

# Valve Surgery

## Valve Stenosis vs Regurgitation

### What is this?

**Valves** separate chambers of the heart. They open to let the blood out from one chamber to another. Obstruction of these valves is called **stenosis** and leakage is called **regurgitation** or “insufficiency”.

### What causes it?

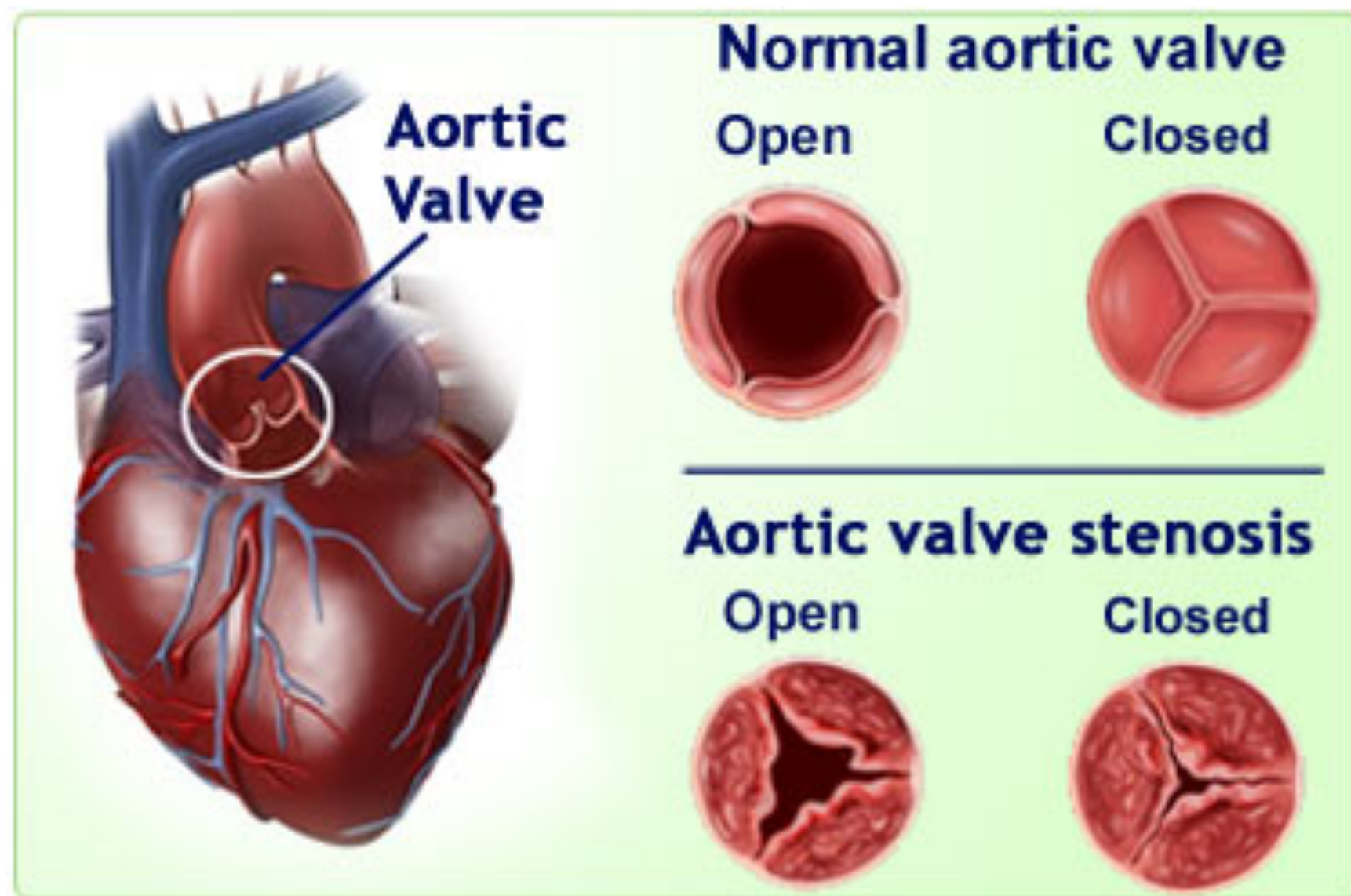
Valves have **3 leaflets** or cusps (the tricuspid valve and aortic valve) or **2 leaflets** as with the mitral valve. They can become leaky or stenotic in different people overtime; genetics also play a role.

## How does it affect the heart ??

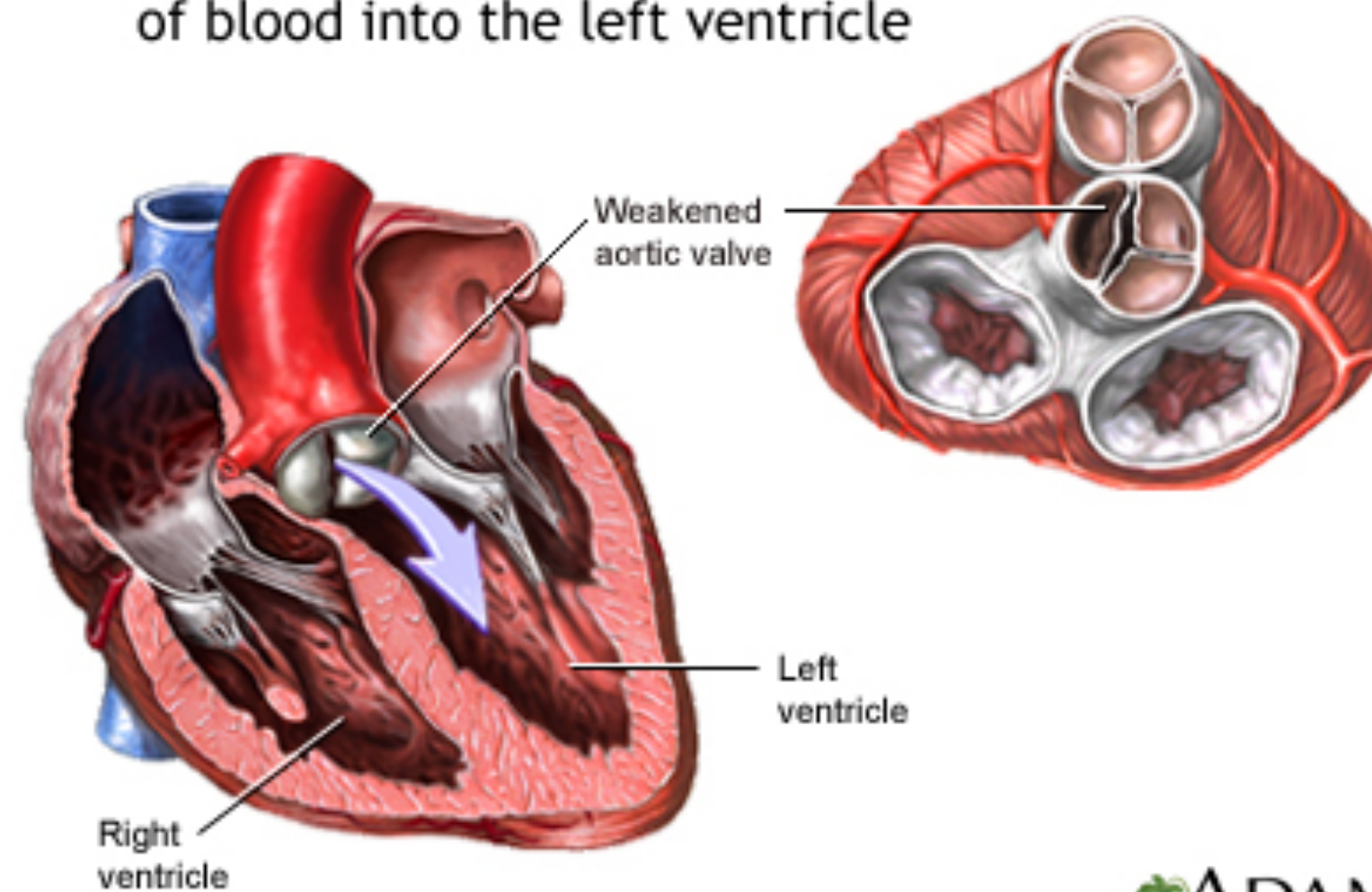
The valve, over time, becomes thick and narrow/obstructed (stenotic) or leaky (regurgitant or insufficient). When the valve is **stenotic**, the chamber has to pump at a higher pressure trying to get the blood through a narrow opening. In response, the heart muscle thickens. When the valve **leaks**, the chamber has to pump more blood and the ventricle enlarges.

