

Transcatheter Aortic Valve Replacement (TAVR)

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Introduction

- Transcatheter aortic valve replacement (TAVR) is a minimally invasive approach for patients who cannot safely undergo surgery who have been diagnosed with aortic stenosis.
- Aortic stenosis is commonly due, but not limited to, aging, stress on the cusps, hypertension, diabetes, and congenital abnormal valve defects.
- Multimodality imaging such as computed tomography, echocardiography, and angiography aide in the diagnosis and assessment of aortic stenosis.
- Coronary artery disease is present in 25-50% of patients with aortic stenosis (Boskovski & Gleason, 2021).

Transcatheter Aortic Valve Replacement vs. Surgical Aortic Valve Replacement (TAVR vs SAVR)

- At a one year follow up, TAVR was found to be superior to SAVR in the composite primary end-point of all-cause mortality, stroke, or rehospitalization (Goel et al., 2019).
- At a 30-day follow up, patients who had undergone TAVR, compared to SAVR, had a lower incidence of disabling stroke, bleeding complications, acute kidney injury, and atrial fibrillation (Goel et al., 2019).

Aortic Stenosis (AS)

- Aortic stenosis (AS) is characterized by progressive calcification of the aortic valve that causes obstruction of the left ventricular outflow tract (Boskovski & Gleason, 2021).
- Aortic valve stenosis (AS) is the most common degenerative valvular disease in developed countries and is becoming a growing healthcare burden as the population ages (Simone et al., 2023).
- The prevalence of AS is substantially higher in older adult patients, many of whom have comorbid cardiovascular disease and poor functional status (Simone et al., 2023).
- Affects almost 5% of patients over the age of 75, with a mortality rate of 80% at two years (Krishnaswamy & Whitlow, n.d., p. 1).

