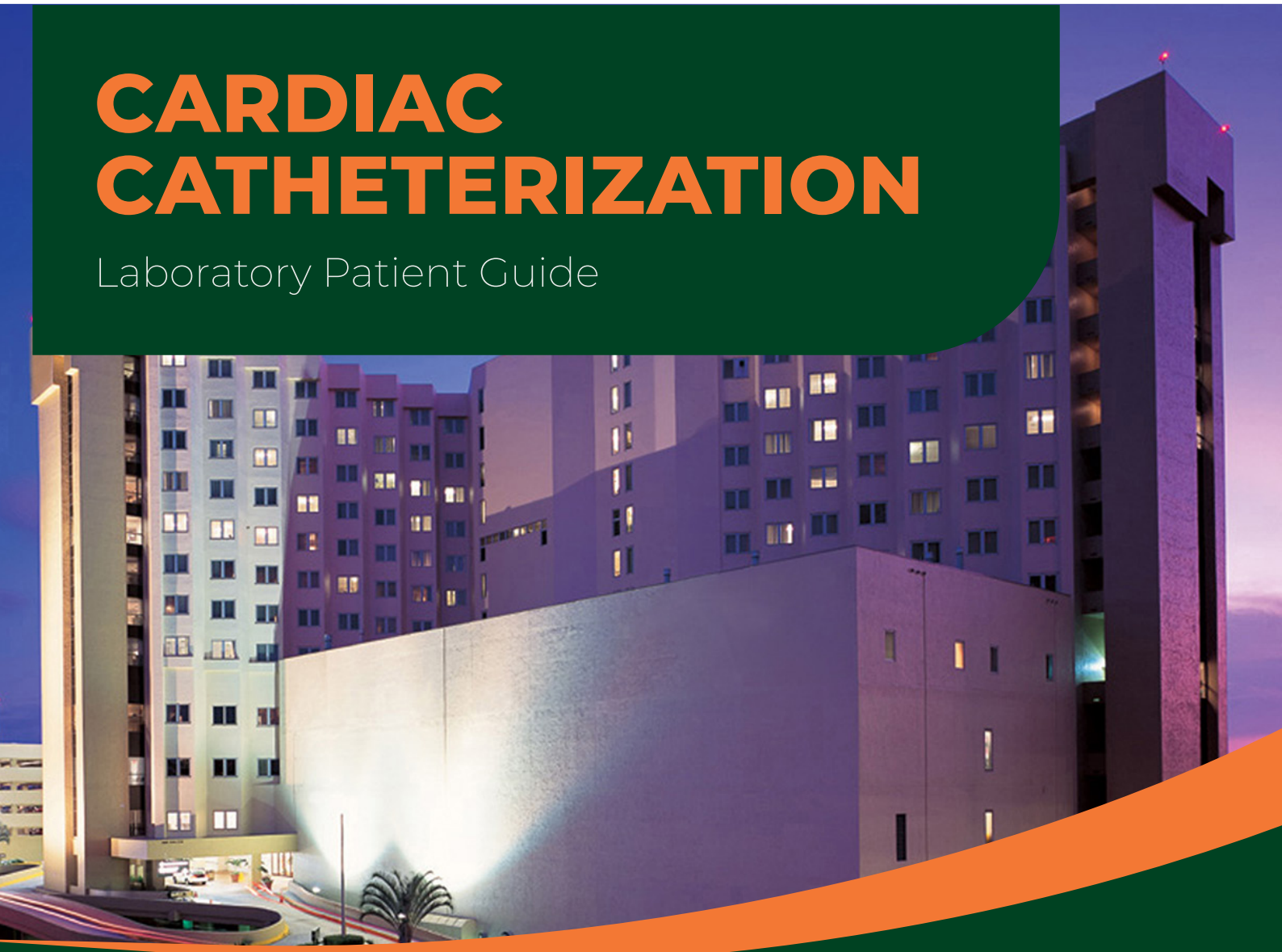
UHealth
UNIVERSITY OF MIAMI HEALTH SYSTEM

CARDIAC AND VASCULAR

CARDIAC CATHETERIZATION

Laboratory Patient Guide



UHEALTH - UNIVERSITY OF MIAMI HEALTH SYSTEM

CARDIAC CATHETERIZATION LABORATORY

INFORMATION FOR PATIENTS AND THEIR FAMILIES

CARDIAC CATHETERIZATION

Laboratory Patient Guide

Contents

Welcome

We created this booklet to help you on your patient journey with us.

The booklet answers frequently asked questions regarding your upcoming procedure:

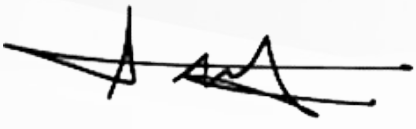
- About your health condition.
- What to expect?
- How does it help with your diagnosis and treatment?
- Procedure details: What will happen before, during and after your procedure?

UHealth Cardiac and Vascular is at the forefront of cardiovascular medicine, offering state-of-the-art care for your heart and blood vessels. Our renowned doctor-scientists provide advanced treatments in our UHealth Cardiac Catheterization Laboratory, recognized globally for its expertise in treating high-risk patients.

Our team combines current and innovative therapies with compassionate, patient-centered care, tailoring treatment to meet your unique needs. We work closely with you and your healthcare providers to ensure a seamless, high-quality experience in beautiful South Florida.

With personalized recommendations and the latest in technology and diagnostics, UHealth Cardiac and Vascular is dedicated to delivering the best in cardiovascular care.

Our Cardiac Catheterization Laboratory is dedicated to providing exceptional patient care through the latest advancements in coronary, structural, and peripheral procedures. With a skilled team of faculty and staff, we prioritize innovation, quality, and cutting-edge technology, including state-of-the-art software and equipment. We also emphasize continuous education and training, incorporating digital health tools and simulations to enhance our procedural planning. Our commitment to research ensures that we remain at the forefront of medical advancements.



Yiannis S. Chatzizisis, MD, PhD
Professor and Chief, Cardiovascular Division
Director, Cardiac Catheterization Laboratory

Our Location

UHealth Tower / Cath Lab

1400 NW 12th Avenue
Miami, FL 33136

305.243.1900

TRANSIT DIRECTIONS TO UHEALTH TOWER:

Public Transportation
Located just steps away from the Civic Center Metro Station on N.W. 12th Avenue, UHealth Tower is conveniently located for those using public transportation. In fact, hundreds of patients, visitors, and employees do it every day.

Bus
For information on bus route schedules and itineraries, call Miami-Dade Transit Information System at **305-770-3131** from 6 a.m. to 10 p.m. on weekdays and from 9 a.m. to 5 p.m. on weekends. Pre-recorded information is available 24 hours a day. Many bus routes travel to UHealth Tower and the University of Miami medical campus. For a detailed map and route information, you can view the Routes and Map Schedules on the Miami-Dade website. This will allow you to view the various routes that lead to UHealth Tower. Just look for the Civic Center Station on the map. **http://www.co.miami-dade.fl.us/transit/bus.asp**

Metrorail
Exit Metrorail at the Civic Center Station on N.W. 12th Avenue. UHealth Tower is south of the Metrorail station at the corner of the N.W. 12th Avenue and N.W. 14th Street intersection. For a detailed map of the various Metrorail stations, you also may log on to Miami-Dade Transit and go to Metrorail Stations. For additional route information, you may also call **305-770-3131**. **http://www.co.miami-dade.fl.us/transit/rail_stations.asp**

Tri-Rail
Take Tri-Rail to the Metrorail station at 79th Street in Hialeah. Take Metrorail south and exit at the Metrorail Civic Center Station on N.W. 12th Avenue. UHealth Tower is located at the corner of the N.W. 12th Avenue and N.W. 14th Street intersection. For more information on getting to UHealth Tower by Tri-Rail, log on to Tri-rail.com, click on Destinations, and then click on University of Hospital/UHealth Tower. **http://www.tri-rail.com/**

What is Cardiac Catheterization?

Cardiac catheterization is also called heart catheterization, heart cath, cardiac cath, or coronary angiogram. Your cardiologist (heart doctor) will use cardiac catheterization to see how well your heart works.