## How does this affect me ??

With mild obstruction, the patient usually has no symptoms. The problem is detected by the presence of a **murmur**. When valve opening narrows to about one-fourth its original size, symptoms are common. The most common symptom of either an obstruction or a leaky valve is **shortness of breath on exertion**.



Failure of the aortic valve to close tightly causes back flow of blood into the left ventricle



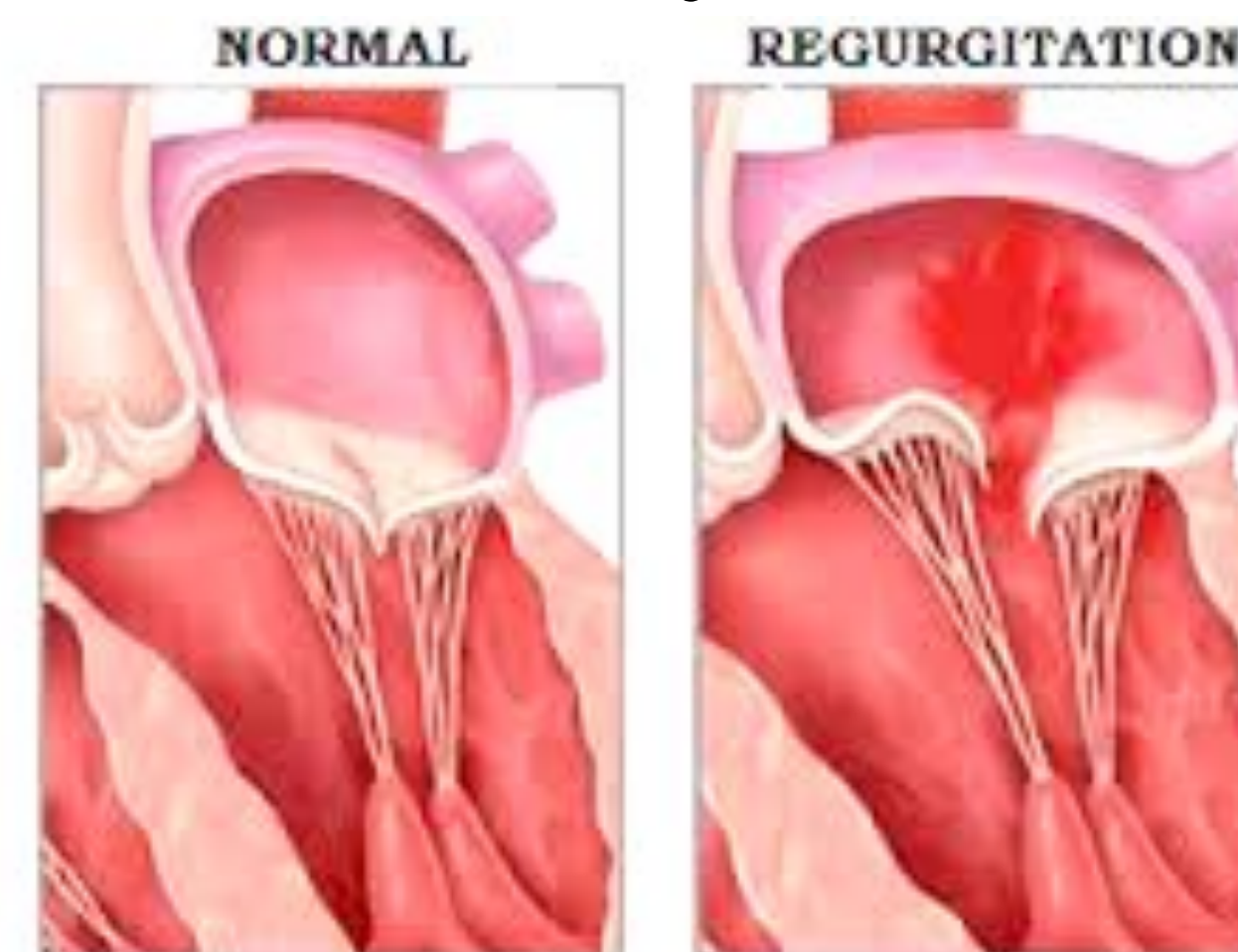
ADAM.

This usually develops over time and the patient may just feel “out of shape”.

Chest pain, lightheadedness, and fainting may occur. Also recurrent fevers may occur, if the valve becomes infected.