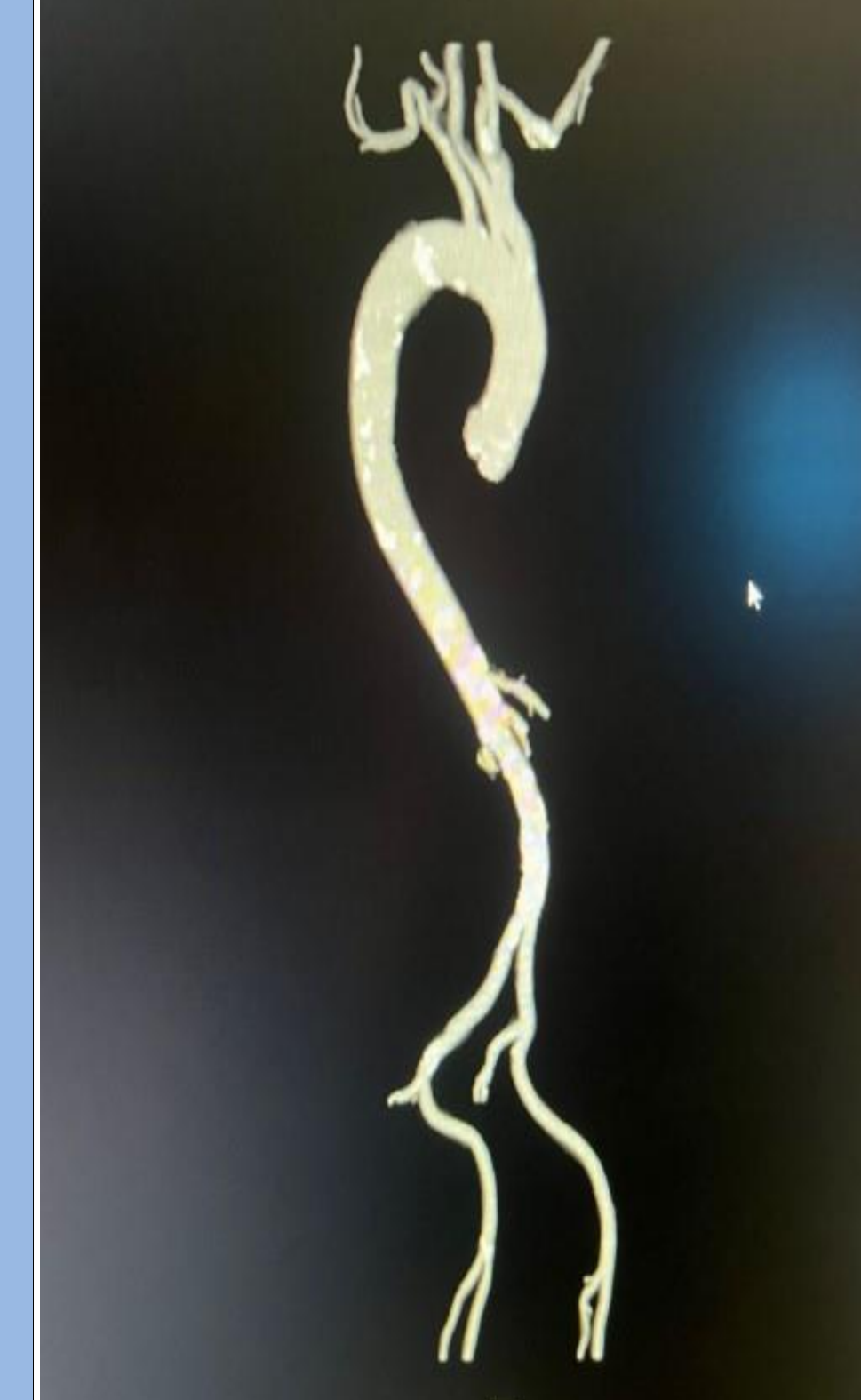
