

DEREK WILLIAMS, DO: Today we're going to discuss percutaneous placement of a pulmonary valve, called the Melody pulmonary valve. This valve was created to give alternatives to patients that have failed surgically placed pulmonary valves. These valves could have failed either because they become obstructed, or insufficient, or a combination both.

The first part of the procedure is to define what's the anatomy the patient currently has, and how we can best fix it. So we perform angiograms in the pre-existing surgically placed conduit to define the degree of obstruction, and the degree of insufficiency. In this case, you can see that this patient has both.

Next, in the cath lab, we treat everything in a sterile environment. We prepare the groin area in a sterile manner, gain access to both the femoral artery and femoral vein. This is done by placing a needle into the groin until we get blood return from the needle.

And then at that point in time we place a wire through the needle, up into the blood vessel, confirm under x-ray that we're in the position that we'd like to be in. And then we place a sheath into that vessel, which holds the vessel open so we can perform our case. In these cases, we also put a percutaneous closure device in the vessel, so that at the end of the case we have good hemostasis.

So once the sheath is in place in the vessel, we remove the dilator, which just gives us a more uniform access to the blood vessels, without causing any trauma. Once that's done, we then advance our catheters, and perform the diagnostic part of our procedure, gathering saturations in different chambers of the heart, as well as pressure measurements. We do so oftentimes by introducing guide wires, which help us transverse the chambers of the heart in a safe manner.

In gathering information, we see monitors in front of us, both with pressure wave forms, to give us the information from within the heart that we need to do our procedures. And also fluoroscopy gives us the roadmap, as we move through the heart, to know where we're headed, and know that we're heading they're safely. At this point in time, we're just gathering pressures from above and below the valve to see the degree of obstruction, and also the degree of valve leakage.

We often have several members of the team in the room. So we have multiple hands performing the case, as well as full a team of anesthesiologists. At this point in time, we're actually moving a guide wire through the right ventricle, and getting access across the pulmonary valve, into the branch pulmonary arteries. At that point in time, we're going to place a stiffer wire out in the periphery of the pulmonary arteries, to have the best access across the valve. Once we have obtained the information that we need in the diagnostic portion of the case, we make very fine measurements of the area in which we're going to perform the procedure-- in this case the pulmonary valve-- to understand the degree of narrowing, backleak, and eventual expansion of the area that we need to obtain the best overall dimension of the valve.

This is a picture of a bare metal stint. We have found that preparing the what we call landing zone for the pulmonary valve is best done using this technology. These stints are mounted on balloons of varying diameter. Use a sleeve to introduce these into the sheaths already in the groin, so that the stint does not move during introduction to the body.

Once we have the stint mounted on the balloon, we then advance a long sheath through the groin, and across the pulmonary valve, through which the balloon and stint combination will be guided in a safe manner. And then once in position, we can then draw back the long sheath, to expose the stint in the area that we'd like it to expand. Once we have the stint and balloon complex in position, we perform further angiography to confirm that we are in the proper location.

And then, when we're ready, we expand the balloon. And with the balloon expansion, the sting fully expands, and then opens the stenotic area that we want to fully expand to prepare for the pulmonary valve. Oftentimes we will place as many stints in that area as needed, until we feel comfortable that we have fully expanded the previously placed surgical conduit to the maximal diameter of the Melody valve that we want to place in this area.

And then we prepare the Melody valve. This is a valve harvested from the internal jugular vein of a cow, and hand sewn onto a stint. You can see during the preparatory phase we test the valve again, making sure it opens and closes appropriately. There's a tag on there that identifies the valve to a certain serial number. And that is removed.

Once we have agreed that the valve is working well, we go ahead and mount it on the delivery cable. This is done by pulling the valve, much like taffy, down into a size that can be safely guided into the body. A protective sleeve is advanced over top of the valve, to protect the valve as we go into the long sheath in the groin. Once that valve has reached its position within the body, we are able to slide back the protective sleeve, and expose the valve for implantation.

We're always careful to make sure that during this process that the valve is fully within the protective sleeve, and does not get damaged during the loading process, either. There's a carrot tip on the end of this delivery system, which is a transition zone, as we got this up through the groin, and across the old pulmonary valve, into position. Once in position, and confirmed by angiography, we inflate an inner balloon. And that partially inflates the valve.

We do further angiography to assure that we're in the correct position. And once we're ready, we fully deploy the balloon, which expands the Medtronic pulmonary valve into position. Once that's accomplished, we place a catheter through the valve, and perform angiography, showing us in this view that there is no more leakage through the valve, and that the valve, by pressure measurements, is offering no residual obstruction. And we perform one last [INAUDIBLE] to make sure the valve is fully intact, has no stent fractures. And we conclude the case.

The patient then stays overnight. We perform some simple studies in the morning. And then they're discharged home.