### **When should the surgery be done?**

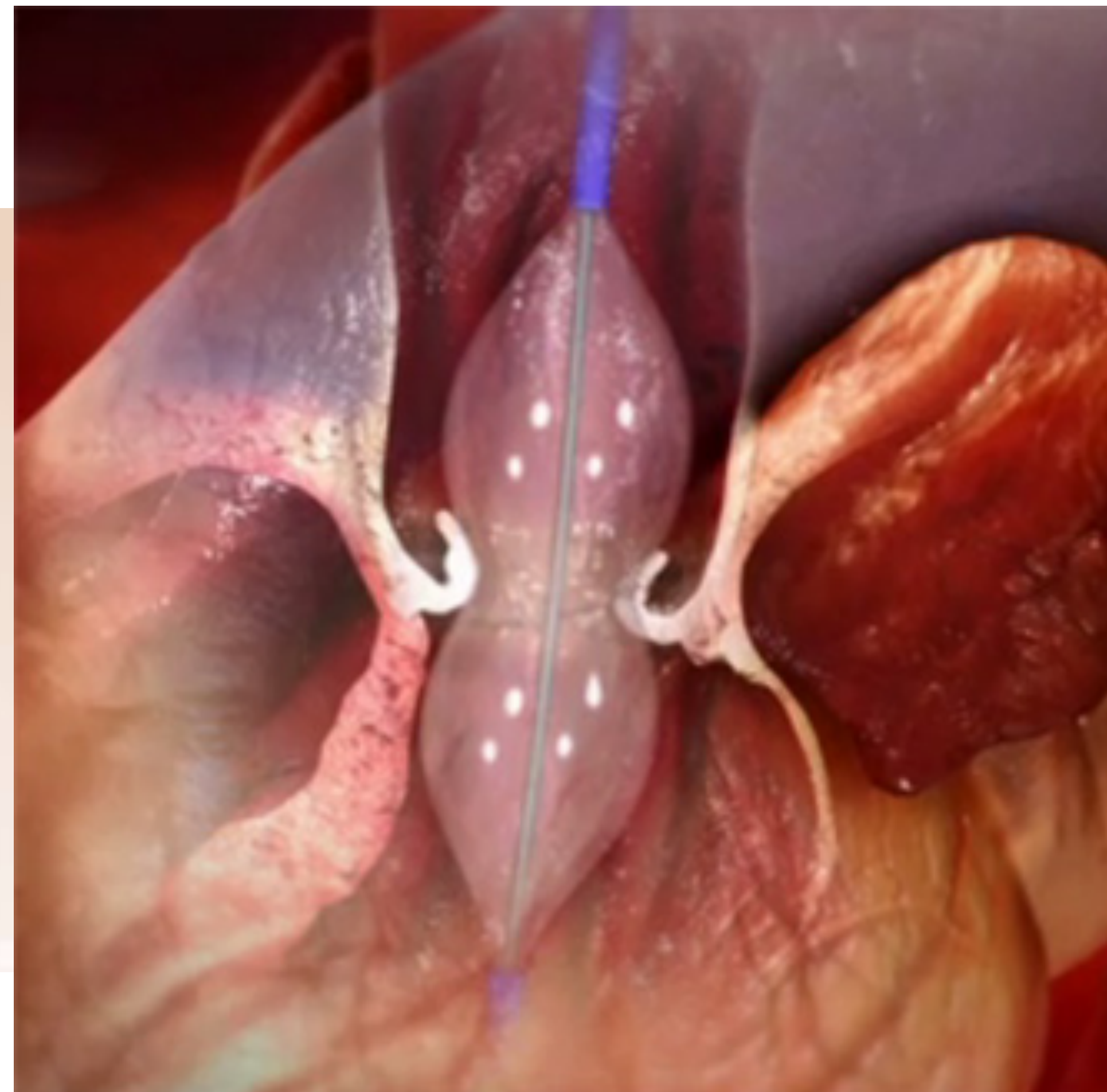
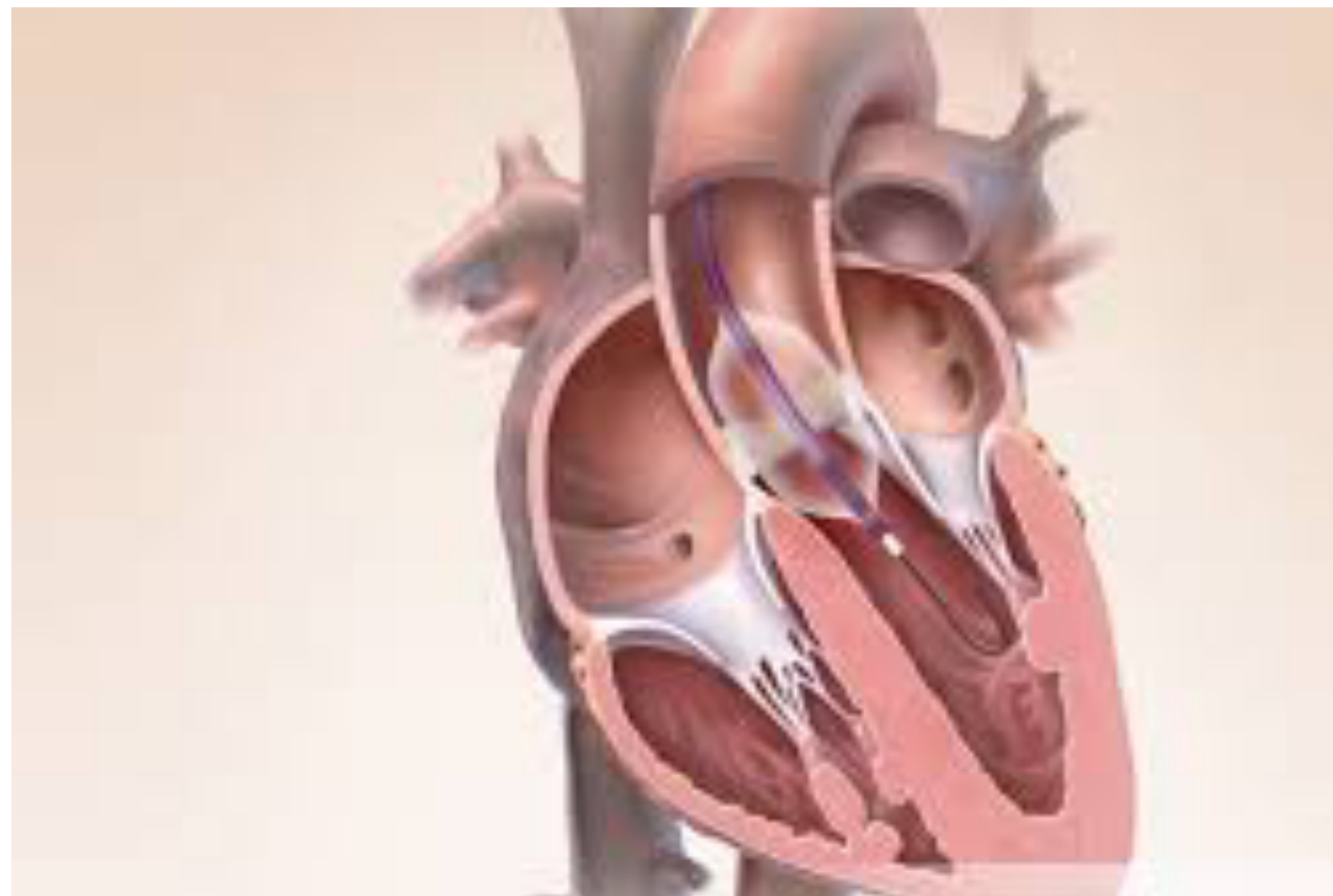
When the valve becomes excessively obstructed or leaky, the valve must be repaired or replaced.



