NOTES

PARTNER trial.

PARTNER 2 trial TAVR vs high risk
LVOT paravalvular leak. Walls are 2.5 - \3 components
Basal sepatal mycoardium of LV. aortomitral continuity. Fibrous cytoskeleton of heart. Continuity b it is contiguuaous b/n aortic and mitral leaflet. Membranous interventricular septum. Shorter septum increases
SA and Avc node are close to the septum. Shorter septum = increases arrhythmia chance.
Many need PPM

Paravalvular abnormality.
Aortic leaflets. Measuring calcium of the aortic valve not coronary arteries. Score of valve. Must use NECT. just vof the valve leaflets.
Perioperative risk prediction. Higher calcium scores do worse t nperioperative period. Real vs notr real stenosis. Decent ventricle can generate pressure across baalv e to show stenosis on TTEE. sometimes their heart is weak and cannot produce gradient even if their low flow state can paradoxically cause low gradient. Low flow low gradient Ao stenosis

Cut offf that predict truly severe vs not severe : 2000 men 1300 women
Can go to cath lab and put cath across valve and give dobutamine to stress them.
Interatrial septum always points to noncornary cust. Membranous septum is close to non. More calcification of noncusp increases risk of ACV node impingement on membranous septum.
Valve will push calcium into membranous septum.

Coronary

During procedure; place pacing wire into heart. Into RV. overdrive the heart and pace the patient at rage about 180 bpm the whole ventricle becomes refractory and standstill. 30 sec. Look at coronary arteries . if stenosis they will stent. 30 sec is enough to infarct mycoardium.

Evaluation of the prox coronary arteries
CT heart aortic valve are not given nitroglycerin bc they could drop preload and die. Coronary arteries will not be vasodilated.
If calcification is bad, mention where the most obstructive section is: e.g mid LAD and prox LEDA. blooming artifact can effect estimate. L main coronary and prox LAD and prox dominant RCA are otherwise do not estimate

Gold standard is catheter angiogram to determine need for stent.
Look at RV need to put epi cardium

Delivery of device in the aorta and branch arteries:

- Retrograde via femo to aorta an deliver to aortic valve. Can access carotid, fem, axillary, iliacs,. If needed can go right into the aorta but need to crack top of

HEART TUTORIAL

TAVR HEART TUTORIAL

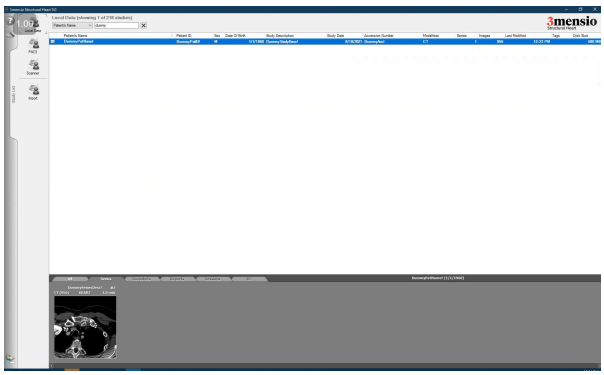
Important numbers:

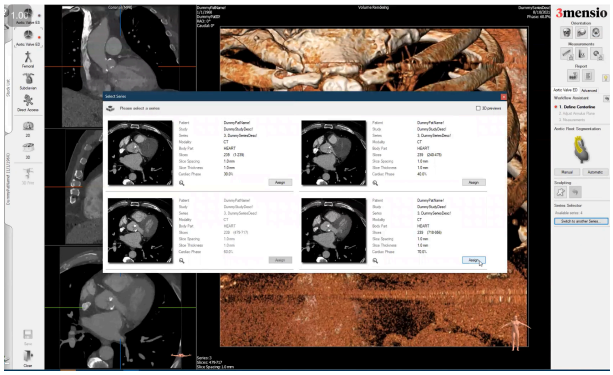
- Coronary heights of ≥10mm are important for ensuring the TAVR won't interfere with the coronary ostia, so if you're getting <10mm, be sure it's for real
- Iliofemoral average diameter of ≥5mm is needed for the surgeons to fit their tools, so be sure it's real if <5.5mm
- An aortic annulus >3cm will make the surgeons look twice, so be sure it's real

Aortic Valve ED

Open up “3mensio structural heart” program on desktop

- Find CT HEART study (should have approx 1000 images) in the bottom “series” tab.
- Double click to open