During a cardiac catheterization, your doctor places a catheter (a long, thin, hollow tube) into your blood vessels. Your doctor will guide the catheter through your heart vessels using a special X-ray.

This procedure lets your doctor see how well your heart is working or figure out if your heart is not working normally.

If you have a heart problem, the doctor can do other procedures using cardiac catheterization to fix it. The other procedures may or may not occur during the same appointment.

Your heart doctor can use cardiac catheterization to:

- Find out why you're having chest pain or an abnormal heart rhythm.
- Look at the blood flow in your heart.
- Find out if you have coronary artery disease (narrowing or blockages of your arteries supplying the heart).
    - Over time, your arteries can get harder or fill with plaque (a buildup of cholesterol, calcium, tissue, and pieces of cells).
- Check for problems with your heart valves, aorta, or pulmonary (lung) artery.
- Check to see if your heart muscle is working normally.
- Take a sample (biopsy) from your heart muscle to look for diseases of your heart.
- Measure the pressures inside your heart chambers.
- Decide if you need other treatments (such as an interventional procedure or surgery).
- Gather more information that other tests couldn't provide.

During a cardiac catheterization, you will be given medicine to relax you or put you to sleep. You may or may not be awake during your catheterization. If you are awake, you should not feel any pain.

There are 2 types of catheterizations:

- Left heart catheterization (cardiac cath) is also called coronary angiogram.
- Right heart catheterization.

The type you get will depend on what your doctor needs to check or fix.

CORONARY ANGIOGRAM OR LEFT HEART CATHETERIZATION ("CARDIAC CATH")

- Your heart doctor begins by numbing your skin with medicine (local anesthetic) where the catheter will go in your body. We call this area the access site.
- You will be given medicine to help you relax.
- Your doctor gently moves the catheter into your blood vessels by using a tiny needle in your wrist or groin. Using specialized X-ray equipment, the doctor guides the catheter through the vessels that travel up to your heart.
- Once the X-rays confirm the proper location, your doctor will inject contrast dye through the catheter into your coronary arteries.
    - The blood vessels that supply blood to your heart muscle.
- The X-ray machine will film the dye moving through your heart's blood vessels. This test can find narrowed or blocked arteries.
- Once your procedure is complete, the doctor gently removes the catheters. Your doctor uses a closure or suture device and/or a compression band to close the access sites.

PERCUTANEOUS CORONARY INTERVENTIONS: ANGIOPLASTY AND STENTING

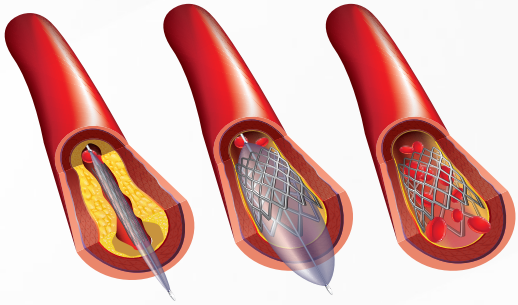
- Your doctor uses angioplasty and stenting to decrease your symptoms of coronary artery disease (most commonly chest pain-discomfort). Your symptoms get better by improving blood flow to your heart's arteries.
- Your doctor will try to open the narrowed or blocked artery using special equipment (wires, balloons, and stents).

Angioplasty:

- During an angioplasty, your doctor can find a narrowed or blocked artery.
- Your doctor inflates and deflates a small balloon at the narrow or blocked part of your artery. This action pushes the plaque against the artery wall. The result is better blood flow to the heart muscle.

Stents:

- In most cases, your doctor places a stent in the narrowed or blocked artery after using the balloon angioplasty.
- The stent is a small, metal mesh tube and keeps the artery open long-term and keeps the plaque pushed against the artery wall.
- The stent holds the artery open, prevents re-narrowing (restenosis), and restores the blood flow.
- Most stents are drug-coated and slowly release medicine over time. The medicine prevents scar tissue from forming in the stent.



Percutaneous Coronary Intervention

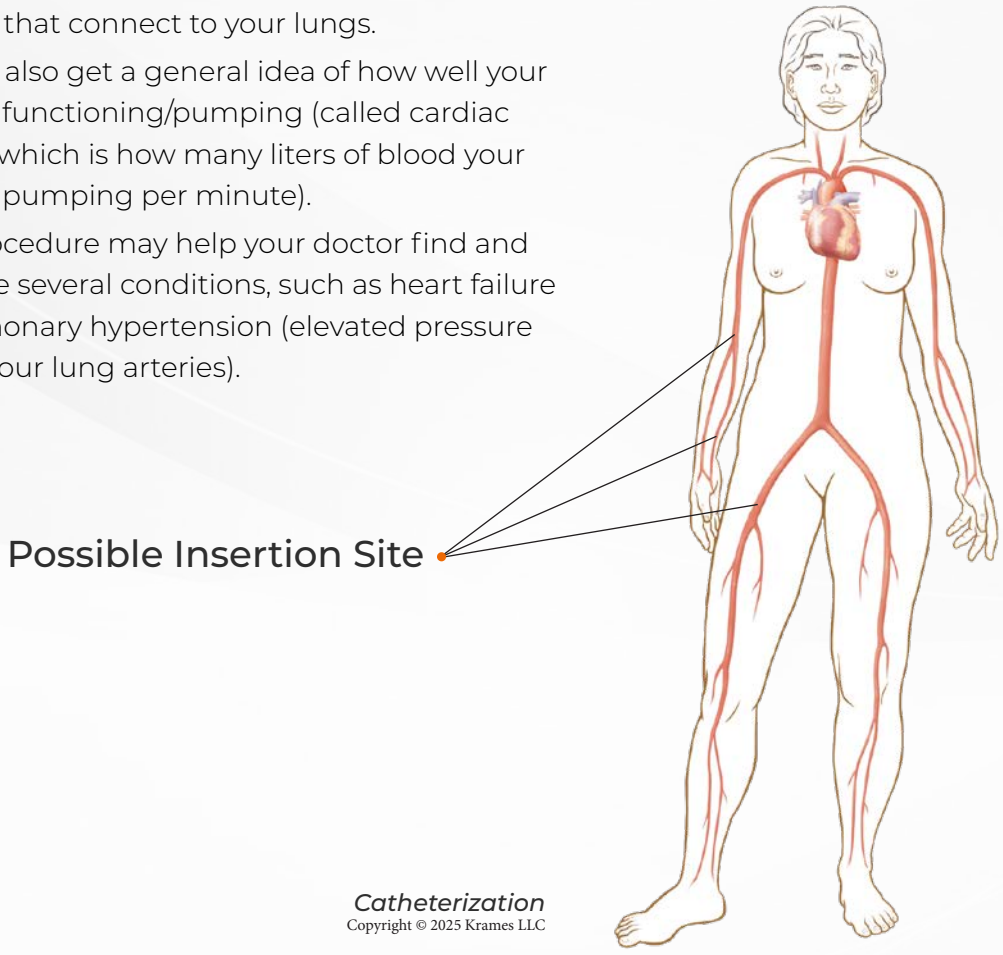
Procedures used when you have a lot of plaque in your coronary arteries:

- Sometimes you can have so much plaque in your artery that your doctor can't open that artery with just a stent.
- Your doctor may need to use special equipment to "grind" or "break" the plaque for better blood flow in your artery and the stent.
- **Atherectomy** removes plaque from the artery by grinding the plaque. People often call this procedure "Roto-Rooter".
- **Lithotripsy** uses ultrasound energy to crack the plaque in your artery. Your doctor uses a balloon catheter to put the ultrasound in the right spot in your artery. With the cracks in the plaque, it is easier for your doctor to place a fully open stent in your artery. This Lithotripsy ultrasound is like what is done for kidney stones.

Our cardiologists (heart doctors) at the University of Miami Health System perform these advanced procedures with excellent results.