## OPTIONS FOR THE PATIENT

- **REPAIR** - Done for an obstructive or narrowing valve. Done in the Cath. Lab or OR The procedure is called a **Valvuloplasty**.
- **REPLACEMENT** - Most replacements of the valves are open heart procedures. When the valve is not working, it is best to replace the valve, if the patient is a candidate for surgery. There are different types of valves available.
  1. A **mechanical valve** that is made of **metal**. This requires the patient to be on **blood thinners** but is are durable.
  2. A valve made from a **biological tissue**, which requires no blood thinners but may not last as long and may need to be replaced again.

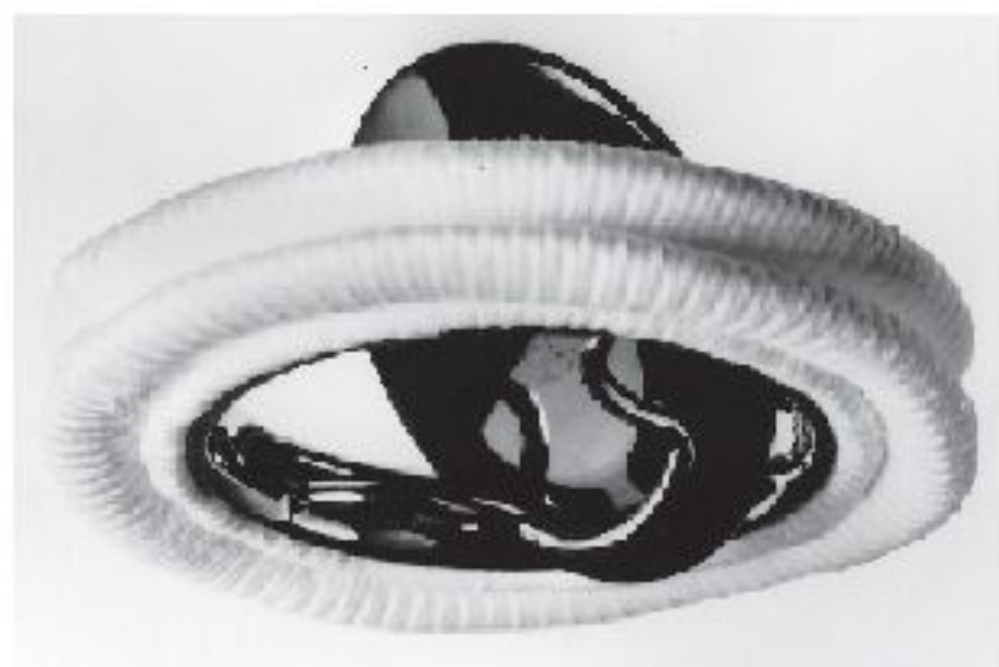
# VALVULOPLASTY



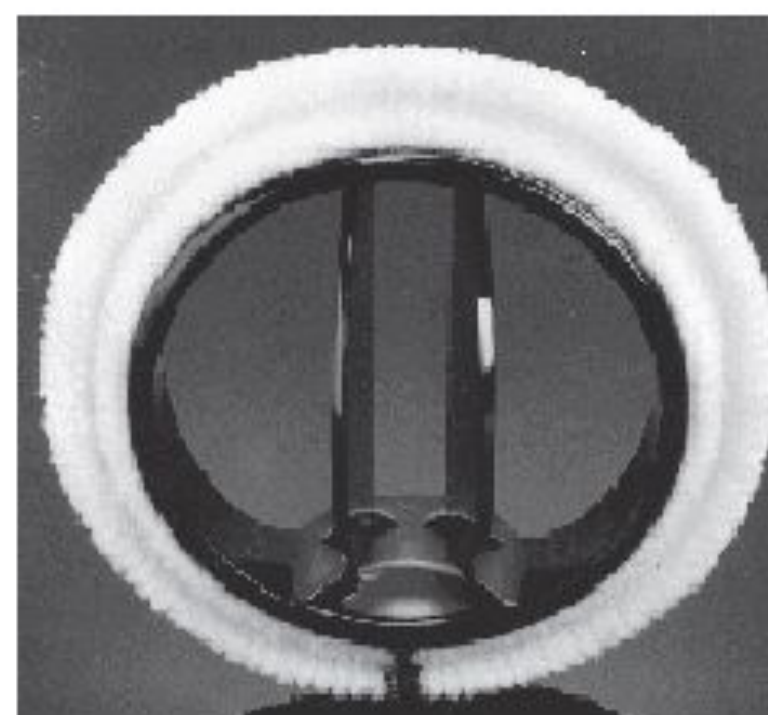
3. A **homograft** or a valve from a **donated human heart**. They require no blood thinners. They do not last as long and require no blood thinners



(a)



(b)



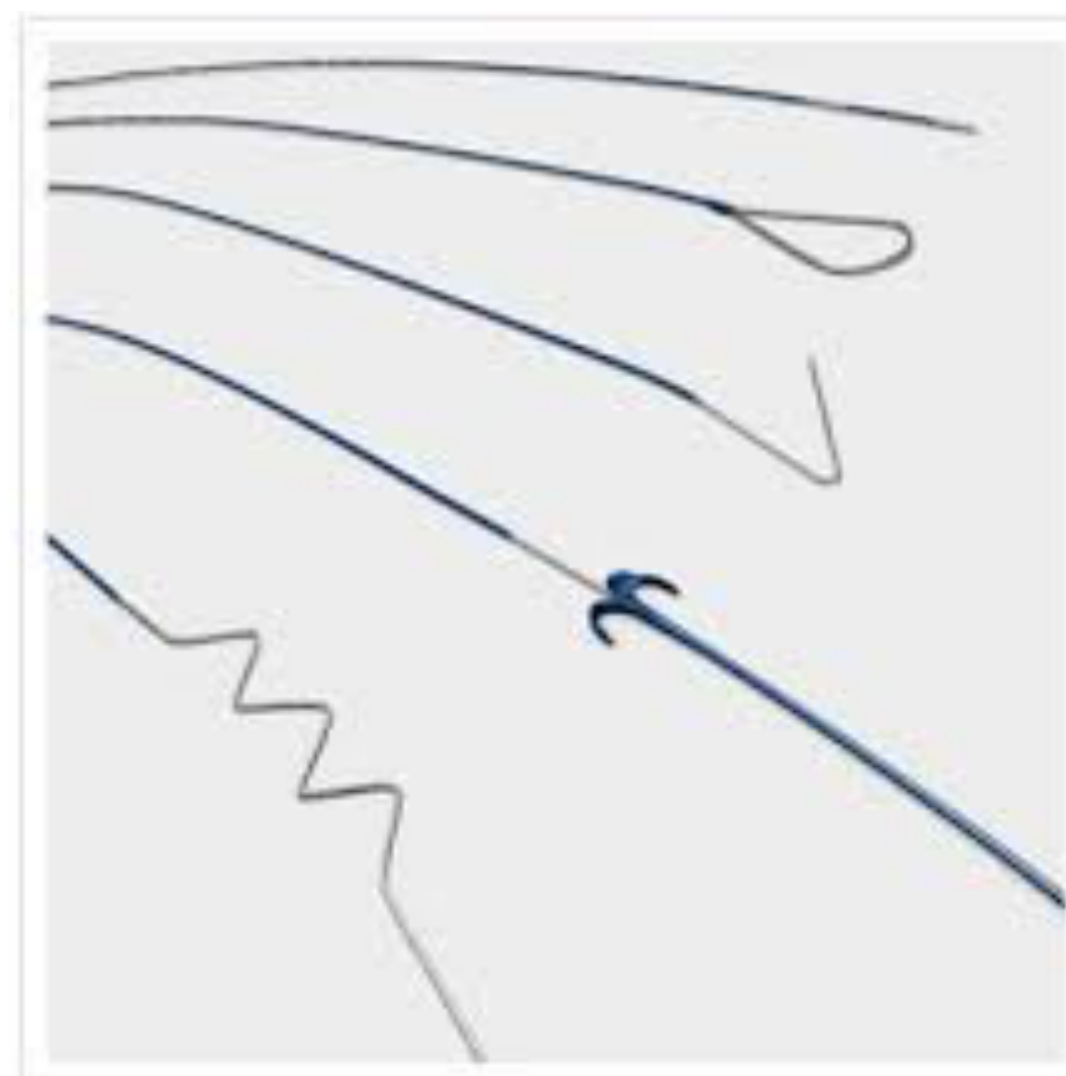
(c)