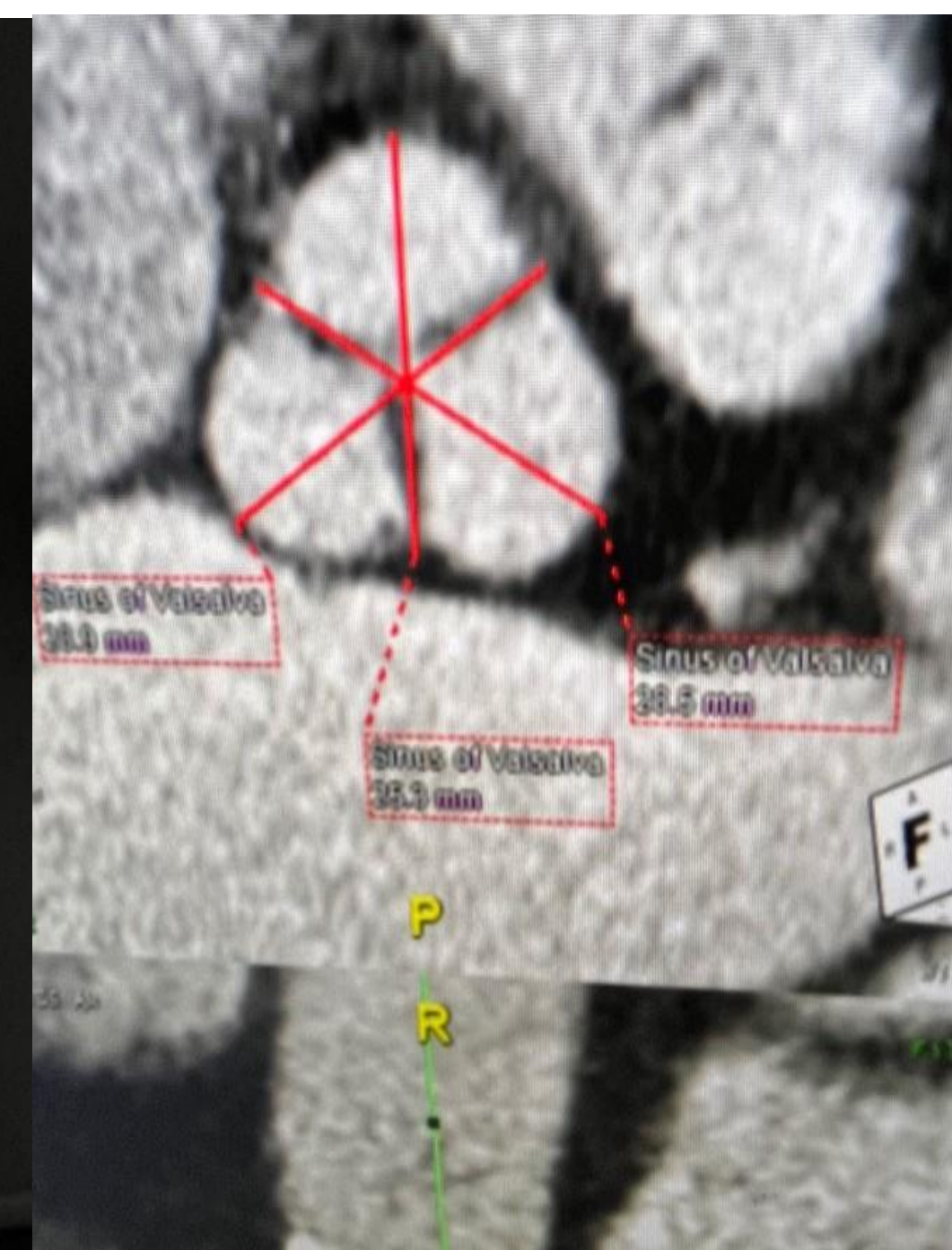
Computed Tomography