RIGHT HEART CATHETERIZATION:

- Your heart doctor begins by numbing your skin with medicine (local anesthetic) where the catheter will go in your body (access site).
- Using a tiny needle, your doctor gently moves a catheter into vessels connecting to your heart's right side.
- The doctor can use the following vessels for access: right or left neck vein, right or left groin vein, or right elbow vein.
- Once the catheter is in the right place, we can measure the pressures and oxygen level in the right heart chambers and the pulmonary arteries that connect to your lungs.
- We can also get a general idea of how well your heart is functioning/pumping (called cardiac output which is how many liters of blood your heart is pumping per minute).
- This procedure may help your doctor find and manage several conditions, such as heart failure or pulmonary hypertension (elevated pressure inside your lung arteries).



Catheterization

PREPARATION REQUIRED BEFORE THE PROCEDURE:

To get ready for your procedure:

- Unless your healthcare team tells you otherwise, do not eat or drink after midnight. This includes not drinking water as well.
- Please take your medicines, including blood pressure and thyroid medicines, with a sip of water in the early morning.
- Please do not take Metformin 24 hours before your procedure.
- Our team will talk to you about your blood thinners. They will tell you when and if you should take any blood thinners.
- Your heart doctor may or may not give you IV fluids before your procedure.
- Please let your heart doctor know if you have an allergy to contrast dye, iodine, or any other allergies.

WHAT TO EXPECT:

To get ready for your procedure:

- You may or may not be asleep, but you will not feel pain during the procedure.
- The prep time before the procedure is about 1-2 hours.
- The actual procedure time may range from 30 minutes to 4 hours.
- Please prepare your loved one, caregiver, or friend for your return home.
    - You cannot drive on the same day as your procedure. Please have someone with you who can drive you back home.
    - Your doctor may discharge you on the same day or admit you to the hospital for monitoring afterward.
    - Discharge may happen 2-6 hours after your procedure.
    - The timing of your discharge depends on:
        - What type of procedure you are having.
        - If your doctor needed to do any other procedures.
        - The access site (wrist or groin).

POST-PROCEDURE SYMPTOMS AND RECOVERY:

Knowing what can happen after your procedure can help lower your stress level. Your symptoms after your procedure can be minor discomfort or a small bruise at your access site. This should go away within a few days/weeks.

Immediately after the procedure, a nurse will check your vital signs and check the access site. Your doctor will make sure that you have enough fluids to help flush the dye out of your system.

If you have any questions or concerns after your procedure, please ask your healthcare team before you leave.

RESUMPTION OF NORMAL ACTIVITIES:

- Care for your access site. At first you may have some tenderness, itching, and/or bruising around the access site. This should get better over time.
- Avoid strenuous activity or exercise for 1 week or follow your heart doctor's instructions.
    - Do activities that are within your comfort level.
    - Wait to lift anything heavier than 10 pounds for 1 week or until the access site heals.
    - If the procedural access site was in your wrist, avoid flexion or overuse of the wrist, such as hammering, playing tennis, golf, etc. for 1 week after the procedure.
- Walking is one of the best ways to get stronger after your procedure. Start with short walks at home. Walk a little more each day. Make sure you take someone with you until you feel OK to walk alone.
- Shower with care.
    - Once a day wash the access site gently with soap and water and gently pat it dry.
    - Avoid too much moisture at the access site.
    - Wait until your access sites fully heal before using powder, lotion, or ointment, or sitting in a bathtub, pool, or other water source.
- Wear loose fitting clothing over the access site until healed.
- Remove dressing in 48 hours or as instructed by your provider.
- You may resume sexual activity within 7-10 days unless your provider tells you otherwise.
- You may drive 24 hours after your procedure unless your doctor tells you otherwise.

WHEN TO SEEK IMMEDIATE MEDICAL ATTENTION

If you experience:

- Dizziness.
- Irregular heartbeat.
- Trouble urinating.
- Fever of 100.4F (38C) or higher.
- Warmth, redness, increasing pain, discharge from the access site.
- Extensive bruising or unusual bleeding at your access site.
- If you notice bleeding or swelling, apply manual pressure directly over the access site and report to the nearest hospital for evaluation.

Call 911 to report to the nearest emergency room if you experience:

- Chest pain.
- Trouble breathing.
- Sudden numbness or weakness in arms, legs, or face, or difficulty talking.
- Warmth, redness, increasing pain, discharge from the access site.
- Bleeding from the access site that does not slow down with firm pressure.
- Severe pain, coldness, numbness, or a bluish color in the leg or arm where the catheter was in your body.

MEDICATIONS:

- You will resume taking all the medicines you took before the procedure unless otherwise specified.
    - [EXCEPTION: If your doctor used contrast dye during your procedure, do not take Glucophage (Metformin), for two days following the procedure.]
- Your doctor may ask you to take new medications for your heart, including blood thinners. Please take the medicines as directed by your doctor.
- For minor discomfort:
    - Take acetaminophen as instructed.
    - Elevate the affected extremity.
    - Apply an ice pack for comfort and swelling.

CARDIAC REHABILITATION PROGRAM:

- After your cardiac catheterization or valve procedure, your heart doctor will refer you to Cardiac Rehabilitation.
- Cardiac Rehabilitation is an exercise program to improve your heart function and physical endurance.
- The Cardiac Rehab team will watch you closely while exercising to make sure you are safe.
- It is important for your recovery, and we want 100% of our patients to attend.

RISK FACTOR MODIFICATIONS:

Remember that your procedure may make your symptoms better but does not cure coronary artery disease. New blockages can still form.

You need to take steps to prevent this by managing your risk factors. Doing so will help make your heart and arteries healthier.

Risk factors for coronary artery disease that you can change include:

· Smoking. · High blood pressure. · Cholesterol. · Diabetes. · Obesity.

You can manage these risk factors with medication, diet, and exercise.

FOLLOW-UP POST PROCEDURE:

One month after your procedure you will have an appointment with your heart doctor or the heart clinic to make sure you are doing OK.

During this visit, a team member will ask you about your symptoms. You may have an exam to see if your heart is getting better.

We will schedule the visit for you. Your heart doctor may want to see you sooner than 1 month depending on how you are doing.

SAFETY RISKS:

Major complications are rare and can include:

- Loss of limb.
- Stroke.
- Heart attack.
- Death.

Other rare complications may include:

- Bleeding.
- Infection.
- Inflammation (redness and swelling).
- Pain.
- Allergic reactions.
- Kidney damage.
- Blood clots.
- Failure to get better or symptoms come back.
- Need to repeat the procedure.
- Hematoma (a large collection of blood outside of your blood vessels may look like a big bruise).
- Injury or scarring of blood vessels, nerves, tissues around the area of the procedure, and nearby organs.
- Heart rhythm changes requiring a permanent pacemaker or defibrillator (devices that can help your heart beat normally).

What is “Structural Heart”?

IV

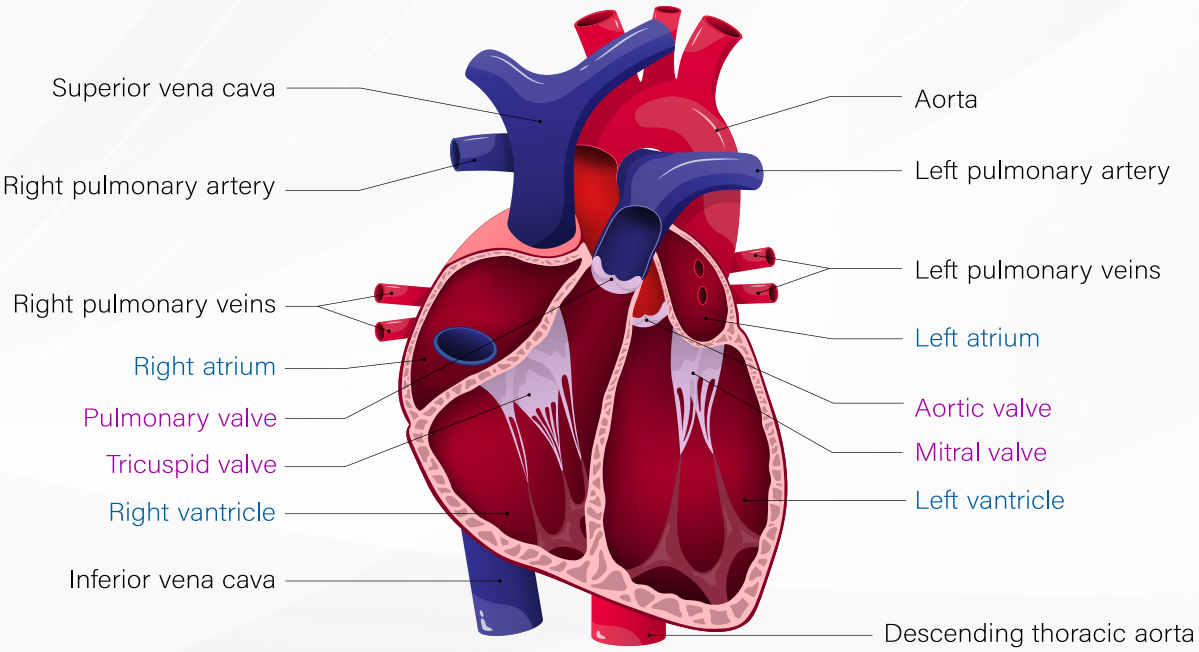
“Structural heart” refers to a specialized area within cardiology that focuses on the diagnosis and treatment of abnormalities in the heart’s structure. These abnormalities can involve the heart’s valves, walls, chambers, or blood vessels and can be either congenital (present at birth) or acquired later in life.

