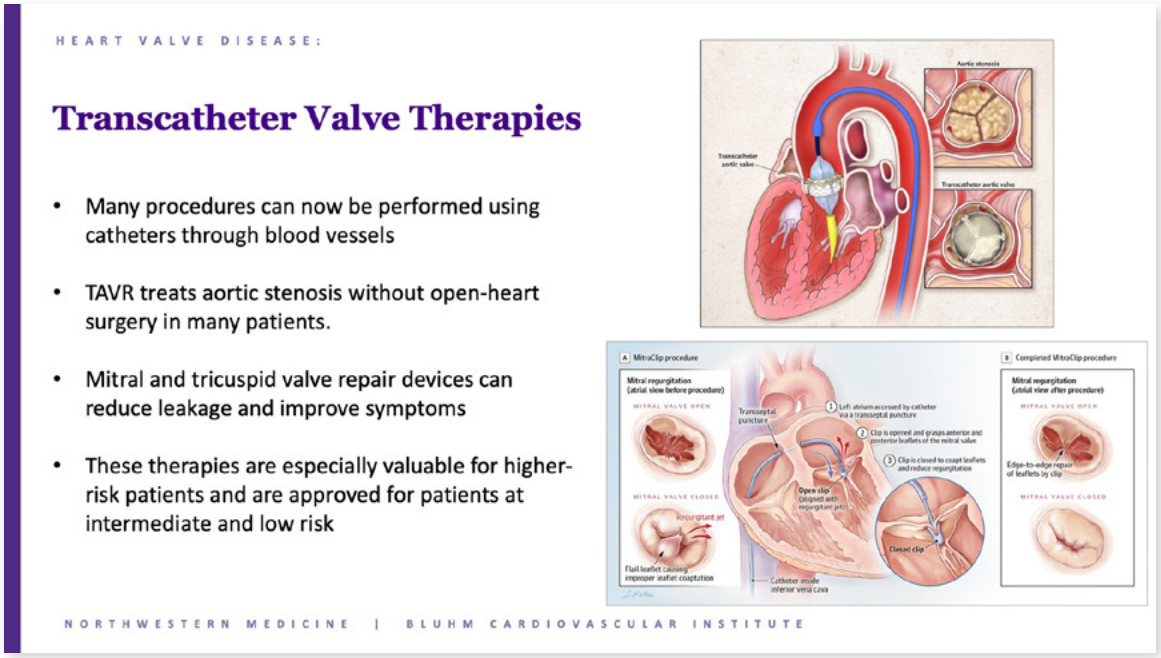
I'm just going to talk basically about valve repair versus valve replacement. These are just some basic concepts to go over. When you think about repair, it's basically taking the valve that you have and repairing what's wrong with it. It's not replacing it. What we believe is that by repairing the valve and leaving you with the valve you were born with, if we can get a good outcome, this is probably your best option. There are cases such as the aortic stenosis where you just have to replace it. I tell patients, if your valve is stenotic, the leaflets don't work properly. This isn't something we can fix with medications and we often just have to replace it. We cannot repair it. It's too damaged and so it has to be replaced. Now when we replace a valve, it'll either be with a biological or

a tissue valve or a mechanical valve. These valves that we replace may require further replacement as they get older. One thing to keep in mind, aortic valves are more commonly replaced. They can be repaired if they're leaking, but they're most commonly replaced. The mitral and tricuspid valves on the other hand, are more commonly repaired. If possible, we feel that's the best option, but we will replace if necessary. Here you can see what a mechanical valve looks like and then a tissue valve. This is just an example of how a surgeon like Doug will sew this in place. It's probably a lot more complicated than my little drawing here, but that's what it looks like.



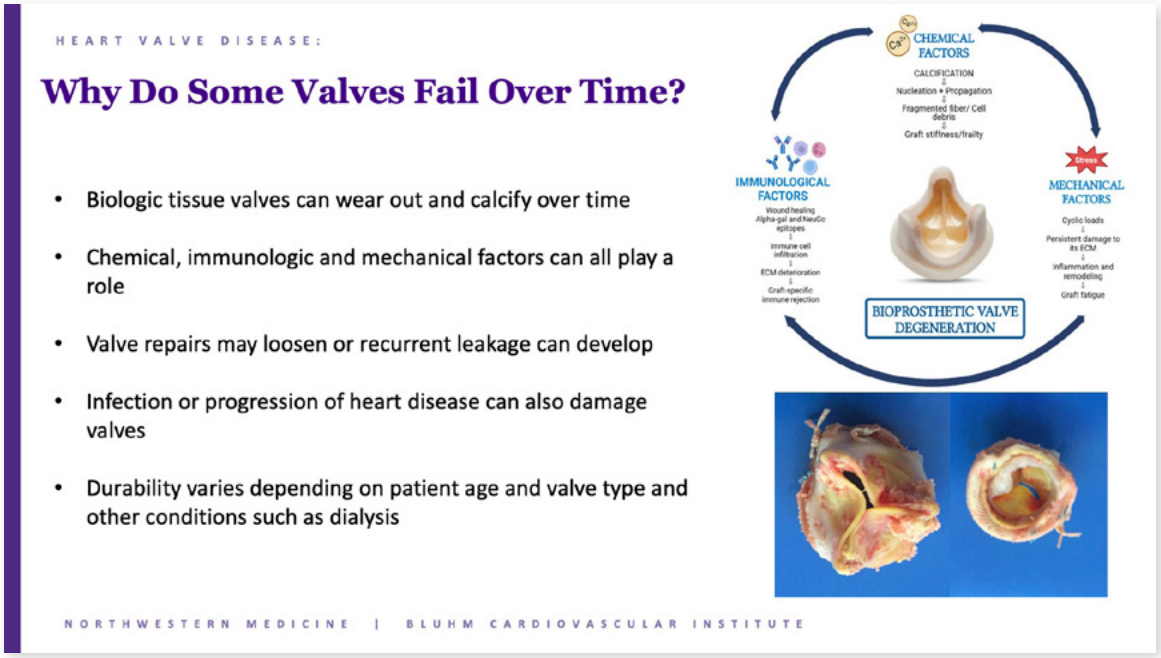
What are treatment options? I'm not going to go into detail about surgery. That's Doug's real wheelhouse, but I will talk to you about transcatheter options. We can repair both the mitral and tricuspid valves and we can also replace the aortic and tricuspid valves. We can replace the mitral as well. I saw a question about that earlier, but that's really in research right now and so far less common and definitely not mainstream. The mainstream procedures you're going to see are repair of either the mitral or tricuspid or replacement of either the aortic or tricuspid.

Transcatheter Valve Therapies



Dr. Anita Asgar: As Adam already mentioned, my expertise is really in transcatheter valve therapies. This has been a relatively new field. We've been doing this for about 20 years now, but a lot of procedures now can be performed using catheters through the blood vessels. We're not surgeons. we're interventional cardiologists and we put catheters into your body and either repair or replace the valve that way. TAVR or transcatheter aortic valve replacement is a procedure to treat aortic stenosis without open heart surgery in many patients. There was a question previously. We do now have access to the JenaValve, which is a valve replacement for aortic regurgitation. We also are in some clinical trials of another valve called the J-Valve. For mitral and tricuspid, repair devices are FDA approved and we use those as well to reduce leakage of the valve and improve symptoms. A lot of these therapies are particularly valuable for patients that are felt to be high risk, have a lot of other medical problems, and would benefit from a less invasive procedure. They are approved for those at intermediate and low risk, particularly TAVR.

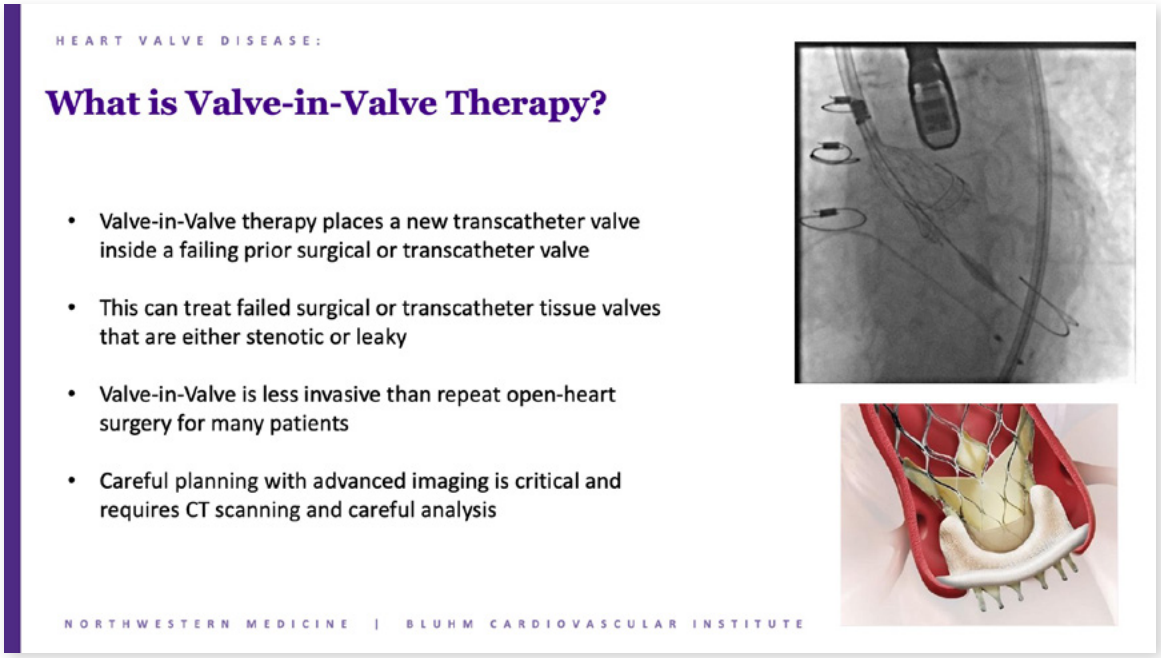
Why Do Valves Fail?



Dr. Anita Asgar: One of the important questions that people ask has been relatively in the news I think in the last month or two is why do valves fail over time? What is the reason behind this? I think the thing to remember is these biological tissue valves can wear out and they can calcify over time. Why they do that is very complex, and I'm not going to go through this figure, but it's multilayered. There are chemical reasons. There may be some immunologic reasons or your immune system, mechanical factors. All of these things can combine and cause this valve to wear out over time. If you have a valve repair, sometimes that may loosen or recurrent leakage can develop and that may be

related to the surgical repair, but often it's just really related to your disease progressing over time. if you have cords that break, you get your valve repaired, the other cords can also break. Some of these things can happen just over time. Any kind of infection or progression of your heart disease can damage your valves. The durability of a valve, and I think this is really important to think about, really depends on the patient age. The older a patient is when we put a valve in, the longer it's probably going to last. The younger a patient is when we put a valve in, probably we have to expect and start planning for the second and maybe third procedure. If you have other conditions, for example, if you're on dialysis, things like that can also affect the longevity of your valve. If you look at this picture I have here, this is an example of a biological valve that has calcified and deteriorated over time. This has obviously been removed and a new valve is placed, but this is what this looks like. These leaflets can get thickened. There can be little knobs of calcium on them, and when they don't function anymore, they need to be replaced.

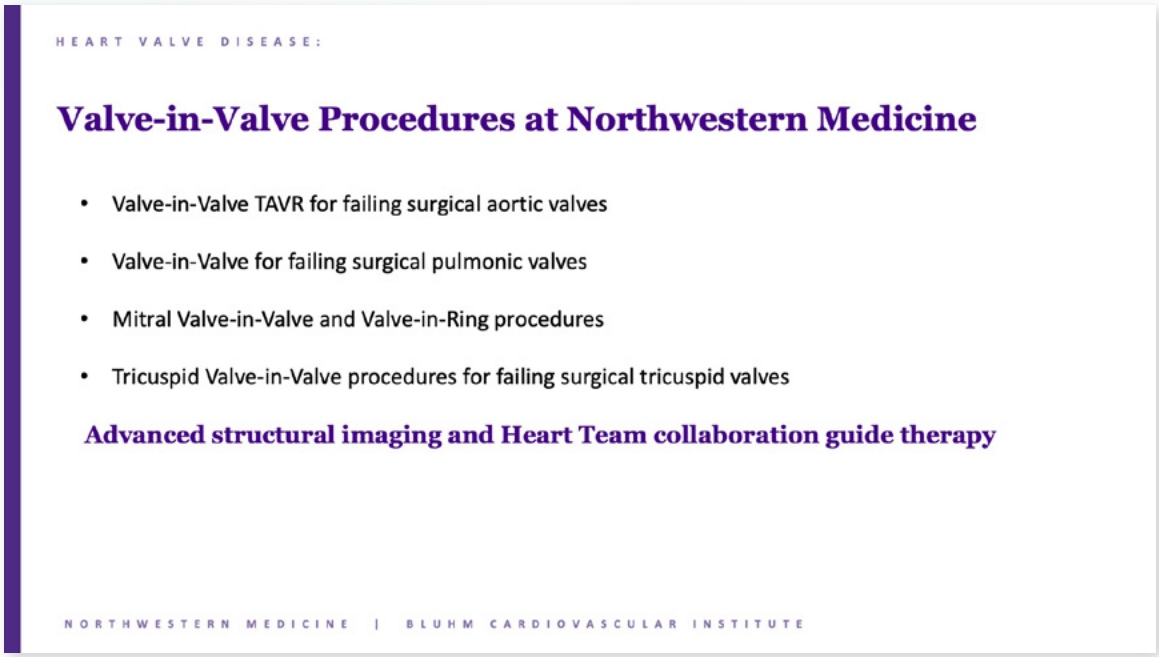
Valve-in-Valve Innovations



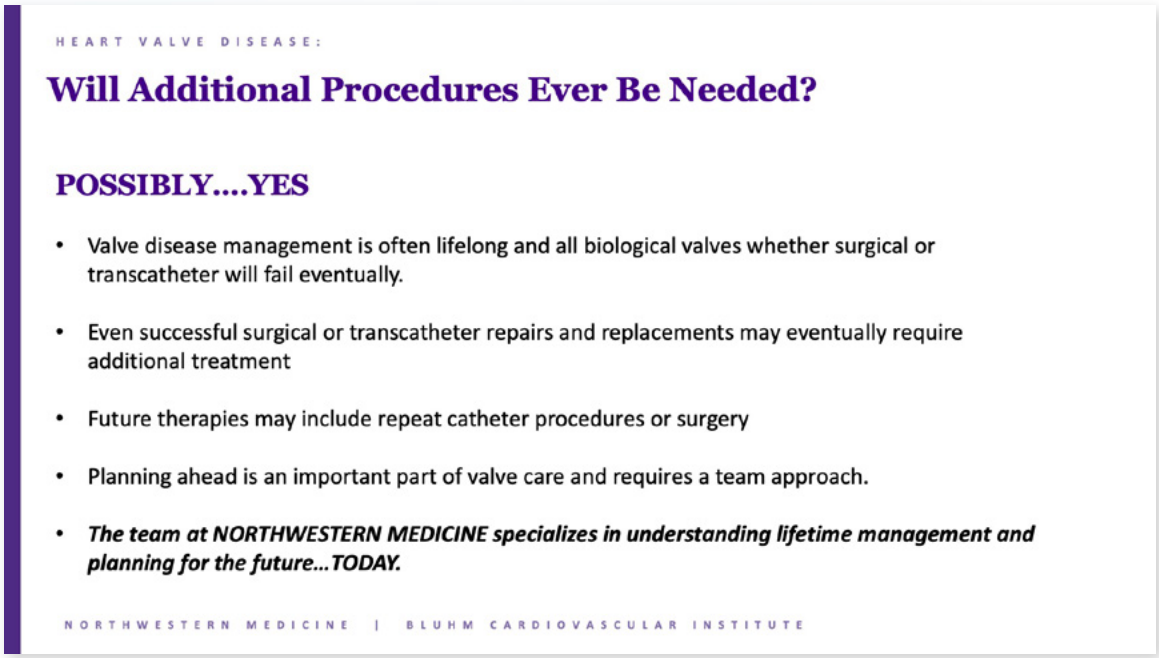
Dr. Anita Asgar: What is valve-in-valve therapy? I know there are some questions about this as well. This is the transcatheter solution to patients who have had a previous either surgical or transcatheter valve that's now failing, much like the valve you just saw that had to be removed. We need therapies to try to treat a biological valve when it fails. We have been doing this for well over a decade where we do what's called valve-in-valve. We can essentially, and I'm showing you a fluoroscopic image there, an x-ray image of a case that I did where basically you put a transcatheter valve inside the surgical valve. The surgical valve holds it, the new valve pushes the old leaflets out of the way and

it starts functioning right away. This is an option to treat either a failed surgical or a transcatheter valve, a tissue valve, not a mechanical valve but a tissue valve that is either not working because it's blocked or it's leaking. It is less invasive than a repeat open heart surgery. It does require careful planning with imaging CT scans. As you can see in that lower cartoon picture, you can see a valve inside a valve, but you also see those two little circles on the side. Those two little circles are actually your coronary arteries. These are things we need to be mindful of. We need to make sure that our valve is appropriately placed so that we do not interact with the coronary arteries, because obviously if we were to do that, that could cause a heart attack or other issues. It does require a lot of planning, but it is very commonly done. It can be done for the aortic. In fact, it can be done for the mitral. If you have a surgical mitral valve replacement, we can also do transcatheter valve-in-valve for that or for a tricuspid or in fact for a pulmonary. Valve-in-valve therapy can be done in any valve actually. It just does require planning and thoughtfulness associated with it.

One of the things to remember, benefits and limitations. I have a little Russian doll there. What I'm trying to show you is you can put a valve in a valve, but at some point, the second valve you put in is always going to be a little bit smaller than the first. There are only a certain number of times you can do this before the valve gets a little bit too small. The benefits; shorter recovery, less pain, shorter hospitalization, often a lot lower risk than a re-operation in many patients, but not every patient's anatomy is suitable. That's why we have to do a lot of planning. That's part where the heart team comes in, and we have to think about what's the best for the patient in front of us. The new valve will have a smaller opening than the old one, just like the Russian dolls. The more procedures you do, future procedures will become a little bit more technically complex. We do need to plan ahead.