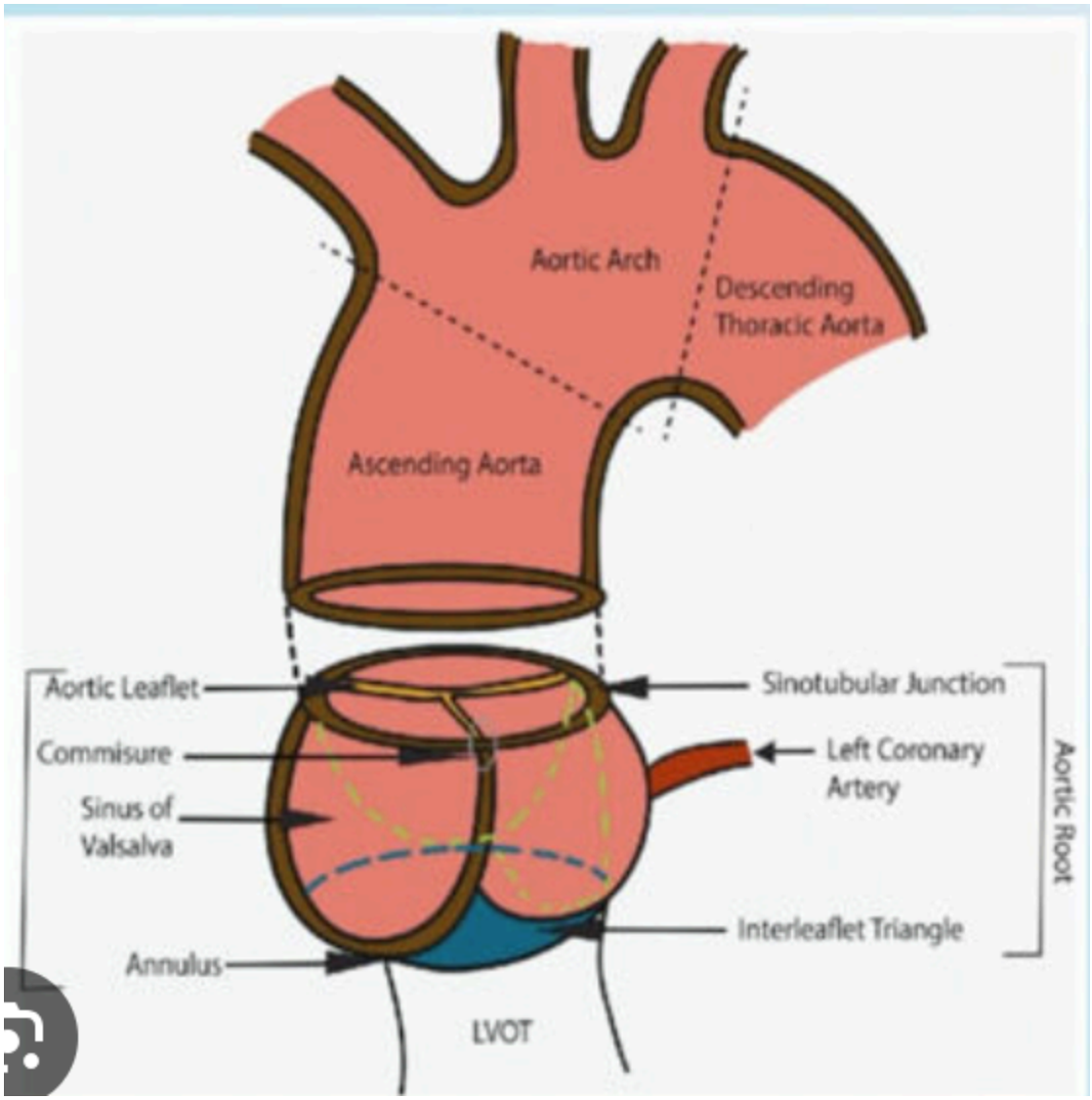




- Choose and click on the “aortic valve ED” option in the left options tab.
- In top right hand corner check that the “phase” says 70%.
    - If not, must change the phase by clicking “switch to another series” option under the “series selector” option in the right toolbar
    - Find 70% cardiac phase and select “assign” on the study

Measurements to acquire:

- Sinus of valsalva



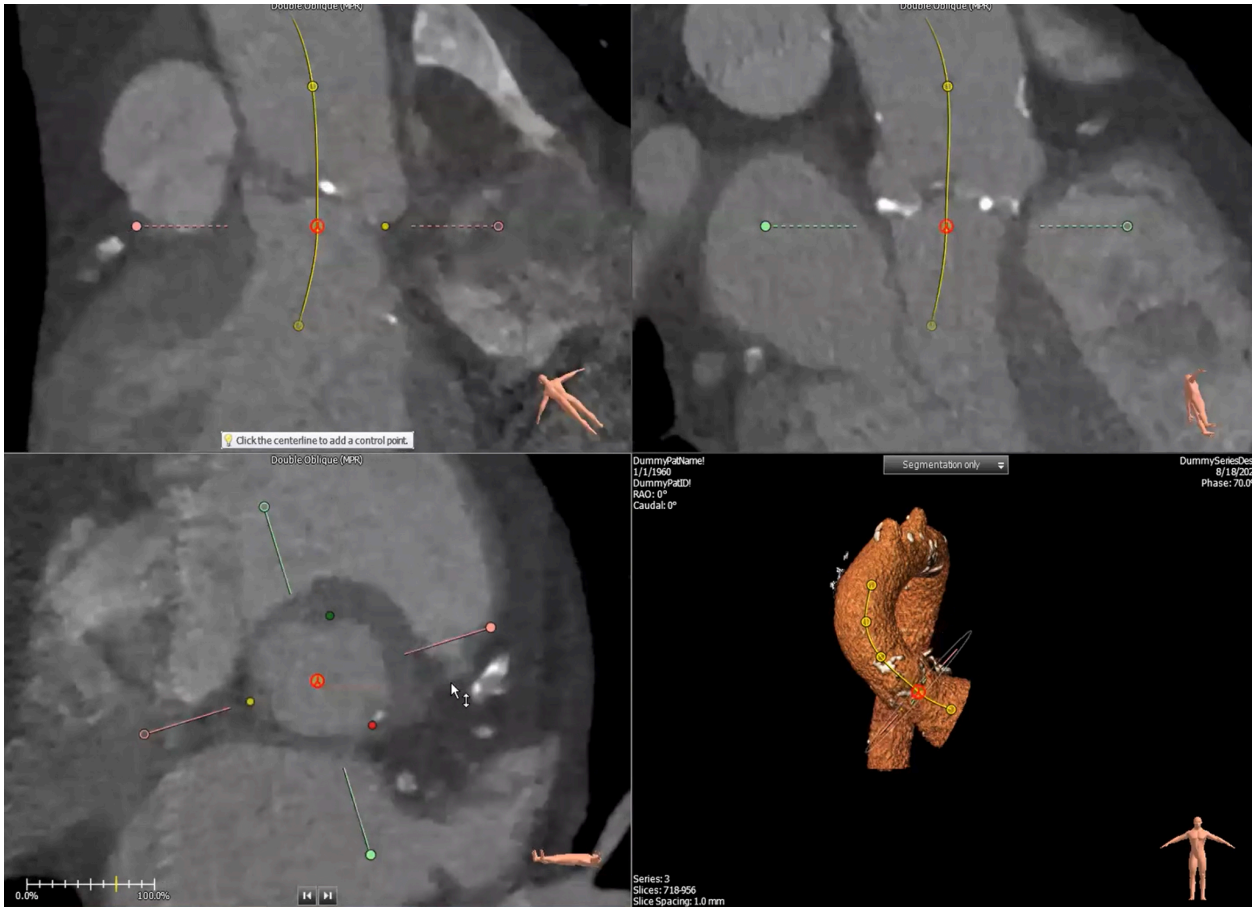
Define centerline

- Click on “automatic” under the “aortic root segmentation” section in the right hand toolbar.
    - If this does not do it automatically, you must click “manual” and draw the lines yourself.
    - Drag the red tricuspid marker to the level of the annulus.

Adjust annulus plane

- Place three markers at the margin of the annulus cusps to measure the sinus during “aortic valve ED” .
- In the bottom left hand corner screen, left side click and place 3 markers at the margin of the annulus cusps. Put them DIRECTLY ON THE LINE.
- Click and scroll left to right and ensure that the markers are placed at the annulus in the top left hand corner. Place the marks directly on the contrast line.