Common structural heart conditions include:

1. **Aortic Stenosis**: Narrowing of the aortic valve, which can restrict blood flow from the heart to the rest of the body.
2. **Mitral Valve Regurgitation**: When the mitral valve doesn’t close properly, causing blood to flow backward into the heart.
3. **Left Atrial Appendage Closure**: A procedure to prevent stroke in patients with atrial fibrillation by closing off the left atrial appendage, where blood clots often form.
4. **Patent Foramen Ovale (PFO)**: A small, usually harmless hole in the heart that didn’t close the way it should after birth.

Treatment for structural heart conditions often involves advanced procedures such as transcatheter aortic valve replacement (TAVR), MitraClip for mitral valve repair, or other minimally invasive interventions. These procedures are typically performed by interventional cardiologists or cardiac surgeons specialized in structural heart disease.

HEART ANATOMY



• AORTIC VALVE STENOSIS

WHAT IS AORTIC STENOSIS?

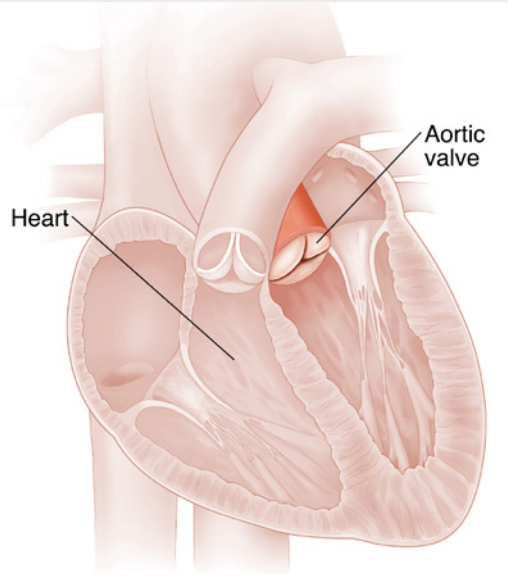
Your aorta is one of the great vessels. It takes blood from your heart to the rest of your body. The aortic valve is between your heart and the aorta. You can think of the aortic valve as a "front door." Blood must go through the 'front door" to get from the heart to the rest of the body.

Aortic Stenosis (stenosis means narrowing) occurs when the leaflets of the aortic valve become thicker than normal. This can happen when calcium builds up on the leaflet. This build-up causes the opening of the aortic valve to become smaller. When the opening of the aortic valve becomes smaller your heart works harder and uses more energy. With each heartbeat, it is harder for the heart to open the "front door" so blood can flow through the smaller opening to the aorta.

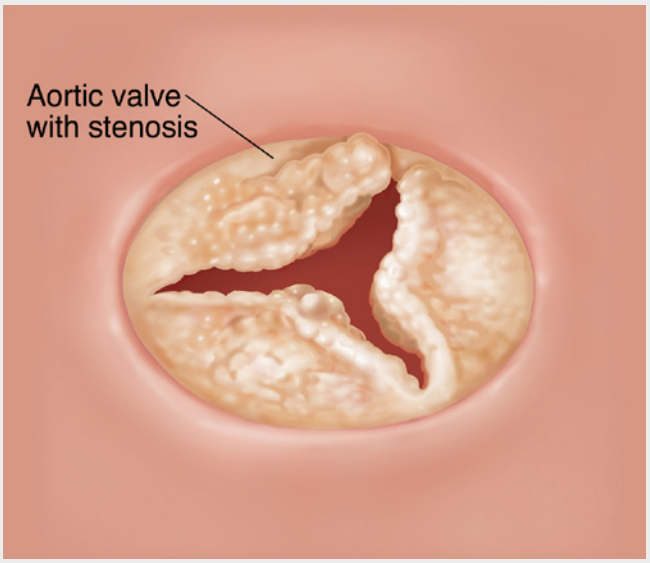
WHAT ARE THE SYMPTOMS OF AORTIC STENOSIS?

Because your heart is working harder:

- You may feel really tired or short of breath when you are active.
- You may have chest pain or pressure.
- You may feel like you have extra heartbeats, or your heart is beating harder or faster than normal (called palpitations).
- You may even faint (pass out).
- As the Aortic Stenosis gets worse, some patients are admitted to the hospital for heart failure, fluid in their lungs, or swelling of their legs.



Cross section of heart showing aortic valve with stenosis



IS AORTIC STENOSIS SERIOUS?

Severe aortic stenosis is a serious problem and can result in death if left untreated. People with severe aortic stenosis who do not get treated are 50% more likely to die within 4 years compared to people who get treatment.

HOW IS AORTIC STENOSIS TREATED?

We do not have medications to treat or prevent aortic stenosis.
The only way to treat aortic stenosis is to replace the valve with a new one. The aortic valve can be replaced using one of 2 ways:

- Open Heart Surgery (SAVR).
- Minimally invasive transcatheter aortic valve replacement (TAVR).

Your team will discuss the procedure options with you. With your input, your team of structural heart specialists will decide which treatment is best for you.

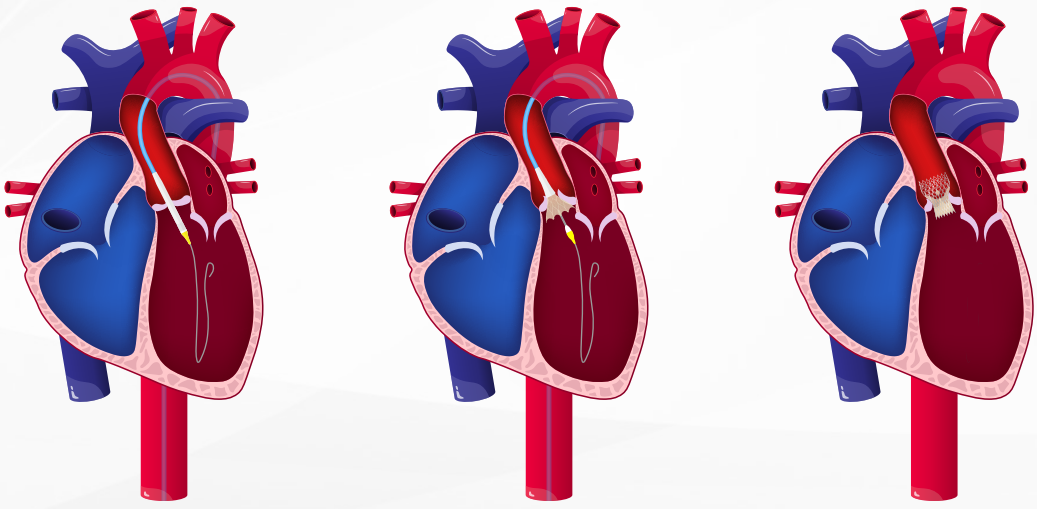
TRANSCATHETER AORTIC VALVE REPLACEMENT (TAVR) ALSO KNOWN AS TRANSCATHETER AORTIC VALVE IMPLANTATION (TAVI)

TAVR is a minimally invasive, catheter-based procedure to replace your stenotic aortic valve. Many doctors have used this procedure. In fact, the total number of TAVR procedures in the US is more than the total number of surgical aortic valve replacements in 2019. Research has shown that when patients are carefully selected, patients having TAVR do just as well as patients having open heart surgery.