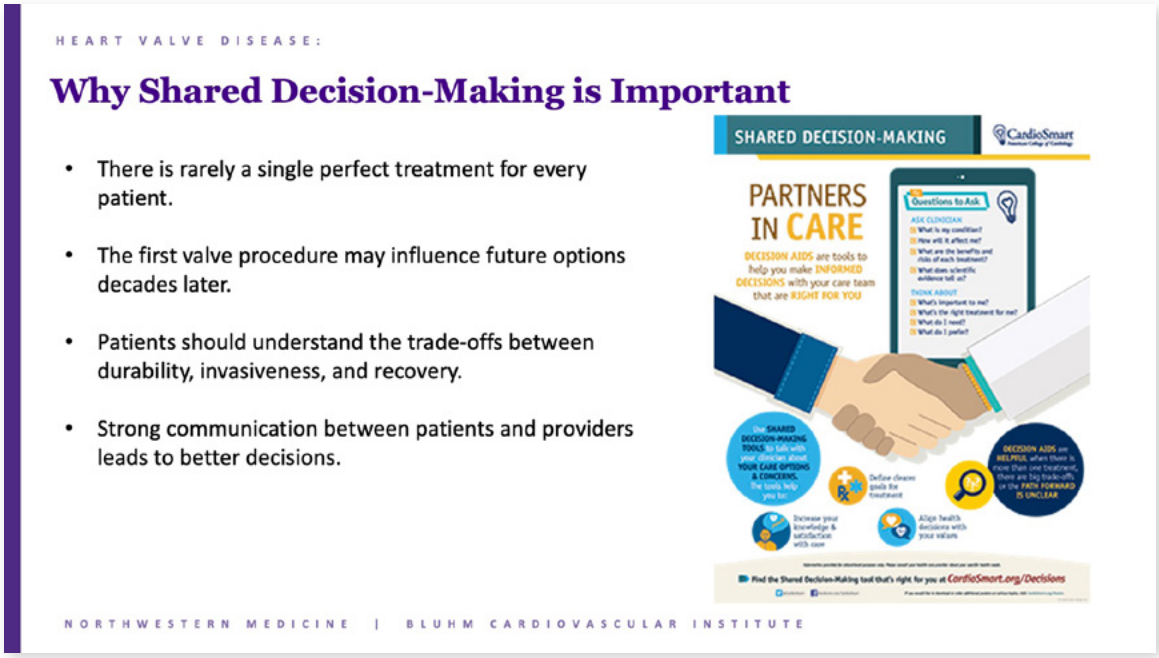


What are we able to do at Northwestern Medicine? We do valve-in-valve TAVR for failed surgical aortic valves for pulmonary. We do mitral valve-in-valve. We do mitral valve-in-ring, and we can do tricuspid valve-in-valve. As I mentioned before, we can basically put a valve almost anywhere. What's really important is the advanced structural imaging and heart team collaboration. Getting your board of directors together to make the right decision for you, that's what's really important and that's what really guides therapy.



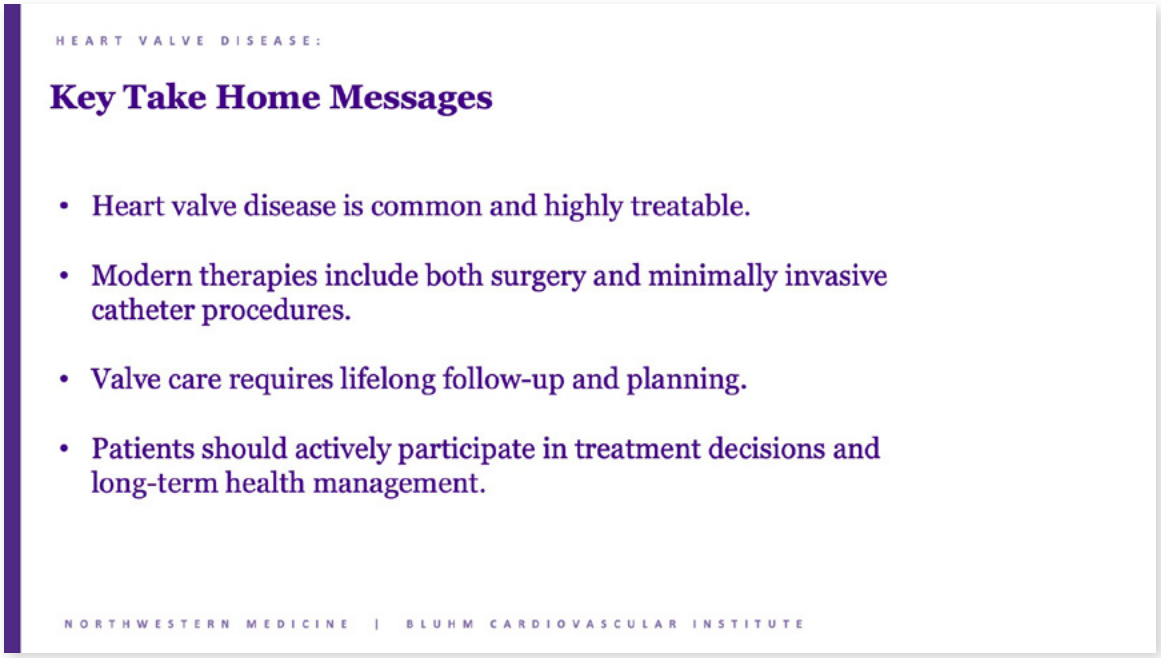
Will you ever need an additional procedure? Possibly, yes; and so whenever we do our first procedure, we're always wondering and thinking about what the next one will be. I think what people have to remember is valve disease management is often lifelong. It's not a one and done. It's usually going to be a one and then another. All biological valves, whether they're surgical or transcatheter, will fail eventually. Even a successful surgical transcatheter repair or replacement might need more treatment in the future. Those future treatments may require a transcatheter procedure or it may require surgery. You do really need to plan ahead. That's going to be an important part of valve care. You're going to need to have that monitoring, and that requires a team approach. I think one of the strengths of the Northwestern team and the program is that we really understand lifetime management and we're really planning for the future today. When you come in and we have the discussion with you, we're thinking about, we're looking at your anatomy and we're trying to decide not what is the procedure that you're having next week, but what is 10 years going to look like and what is the next 10 years after that going to look like? That's going to be important and these are the questions you should ask and that you need answers to.

Shared Decision Making



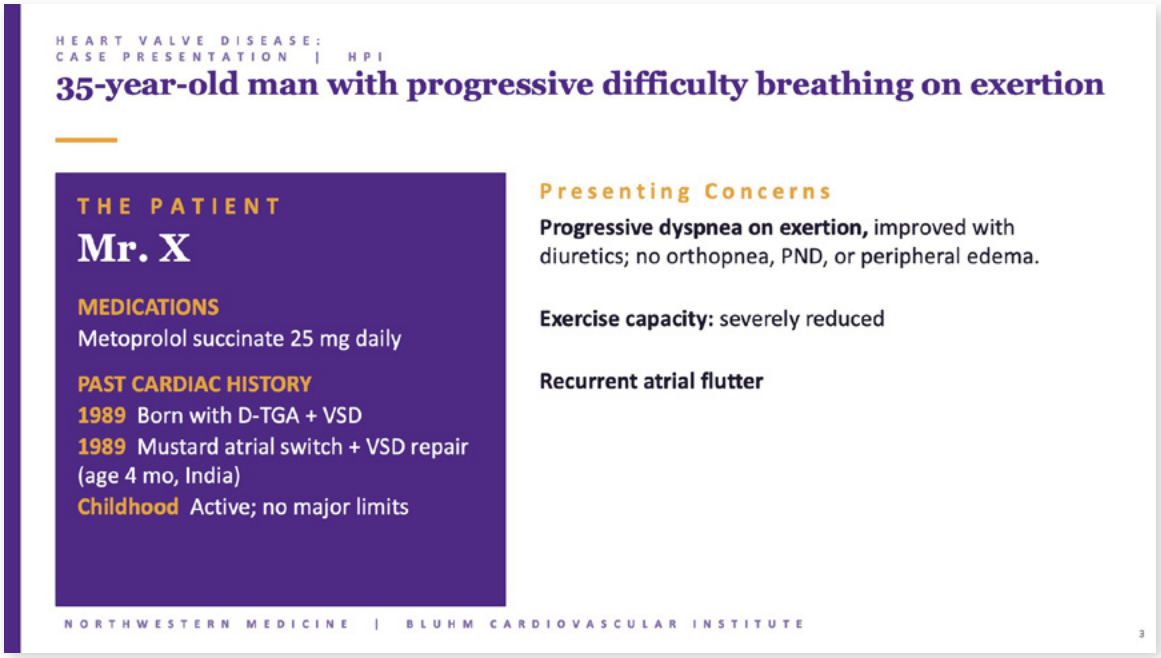
Dr. Anita Asgar: This is what leads to shared decision making. What does shared decision making mean? It really does mean partnership in care between your treatment team, your surgeon, your interventional cardiologist, your imager, and the patient. There's rarely one perfect treatment that's good for every patient. Every patient has to be treated as an individual. Whatever we decide in the first go around is going to affect future options decades later. We really need to understand the trade-offs and we need to talk about this. The communication is going to be important and that's what's going to lead to a better decision for you and a better outcome. I encourage all my patients to ask as many questions as they need to ask, but that's the only way you're going to get the answers.

Key Take Home Messages

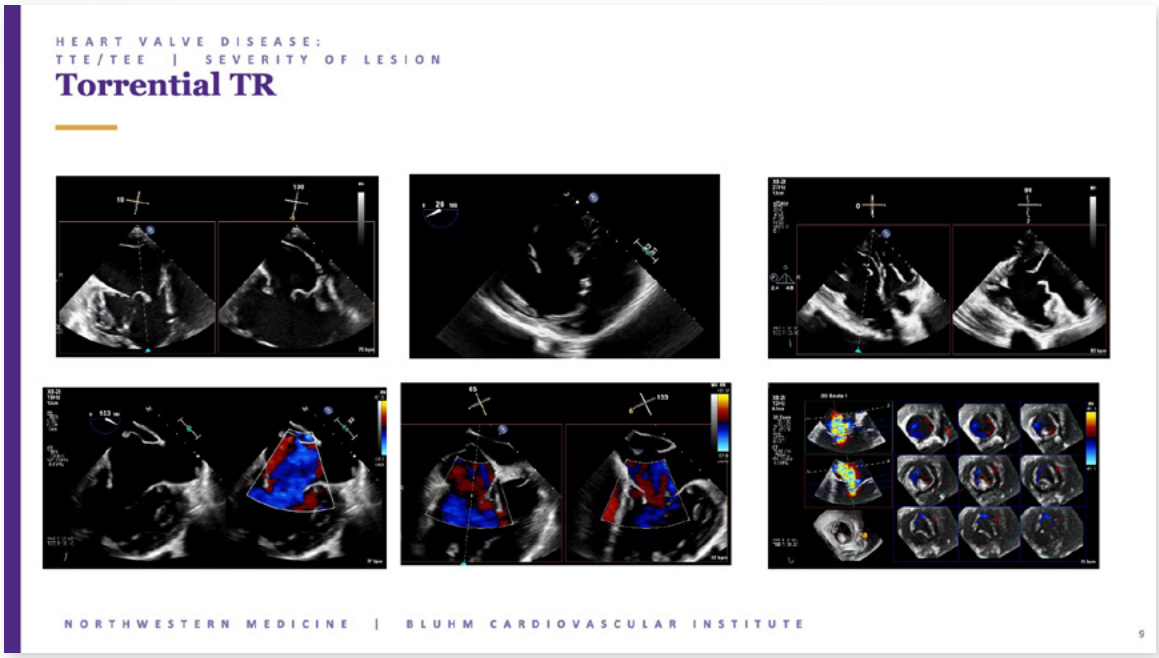


Dr. Anita Asgar: Just to finish up here, I think the key take home messages I wanted to leave you with; heart valve disease is very common, but it is highly treatable. There are modern therapies that are both surgical and minimally invasive catheter procedures, but valve disease and valve care really does require lifelong follow-up and planning. I believe that patients get the best care when they actively participate in the treatment decisions and the long-term health management or the long-term management of their valve disease.

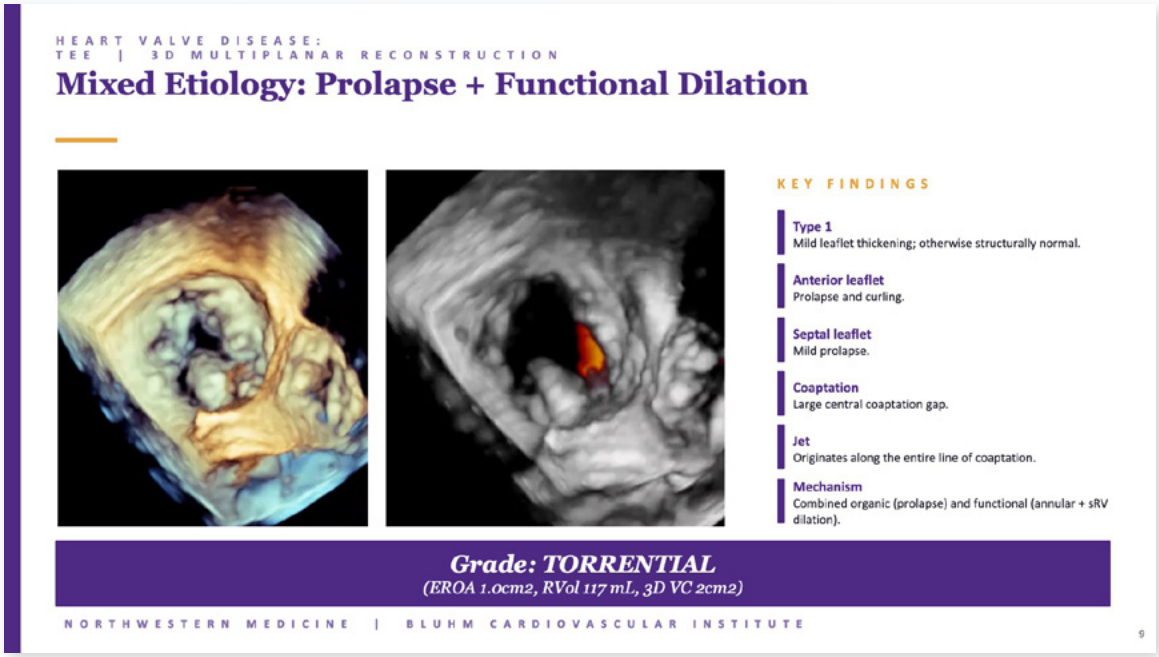
Case Study: Complex Reoperative Male Patient



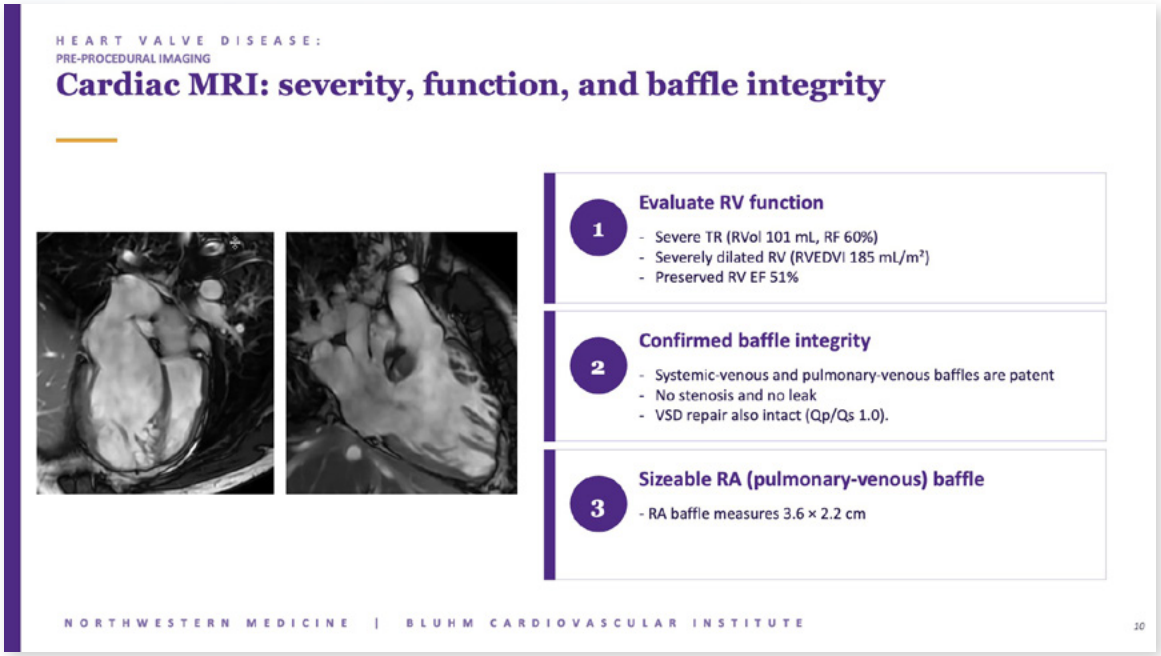
Dr. Asgar: Okay, so I want to show you this case, and this is a bit of a rare case, but what I think is important about this case is the collaboration and the planning for the future. This is a young man. This is a 30 5-year-old man who comes in. He has got progressive difficulty, breathing on exertion. He's an active guy. He is an engineer. You look at his history. He has congenital heart disease. He was born with a congenital defect where his main vessels were switched and he had to have corrective surgery very shortly after birth at the age of four months in India, and they did a very complex surgery to try to fix that for him. He was active in childhood. He had no major limitations, but when he comes to us now at 35, he has got a lot of concerns. He's short of breath and he can't do the things he wants to do and his exercise capacity is severely reduced and he's also having palpitations in atrial arrhythmias.



