TAVR Imaging Assessment Guideline

April 2017

Pre-Procedure Imaging

Region of Interest	Recommended Approach and Key Measures	Additional Comments
Aortic Valve Morphology	• Transthoracic Echo (TTE) ▪ Tri-leaflet, bicuspid or unicuspid ▪ Valve calcification ▪ Leaflet motion ▪ Annular size and shape	• Transesophageal Echo (TEE) if can be safely performed, particularly useful for sub-aortic membranes • Cardiac MRI if echocardiography is non-diagnostic • ECG-gated thoracic CTA if MRI is contraindicated
Aortic Valve Function	• Transthoracic Echo (TTE) ▪ Maximum aortic velocity ▪ Mean AV gradient ▪ AVA ▪ Stroke volume index ▪ Presence and severity of AR	• Additional Parameters ▪ Dimensionless index ▪ AVA by planimetry (echocardiography, CT, MRI) ▪ Dobutamine stress echo for LFLG AS-reduced EF ▪ Aortic valve calcium score if LFLG AS diagnosis in question
LV Geometry and Other Cardiac Findings	• Transthoracic Echo (TTE) ▪ LVEF, regional wall motion ▪ Hypertrophy, diastolic FX ▪ Pulmonary pressure estimate ▪ Mitral valve (MR, MS, MAC) ▪ Aortic sinus anatomy and size	• CMR: Identification of cardiomyopathies • Myocardial ischemia and scar: CMR, PET, DSE, thallium • CMR imaging for myocardial fibrosis and scar

Annular Sizing	TAVR CTA-gated contrast-enhanced CT thorax with multiple acquisitions. Typically reconstructed in systole 30 – 40% of the R-R window.	• Major/minor annulus dimension • Major/minor average • Annular area • Circumference/perimeter
Aortic Root Measurements	Gated contrast-enhanced CT thorax with multiphasic acquisition. Typically reconstructed in diastole 60 – 80%.	• Coronary ostia heights • Mid-sinus of valsalva (sinus to commissure, sinus to sinus) • Sino-tubular junction • Ascending aorta (40 cm above valve plane, widest dimension, at level of PA) • Aortic root and ascending aorta calcification • For additional measurement, see “Checklist for Pre-TAVR Patient Selection and Evaluation”
Coronary Disease and Thoracic Anatomy	• Coronary angiography • Non-gated thoracic CTA	• Coronary artery disease severity • Bypass grafts: Number/location • RV to chest wall distance • Aorta to chest wall relationship
Non-Cardiac Imaging	• Carotid ultrasound • Cerebrovascular MRI	May be considered depending on clinical history

Vascular Access Recommendations (Imaging Dependent on Renal Function)

Region of Interest	Recommended Approach	Key Parameters
Normal Renal Function (GFR >60) or ESRD Not Expected to Recover	TAVR CTA	• Aorta, great vessel, and abdominal aorta • Dissection, atheroma, stenosis, calcification • Iliac/subclavian/femoral luminal dimensions,

		calcification, and tortuosity
Borderline Renal Function	• Contrast MRA • Direct femoral angiography (low contrast)	• Institutional dependent protocols • Luminal dimensions and tortuosity of peripheral vasculature
Acute Kidney Injury or ESRD with Expected Recovery	• Non-contrast CT of chest, abdomen and pelvis • Non-contrast MRA • Can consider TEE if balancing risks/benefits	Degree of calcification and tortuosity of peripheral vasculature

Peri-Procedural Imaging

Imaging Goals	Recommended Approach	Additional Details
Interventional Planning	TAVR CTA	Predict optimal fluoroscopy angles for valve deployment
Confirmation of Annular Sizing	Pre-procedure MDCT	• Consider contrast aortic root injection if needed • 3D TEE to confirm annular size
Valve Placement	Fluoroscopy under general anesthesia	TEE (if using general anesthesia)
Paravalvular Leak	Direct aortic root angiography	TEE (if using general anesthesia)
Procedural Complications	• Transthoracic Echo (TTE) • TEE (if using general anesthesia) • Intra-cardiac echocardiography	See treatment options in "TAVR Procedural Complications and Management"

Long-Term Post Procedural Imaging

Evaluate Valve Function	Transthoracic Echo (See "Post TAVR Checklist" for Frequency)	• Key elements of echocardiography ▪ Maximum aortic velocity ▪ Mean aortic valve gradient ▪ Aortic valve area ▪ Paravalvular and valvular AR
LV Geometry and Other Cardiac Findings	• Transthoracic Echo (TTE) ▪ LVEF, regional wall motion ▪ Hypertrophy, diastolic function ▪ Pulmonary pressure estimate ▪ Mitral valve (MR, MS, MAC)	

2017 ACC Expert Consensus Decision Pathway for Transcatheter Aortic Valve Replacement in the Management of Adults With Aortic Stenosis A Report of the American College of Cardiology Task Force on Clinical Expert Consensus Documents Catherine M. Otto, MD, FACC, Co-Chair; Dharam J. Kumbhani, MD, SM, FACC, Co-Chair; Karen P. Alexander, MD, FACC; John H. Calhoon, MD, FACC; Milind Y. Desai, MD, FACC; Sanjay Kaul, MD, FACC; James C. Lee, MD; Carlos E. Ruiz, MD, PHD, FACC; Christina M. Vassileva, MD, FACC