The procedure is like cardiac catheterization.
Your doctor puts a catheter through your blood vessel (most commonly the groin artery).

If you and your doctor decide this is the right procedure for you, the following will happen:

You will meet with an anesthesiologist, a doctor who gives you medicine to relax you or put you to sleep. After speaking with you, the anesthesiologist will decide which type of medicine you should have.



Transcatherter Aortic Valve Replacement (TAVR)

Your heart doctor begins by numbing your skin with medicine (local anesthetic) in the area where the catheter will go in your body. This area is called the access site. Using a special X-ray and contrast dye (a liquid that makes it easier for the doctor to see your heart and blood vessels), your doctor can guide special equipment from your groin to your heart.

Your doctor will put the new artificial valve in the proper place in the heart. Once the X-rays confirm the proper location, your doctor will put the new valve inside the old valve. The old valve is pushed to the side. Because your doctor does not need to stop your heart for this procedure, your new valve starts working right away.

Your cardiac team takes pictures and measurements to make sure your new valve works correctly. Once your procedure is complete, the doctor gently removes the catheters. The doctor uses a closure or suture device and/or a compression band to close the access sites.

• MITRAL VALVE REGURGITATION

WHAT IS MITRAL VALVE REGURGITATION?

Your **mitral valve** connects the left atrium to the left ventricle.
After your blood gets oxygen from your lungs it goes to your left atrium
Your blood then moves through your mitral valve to your left ventricle.
Your left ventricle is the main pumping chamber of the heart.
Normally, when the left ventricle pumps, blood moves out of the heart into the aorta.

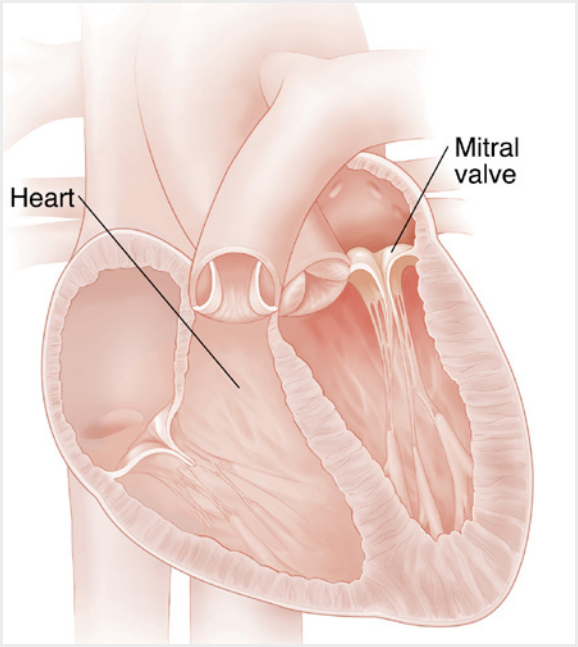
Mitral valve regurgitation (Mitral Insufficiency or “leaking”) occurs when the mitral valve does not close tightly. When the Mitral valve does not close tightly, blood leaks from the left ventricle back into the left atrium every time the heart pumps.
When too much blood regurgitates (flows backward) in the heart, pressure builds up.
First, pressure builds up within the left atrium, which increases the pressure in the lungs.
The increased pressure in the lungs causes fluid to build up in the lungs.

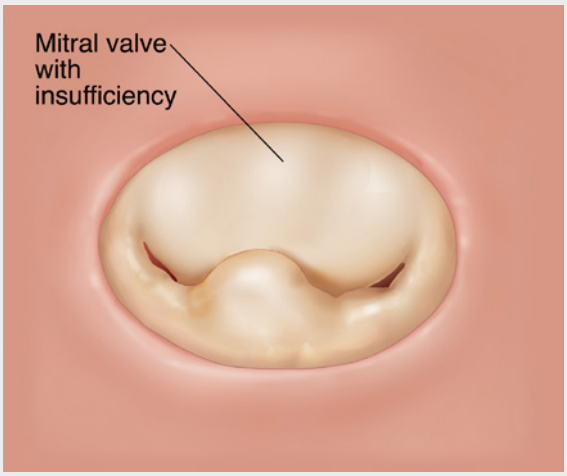
This extra pressure can cause heart rhythm problems (for example, atrial fibrillation, an irregular heartbeat).

The extra pressure can also cause muscle damage to the heart because the heart must work harder to move that blood to the ventricle twice.

WHAT ARE THE SYMPTOMS OF MITRAL VALVE REGURGITATION?

- You may feel short of breath.
- You may feel really tired (fatigue).
- You may feel like your heart is pounding in your chest.
- You may notice swelling in your body, such as in your feet and ankles.





HOW IS MITRAL VALVE REGURGITATION TREATED?

Your treatment will depend on the cause and severity of your condition.
To repair your mitral valve, you may need either:

- Surgery: Mitral Valve Repair.

or

- Minimally invasive **Transcatheter Edge-to-Edge Repair (TEER).**

Your team will discuss the procedure options with you. With your input, your team of structural heart specialists will help you decide which treatment is best for you.

TRANSCATHETER EDGE-TO-EDGE REPAIR (TEER)

Mitral TEER, also called “clipping,” is a minimally invasive non-surgical, catheter-based procedure.

The procedure is like cardiac catheterization.
Your doctor puts a catheter through your blood vessel (most commonly the groin artery).

If you and your doctor decide this is the right procedure for you, the following will happen:

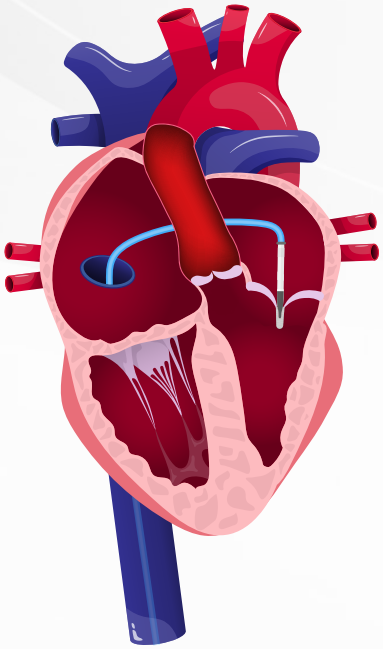
You will meet with an anesthesiologist, a doctor who gives you medicine to relax you or put you to sleep. After speaking with you, the anesthesiologist will decide which type of medicine you should have.

Your doctor will also use a device called transesophageal echo.
The transesophageal echo is a small ultrasound probe. Your doctor lowers the probe in your esophagus(throat) while you are asleep. This device allows the doctor to see your heart valves.

Your heart doctor begins by numbing your skin with medicine (local anesthetic) in the area where the catheter will go in your body. This area is called the access site. Using a special X-ray and contrast dye (a liquid that makes it easier for the doctor to see your heart and blood vessels), your doctor can guide special equipment from your groin to your heart. Your cardiac team takes pictures and measurements to make sure your new valve works correctly.

Once your procedure is complete, the doctor gently removes the catheters.
The doctor uses a closure or suture device and/or a compression band to close the access sites (the cuts used to insert your catheter).