- In the “refine annulus plane” section, click “confirm” to save the annulus measurements



Check phases

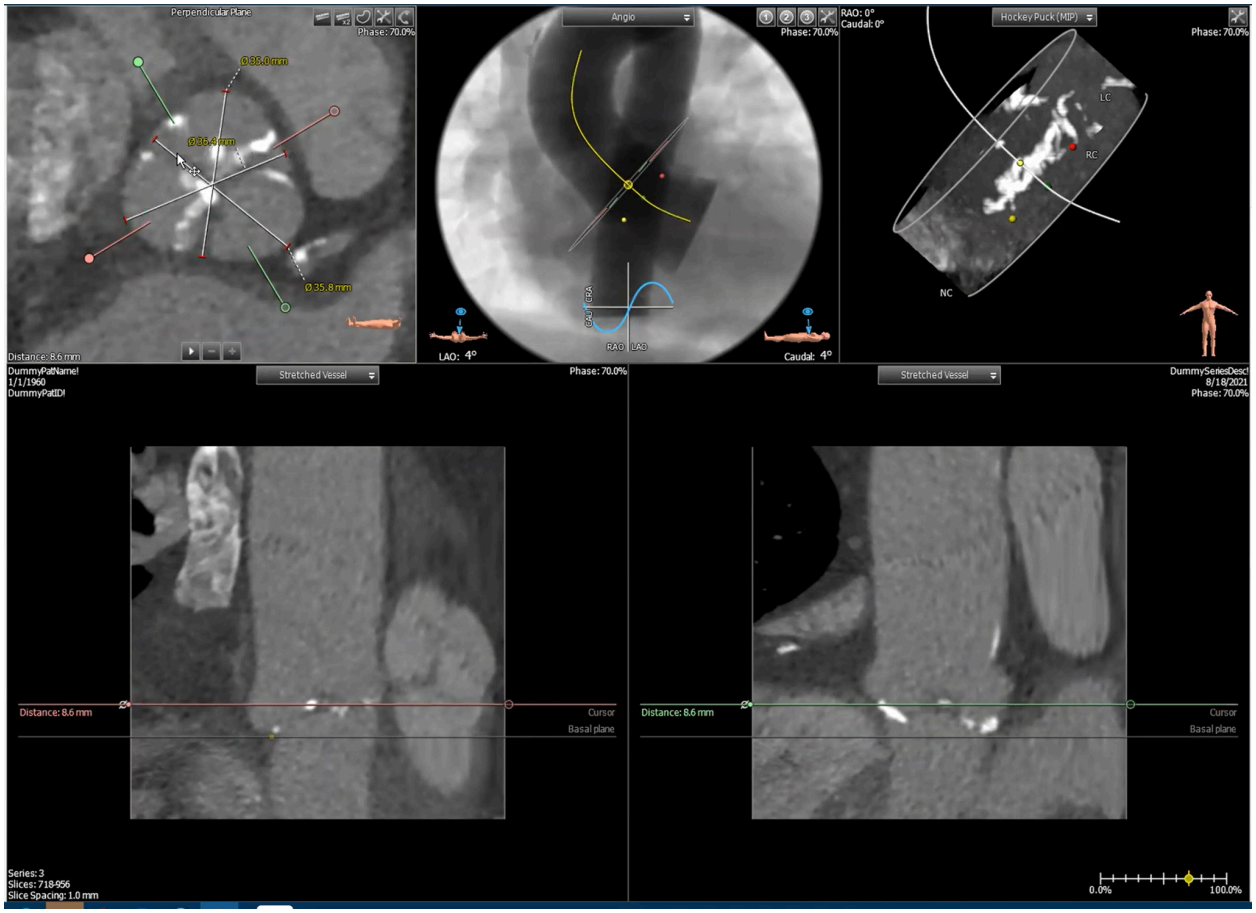
- After hitting confirm you can cycle through the cardiac phase to assess valvular movement. Go to the top left hand box and click play button. Use minus button to slow speed down or plus button to increase speed
- Scroll superiorly and inferiorly and analyze the entire root to give the valves a fair chance to open up.
- Classify the amount of rafe (fused comminsures)
    - Type 0: no rafe
    - Type 1: one rafe (#); # = N for noncoronary, R for R coronary, L for noncoronary
    - Type 2: two rafe