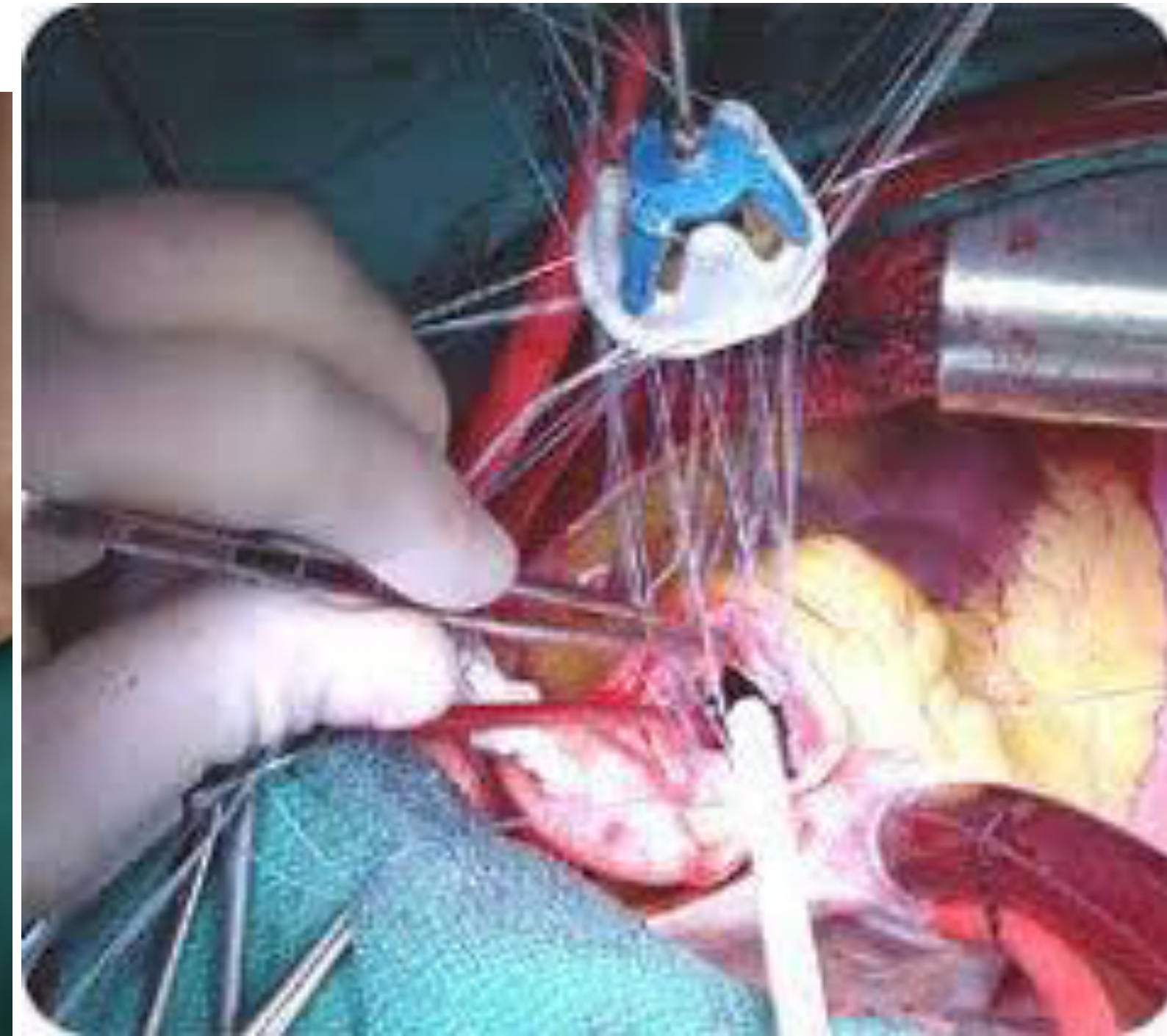
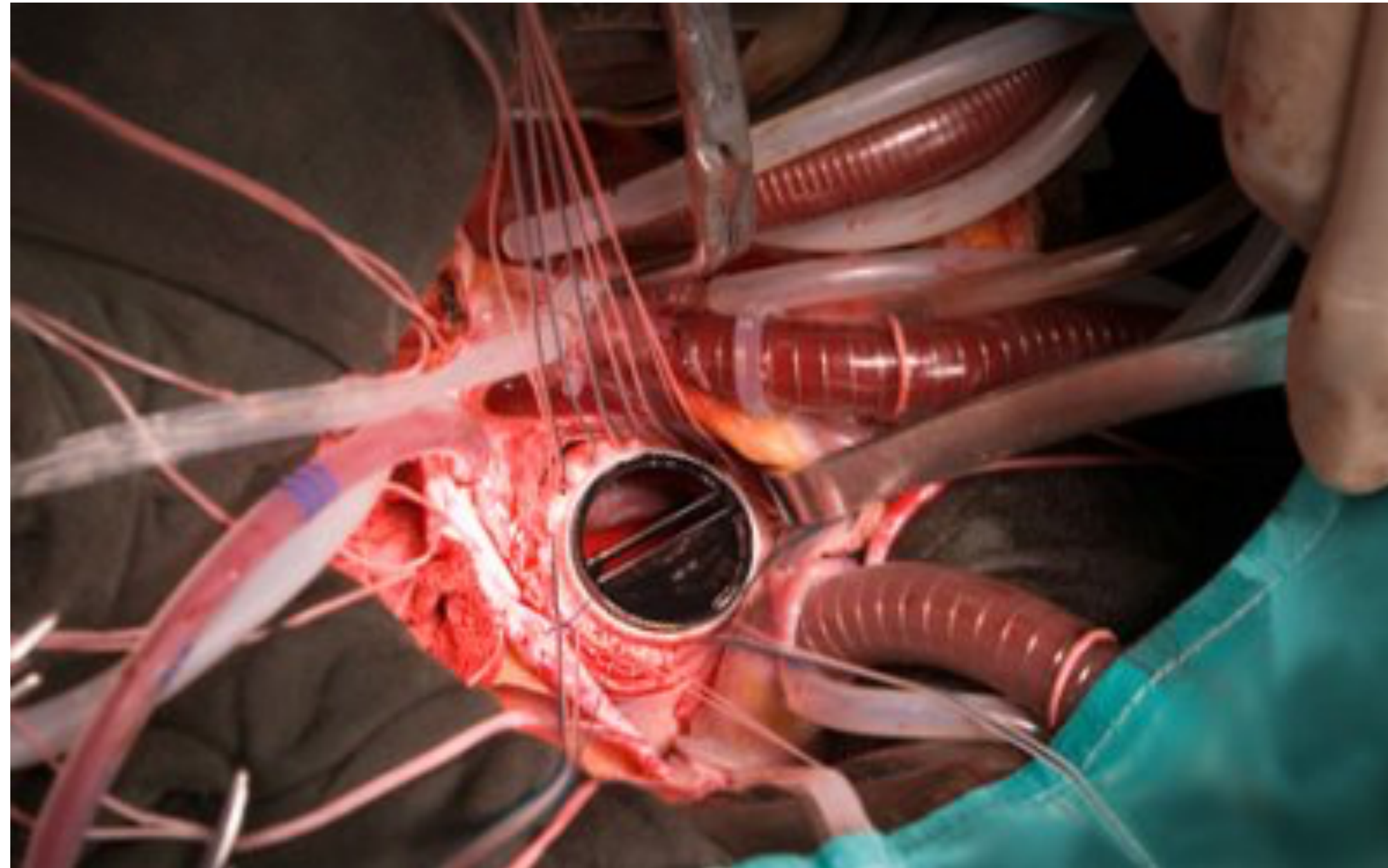