TRANSCATHETER EDGE-TO-EDGE REPAIR (TEER)



Mitral Clip

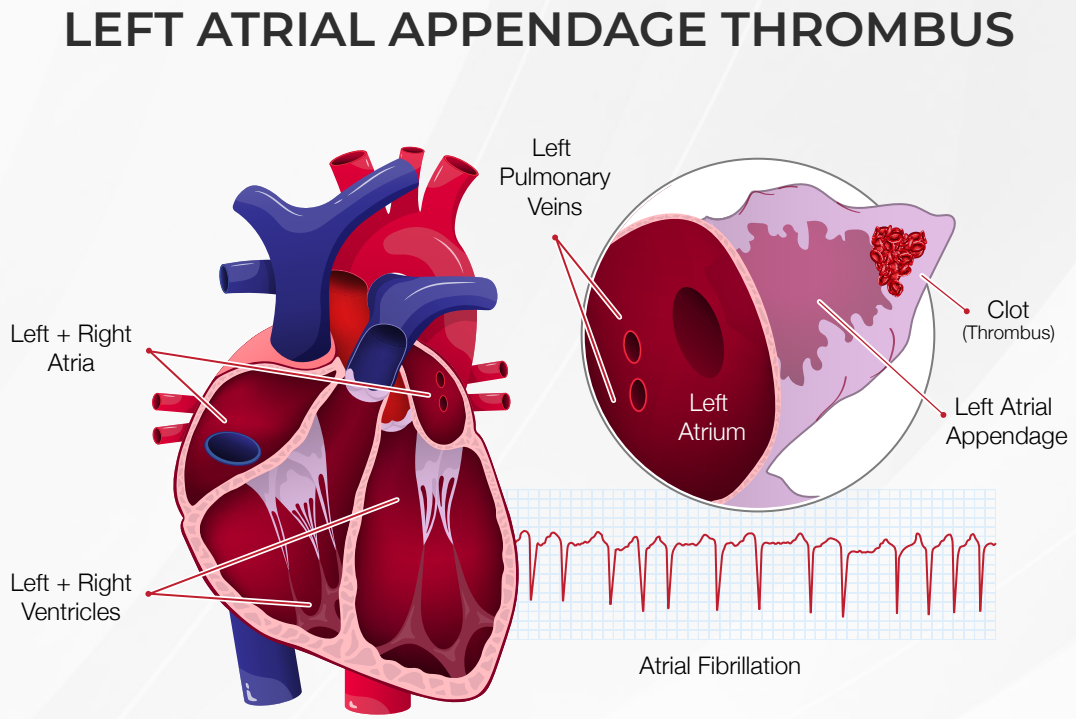
• LEFT ATRIAL APPENDAGE CLOSURE

WHAT IS A LEFT ATRIAL APPENDAGE (LAA)?

LAA is an outpouching of your left atrium, one of the heart's top chambers.

WHAT ARE THE SYMPTOMS OF A LEFT ATRIAL APPENDAGE?

There are no symptoms of LAA. However, an LAA can put you at risk for a stroke if you have atrial fibrillation (irregular heartbeat). Blood may collect in the little pouch and cause clots to form. If you have atrial fibrillation, your blood can stand still in your atrium, making it more likely that a clot will form. A clot can travel in your blood to your brain and cause a stroke. People with atrial fibrillation (a type of irregular heartbeat) are more likely to have a stroke than the general population.



HOW IS A LEFT ATRIAL APPENDAGE TREATED?

Your heart doctor may need to close your LAA if you are at risk for stroke or blood clots. To close your LAA, you may need:

- Surgery.

or

- Left Atrial Appendage Closure a minimally invasive catheter procedure.

Your team will discuss the procedure options with you. With your input, your team of structural heart specialists will help you decide which treatment is best for you.

LEFT ATRIAL APPENDAGE CLOSURE (LAAC)

Left Atrial Appendage Closure is a minimally invasive catheter procedure that blocks or closes the opening to your LAA to keep clots from forming in your left atrium. This procedure will prevent the clots from going into your bloodstream. It can prevent most strokes in people with atrial fibrillation (AFib). It can be an alternative to taking blood thinners for some people.

If you and your doctor decide this is the right procedure for you, the following will happen:

- You will meet with an anesthesiologist, a doctor who gives you medicine to relax you or put you to sleep. After speaking with you, the anesthesiologist will decide which type of medicine you should have.
- The procedure is like cardiac catheterization. Your doctor puts a catheter through your blood vessel (most commonly your groin artery). Using a special X-ray, your doctor can guide special equipment from your groin to your heart.
- The doctor will cross a part of your heart called the atrial septum.
- Your doctor moves the catheter to the furthest part of the LAA.
- Your doctor places the left atrial appendage (LAA) occlusion device in the proper place.
- Your heart doctor confirms the proper position.

Your doctor will also use a device called transesophageal echo.

- The transesophageal echo is a small ultrasound probe.
- Your doctor lowers the probe in your esophagus(throat) while you are asleep.
- This device allows the doctor to see your left atrial appendage.

Your heart doctor may also place a special IV in your wrist called an arterial line.

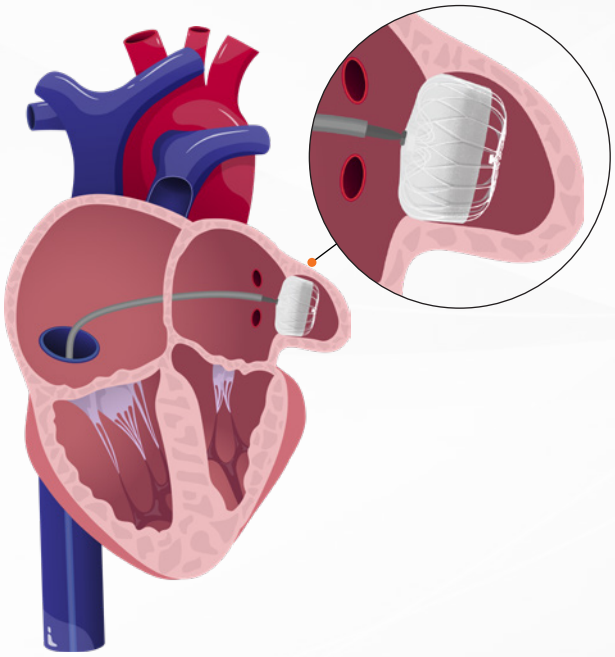
- The arterial line can check your blood pressure and take blood samples during your procedure.

LEFT ATRIAL APPENDAGE CLOSURE (LAAC)

Once the procedure is complete, your doctor gently removes the catheters. The doctor uses a closure or suture device and/or a compression band to close the access sites (the cuts used to insert your catheter).

Patients typically go home the same day

Over time, your heart will grow tissue over the implant, sealing the LAA for good.



Occlusion Device

• PATENT FORAMEN OVALE (PFO)

WHAT IS A PATENT FORAMEN OVALE (PFO)?

A Patent Foramen Ovale (PFO) is a small opening between the right and left atrium. Everyone has a PFO before birth. In most people the PFO closes shortly after being born. When the hole closes, a thin wall made of 2 flaps separates the right and left atrium. This hole does not close for 25% of people. We call this hole a PFO if it does not close after birth. If you have a PFO, your blood can flow between the right and left atrium through the flaps. Blood flowing between the left and right atria is not normal.

What are the symptoms of Patent Foramen Ovale (PFO)?
In most people a PFO will not cause symptoms.
In rare cases, if you have a PFO:

- You may have low oxygen levels and you might feel tired.
- You may have a higher chance of having a stroke.
    - A stroke can happen if a small blood clot moves from a vein through the right atrium to the left atrium.
    - This clot may then move to your brain.