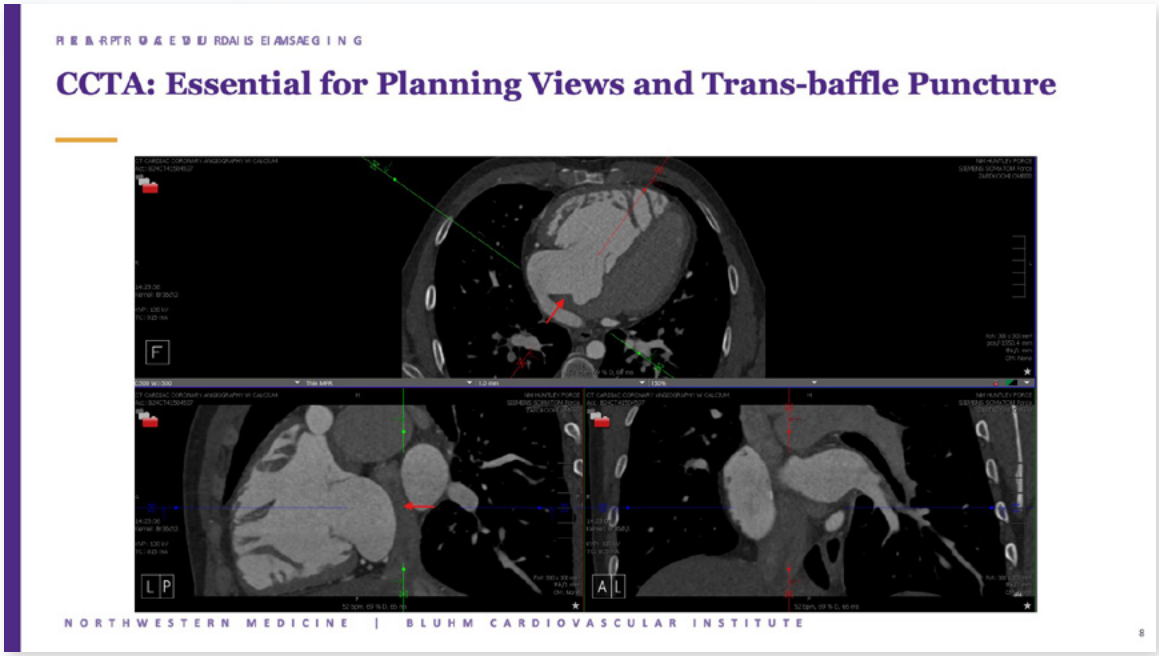
This is just some echo pictures, but basically what you can see, these are echo pictures of his tricuspid valve. The congenital abnormality he was born is the right and the left side of his heart was switched. Normally your left ventricle is the powerful pump of your heart, but when you're switched like this, the right ventricle becomes the main pumping chamber and it's not designed for that unfortunately. When that is the case, patients have trouble as they get older and their valves start to leak. What you see in the lower left panel with the color, all that yellow that you see is this valve is leaking severely and it's giving him a lot of symptoms and it's making the heart weaker and it's giving him symptoms of heart failure. This is tricuspid regurgitation and this was deemed to be torrential, which is worse than severe. It is the most severe form of tricuspid regurgitation.



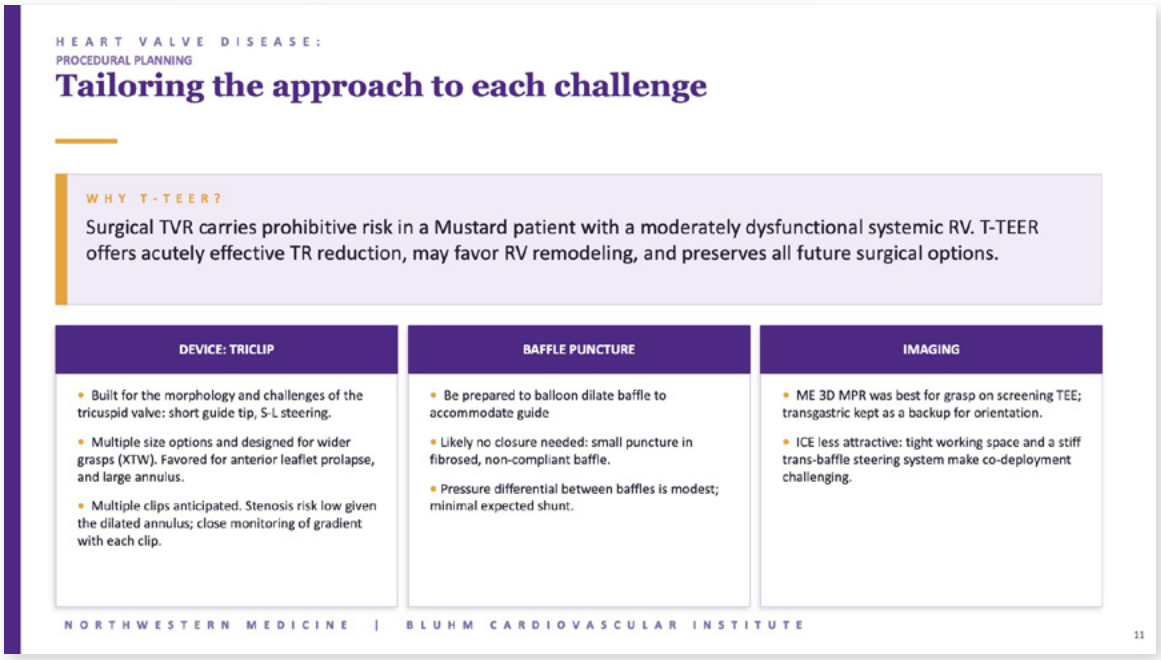
This is just another one of these three dimensional images and what's challenging about him? He is young, but he has already had a previous surgery in the past and we have to be thinking about he's 35. What are we going to do next after this? This is just showing you how much this valve is leaking. All you see is color coming out here, so this is very severe.



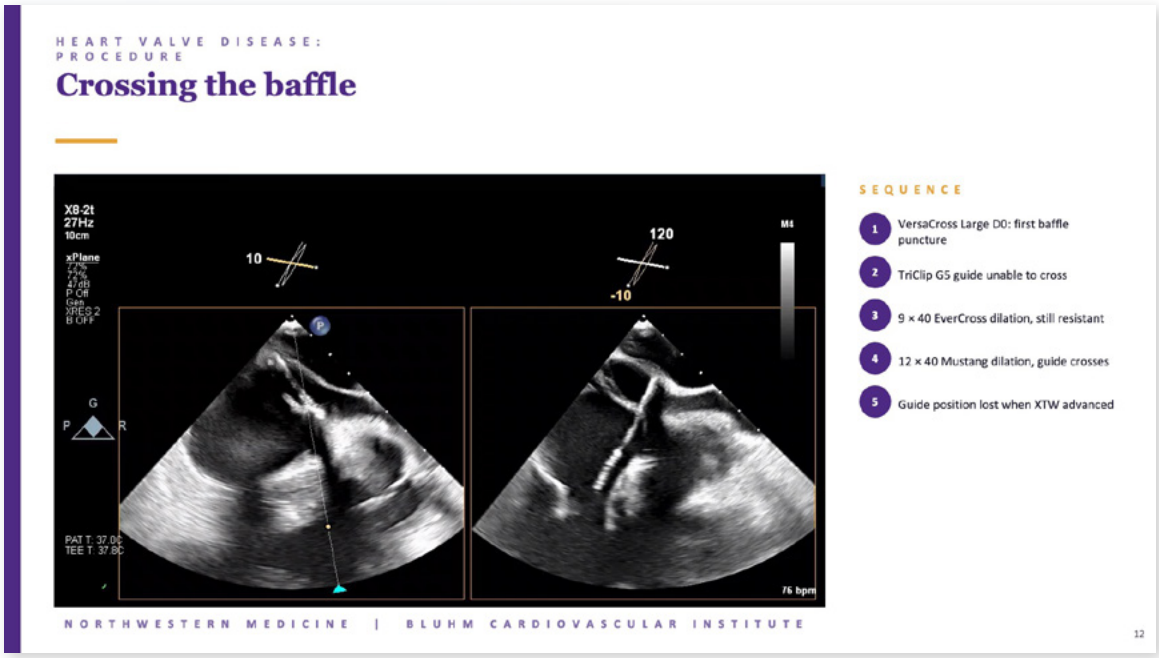
We did an MRI to try to understand. These are MRI pictures of his heart trying to understand what's going on, how well is his heart functioning. What we could see was the main pumping chamber, which for him is his right ventricle as opposed to his left. Not only is the valve leaking, but the pumping chamber is quite dilated, but the function looks okay. The surgical repair he had seems to be functioning fine, and so really the key problem for him is this valve that's leaking severely.



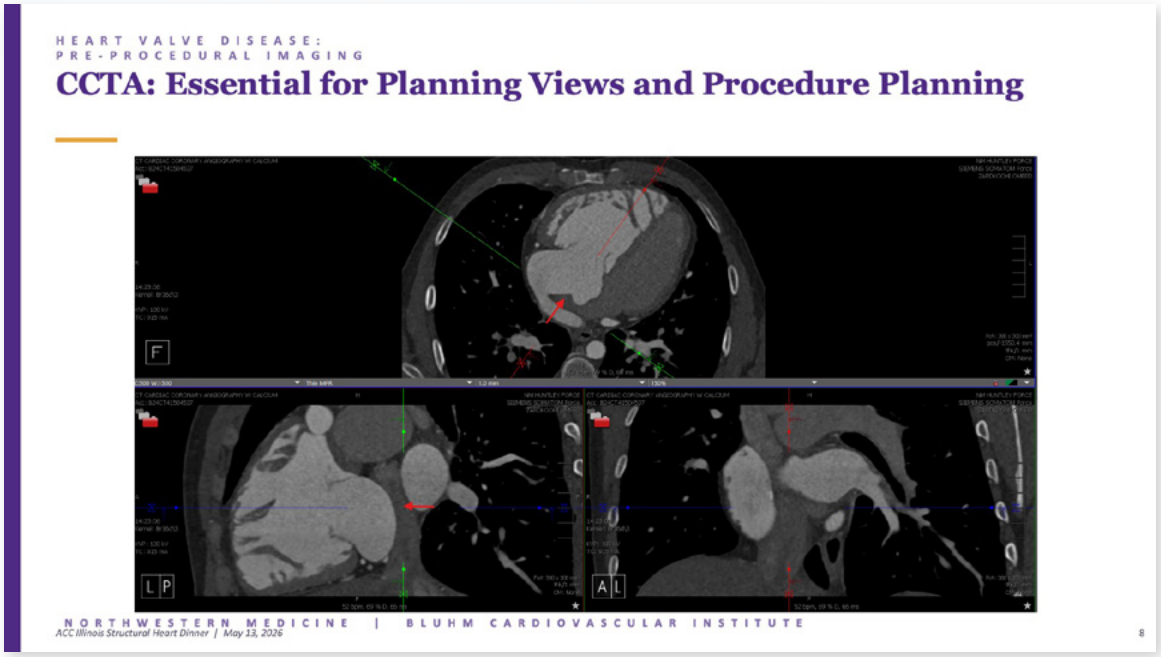
Again, like I told you, this requires multiple imaging often. We have to look at things from different ways and we have to plan out our procedures. These are pictures of a cardiac CT. This is us trying to figure out what's the best option, how can we tackle this, what are we going to do? We were looking at this essentially for repair because a 35-year-old, we didn't want to replace the valve by transcatheter. We had talked in our heart team meeting and felt if we could delay another surgery later and get him another five to 10 years, that would be preferable to us.



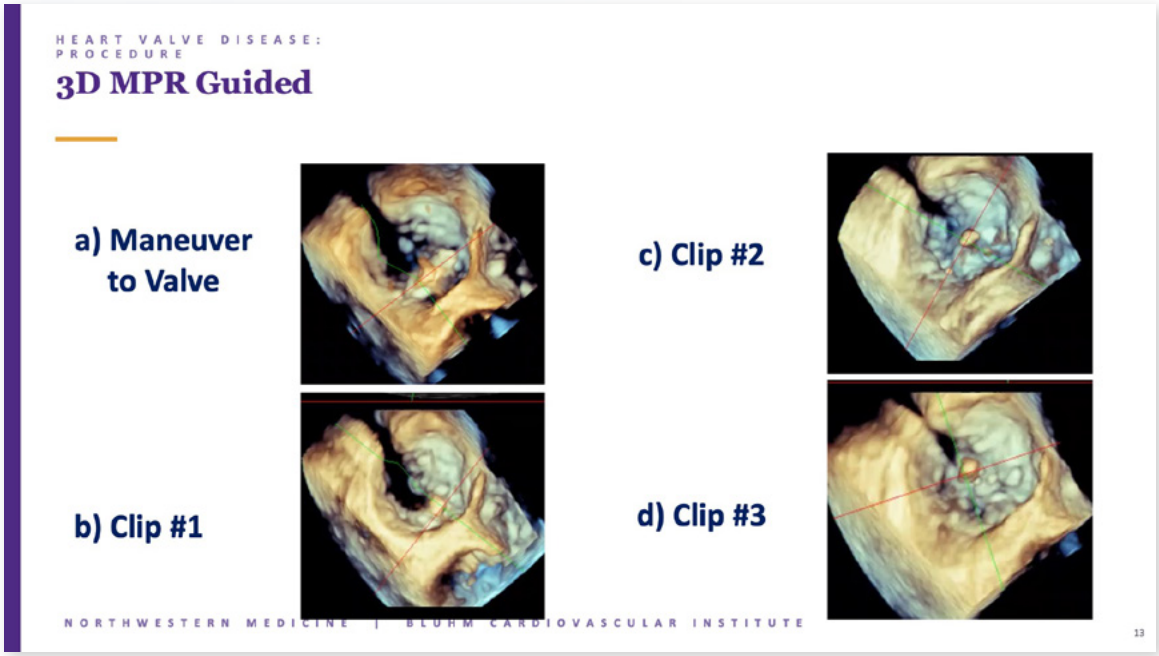
What we decided to do was repair this valve using a device called the TriClip. It's a little bit complicated when you have congenital heart disease to get around and navigate a heart that somebody has already been there; the surgeon has already been there and reconnected things. The CT scan for me is like a map. It helps me figure out where am I going to going to go and how am I going to get there and what is the right imaging in order to do this.



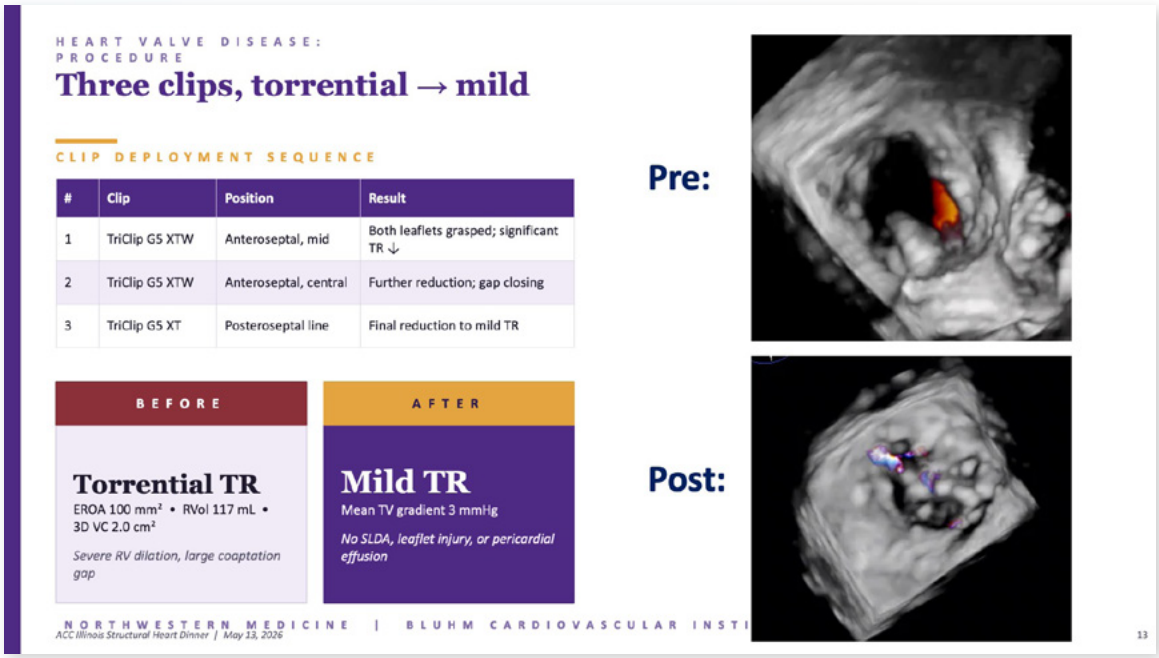
This is what we did. This is under echo. We were able to navigate through his heart and take a small needle and crossover from the right side of the heart to the valve that was causing the problem.



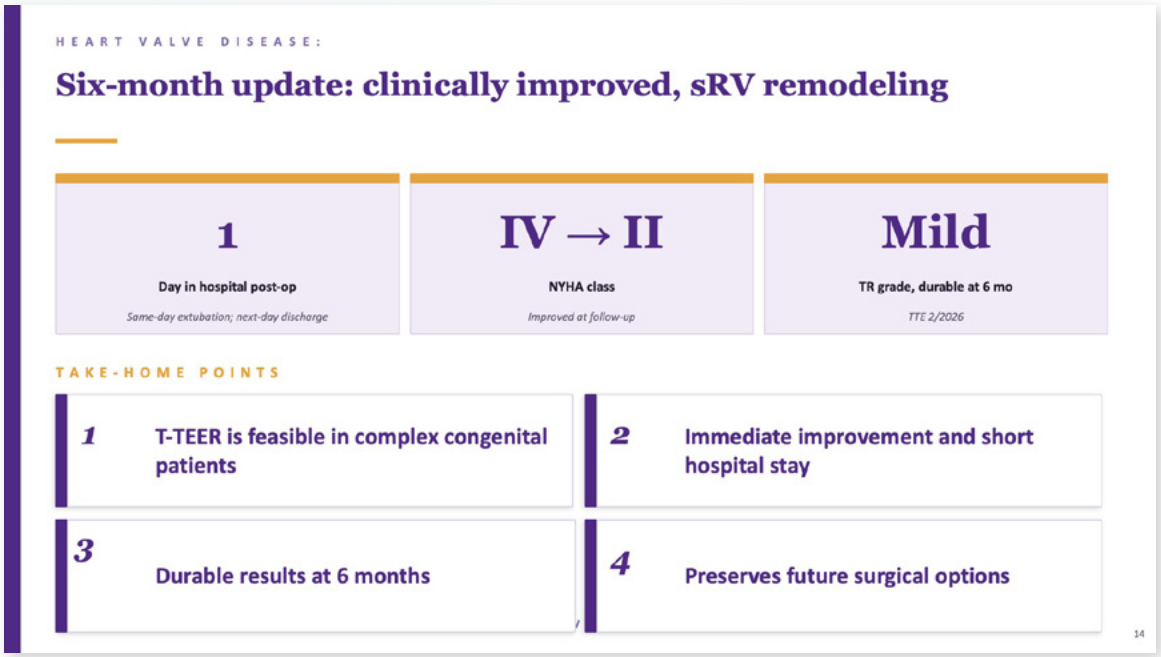
As you can see, again, I'm looking at this. This is my map. I'm trying to figure out how I have to get where I need to get.