Tissue valves are made with tissues from porcine (pig) heart valves or bovine (cow) cardiac tissue.



# Similar to Bypass Surgery





## RISKS OF VALVE REPLACEMENT

The risks of valve replacement are generally higher for older people and those in poor health.

Possible problems include:

- **Infection**-There is a risk of wound infection, lung infections, bladder infection, heart valve infection. All of these which are treated with antibiotics.
- **Excessive bleeding**
- **Blood clots**- Common with a poorly functioning valve

- **Stroke or transient ischemic attack (TIA) or heart attack-** Plaque breaks off during surgery and travels to the brain or heart
- **Repeated valve surgery-** Occurs when the valve replacement wears out
- **Irregular heartbeat (arrhythmias) -** Occurs in 25% of the patients having valve surgery and usually resolves itself. However, 1-2% of the people do require a pacemaker post valve surgery.
- **Kidney problems-** In 5% of the people, the kidneys do not work well the first few days after surgery. In a few cases, temporary dialysis may be needed.

Overall, valve surgery is a **major operation**. The risk of death from the procedure is estimated to be **1-3%**. However, this risk is much lower than leaving a severely functioning valve untreated.

## WHAT IS TAVR ????

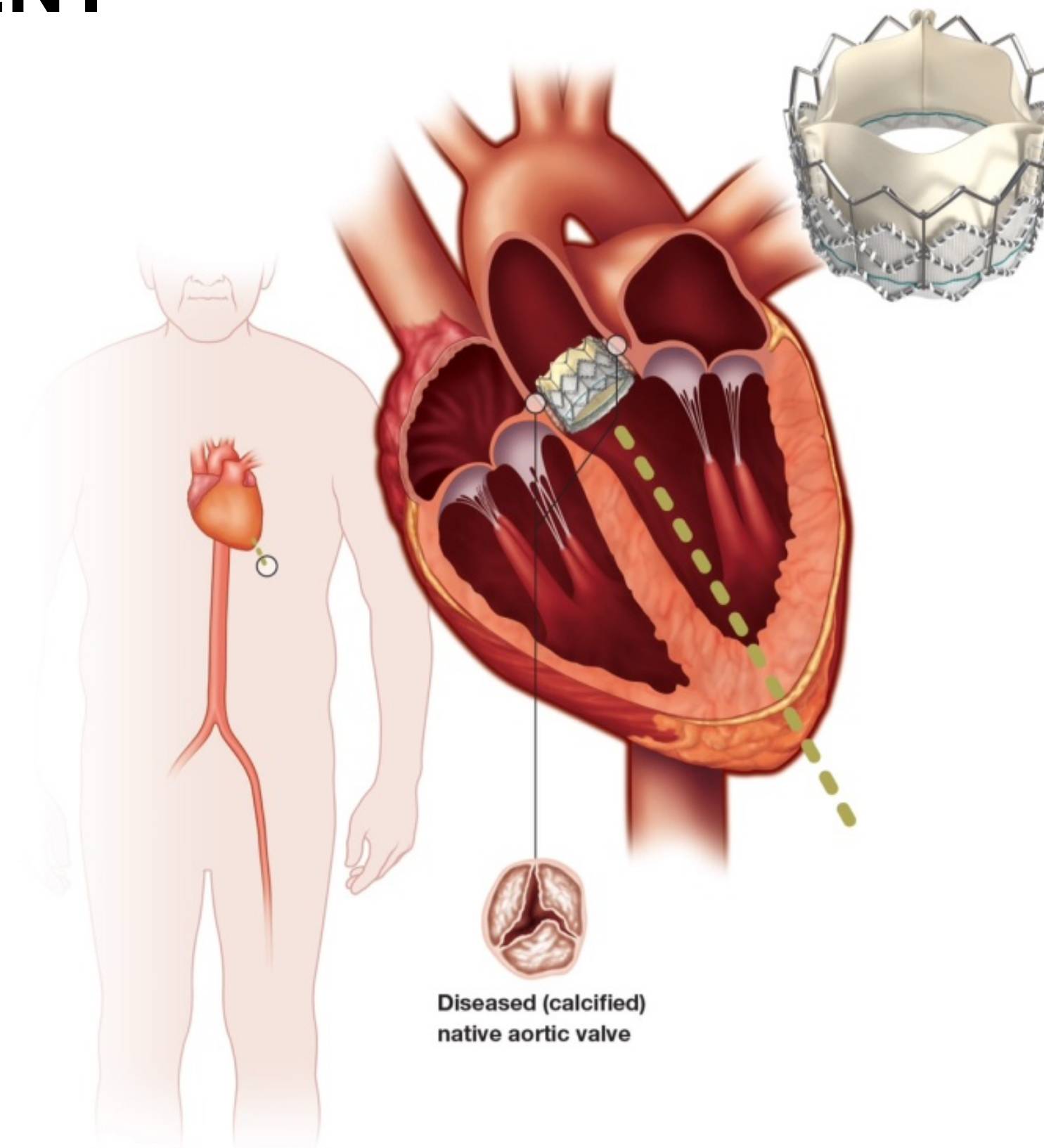
- This is a **minimally invasive** procedure that repairs the aortic valve without removing the old, damaged valve
- Instead, it wedges a replacement valve in the aortic valve's place
- This procedure is called **transcatheter aortic valve replacement (TAVR)**
- The procedure is similar to placing a stent into an artery. The valve is completely **collapsible on a balloon** when it is inserted.
- Once the new valve is in its correct location, it is expanded and pushes the leaflets of the old valve out of the way and takes over the job of regulating blood flow