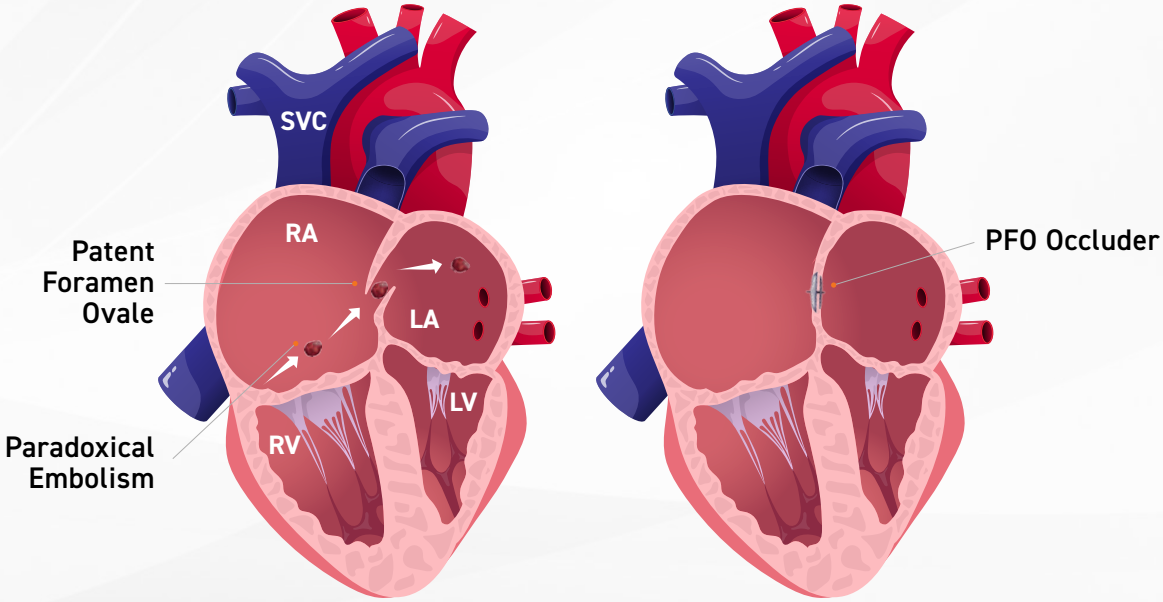
HOW IS A PATENT FORAMEN OVALE (PFO) TREATED?

Your heart doctor may need to close your PFO if you are at risk for stroke or blood clots. To close your PFO, you may need:

- PFO Closure – a minimally invasive catheter procedure.

Your team will discuss the procedure options with you. With your input, your team of structural heart specialists will help you decide which treatment is best for you.

PATENT FORAMEN OVALE (PFO) CLOSURE



PFO CLOSURE

If you and your doctor decide this is the right procedure for you, the following will happen:

You will be given sedation to help you relax. You may or may not be aware during your procedure. If you are aware, you should not feel any pain.

Your doctor will also use a device called transesophageal echo. The transesophageal echo is a small ultrasound probe. Your doctor lowers the probe in your esophagus(throat) while you are asleep. This device allows the doctor to see your heart valves.

Your doctor will guide special equipment from your groin to your heart (like a cardiac catheterization). Using a special X-ray and ultrasound camera inside the heart, your doctor will place a closure device plug to close the PFO.

Your heart doctor may place an arterial line in your wrist to check blood pressure and take blood samples during the procedure.

Once the procedure is complete, your doctor gently removes the catheters.
The doctor uses a closure or suture device and/or a compression band to close the access sites (the cuts used to insert your catheter).

Patients typically go home the same day.

WHAT DO YOU HAVE TO DO BEFORE YOUR STRUCTURAL HEART PROCEDURES?

You will have a few tests to make sure that you can have one of the procedures described above. These tests may include:

- An electrocardiogram (EKG).
- An echocardiogram (heart ultrasound).
- A transesophageal echocardiogram (TEE) may or may not be used during your procedure.
- A cardiac catheterization (right and left heart catheterization).
- A CT scan of your heart and blood vessels.
- A few assessments of your general health and well-being.

To get ready for your procedure:

- Do not eat or drink after midnight. This includes not drinking water as well.
- Please take your medicines, including blood pressure and thyroid medicines, with a sip of water in the early morning.
- Please do not take Metformin 24 hours before your procedure.
- Our team will talk to you about your blood thinners. They will tell you when and if you should take any blood thinners.
- Your heart doctor may or may not give you IV fluids before your procedure.
- Please let your heart doctor know if you have an allergy to contrast dye, iodine or any other allergies.

WHAT TO EXPECT:

- The prep time before the procedure is about 1-2 hours.
- The actual procedure time may range from 2-4 hours.
- Please let your loved one, caregiver, or friend know that they will need to pick you up to go home within the first 24-48 hours of your procedure.
- Our goal is to get you home the day after your procedure and for you to return to your regular routine within 4-5 days.
- You will recover from your procedure on our cardiac floor.
- It would be best if you were out of bed and sitting in a chair within 4-6 hours of your procedure.
- You should be walking shortly after that.
- Unless your doctors specify otherwise, you will have blood work, an ECG, and an echocardiogram the morning after your procedure.
- A physical therapist or a nurse will assess your strength walking around the unit.
- We will discharge you later that day if your doctors do not have concerns about your access site or how your heart is beating.

POST-PROCEDURE SYMPTOMS AND RECOVERY:

Knowing what can happen after your procedure can help lessen your anxiety. Your symptoms after your procedure can be minor discomfort or a small bruise at your access site. This should go away within a few days/weeks.

Immediately after the procedure, a nurse will check your vital signs and check the access site.

Your doctor will make sure that you have enough fluids to help flush the dye out of your system.

If you have any questions or concerns after your procedure, please ask your healthcare team before you leave.

RESUMPTION OF NORMAL ACTIVITIES:

- Care for your access site. At first you may have some tenderness, itching, and/or bruising around the access site. This should get better over time.
- Avoid strenuous activity or exercise for 1 week or follow your heart doctor's instructions.
    - Do activities that are within your comfort level.
    - Wait to lift anything heavier than 10 pounds for 1 week or until the access site heals.
    - If the procedural access site was in your wrist, avoid flexion or overuse of the wrist, such as hammering, playing tennis, golf, etc. for 1 week after the procedure.
- Walking is one of the best ways to get stronger after your procedure.
    - Start with short walks at home.
    - Walk a little more each day.
    - Make sure you take someone with you until you feel OK to walk alone.

- Shower with care.
  - Once a day wash the access site gently with soap and water and gently pat it dry.
  - Wait until your access sites fully heal before: using powder, lotion, or ointment, or sitting in a bathtub, pool, or other water sources.
  - Avoid too much moisture at the access site.
- Wear loose-fitting clothing over the access site until healed.
- Remove the dressing in 48 hours or as instructed by your heart doctor.
- You may resume sexual activity within 7-10 days unless your structural heart specialists instruct you otherwise.
- You may drive 5-7 days after your procedure unless your doctor tells you otherwise.
- Dental Procedures. Your doctor may recommend an antibiotic with dental procedures (not routine cleaning) following your procedure. Please inform your dentist of your procedure before any dental work.

WHEN TO SEEK IMMEDIATE MEDICAL ATTENTION

If you experience:

- Dizziness. • Irregular heartbeat. • Trouble urinating. • Fever of 100.4F (38C) or higher.
- Warmth, redness, increasing pain, discharge from the access site.
- Extensive bruising or unusual bleeding at your access site.
- If you notice bleeding or swelling, apply manual pressure directly over the access site and report to the nearest hospital for evaluation.
- Increased swelling in your feet, ankles, or legs.
- Weight gain of more than 2 pounds in 24 hours or more than 5 pounds in a week.
- Any significant changes in your energy level or functional abilities.

Call 911 to report to the nearest emergency room if you experience:

- Chest pain. • Trouble breathing.
- Sudden numbness or weakness in arms, legs, or face, or difficulty talking.
- Warmth, redness, increasing pain, discharge from the access site.
- Bleeding from the access site that does not slow down with firm pressure.
- Severe pain, coldness, numbness, or a bluish color in the leg or arm where the catheter was in your body.

MEDICATIONS:

- You will resume taking all medicines you took before the procedure unless otherwise specified.
- [EXCEPTION: If your doctor used contrast dye during your procedure, do not take Glucophage (Metformin), for two days following the procedure.]

- Your doctor may ask you to take new medications for your heart, including blood thinners. Please take the medicines s as directed by your doctor.
- For minor discomfort:
  - Take acetaminophen as instructed.
  - Elevate the affected extremity.
  - Apply an ice pack for comfort and swelling.

CARDIAC REHABILITATION PROGRAM:

- After your cardiac catheterization or valve procedure, your heart doctor will refer you to Cardiac Rehabilitation.
- Cardiac Rehabilitation is an exercise program to improve your heart function and physical endurance.
- The Cardiac Rehab team will watch you closely while exercising to make sure you are safe.
- It is important for your recovery, and we want 100% of our patients to attend.

FOLLOW-UP POST PROCEDURE:

One month after your procedure you will have an appointment with your heart doctor or the heart clinic to make sure you are doing OK.