You can go again. We were able to maneuver. We did manage to get there. What you can see in this picture are the clips that we used to repair him. We did this TriClip procedure on him. We put three clips into his valve to repair the valve.



That brought him down from torrential tricuspid regurgitation to mild. It was a significant improvement without open heart surgery. Is this going to be the final intervention he's going to need? Absolutely not, but it's going to buy him time so that when he needs another intervention and maybe that's going to be transplant, it's going to be hard to tell, he will have only had one previous surgery and not multiple surgeries.



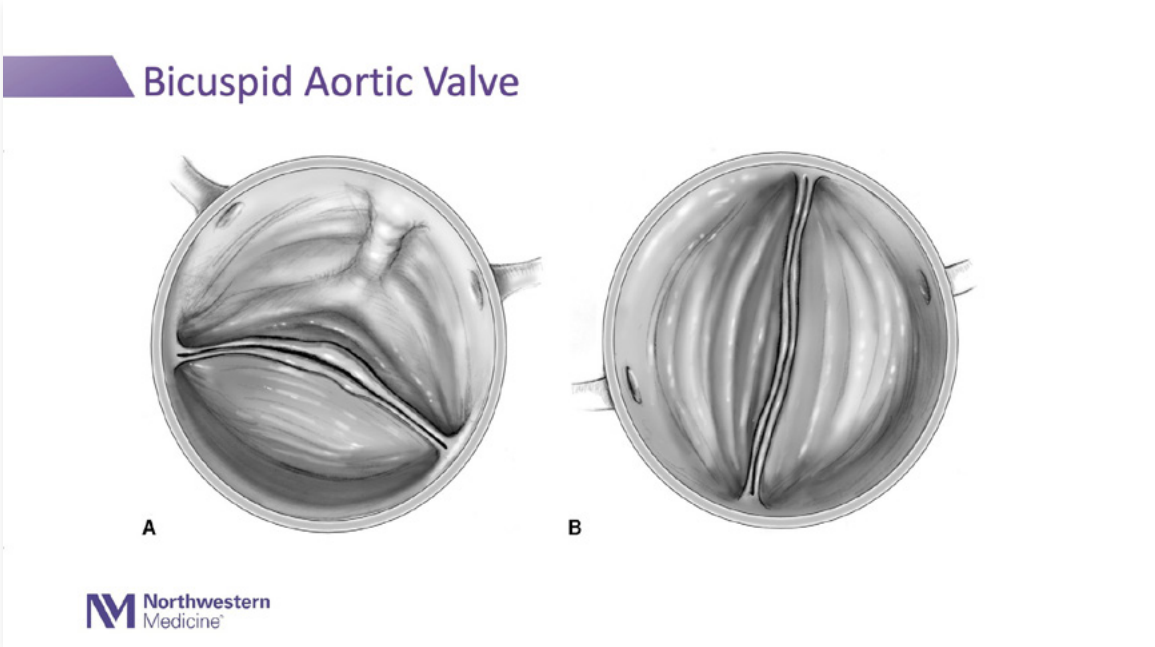
He was in hospital for 24 hours. He improved quite significantly. At six months, he was doing much better. His tricuspid regurgitation was still mild and his heart function had actually improved now that we had taken away the leaking. He's doing well. Remember, this is a lifelong disease. This is helping him now. In maybe 10 years, I don't know, maybe longer, maybe less, he's going to need another intervention and we'll have to be ready for that. Maybe at that point it's going to be surgery, but this was a really great option for him. It was low risk and it got him home and it got him the result that he needed. Thank you.

What Do Patients Want?

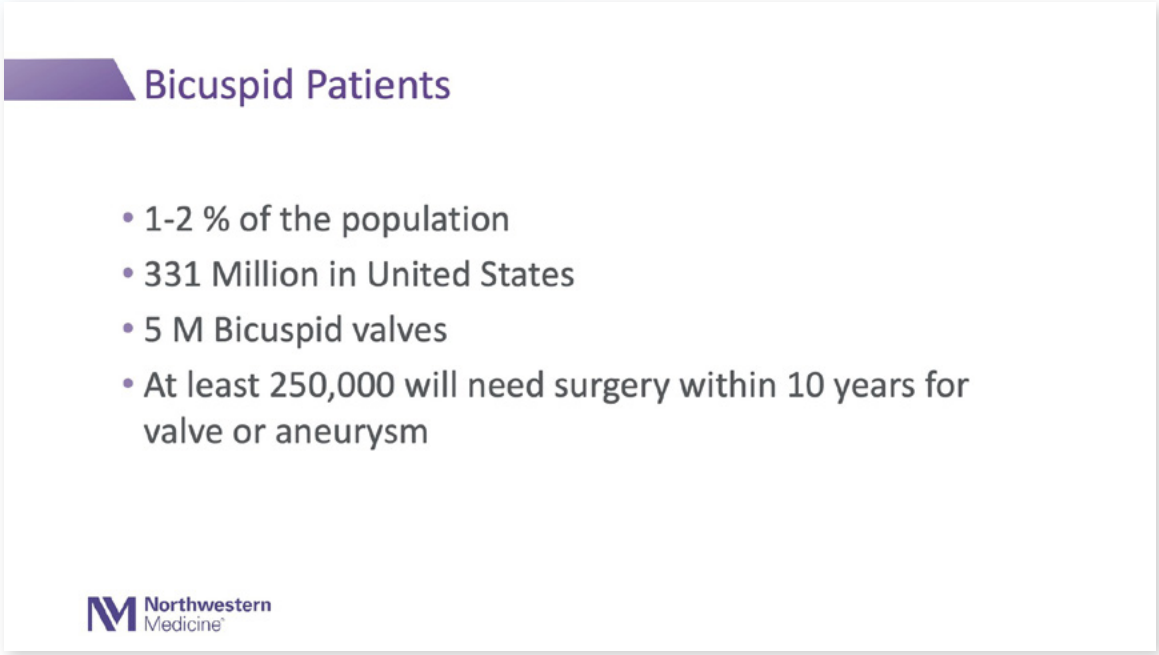
Dr. Doug Johnston: I don't think I have anything to add. That was amazing, Anita. I mean, you get a sense of the enthusiasm for working together on these cases and I'm not going to boil the ocean in what I'm going to talk about here. I want to focus on some surgical aspects.

I'll just take you through the thought process. I'll just start at a high level and maybe this will make sense to you, but this is how we think about when you come to see us or you're thinking about where to go. We start from the patient. We don't start from, this is what I like to do or this is the procedure I think you should have. You guys want information. You want a normal lifestyle, and for a lot of people, that means no blood thinners, but not for everybody. Sometimes people will come to us and say, I want to have one procedure in my lifetime, and in some cases the only way we can think about that being a possibility is to use a mechanical valve. That's a tradeoff we always talk about. Most of you don't want to have restrictions on your life. You don't want to have work restrictions, exercise restrictions. You want the smallest incision possible, we recognize that, and you want a fast recovery. We have to think about all these things. We know that whatever scientific papers we publish that say that survival and all these long-term issues, they're important and we have to be very thoughtful about that. You as patients, when you come to us, and if you feel comfortable talking about it, this is most often what the concern is.

Bicuspid Aortic Valve



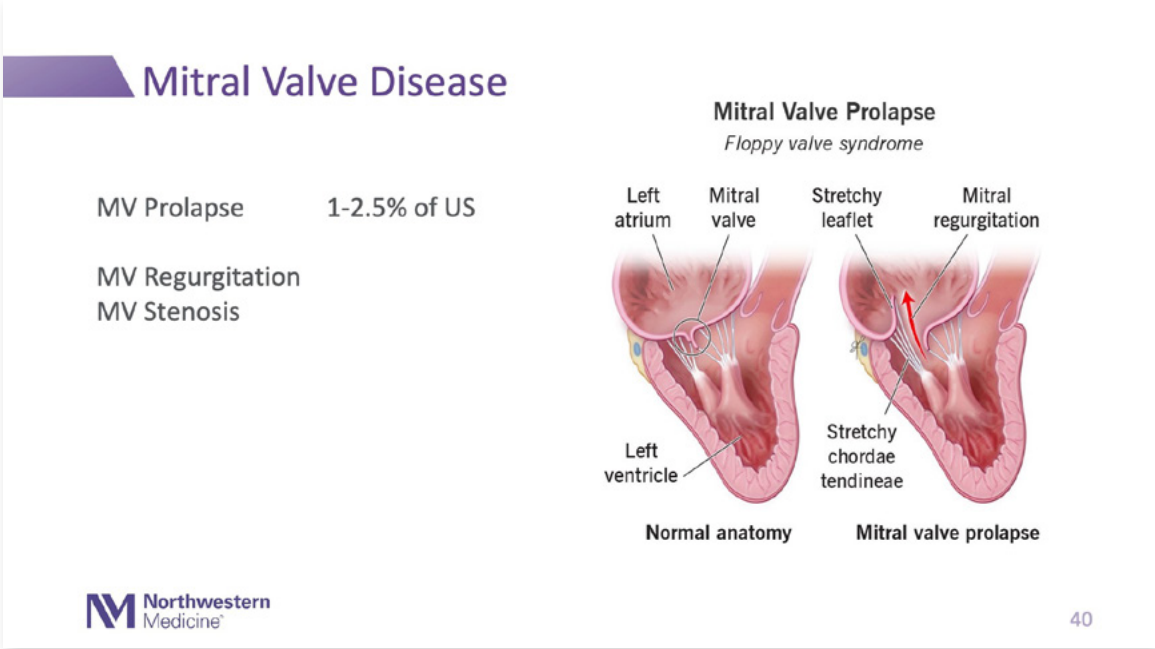
Dr. Doug Johnston: Our valve center strategy is very patient centric. We start from who are you, what do you want to achieve in your life, what's your medical condition, and how can we help you. This concept we're talking about today, lifetime disease management, has to come into the discussion. It's not about the one procedure I'm going to do or the one procedure that Anita is going to do; it's about the rest of your life and what's going to be right for you.



I'll just use one example, and we have a bunch of questions in the chat about bicuspid aortic valve. This is the most common congenital heart. I'll call it a difference. It's not really congenital heart disease because some bicuspid valves work for the lifetime. This is not the Mercedes star that you saw earlier, but either two leaflets that are fused together, or in less commonly on the right side, you'll see the two leaflets that are very symmetric.

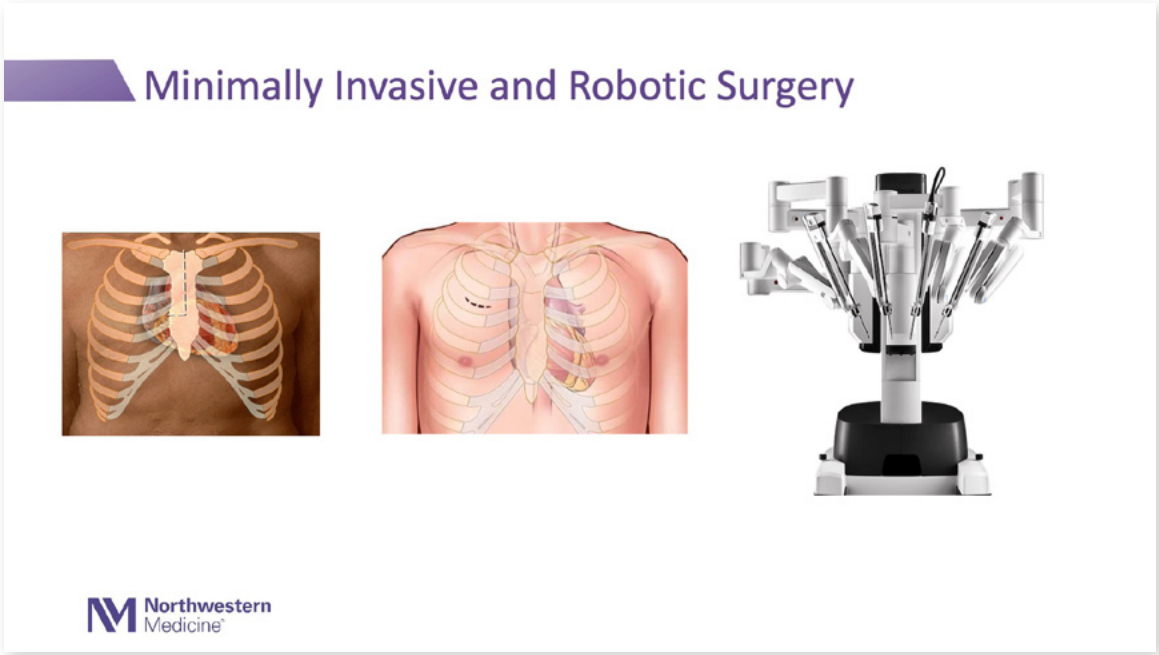
Bicuspid valve is really common, so 1% to 2% of the population of the US. That means probably 5 million bicuspid valve patients, most of whom don't know they have it, but at least 250,000 of those patients are going to need surgery or a procedure within the next 10 years for their valve or for aneurysms, which tend to happen also in bicuspid patients.

Mitral Valve Prolapse



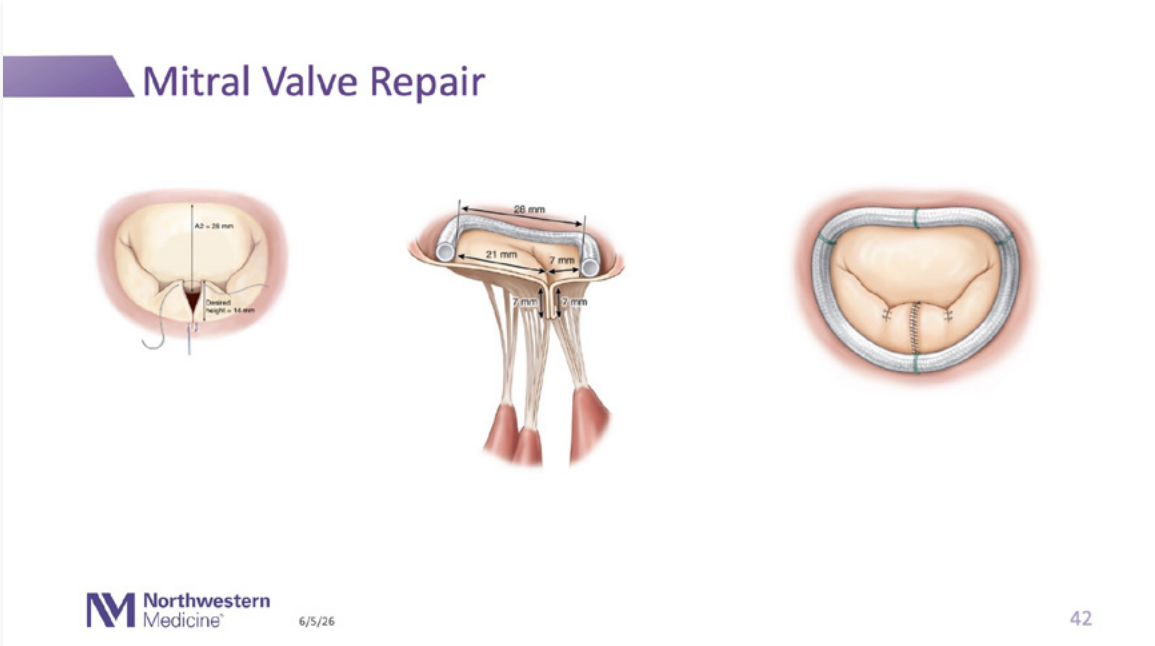
Dr. Doug Johnston: This is a really big population. What's another really big population? Mitral valve prolapse, so mitral valve disease. We talked a little bit about the difference between stenosis and regurgitation, but this idea of a floppy valve or stretchy leaflet. Lots and lots of people, probably more than the 1% to 2.5%, as many as 5% have some degree of mitral valve prolapse. Most of those people will never need anything from either of us, but it runs in families as well and it is one of those things that you can have early in life diagnosed. Oh, you have a little bit of mitral valve prolapse and 20 years later you have a leaky valve. It's a disease that we think about a lot because many of these patients can have a repair procedure and preserve their valve.

Minimally Invasive and Robotic Surgery



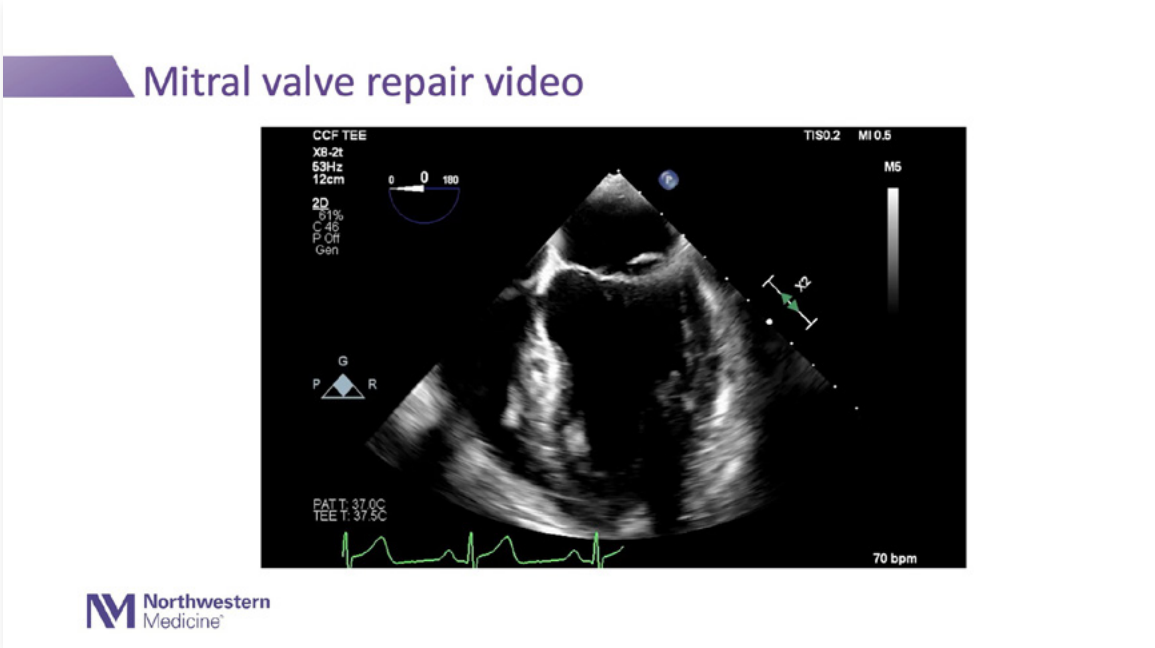
Dr. Doug Johnston: What do we think about as surgeons? We will talk about this a little more in a second, but we think about, as surgeons and interventional cardiologists, what is the smallest, least invasive procedure we can do that has the best outcome? I say it that way for a reason, meaning some people need a lot of things done to their heart, valve plus aorta, plus some coronary bypasses. Currently in many of those cases, there's no good way to do that with a small incision. We first have to ask the question, what's the safest thing to do? Second is, what's the most durable or most effective thing to do? Third is, what's the size of the incision? The good news for all of you is that increasingly we can do really good things with really small incisions, not in everybody, but in more and more over time.