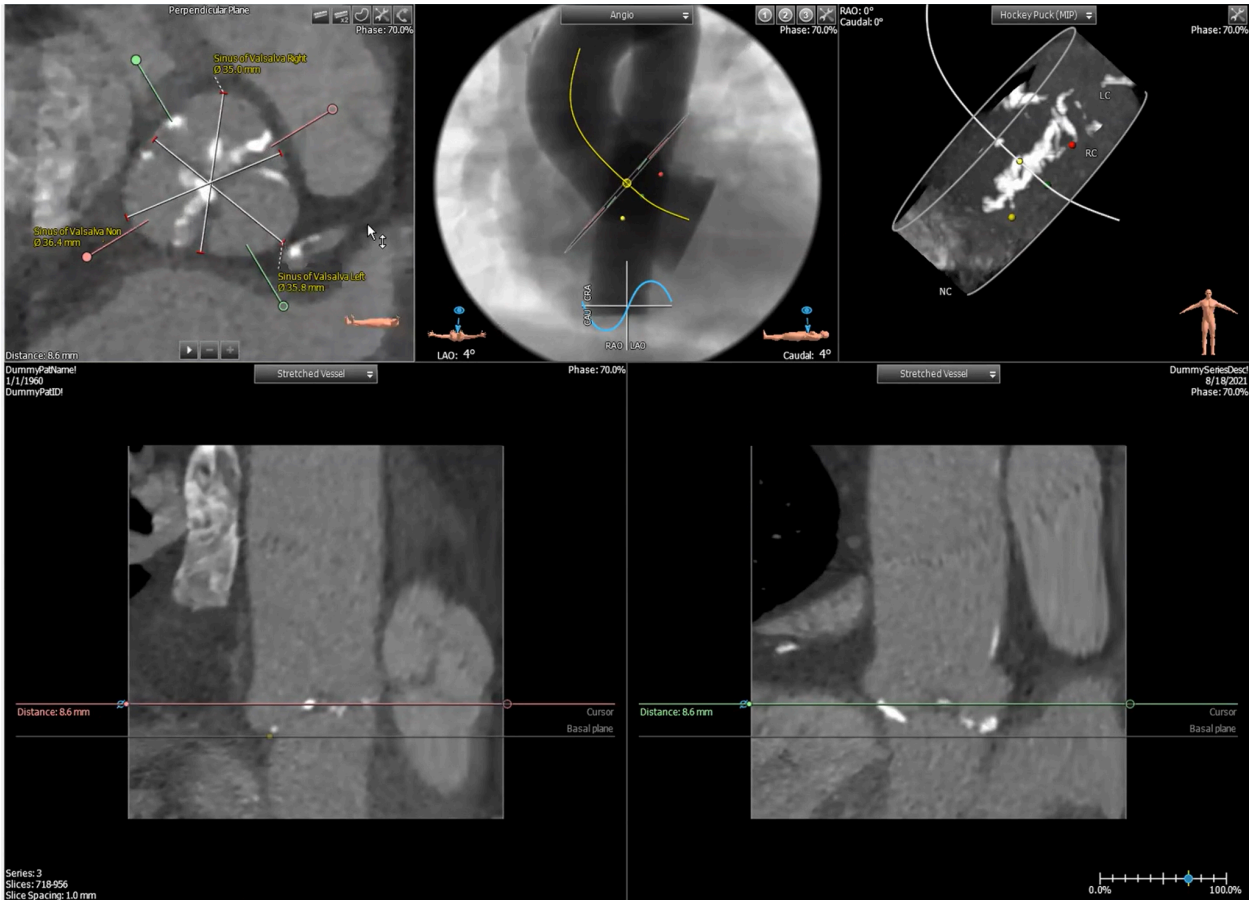
Measure commissures

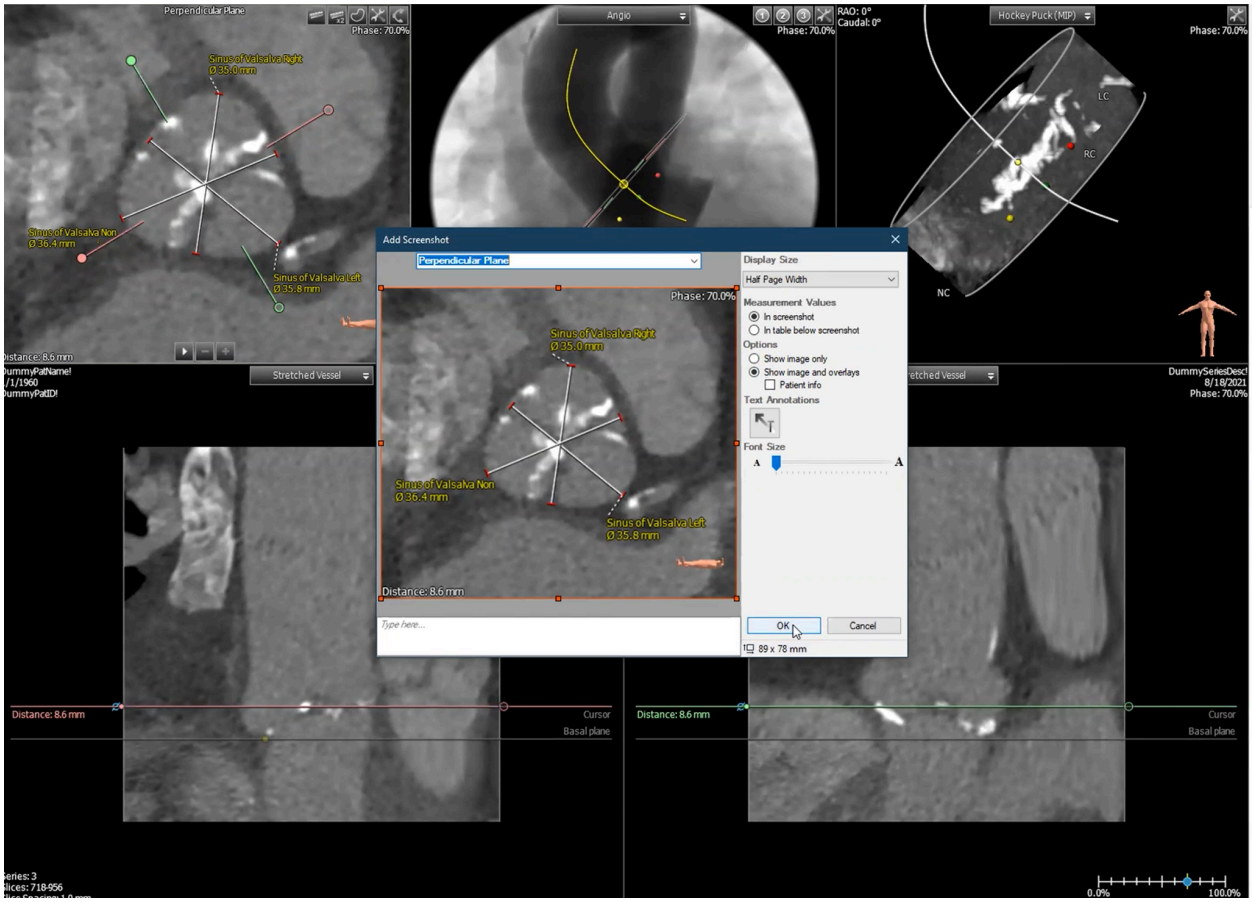
- Scroll up to the widest part of the sinus
- Take three measurements from the commissure to the cusp.
- Click on the most left sided ruler icon in the perpendicular plane box to measure each point

Right click on the measurements when done to assign labels

- Assign the following labels: “sinus of valsalva non / right / left”
    - The non coronary cusp is always adjacent to the intra-atrial septum
    - Right is more anterior and towards the sternum
    - Left is towards the left atrial appendage
- When complete, save by clicking F5 / F6.
- Click ok on the popup.