During this visit, a team member will ask you about your symptoms. You may have an exam to see if your heart is getting better.

We will schedule it for you. Your heart doctor may want to see you sooner than 1 month depending on how you are doing.

SAFETY RISKS:

Major complications are rare and can include:

- Loss of limb.
- Stroke.
- Heart attack.
- Death.

Other rare complications may include:

- Bleeding.
- Infection.
- Inflammation (redness and swelling).
- Pain.
- Allergic reactions.
- Kidney damage.
- Blood clots.
- Failure to get better or symptoms come back.
- Need to repeat the procedure.
- Hematoma (a large collection of blood outside of your blood vessels may look like a big bruise).
- Injury or scarring of blood vessels, nerves, tissues around the area of the procedure, and nearby organs.
- Heart rhythm changes requiring a permanent pacemaker or defibrillator (devices that can help your heart beat normally).

Renal Denervation

V

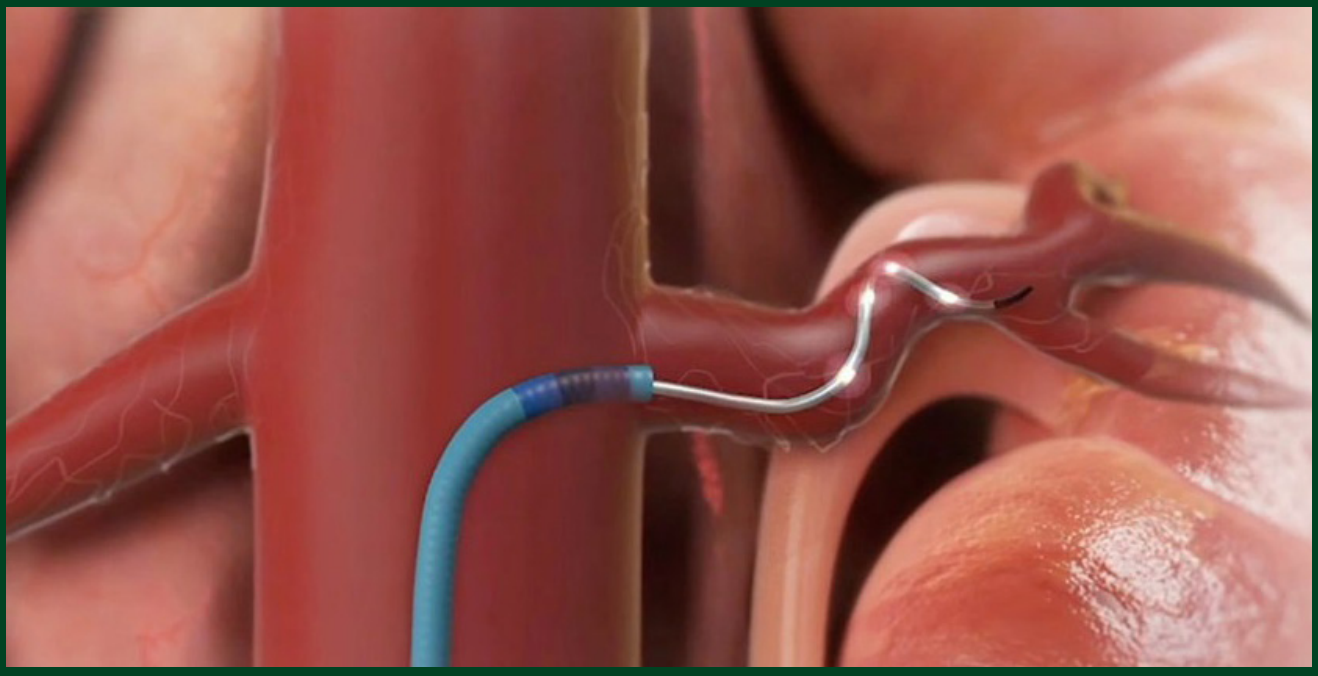
WHAT IS RESISTANT HYPERTENSION (HIGH BLOOD PRESSURE)?

- If your blood pressure stays high even after taking blood pressure medicines for a while, you may have resistant high blood pressure.
- This type of high blood pressure can happen if the nerves from your brain, heart, and kidneys that control your blood pressure are too active.
- We can use Renal Denervation to treat patients with this high blood pressure problem.
    - Patients with major side effects from their blood pressure medicines may also benefit from the procedure.

WHAT IS RENAL DENERVATION, AND HOW DOES IT WORK?

- Renal Denervation decreases the signals the nerve sends to the blood vessels of your kidneys.
- To decrease the number of signals from the nerve, your doctor sends energy to the nerves through a small tube called a catheter.
- The doctor can use either radio frequency energy(heat) or ultrasound energy.
- The energy burns the nerve endings, decreasing the signals the nerves can send to the kidneys' blood vessels.
- This process does not hurt your blood vessels.
- This procedure decreases blood pressure in many patients with resistant high blood pressure, up to 10 points on average.
- Because your doctor uses a small cut to put the catheter in your thigh, we call Renal Denervation a minimally invasive procedure.

Renal Denervation



PROCEDURE DETAILS:

- Your doctor will advise you if you will be receiving sedation or anesthesia for your procedure. Usually, the doctor will give you medicine that relaxes you so much that you may not remember the procedure (twilight sedation).
- Your heart doctor begins by numbing your skin where the catheter will go in your body using medicine (local anesthetic).
- We call the area where the catheter enters your body the access site.
- Using a special X-ray and Iodine contrast dye (a liquid that makes it easier for the doctor to see your blood vessels), your doctor can guide a small device through your blood vessels from your groin to the arteries (blood vessels) of your kidney.
- Once the catheter is in place, your doctor guides another device through the catheter to the kidneys' blood vessels.
- This device will send energy (radiofrequency or ultrasound) to the nerves that send signals to your kidney's blood vessels.
- This energy burns the ends of the nerves, which decreases their activity.
- Your doctor repeats the process for the other kidney.
- Once the treatment is over, your doctor carefully removes the catheter.
- Your doctor uses a closure or suture device and/or a compression band to close the access site.
- The whole procedure typically takes 1 hour.

WHAT IS THE RECOVERY AFTER THE PROCEDURE?

- Patients typically go home the same day.
- We ask that you do light activity for about a week after the procedure to allow your access site to heal.
- You should avoid heavy exercise or lifting anything more than 10 pounds. This may reopen your access site.
- We will schedule a follow-up appointment with your doctor for you.

SAFETY-RISKS:

- A Renal Denervation procedure is safe.
- Complications are rare and may include:
    - Bleeding and/or bruising in the groin area.
    - Kidney injury.
    - Infection.
    - Allergic reaction to the medicines used.

Your doctor will discuss the benefits and risks of Renal Denervation in detail before you decide to have the procedure. We are happy to give you more information and help you with this process. Please feel free to ask our team any questions you have.

Our Providers

VI

Yiannis S. Chatzizisis, M.D.
Professor and Chief
Division of Cardiovascular Medicine
Director, Center for Digital Cardiovascular Innovations

Pedro R. Cox, M.D.
Associate Professor of Medicine
Structural and interventional cardiologist

Nikolaos Spilias, M.D.
Assistant Professor of Cardiology
Structural and Interventional Cardiologist
Associate Program Director of
Interventional Cardiology Fellowship

Eduardo De Marchena, M.D.
Associate Dean for International Medicine
Professor of Medicine and Surgery

Claudia A. Martinez, M.D.
Professor of Clinical Medicine

Jessica Garcia, MSN, APRN FNP-BC

Lisetta Apollini, MSN, APRN FNP-BC

The mission of UHealth's Cardiac Catheterization Lab is to be a cutting-edge Cardiovascular center that transforms lives by delivering exceptional clinical care through the integration of digital technologies, world-class research and innovation, superior education and training, and collaboration with academia and industry.

IMPORTANT PHONE NUMBERS

Scheduling: **305-243-5554**

Cardiac Catheterization Lab at UHealth Tower: **305-689-5861**

University of Miami Health System: **305-243-4000**

UHealth
UNIVERSITY OF MIAMI HEALTH SYSTEM

CARDIAC AND
VASCULAR