- Provides cardiac and peripheral information in assessing a patient's feasibility for TAVR and in the planning procedure (Krishnaswamy & Whitlow, n.d.).
- CT provides important data regarding the cardiac chambers and the status of coronary artery disease (Ahmad et al., 2022).

Sagitta view of aorta



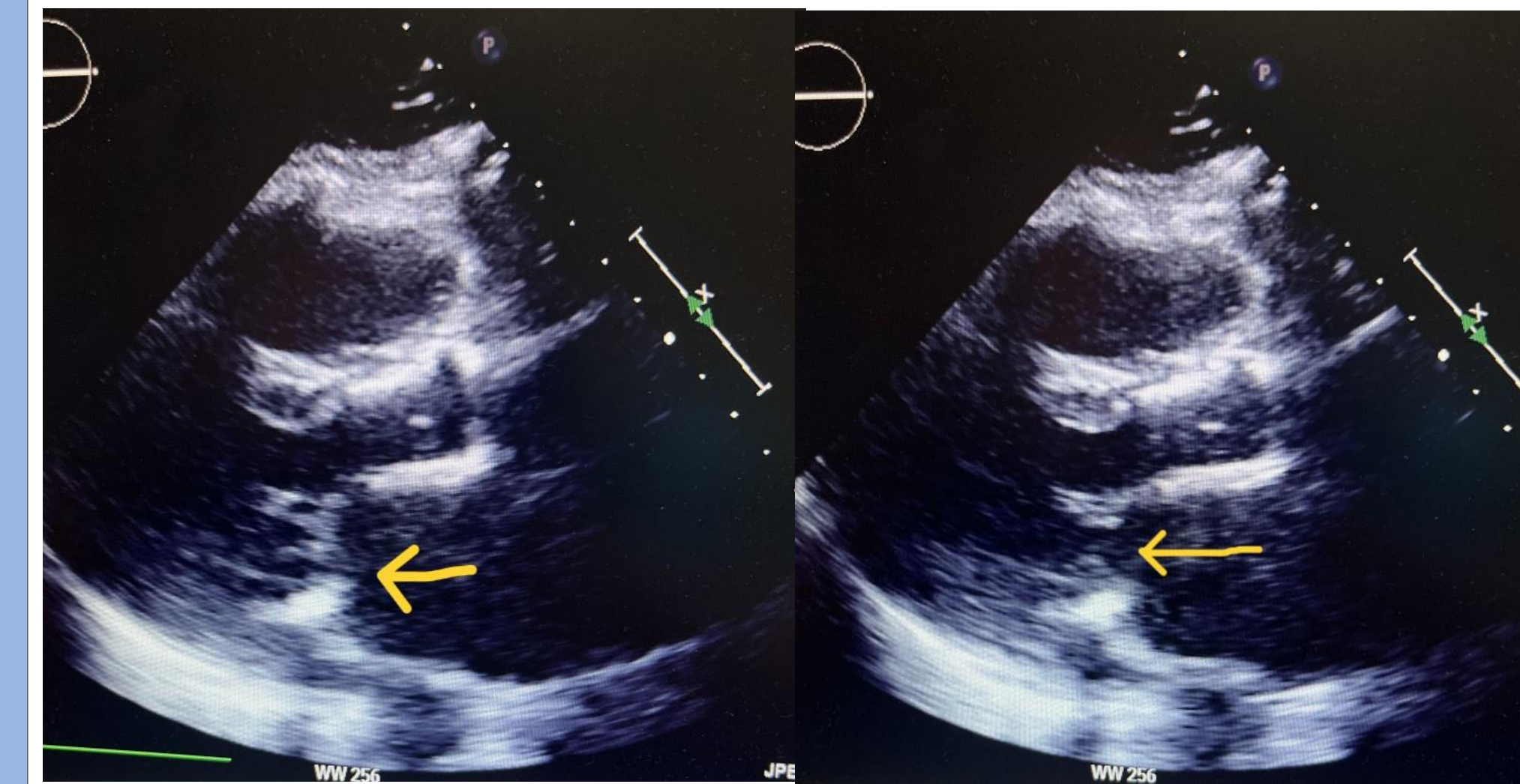
Measurement of aorta



Last three images are 3D gated computed tomography (CTA) reconstruction of the aorta (Clinical Affiliate Site, 2023)

Transthoracic Echocardiography (TTE)

- TTE is an excellent tool for morphologic classification of affiliated valvular pathology, ie, regurgitation, and stenosis (Ahmad et al., 2023).
- Assesses the degree of aortic stenosis (Ahmad et al., 2022).



Closed Valve

Open valve

(Clinical Affiliate Site, 2023)

Left Heart Catheterization

- Used to evaluate the health of the main pumping chamber of the heart, the left ventricle (LV) (Alhabah et al., 2023).
- Transarterial gradients are used to determine the severity of vascular disease (Alhabah et al., 2023).
- There are two methods to obtain pressure gradients between the left ventricle and aorta:
 - Simultaneously using two transducers and a Langston pigtail catheter.
 - Pullback method measures pressure changes from the left ventricle to the aorta.