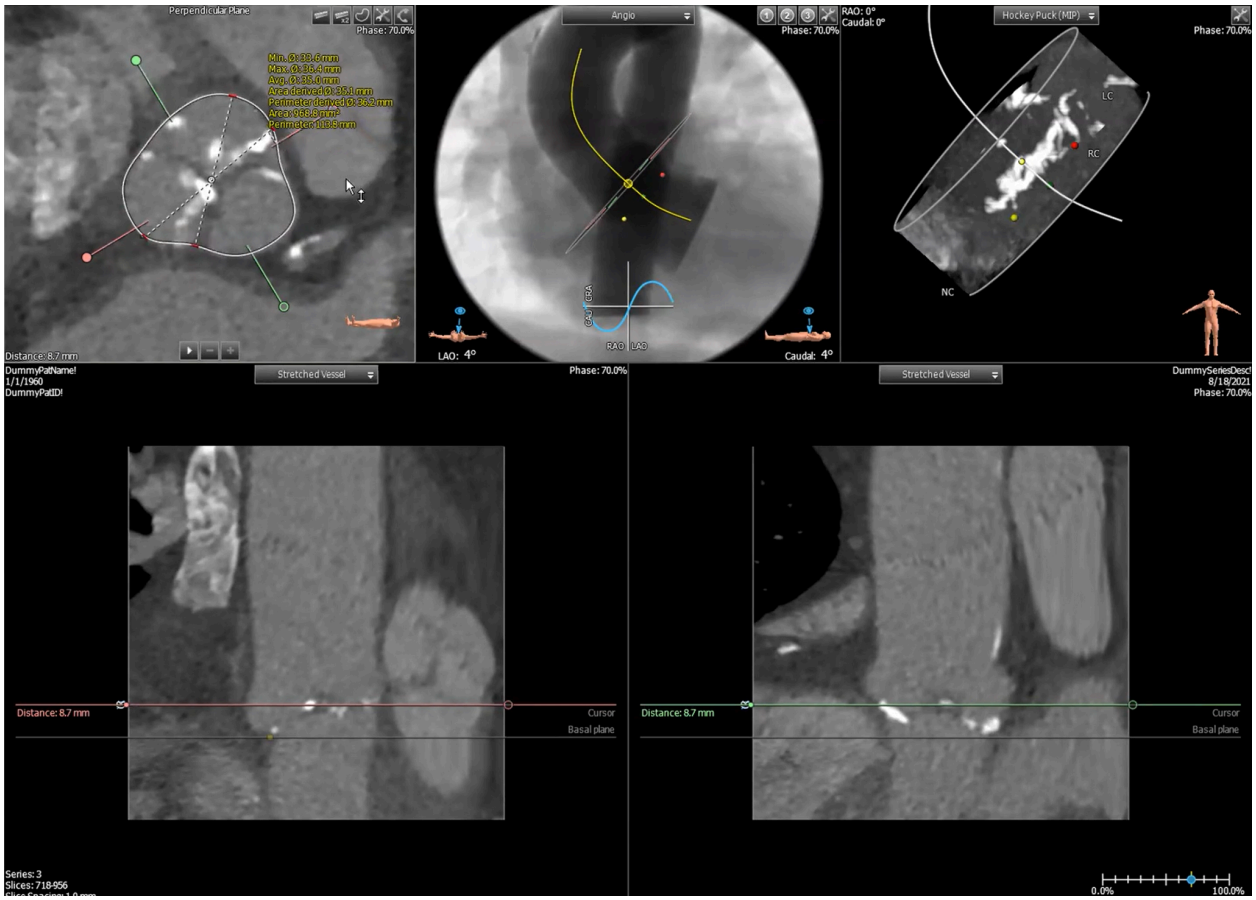



Perpendicular Plane
Phase: 70.0%
Sinus of Valsalva Right
Ø 35.0 mm
Sinus of Valsalva Non
Ø 36.4 mm
Sinus of Valsalva Left
Ø 35.8 mm
Distance: 8.6 mm
Angio
Phase: 70.0%
LAO: 4°
RAO
LAO
Caudal: 4°
RAO: 0°
Caudal: 0°
Hockey Puck (MIP)
Phase: 70.0%
LC
RC
NC
DummyPatName!
1/1/1960
DummyPatID!
Stretched Vessel
Phase: 70.0%
Distance: 8.6 mm
Cursor
Basal plane
Series: 3
Slices: 718-956
Slice Spacing: 1.0 mm
Stretched Vessel
DummySeriesDesc
8/18/2021
Phase: 70.0%
Distance: 8.6 mm
Cursor
Basal plane
0.0%
100.0%



Measure area of sinus of valsalva

- Click the up arrow on the keyboard
- Choose the lasso tool to make area measurements around the cusp. Only insert up to 15 points. Ensure that the measurements are visible.
- Right click and add text annotation “sinus of Valsalva”
- Click F5/F6 to save.



Aortic Valve ES

Need the following measurements

- Annulus
- Sinotubular junction diameter
- Sinotubular junction height
- Left coronary artery height
- Right coronary artery height

Click on the left tab “aortic valve ES” for the remainder of the measurements in the heart.