Mitral Valve Repair

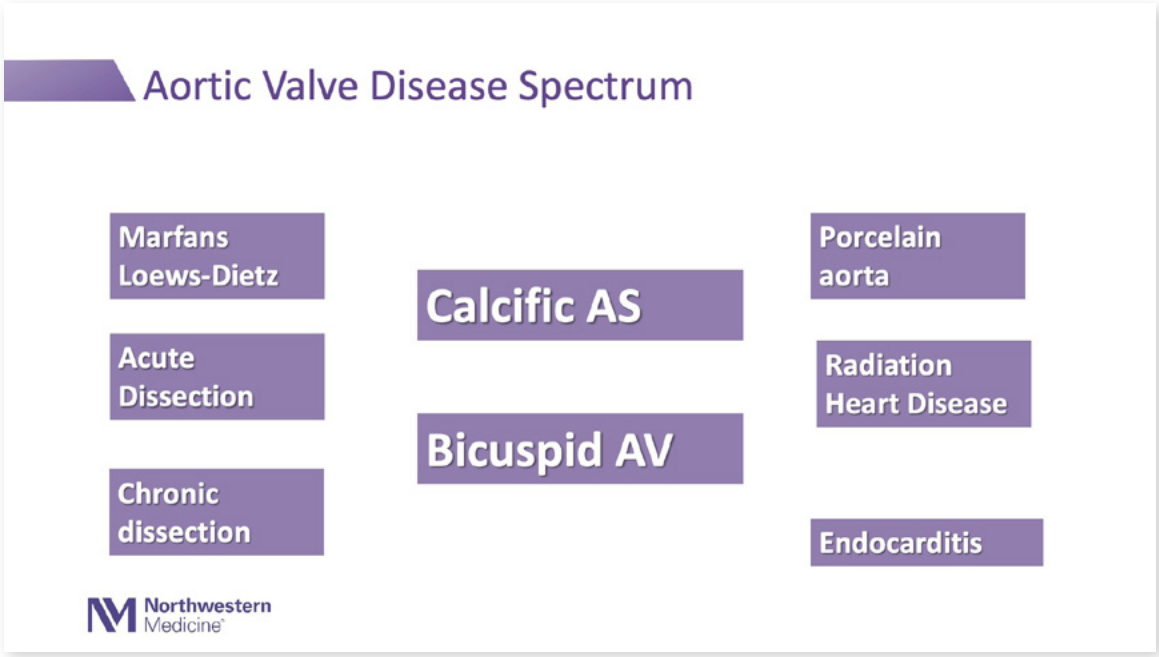


Dr. Doug Johnston: Whether we're talking about a transcatheter procedure or a mitral valve repair, we have options that don't always require the zipper as patients like to call it, but the full up and down sternotomy incision. These are some drawings from Pat McCarthy, who's our colleague and friend in the Bluhm Cardiovascular Institute, who is a world leader in mitral valve repair and has been doing this for 20 years and has really refined the technique into a method that's very repeatable and teachable to people around the world. Essentially what's involved, if you look at that middle picture, is we take a leaky valve, we remove the leaky part, or we fix the cords and we take exact measurements that tell us exactly how the valve is going to come out at the end. We know how big the leaflets are going to be and how much overlap, what we call coaptation length, there's going to be. We know we can get a valve that works.

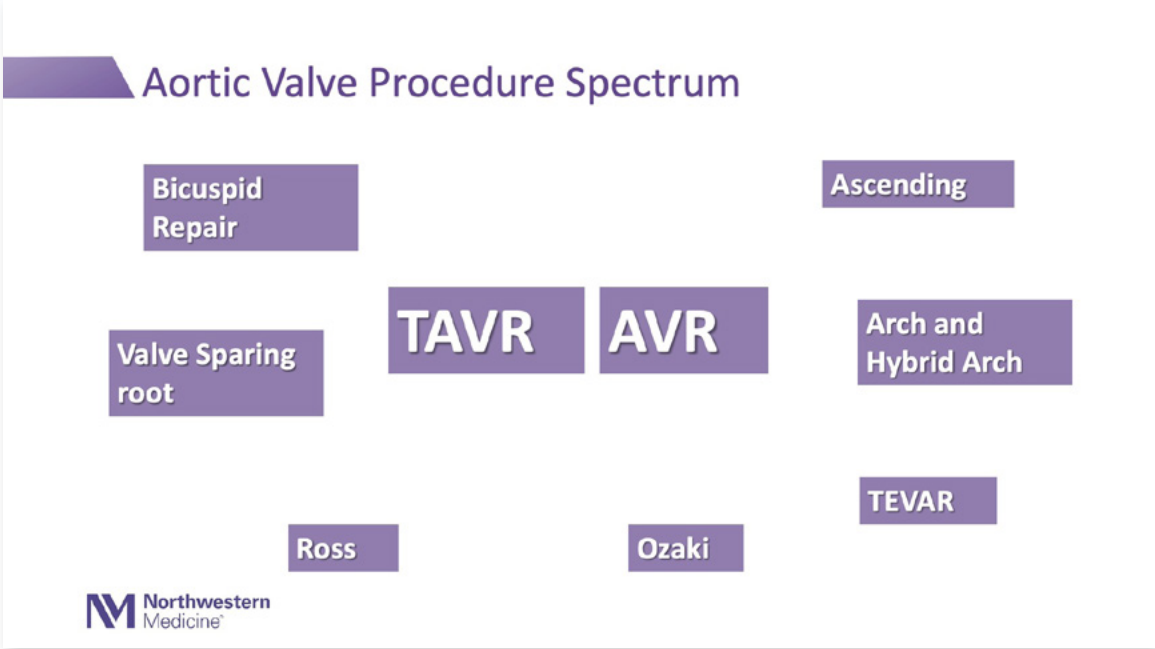
At the end of the operation, it's very reproducible. It looks like something on the right. A valve that starts out with a fixable problem that has a really well done repair can last for a really long time. Part of this lifetime management issue is understanding that not all repairs last forever, just like not all bioprosthetic valves last forever. We've got to have a lot of tools in our toolbox to do number two, number three, sometimes number four, with the goal that in between somebody has a normal lifestyle to get back to our first point. If somebody told you, you were going to have to think about your heart disease every day for the rest of your life, or alternatively, you might need an operation in 10 years and then 25 years and then 35 years from now, but in between, you didn't have to think about your heart every day, that might not sound so bad. For a lot of patients, that's what we're thinking about.



Aortic Valve Disease Spectrum

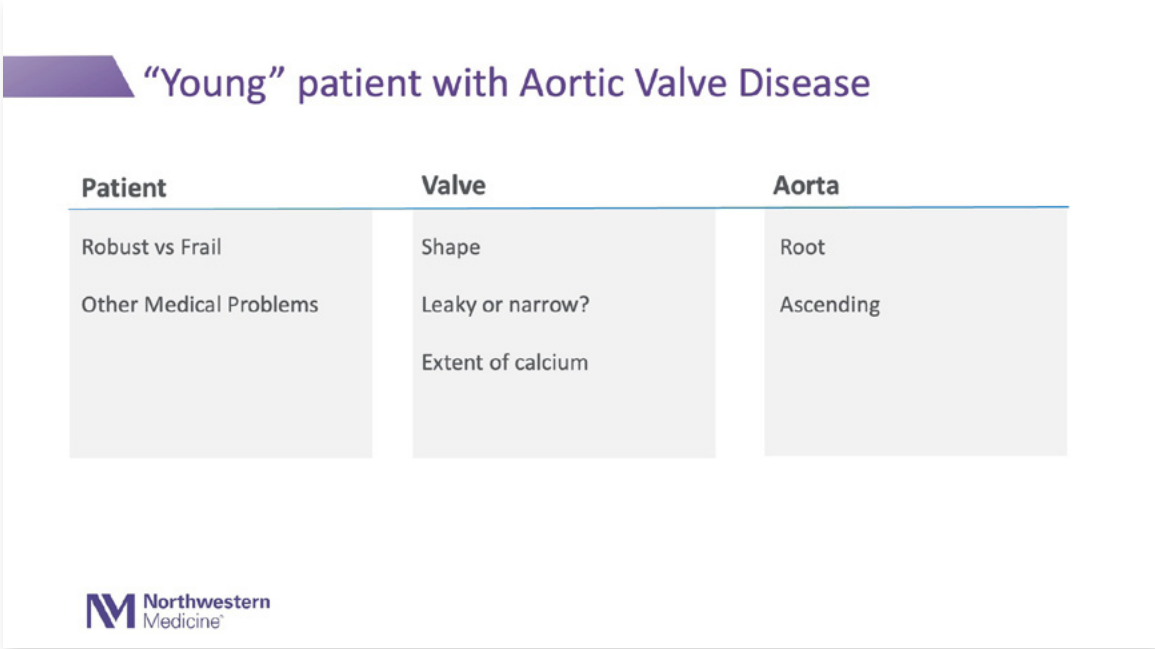


Dr. Doug Johnston: Just quickly, we switched to thinking about aortic valve disease. A lot of times what you may hear from your surgeons or cardiologists is one procedure versus another, like surgical aortic valve versus transcatheter aortic valve. We don't think that way. We think of ourselves as team members that have a bunch of tools to bring to the table. If we think about the landscape of patients who have aortic valve disease, there are people who have aortic problems who have primarily an issue with aortic wall. There are people who have had radiation in childhood or in young adulthood who have problems with multiple valves. There are people with bicuspid valve and there's everything in between.

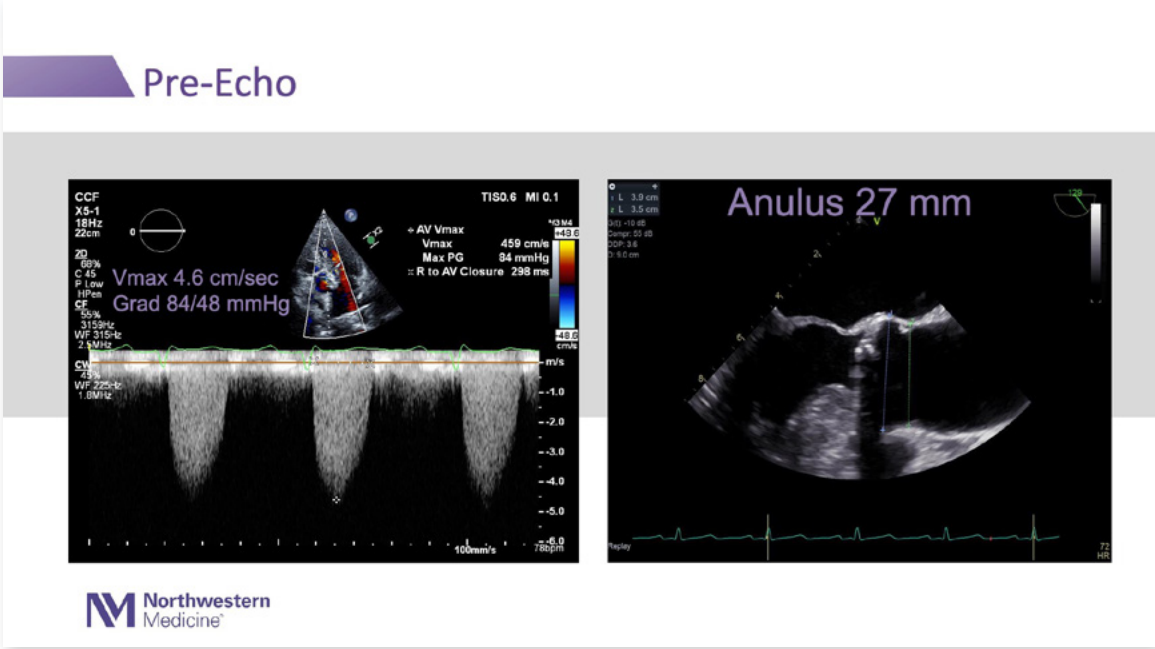


We think about what can we do for patients that includes the most common procedures, you're going to hear about a lot of places, but it also includes all of the tools we should have in our toolbox to treat the whole disease.

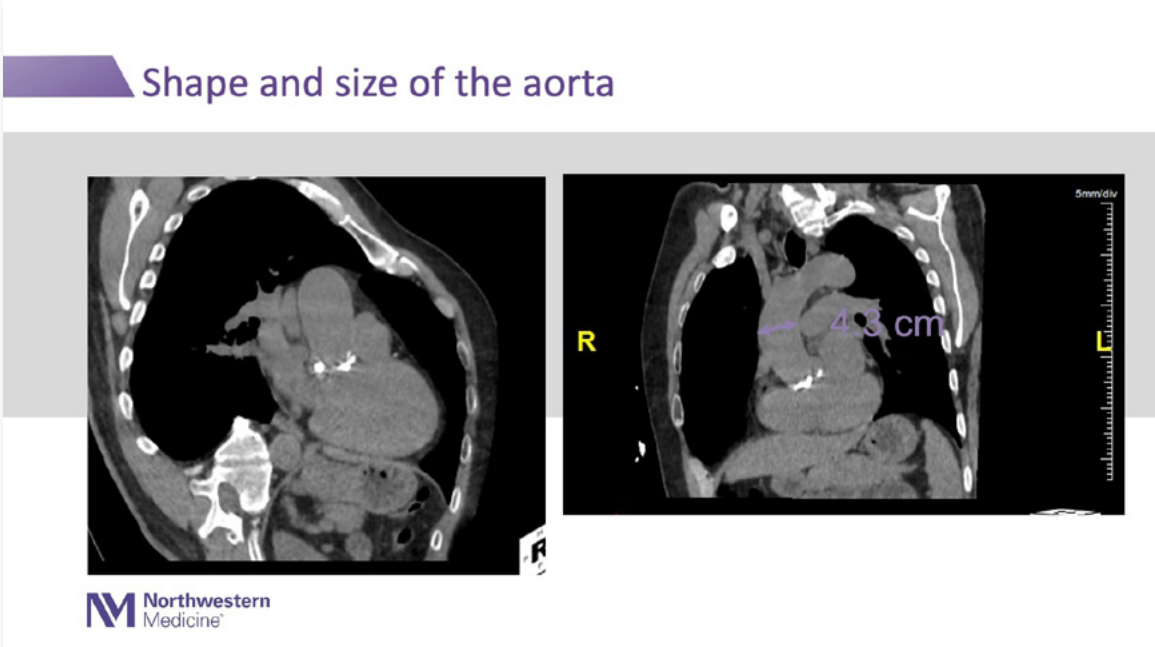
Young Aortic Valve Patients



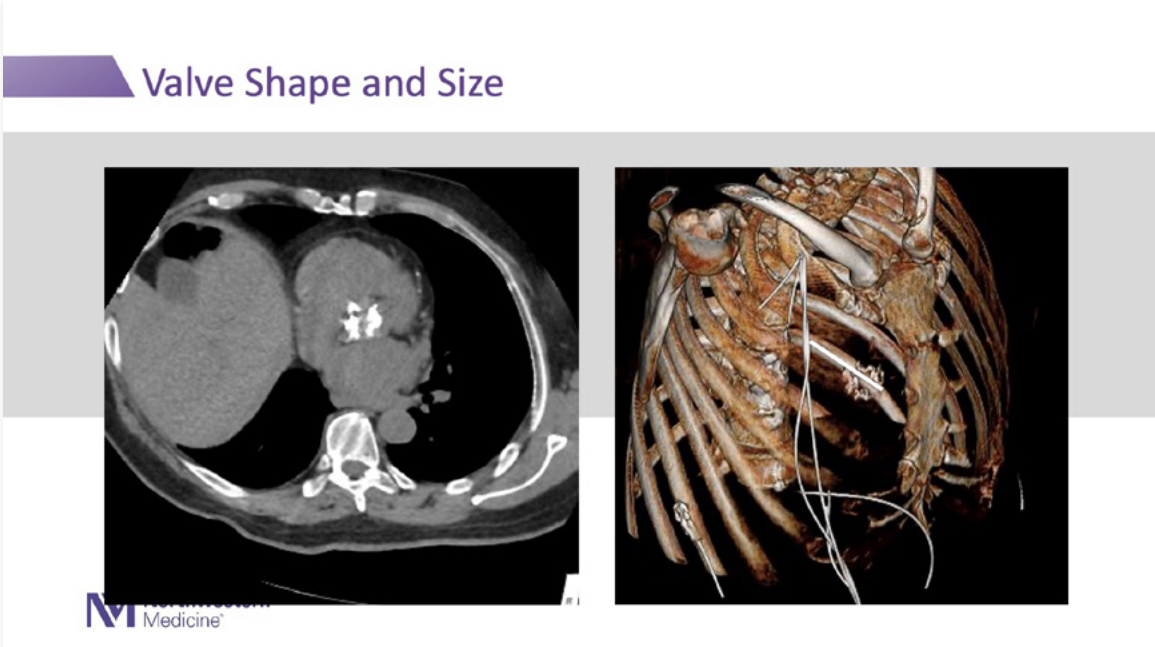
Dr. Doug Johnston: I'll just give you one example. We take a young patient with aortic valve disease, and these days, young can be anything from 30 to 70. I mean, we have 80 plus year olds who are playing pickleball every day, whose biggest concern is how fast can they get on the court. Really we're thinking about how is the patient, what else is going on with them? What does the valve look like? Is it leaky or narrow? Is it a bicuspid or a three leaflet? What else is going on? Is there a problem with the root and the ascending? This is going to take us down one of a few different pathways, is this a patient who might be able to have a transcatheter valve, or if they need an open procedure, what else needs to be done?



This is just an example. We won't spend a lot of times on the echo, but this is an executive in their 60s who hadn't been to the doctor in quite a while and found a heart murmur and was found to have an aortic valve that's very narrow, severe aortic stenosis. That's the reason to have surgery.