- The TAVR procedure is not without risk but provides a beneficial treatment option for patients who are now intermediate or high risk surgical candidates and also provides a faster recovery of **only 3-4 days post procedure.**
- This procedure has recently (Sept. 2016) been approved for **INTERMEDIATE** as well as HIGH risk patients with aortic stenosis by the FDA
- TAVR is an effective option now to surgery which will improve the quality of life of patients by repairing their aortic valve with minimum risk

## TAVR - Aortic Valve on the Balloon



## TAVR PLACEMENT





## MITRAL CLIP PROCEDURE

- Percutaneous method of treatment targeting patients who have been **denied heart surgery** to fix their mitral valve regurgitation.
- **MitraClip** was first implanted in **2003** and in **2013** became FDA approved alternative for mitral valve regurgitation surgery
- Made of a super-elastic metal alloy (Nickel Titanium) and a polyester cover to promote tissue growth
- Post procedure, the patient will be on anticoagulation therapy for a short time and anti-platelet regimen on discharge

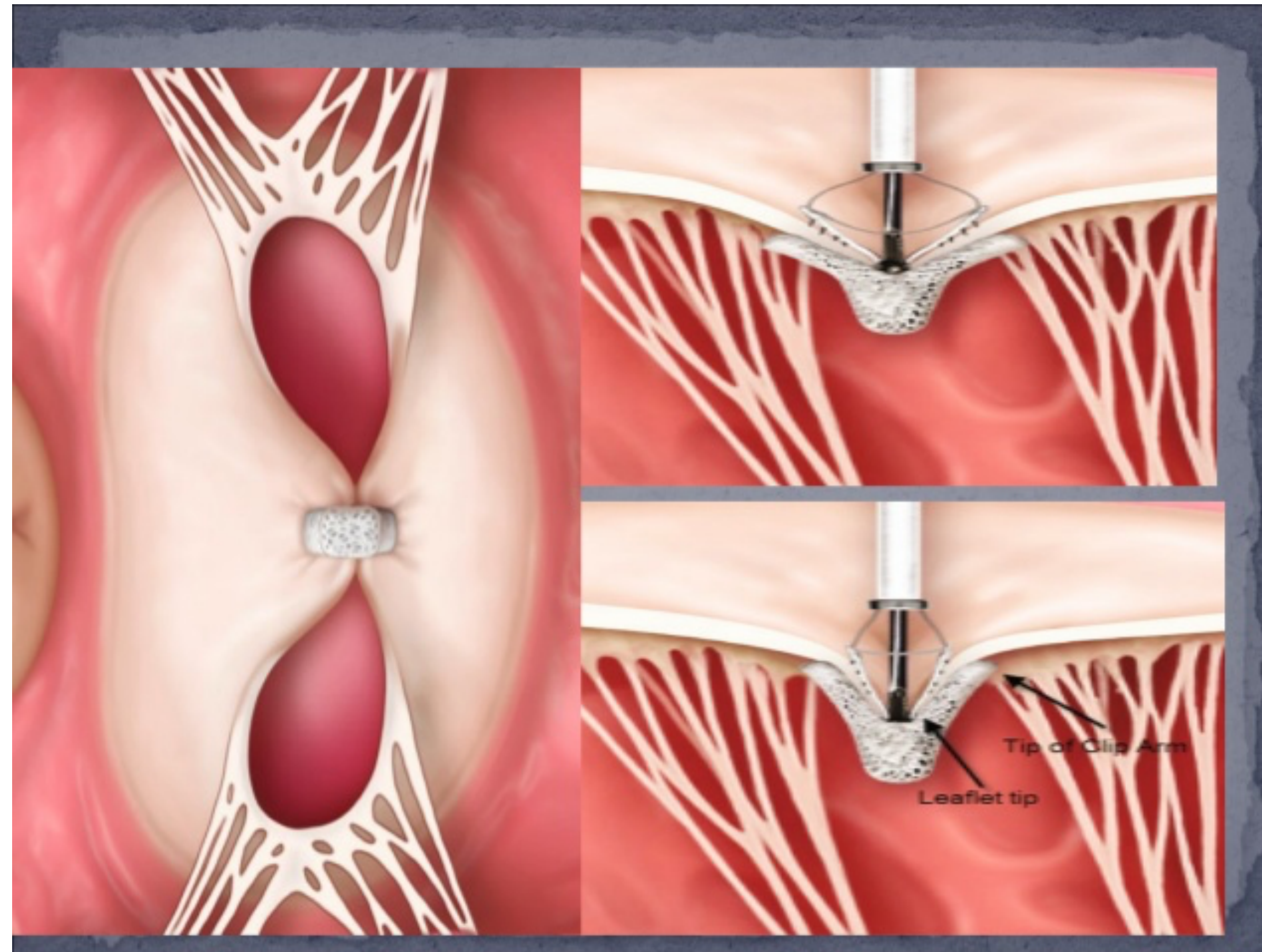


### Catheter-Based Mitral Valve Repair MitraClip® System

A composite image illustrating the MitraClip system. At the top, the text "Catheter-Based Mitral Valve Repair" and "MitraClip® System" is displayed. Below this, there are several panels: a diagram of the mitral valve with two leaflets, a photograph of the device, and a series of three anatomical diagrams showing the device being inserted into the mitral valve and closing it. The diagrams are arranged in a grid-like fashion.