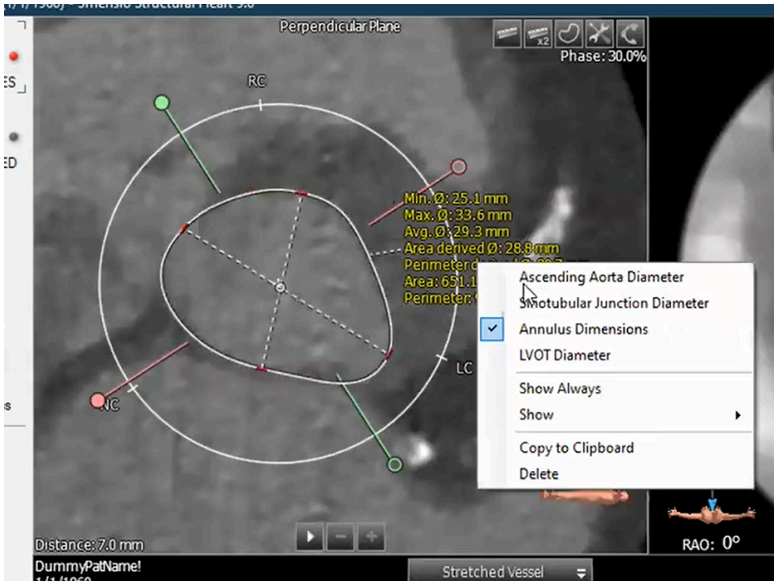
- Ensure that the phase in right hand corner says “30%”
- Click “automatic” in the “aortic root segmentation” section in the right hand toolbar

Measure the annulus

- Follow the same procedure as before and insert points to adjust the annulus plane.
- Hit confirm when done.

Lasso the annulus

- Follow same procedure as before and choose the lasso tool to measure the annular area.
- Right click on “annulus dimensions”

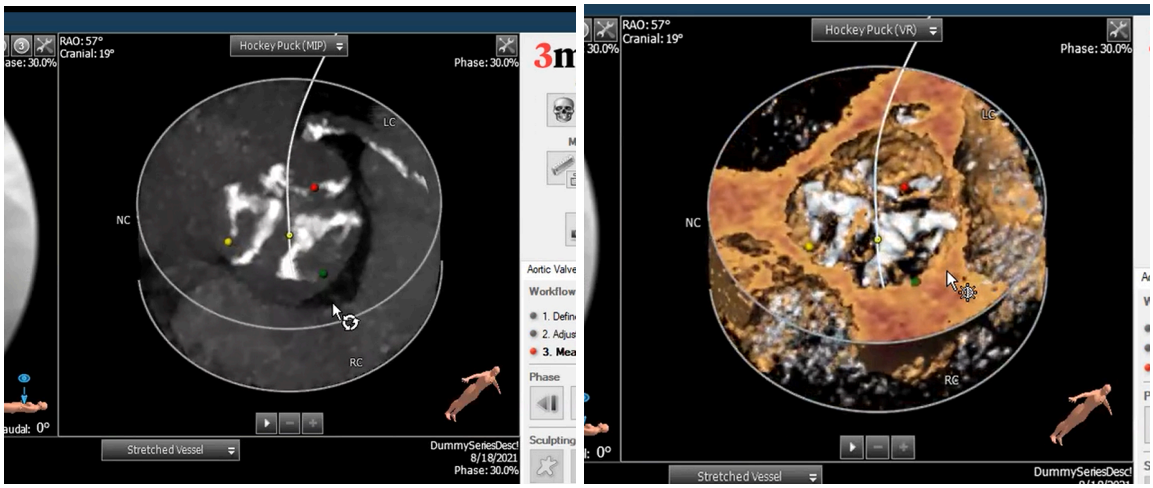


Measure LVOT

- At the level of the annulus, scroll 3 mm below this level in the coronal plane to find the LVOT.
- Using a lasso tool, measure the surface area of the valve.
- Right click and label it “LVOT diameter”
- Save measurements

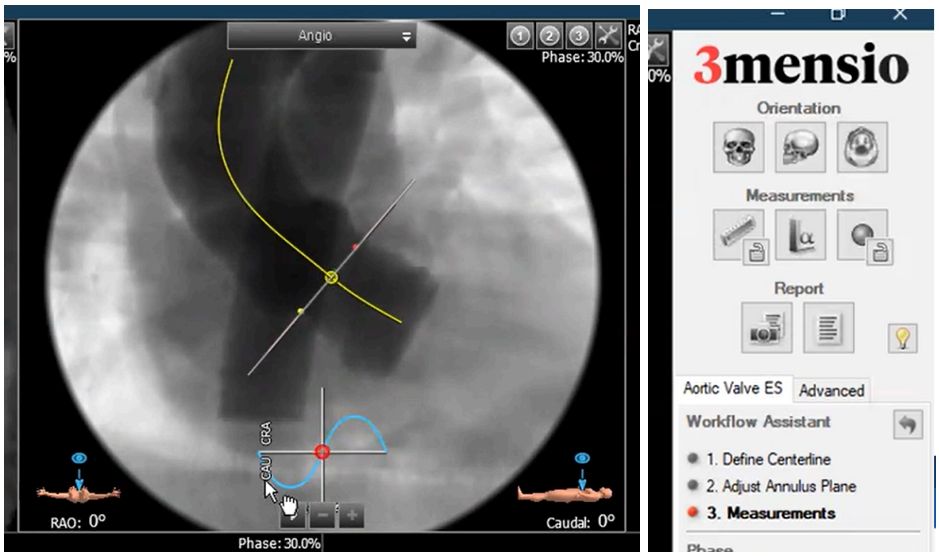
Now create a overview of valve by creating a 3D MIP