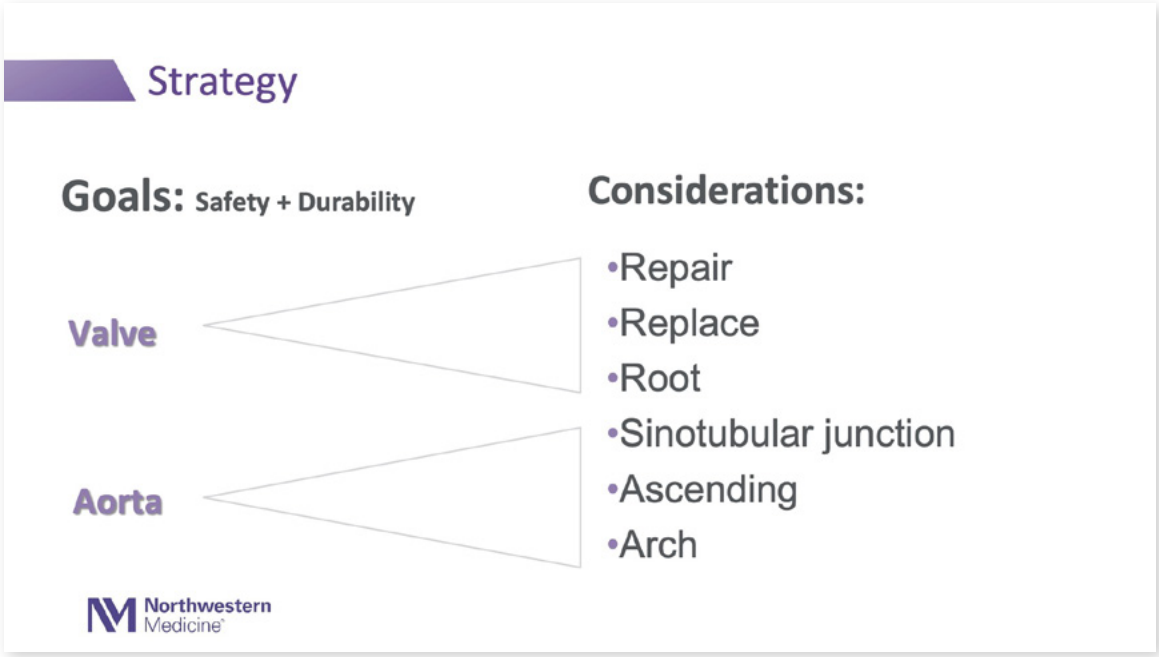


We get these echo measurements and then a CAT scan to look at everything. This was a very heavily calcified valve, what's called a unicuspid valve, which really means that it's a severe version of a bicuspid. It's not such a great valve for a transcatheter, and the patient really wanted as small an incision as possible. We do these fancy 3D reconstructions and we measure everything out. In this case we said, the only thing that needs to be done for you is the valve, and we can do that through a pretty small incision. It's not quite as small as TAVR.



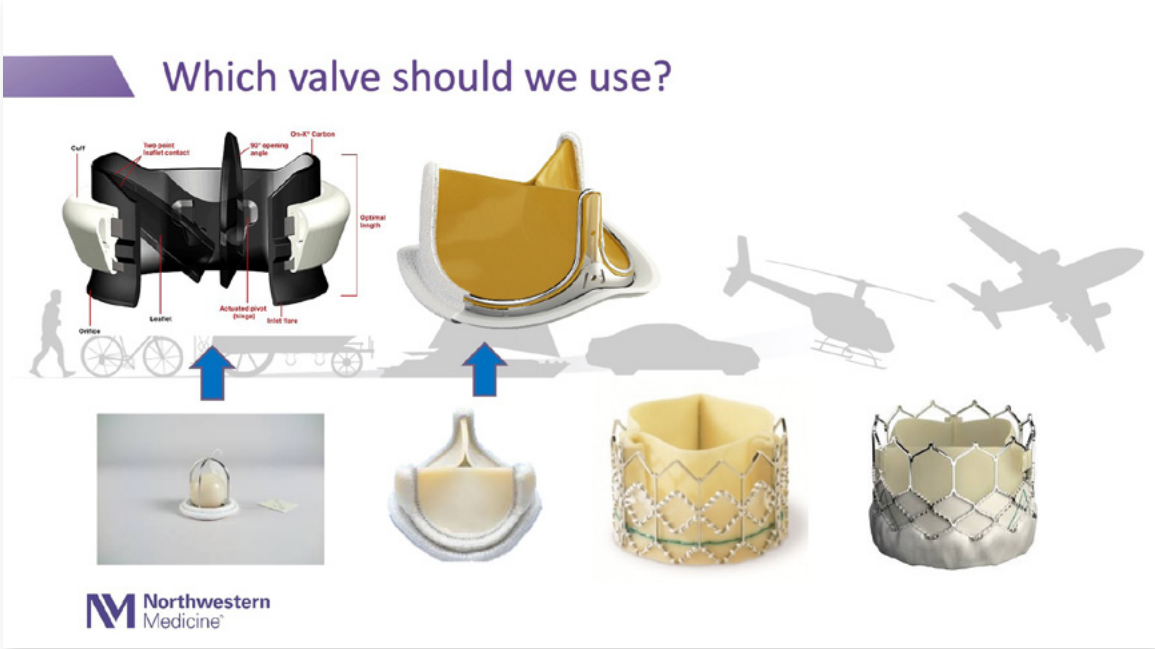
What we do is to look at the valve itself. You can see there on the left side, and then we do a 3D plan of exactly where the incision is going to be. This is going to be in between the ribs on the right hand side.

Strategic Planning with Cardiac Conditions



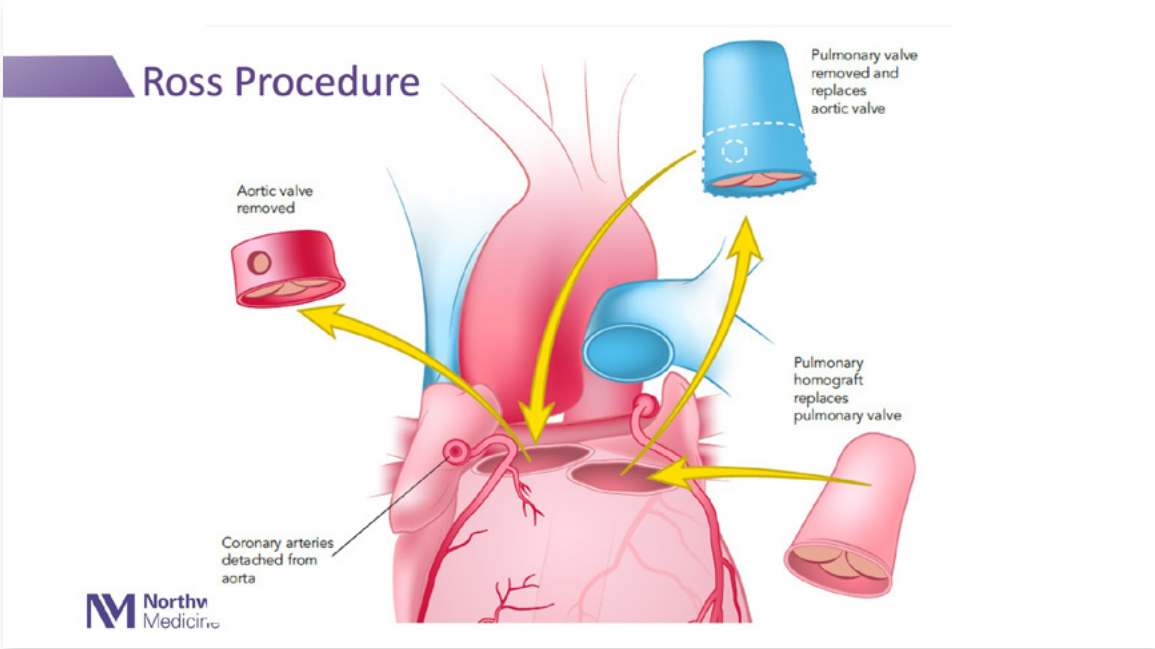
Dr. Doug Johnston: We're pre-planning this and we show this to the patient in the setting of thinking of all the things we need to do. In this case, we just have to do the valve, but we're not a one-trick pony. We think about anything else that might need to be fixed at the same time.

Which Valve Replacement Should Be Used?

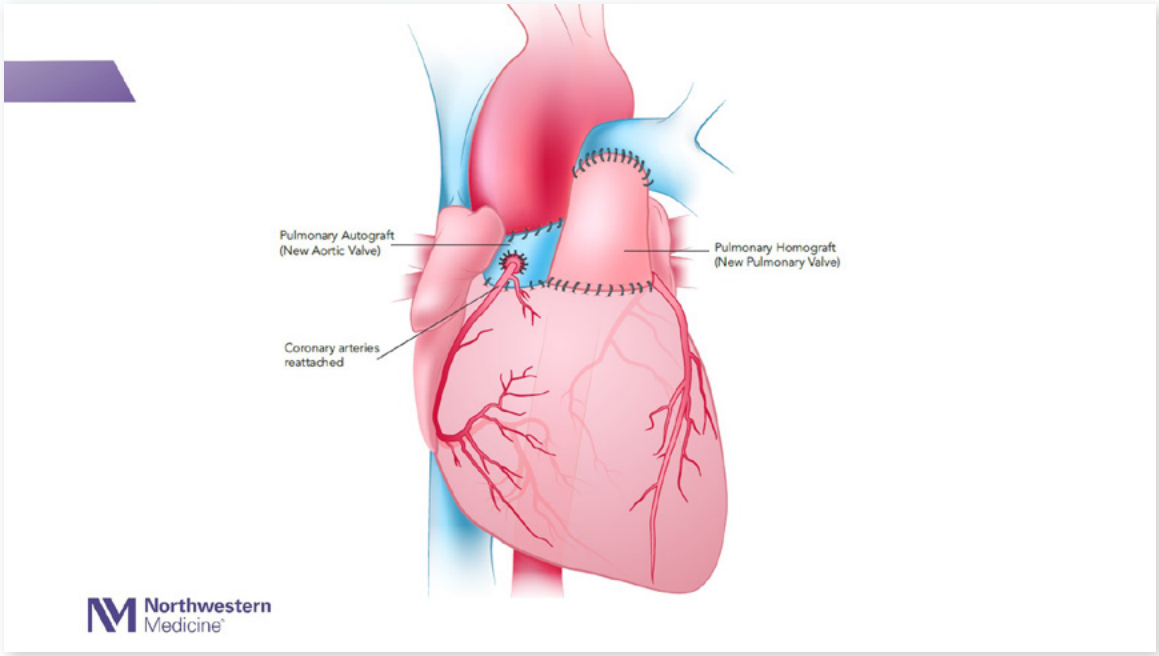


Dr. Doug Johnston: This is an important point. We often tend to get fixated on one type of technology that's getting better. People ask some questions about the JenaValve. You heard about that there's a lot of new transcatheter valves. There's also been a tremendous development in surgical valve technology, and so what we have to use for you today is not what we had even 10 years ago or 15 years ago. The durability; we're going to expect the efficiency of these valves.

The Ross Procedure



Dr. Doug Johnston: The other thing we're going to think about before we get to that minimally invasive operation is, for a young patient, should we be thinking about other types of procedures like a Ross procedure, which is where the pulmonary valve is transplanted to the patient's aortic valve position, and that can be a very durable result for young patients. That's what it looks like when we're done.


Pulmonary Autograft
(New Aortic Valve)
Pulmonary Homograft
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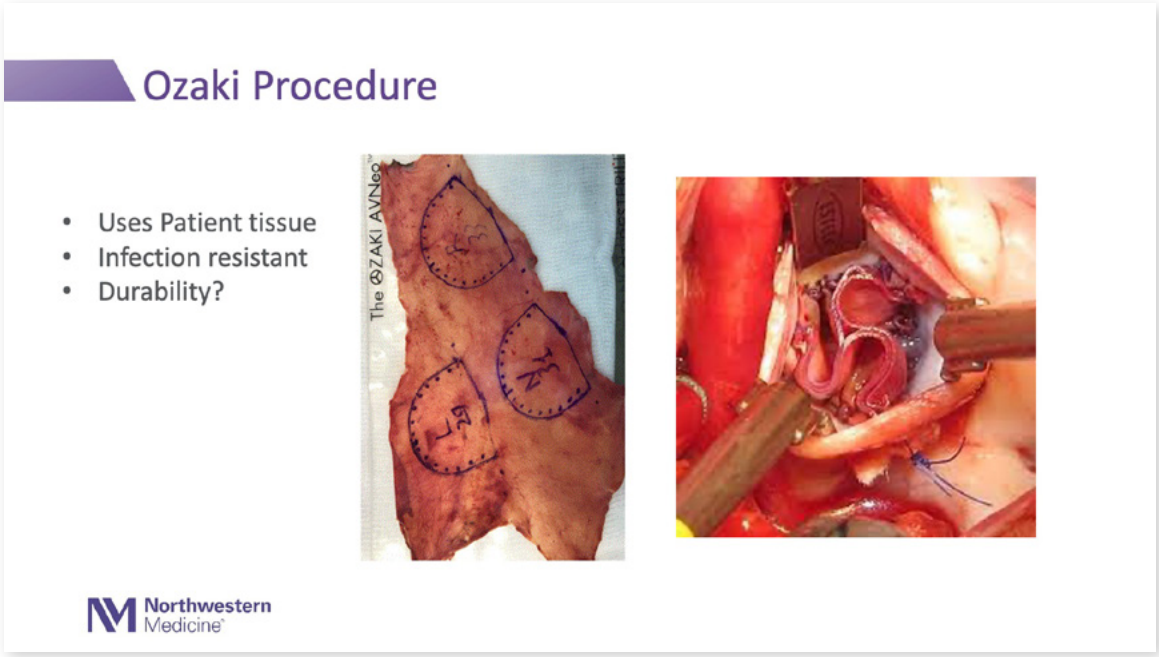
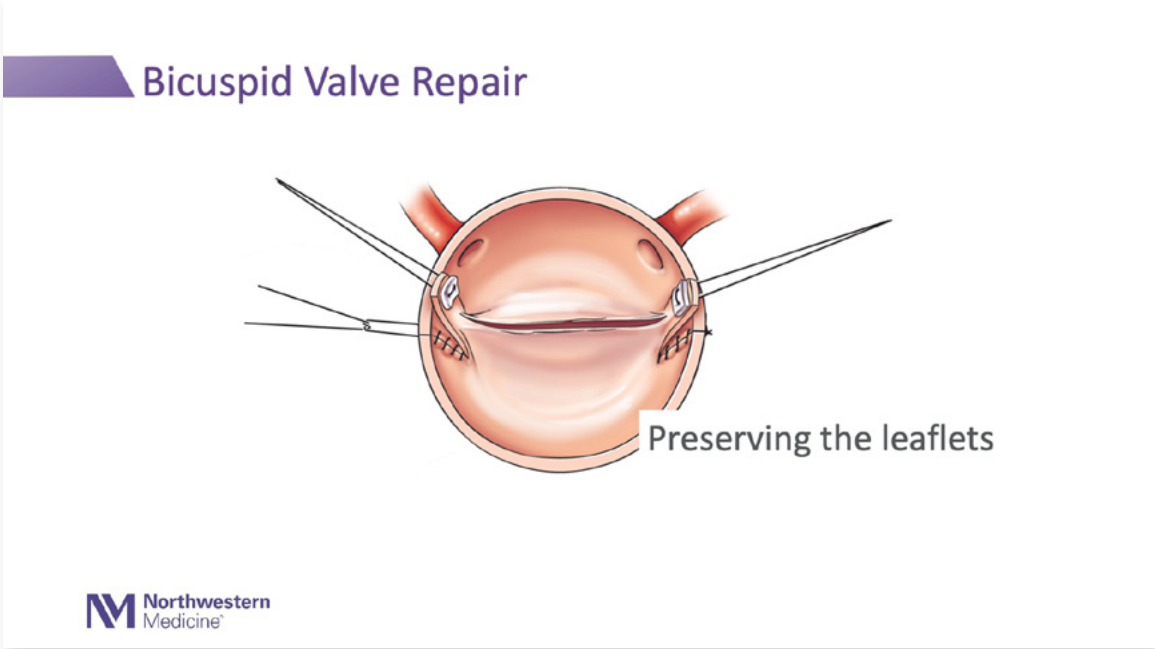
The Ozaki Procedure

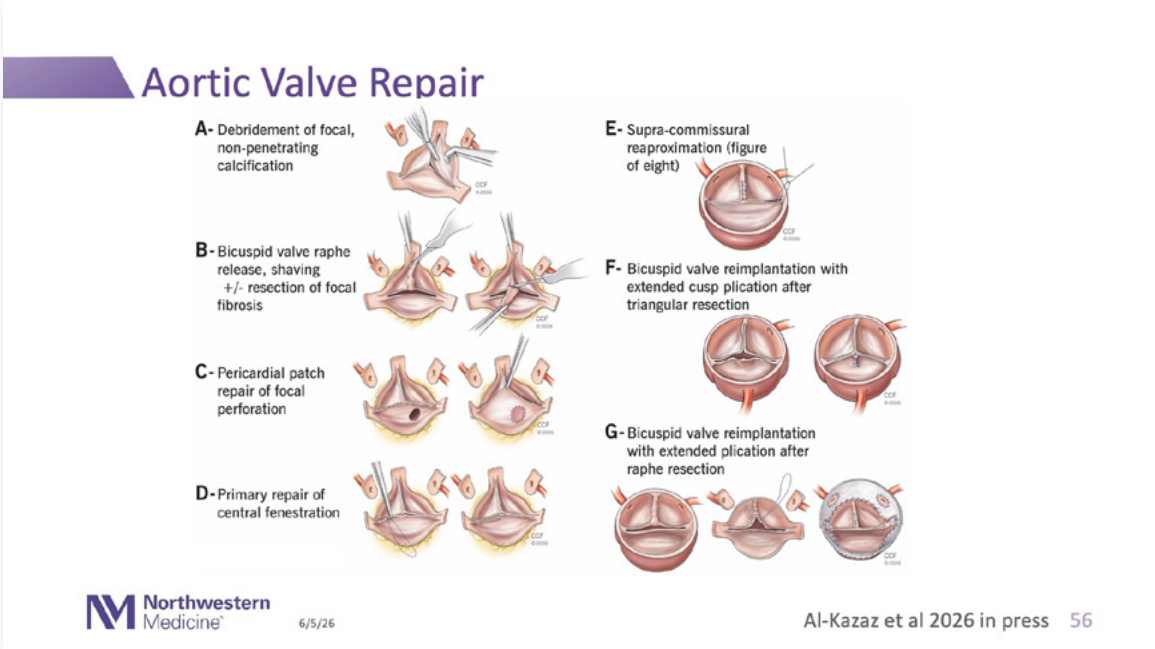


Dr. Doug Johnston: There's also what's called the Ozaki procedure, which is where we use the pericardial tissue from the patient to create a new valve. This is the kind of discussion that you really want to have an experienced heart team to talk to you about. These options are not a one size fits all. These are the results of a kind of deep conversation between the team.