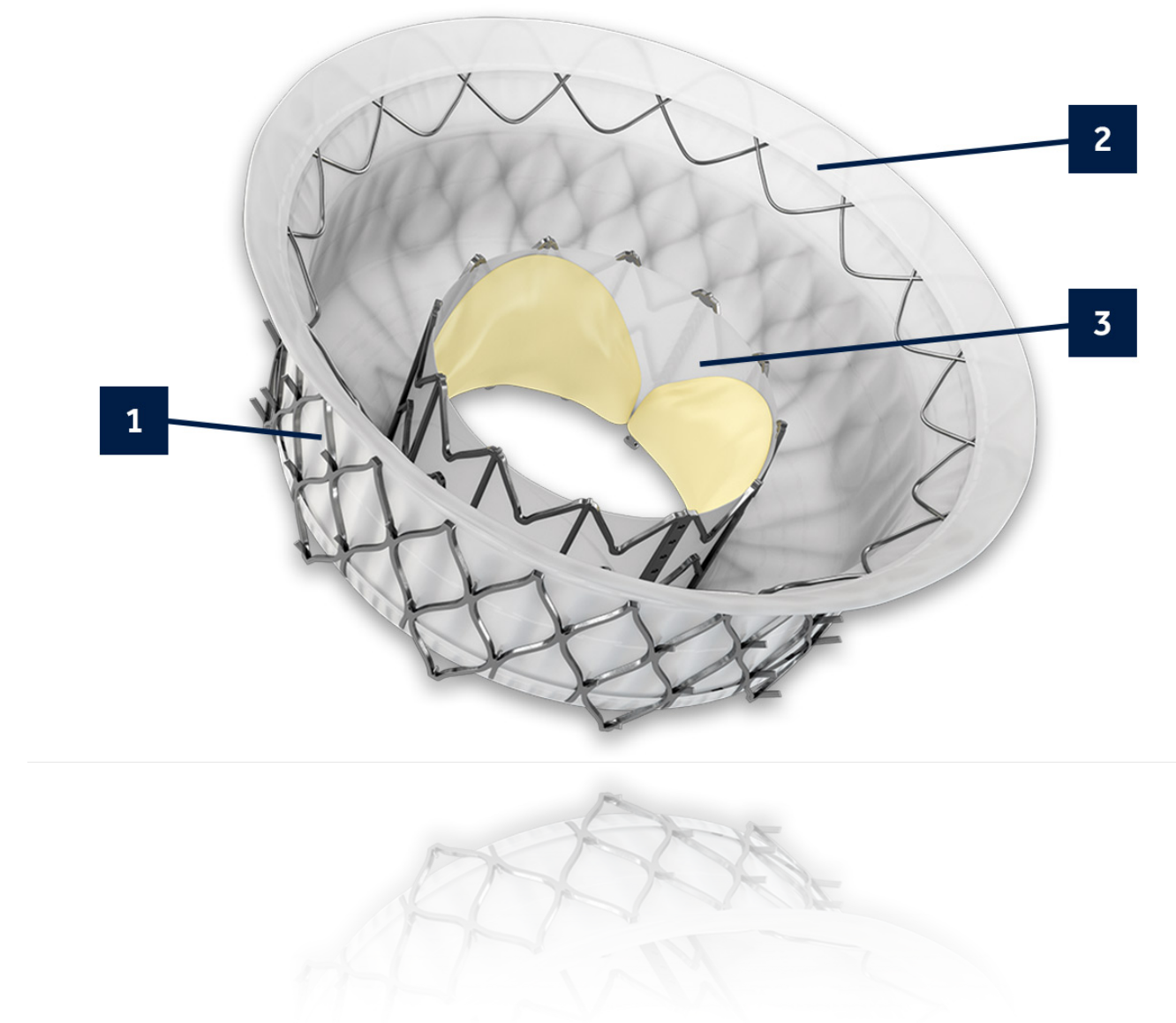
How the device works

## MITRAL CLIP PROCEDURE



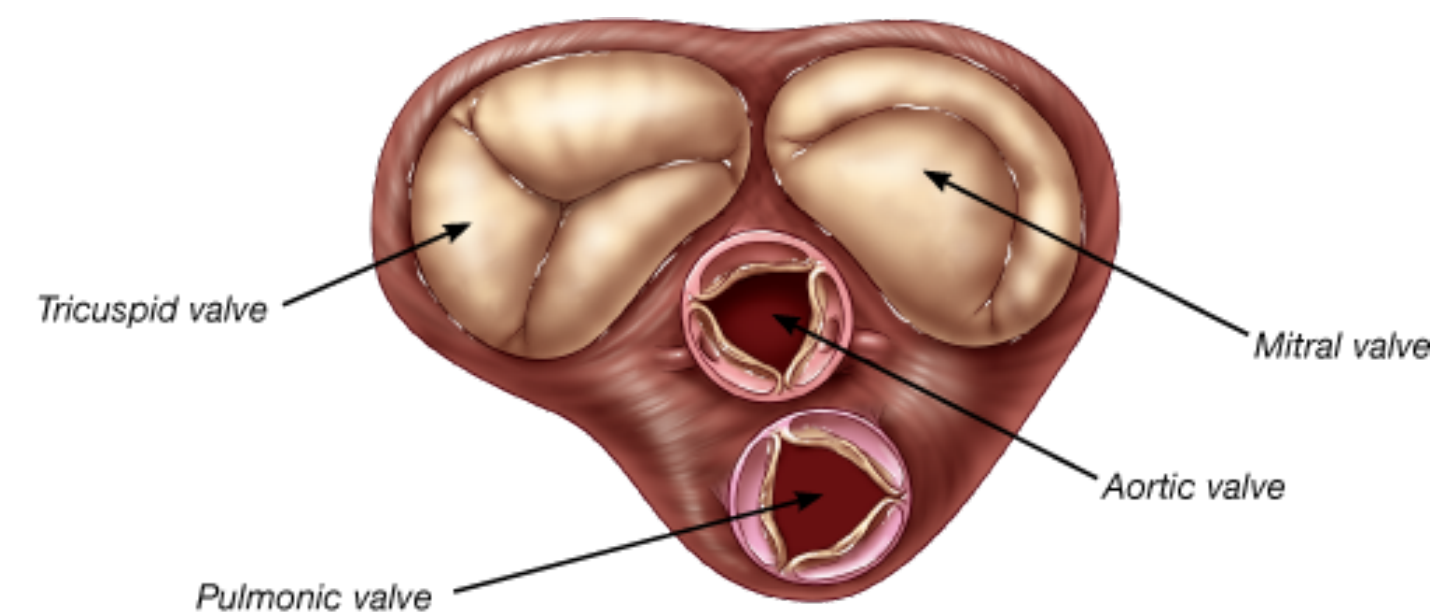
## APOLLO TMVR TRAIL

- First patient treated 10/2017. **NOT FDA approved** yet
- Transcatheter Mitral Valve placement through the groin
- Inner stent houses a tri(3)-leaflet bovine valve



## TRICUSPID VALVE INTERVENTIONS

- Usually to treat tricuspid regurgitation
- Usually in conjunction with other valve problems
- Usually symptoms of shortness of breath, tiredness, edema, liver swelling and right heart failure are treated without repairing the valve, such as the use of diuretics.
- Usually surgery of the tricuspid valve is in conjunction with mitral and aortic valve surgery.



**Transcatheter Tricuspid replacement :  
1st done Cleveland Clinic Nov. 2016. The “NaviGate”  
atrioventricular valved stent. Still in Human Trials.**