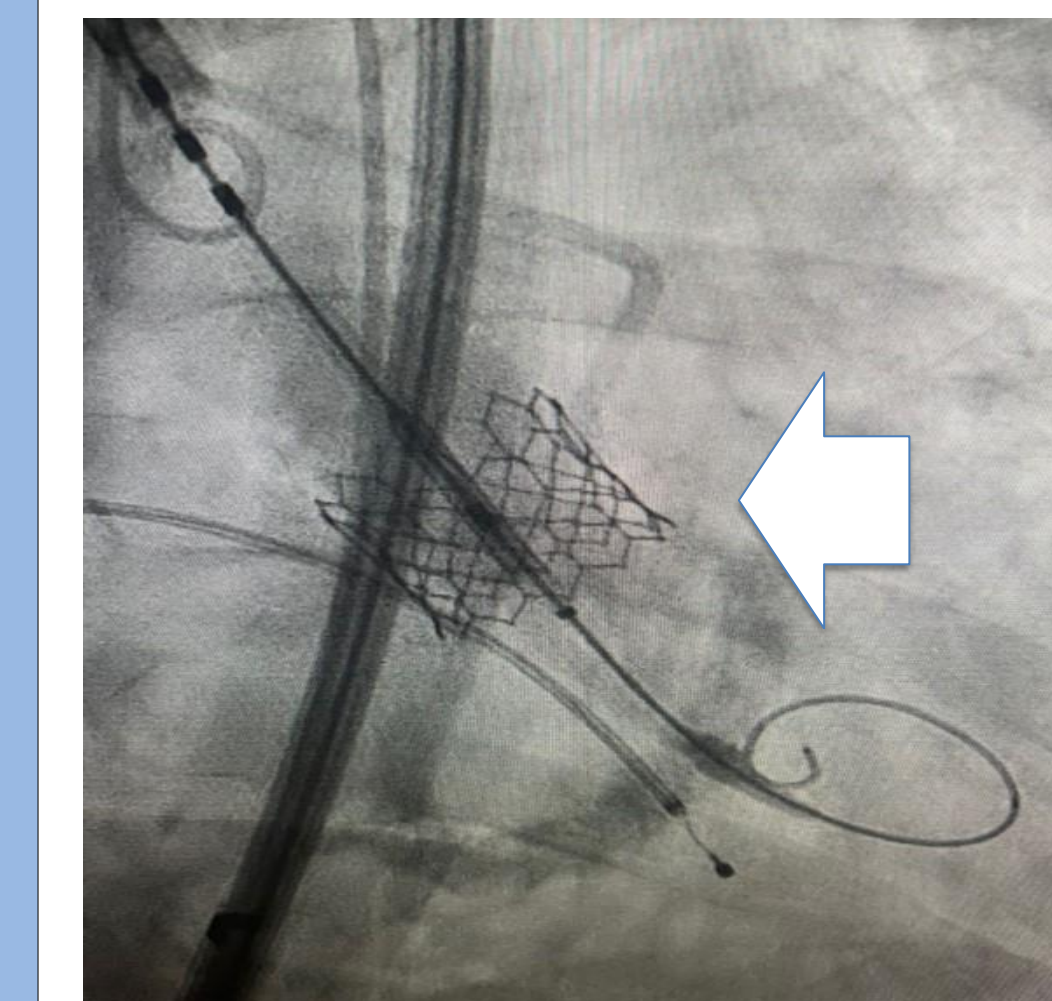


Left coronary angiography

(Clinical Affiliate site, 2023)

TAVR Procedure

- Performed under moderate to general anesthesia.
- Usually performed through a completely percutaneous method with cannulation of the common femoral artery followed by a preclosure of the arteriotomy site using a percutaneous suture device (Ierovante, 2021).
- Standard for TAVR is a hybrid operating room/catheterization laboratory for simultaneous fluoroscopy guided catheter manipulation and conversion to open surgery, if needed (Sorajja et al., 2020).
- Venous access for rapid ventricular pacing, arterial access for delivery sheath and contrast injection.
- Aortogram (fluoroscopic image of the aorta with contrast) to position the valve.
- Rapid ventricular pacing during valve deployment.
- Angiography and echocardiography performed to assess correct valve placement.
- Arterial and venous closure of access site to obtain hemostasis.



Post deployment of aortic valve

Clinical Affiliate Site, 2023

Conclusion

- Transcatheter aortic valve replacement is a minimally invasive procedure to help patients with aortic stenosis.
- A team approach consists of invasive cardiologists, cardiothoracic surgeons, cardiac catheterization technologists, and operating room personnel.
- Superior to surgical aortic valve replacement when assessing the risk for major complications post procedure.