Bicuspid Aortic Valve Repair

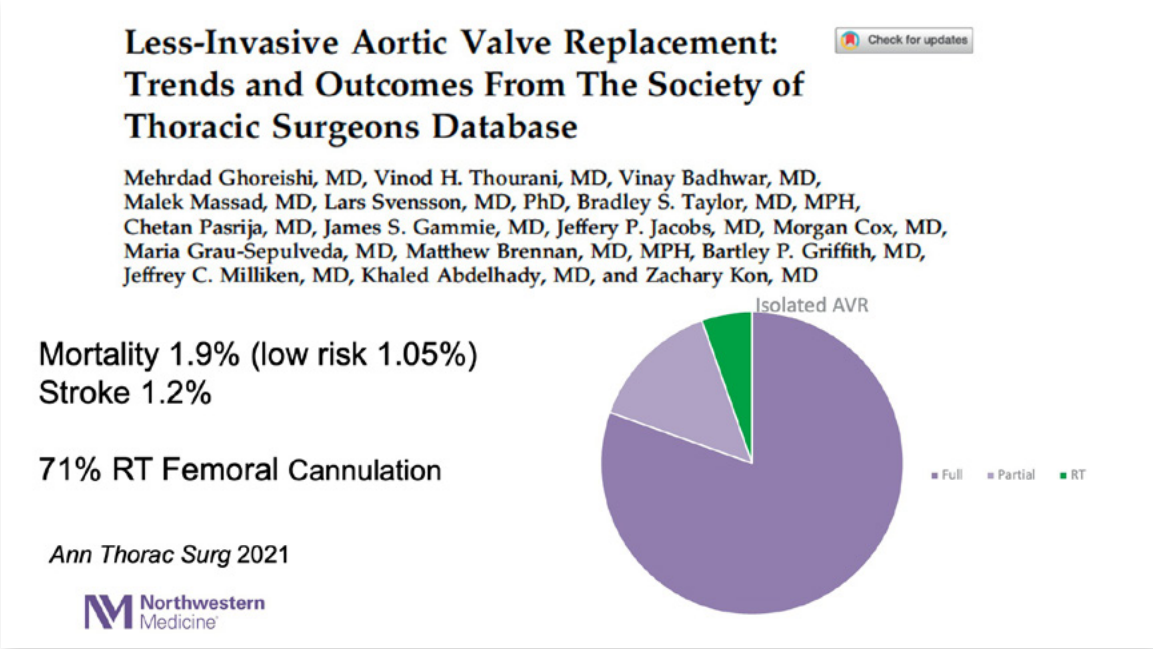


Dr. Doug Johnston: For some patients who don't have stenosis, repair is also an option for aortic valves. This is a procedure that's not done in as many institutions as valve replacement, but it's one that you want to be able to ask your heart team about in particular when you have regurgitation.

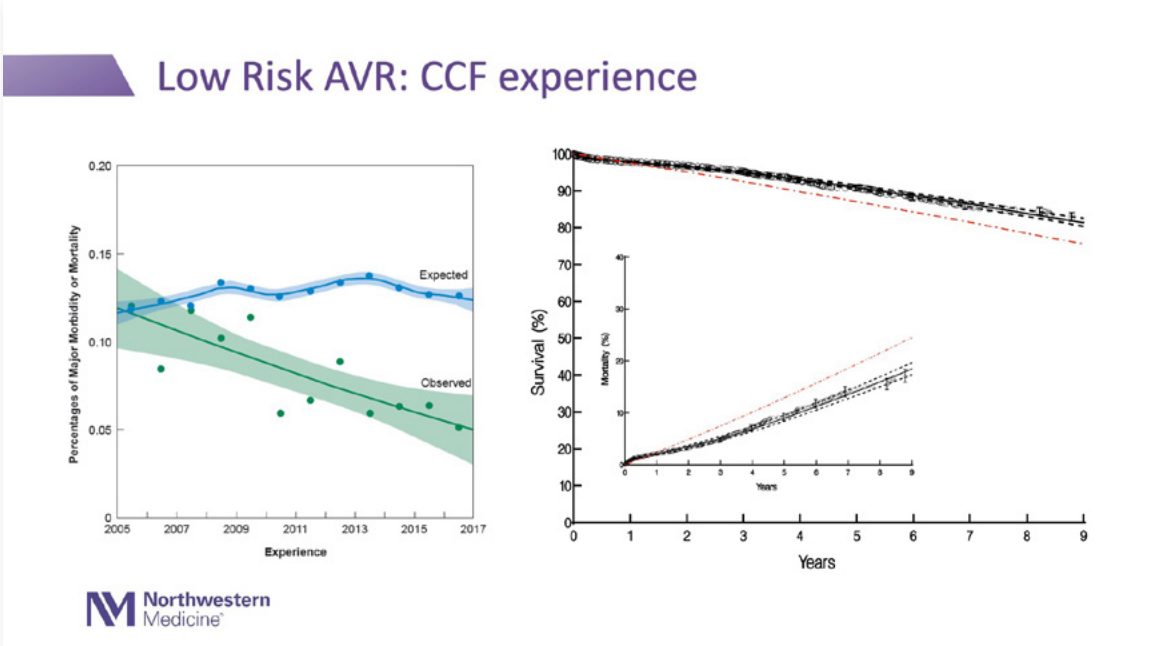


There are a lot of different ways to do it without belaboring that point. This is a review paper that our colleague Mohamed Al-Kazaz and Dr. Asgar and I are just putting out now looking at all the different ways to repair leaky aortic valves.

Minimally Invasive Considerations

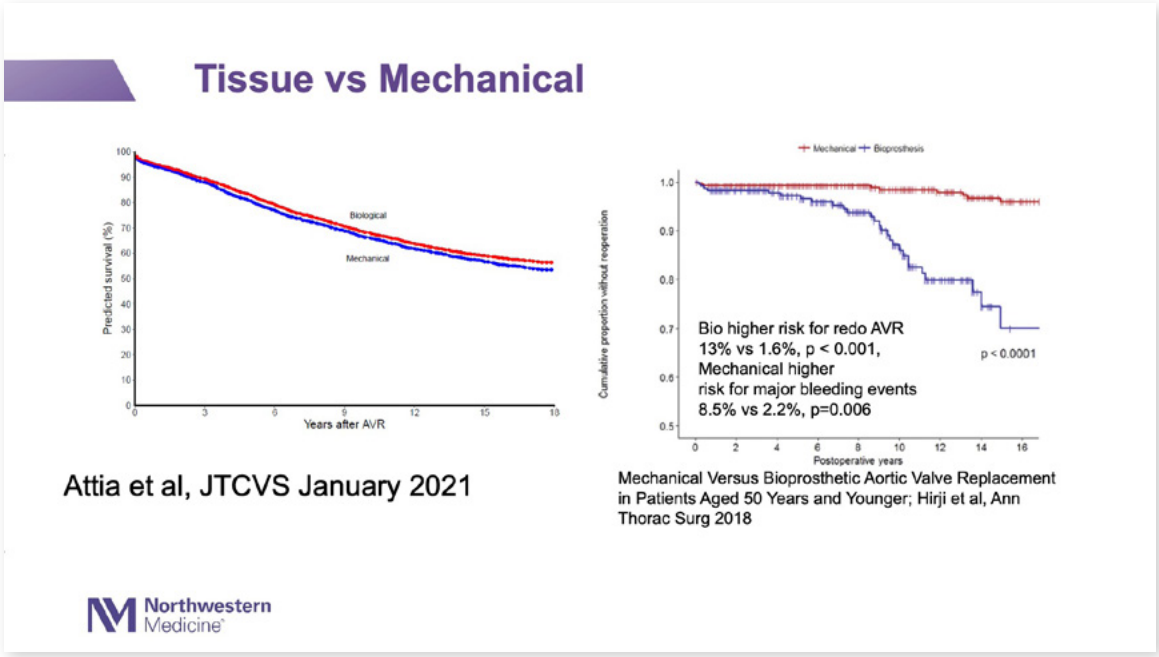


Dr. Doug Johnston: We know that minimally invasive surgery is not common around the United States. This is a paper from a couple years ago. If you just look at that pie chart on the right side, that dark purple is the full zipper up and down incision. It basically shows us that around the United States, most patients are getting a full sternotomy when they have just an aortic valve that needs to be replaced. We do a lot of small incision surgery at Northwestern. There are a lot of valve centers of excellence that do that, but it's something you want to ask about.

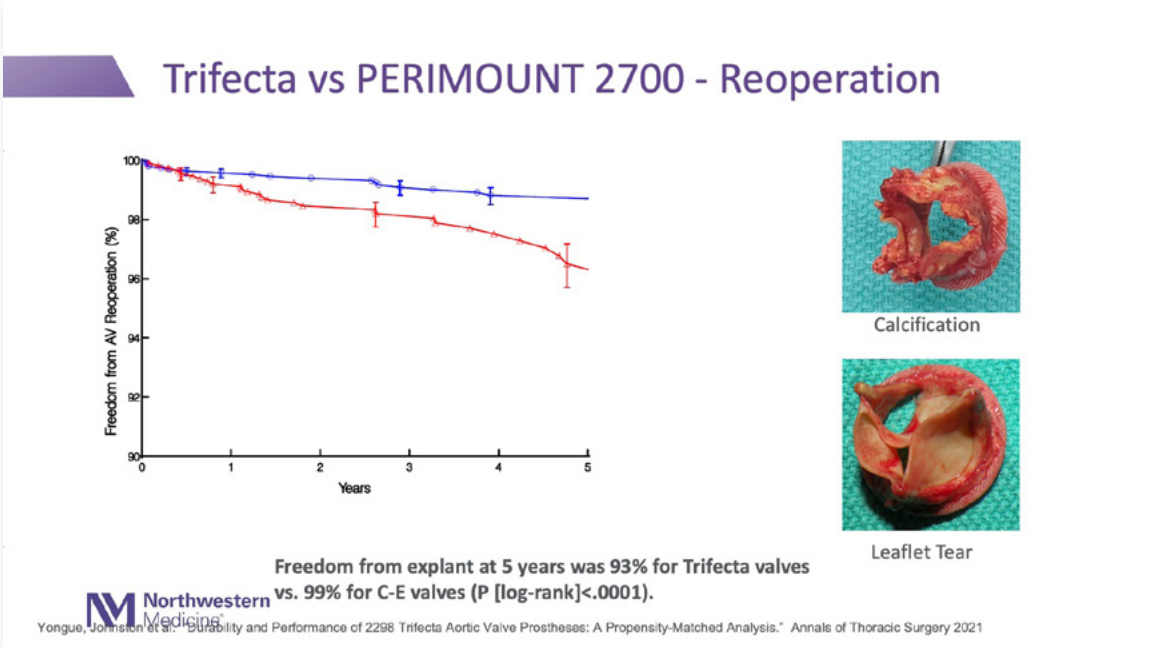


We also know that the outcomes for aortic valve surgery and mitral valve surgery, if you do need to have surgical procedure and not a transcatheter procedure, have really gotten much better over the last 20 years and they're truly excellent at present.

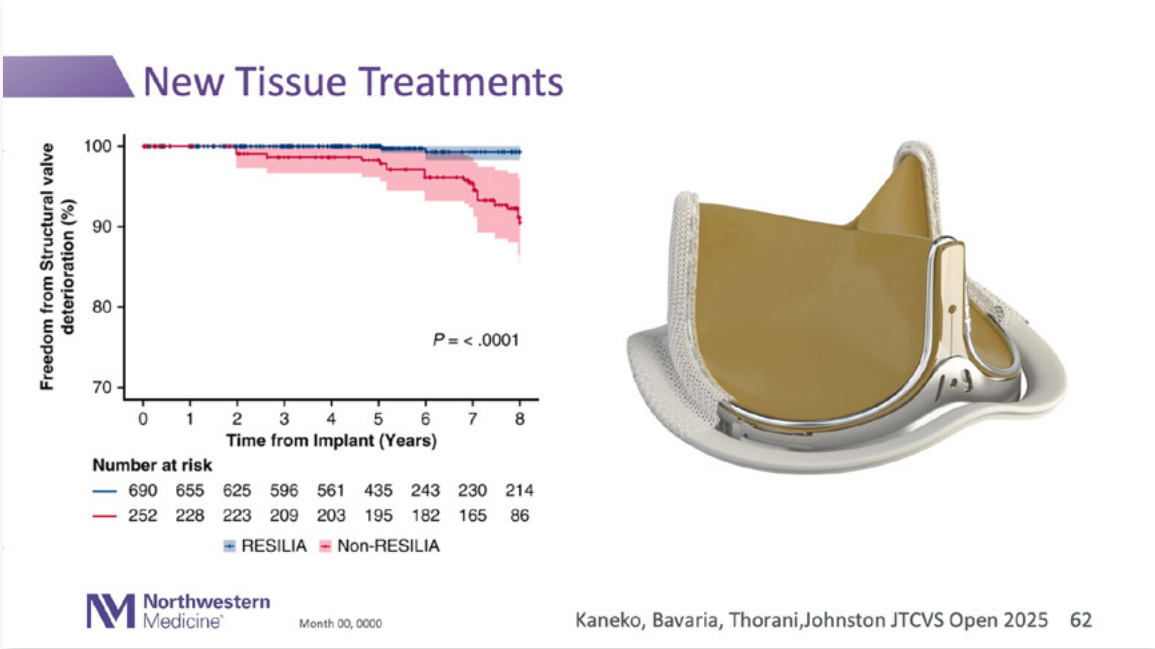
Mechanical vs. Tissue Valve Outcomes



Dr. Doug Johnston: We'll talk a little bit about valve choice, but essentially this is a conversation that you want to have with your team. The good news is that modern tissue valves do last a really long time and there's very good evidence that you might need another procedure. Your life expectancy is going to be similar whether you get a tissue valve or a mechanical valve.



You can get a surgical valve. I think we can just wrap it up on this slide, but one of the things that we've learned over the years is that the current generation of tissue valves all have good durability compared with 25 or 30 years ago, but there are differences. Some of you ask questions about the trifecta valve. This is a valve that had very good early data, but what we found is we get out more closer to eight or nine years that there's a difference in durability between the trifecta and some of the other valves. It's not a bad valve, but there is a difference. This valve was actually taken off the market.



The good news is that overall valve technology is moving in the direction of very long durability and there's now data for the resilia tissue valve at 10 years that shows a very, very low rate of deterioration. This is the Inspirus data that was just presented that is compared to the previous generation. That blue line on the top is the number of valves that have deterioration, so much better than the prior generation. We now know that at 10 years, there's a very low risk.

Questions and Answers

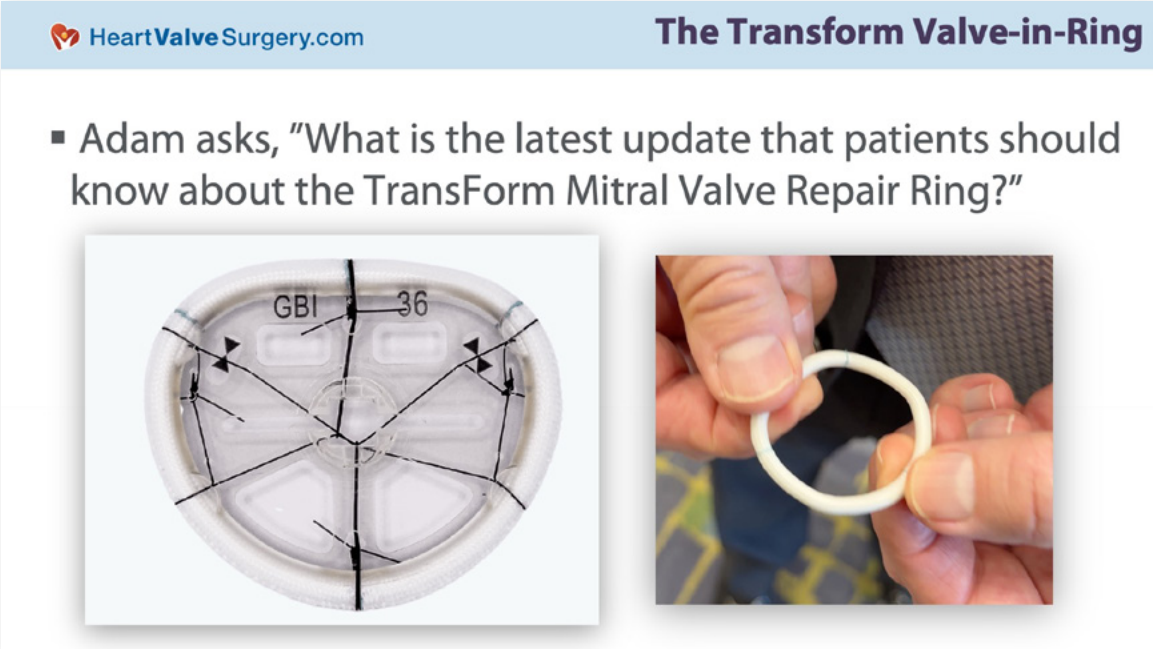
HeartValveSurgery.com

Valve-in-Valve Longevity and Efficacy

- John asks, In 2025, at the age of 59, I had my third SAVR by Dr. Doug Johnston. It was a tissue valve to replace a failing nearly 18-year-old tissue valve. My team and I decided to go SAVR instead of TAVR because at my age I will eventually need another intervention and its better to hold off on TAVR until my 70s, as the number of successful ViVs has its limits. My question is, "What is the latest information on the longevity and efficacy of ViV?"

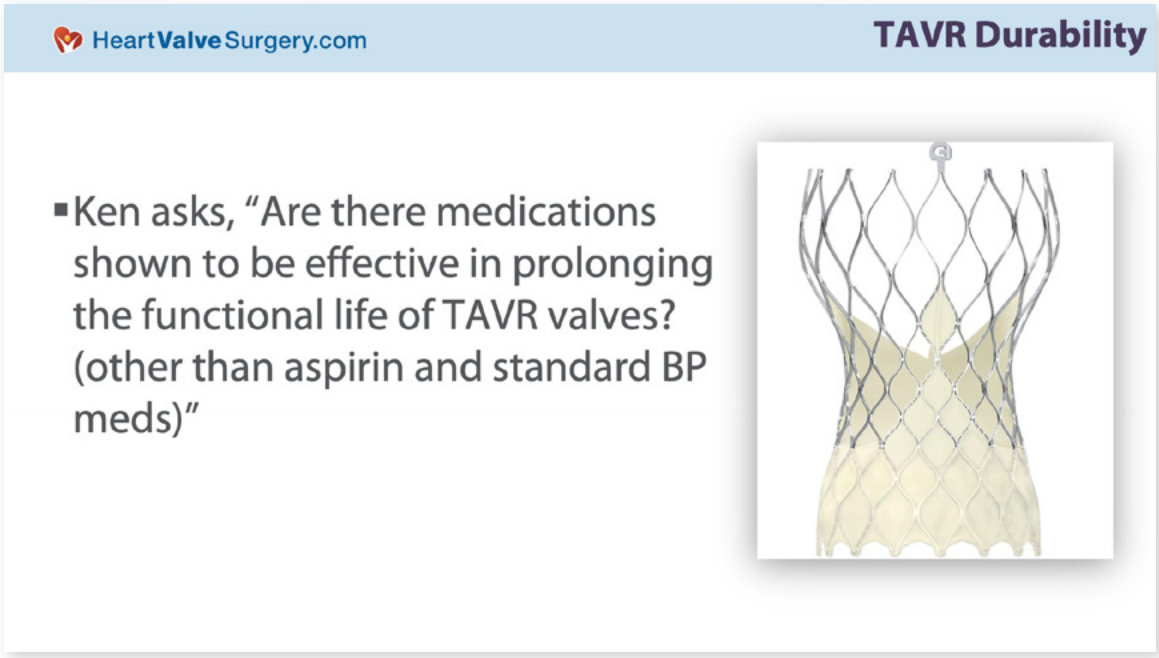
Adam Pick: John asks, "In 2025, at the age of 59, I had my third SAVR by Dr. Doug Johnston. It was a tissue valve to replace a failing nearly 18-year-old tissue valve. My team and I decided to go SAVR instead of TAVR, because at my age, I will eventually need another intervention and it's better to hold off on TAVR until my 70s as the number of successful valve-in-valves has its limit. My question is, what is the latest information on the longevity and efficacy of valve-in-valve?"

Dr. Asgar: That's a great question. Just to keep us on time, the biggest predictor of how well you'll do with a valve-in-valve is actually the size of the surgical aortic valve that your surgeon put in. If your surgeon was able to get a large valve in place, we can get a very good result with valve-in-valve. As I mentioned earlier, there's great new technology coming out. We're going to be part of this trial called Paradigm, which has a brand new valve with even better hemodynamics. I've studied it. We're publishing our initial data, but the initial valve-in-valve data with this valve looks absolutely phenomenal. It really does hinge on what is the surgical intervention that was done, but there's no reason to believe that a valve-in-valve biological valve will last any less long than the surgical biological valve that you had.



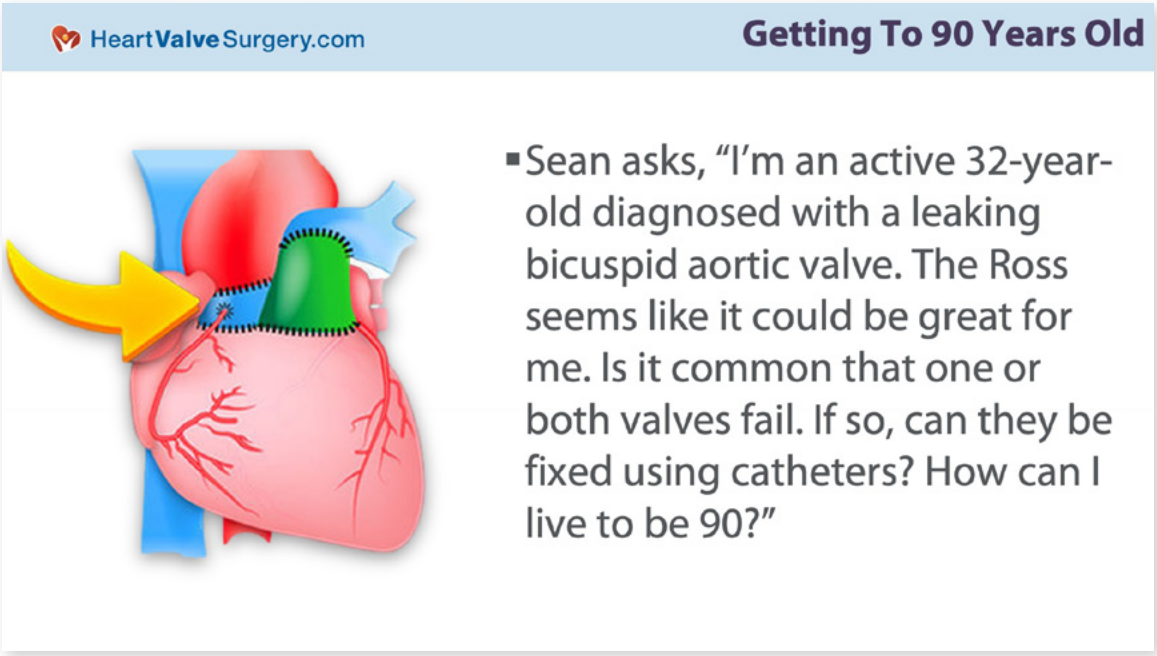
Adam Pick: Great. Going off the chart, Priya asked a question. Could you please share the survival slide or all of the slides if possible? So everybody on the line knows, we are going to go ahead and post not only a replay of the video, but an ebook that contains not just the slides, but all the comments from Dr. Asgar and Dr. Johnston. That'll be coming to you by email. Let's keep going though, because we've heard a lot about valve-in-valve. Dr. Johnston, you really quickly talked about valve-in-ring and I just got to ask you this question. What's the latest update that patients should know about the transform mitral valve repairing?

Dr. Johnston: It's a great question, Adam. The transform ring is a new ring similar in idea to the ones we've been using for like 25, 30 years, but this one was developed specifically by Dr. McCarthy for two reasons. One is, it's got very standardized measurements, so you can use that formula to say exactly how well the valve is going to meet in the middle at the end of a repair. It's designed instead of a rigid ring, it's got silicone in it. You can see on the right side it turns into a circle. When Dr. Asgar sees you down the road, we obviously hope your repair is going to last a really long time, but keep in mind this is like repairing a piece of clothing that's been worn out. I mean, your valve is not working, the tissues are a little bit weak, and so repairs are only as good as the tissue we're doing it on. When the valve eventually fails, this ring can become circular allowing us to put a new valve on the inside of it. We think this is going to be a great option. We don't know how long some of these repairs are going to last. I mean, some repairs last 20 or more years, but it gives patients the option to have a transcatheter valve in the ring down the road.



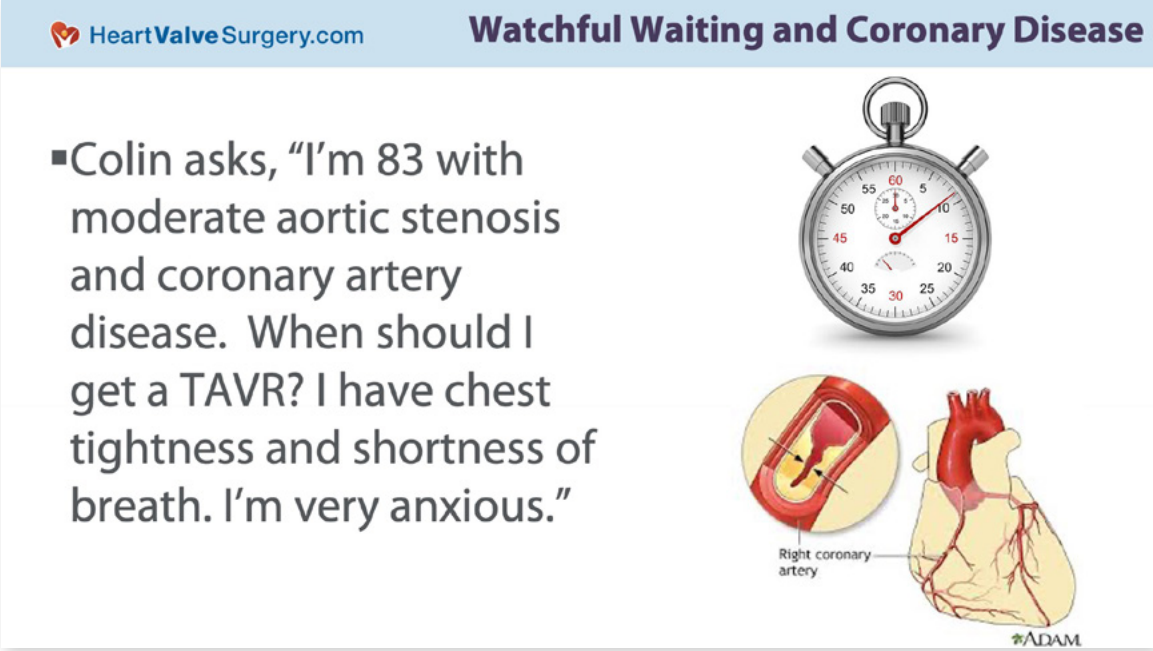
Adam Pick: Great, and let's go over to this concept and discussion about durability. Ken asked an interesting question that I've never heard before. Are there any medications shown to be effective in prolonging the functional life of TAVR valves other than aspirin and standard blood pressure meds?

Dr. Asgar: Yeah, it's a great question and the answer is we don't know yet. There is some thought that drugs like statins that are used to maintain your cholesterol at acceptable levels have very powerful anti-inflammatory effects, and so they may be useful to prevent calcification and inflammation that happens with the TAVR valves, but that has not really been studied in any detail yet. It remains to be seen and really another area of research for us.



Adam Pick: Got it. Now let's move back. Doug, you quickly talked about the Ross procedure, near and dear to my heart because I had a Ross procedure done 20 years ago. I've had no re-interventions. I've been on no medication. If anybody in the line has questions about the Ross procedure from the patient perspective, I'm here to help as best I can learn about this technique that has really given me an incredible lifestyle. Sean asked this brilliant question, which is, I'm an active 32-year-old diagnosed with a leaking bicuspid aortic valve. The Ross procedure seems like it could be a great fit for me. Is it common that one or both valves fail? If so, can they be fixed using catheters? I love this. He says, how can I live to be 90?

Dr. Johnston: It's a great question. First thing I would say, Sean, is that if your valve is leaking, the first question we want to answer is, can you have a repair, because repair preserving your own valve can be done minimally invasively. It can be very durable in many bicuspid patients, and it's the least intense thing we can do to your heart at this point. If your valve isn't repairable, then it's definitely worth thinking about a Ross. At age 32, that's the procedure we would think very strongly about. It's not common that both valves fail. It's more common for the homografts, the human cadaver valve that we use on the right side, the pulmonic side to fail, but typically they fail very late and those can be fixed using a catheter. Dr. Asgar treats this problem a lot. It's a great operation for a younger patient. It's something I would absolutely consider, but don't discount the possibility of a repair. If you've got a leaky valve, that should be high on our list.



Adam Pick: Great, and let's move now over to Colin who also asked a really interesting question about watchful weighting and related cardiac condition being coronary artery disease. He asks, I'm 83 with moderate aortic stenosis and coronary artery disease. When should I get a TAVR? I have chest tightness and shortness of breath. I'm very anxious.

Dr. Asgar: Yeah, it's a great question. I think part of what's important here is trying to understand what's responsible for symptoms. For now, we're not treating moderate aortic stenosis in patients who have normal left ventricular function or normal heart pump function for the reasons we've already talked about. If we replace a valve or just starting the clock on the new one, I would want to get more questions about the coronary artery disease. Is that something that's significant and could that be responsible for the symptoms, because moderate aortic stenosis technically doesn't usually give symptoms. I would focus a little bit on the coronary disease and find out is that severe, can that be managed? Obviously if there's a feeling that you would need open heart surgery for the coronary disease, they would replace the valve at the same time, but if we think that there's an angioplasty and stent option, I think that would be the first step, and then to continue to watch the aortic stenosis. Moderate AS could take years to progress, and so you may not need another intervention for five to seven years. It's hard to know.

Adam Pick: Great. Thanks for that, Dr. Asgar, and this is again a very interesting question just given the excitement over artificial intelligence in just about everything including medicine. Keira asked, is AI having any impact on how the doctors are treating heart valve disease?

Dr. Johnston: Yeah, it's having an impact in the diagnosis. Where this is going to help us the most is in screening patients for heart valve disease. There are some tools now that can actually help detect heart valve disease from an EKG, believe it or not. We look at an EKG as a rhythm test, but there are some advanced tools and we're working with a couple of different companies to deploy some of those here at Northwestern. The next kind of frontier of that is being able to get a test like an echocardiogram but done in a doctor's office as an outpatient and you're with your primary care physician using like an iPhone, where the technology is good enough to diagnose whether or not the disease is there and then you could be referred for a more formal study. There's a lot of stuff going on in this space. It's super exciting. I would say stay tuned for a lot of developments in the next couple of years.

Dr. Asgar: I think maybe the only other thing I would add is AI is also helping us model. One of the things I talked about earlier is how we can try to model what your next valve would look like and what the possibilities are, and there's great AI type software that can take your CT scan and we can model your first valve and we can even model your second valve. That helps us for procedural planning, and so that's a great tool as well.

Adam Pick: Yeah. Dr. Johnston, I know you talked about some of the good 10 year results from the resilia tissue. Larry asked a question about the Foldax valve. He says, what can the doctors tell us about the Foldax valve? I heard it was designed to last forever?

Dr. Johnston: Yeah, it was designed to last forever, like any non-tissue valve. This is a neat one. It's a valve made of polymer. This is probably the one that's farthest along, but there are two or three others in animal studies right now. The devil is in the details, which is these polymer valves have been around since the 60s, believe it or not. The material is really what matters. Some of the early valves that plastic really, which is a flexible plastic that it's made of would crack after a time. You think of the millions of cycles these valves undergo. Some of them are not very friendly to the bloodstream, so they develop clots. There is a one year study of the Foldax valve on patients in India. It was viewed as a successful study, although one year is obviously really early, and there is some concern that patients had more blood clots forming on the valve than you might expect; so lots of interesting potential in the polymer valve space. This is going to give us a whole new avenue to go with non-tissue valves, but too early to say on a particular valve about the longevity.

Adam Pick: Great. Moving on, let's go over to a question that I get a lot. It's all about pump head. Randall asks, my wife had open heart surgery in 2020, began experiencing symptoms. The doctor says nothing is wrong or it must be migraines. My wife never had these symptoms. Do you have any insights or guidance?

Dr. Johnston: I'm very sorry to hear about this Randall. Fortunately long-term neurologic issues with most types of open heart surgery have become very rare. The pump itself has become very safe, but even something that's safe across the board for most patients still has a complication rate. I mean, all of these procedures do. The best guidance I could give you is that the first thing that should be ruled out is that there is any evidence of mini strokes or even a bigger stroke. An MRI is probably the most useful study to get to rule that out. It's not positive in everybody, but it can provide some guidance for therapy.

Adam Pick: Fantastic, and why don't we go ahead and ask a question given all that we've talked about today. When you think about the long-term heart valve success, what do you Dr. Johnston and Dr. Asgar think is the biggest potential pitfall for patients about planning the lifetime management of their disease?

Dr. Johnston: I'll say two pitfalls. One is there's way too much bad information out there, and I honestly think we've moved from Dr. Google to Dr. ChaGPT and it's gotten worse. All of these tools can be great for doing research, but they're not necessarily built on good medical data and the data is changing all the time. You really need to have a good heart team. One of the questions in the chat was, how do I get a team? Do I have to make appointments with a bunch of different people? I think the answer is no, you have to go to a good place that will help guide you through the process. The two pitfalls are relying too much on generalized information and being told that there's only one option for your disease. I think if your doctors have not considered multiple options, then it might mean they only do one thing, and that's a problem. You want a team that really thinks about you as the center and not the surgeon or the interventional cardiologist as the center.

Dr. Asgar: Yeah, I would agree. I think if you're going to someone, when all you have is a hammer, everything looks like a nail. I think the important thing is to have a team that can look at you and talk about lifetime management and talk about the different options, and that presents you with that and is open to hear your questions. I agree with Doug lately in the media, whether it's the Wall Street Journal or what sort of newspaper is printing, there's a lot of misinformation out there and I think the important thing to do is really go to the source and get the actual information and ask those questions. I love it when a patient comes to me with a list of questions, because at least I know that we're addressing what are their biggest concerns. Otherwise, I feel like I'm talking and I don't know if I'm answering all the questions, and we could talk for an hour and I might not get to it. I think it's really important to do your research and have the questions and really get the knowledge from the source.

Adam Pick: That is great advice. I want to go ahead and thank Dr. Johnston and Dr. Asgar and the entire Northwestern Medicine team for putting together this incredible information for us to learn and benefit from today. I want to thank all the people who've joined us today from all over the world to learn about our valves and how to take care of them as best we can. As we always say here, "Keep on ticking!"

Patient Resources

Since 2006, HeartValveSurgery.com has developed several resources to help you better understand your diagnosis, your treatment options and your recovery.

Listed below, please find resources created exclusively for patients and caregivers. We hope they educate and empower you.

- Adam's Free Patient eBooks - Download 10+ free eBooks about heart valve disease and treatment options for aortic, mitral, pulmonary and tricuspid valves.
- Heart Valve Learning Center - Visit the Heart Valve Learning Center to access over 1,000 pages of educational information about valvular disorders.
- Patient Community - Meet people just like you in our patient community. There's nothing better than connecting and learning from patients who are sharing their stories in our community.
- Surgeon Finder - Find and research patient-recommended heart surgeons that specialize in heart valve repair and heart valve replacement procedures.
- Heart Hospitals - Learn about medical centers that have dedicated teams and resources that specialize in heart valve therapy.
- Adam's Heart Valve Blog - Get the latest medical news and patient updates from our award-winning blog.
- Educational Videos - Watch over 100 educational videos filmed by the Heart-ValveSurgery.com film crew about heart valve surgery.