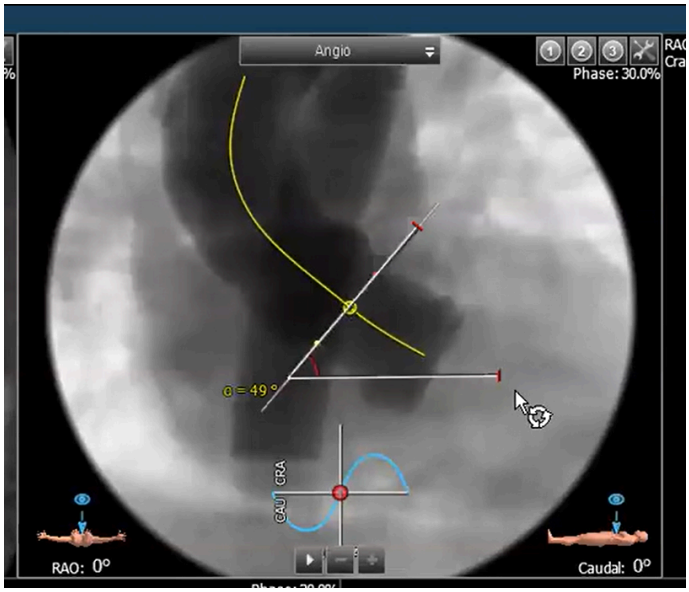
- In top right hand corner click the drop down and switch from “hockey puck - MIP” to “Hockey puck - VR”
- Right click and dragging will allow you to window and level to see both the valve and amount of calcification.
- F5/F6 and save both VR and MIP.



Sine wave fluoro shot

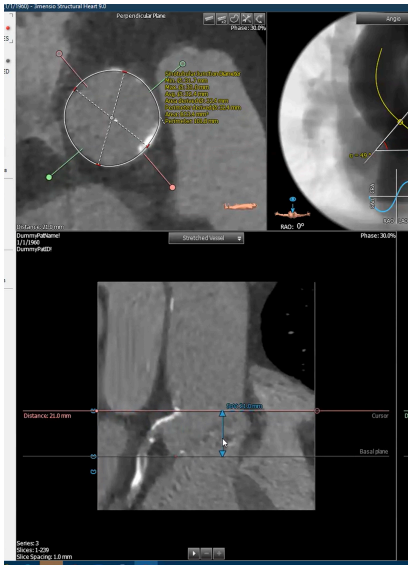
- In the middle box, click the red dot on the sine wave to ensure that the RAO/LAO and caudal measurement are both 0, or as close to 0 as possible.
- Click on the middle angle measurement by clicking the middle icon in the measurements right tool bar.
- Draw on line to follow the annulus line and an additional line horizontal to this.
- Save measurement





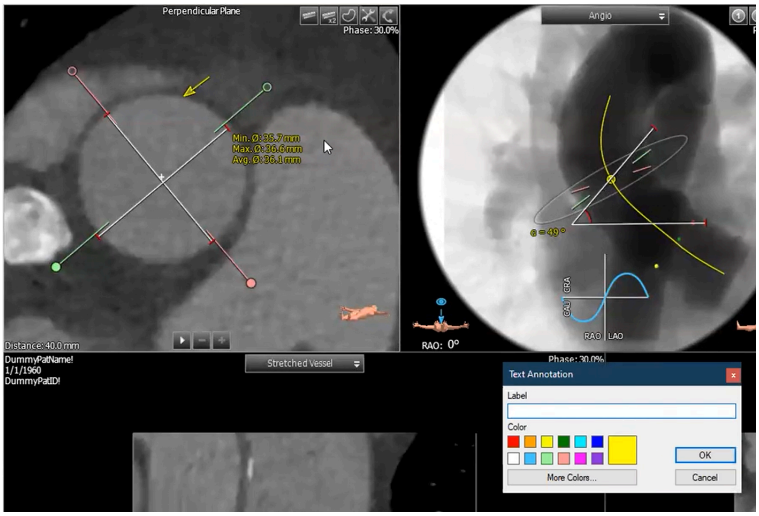
Measure the sinotubular junction

- Find the sinotubular junction
- Bottom left box / coronal plane:
    - Move the pink cursor to approximate where the junction is.
    - Right click and assign “sinus of valsalva height” (the program erroneously calls this SoV though it is actually the sinotubular junction) and then drag blue line into the middle.
- Top left box / perpendicular plane:
    - Use the lasso tool to measure the sinotubular junction diameter.
    - Right click the measurement and assign “sinotubular junction diameter”
- Save images.



Measurement the Ascending aorta

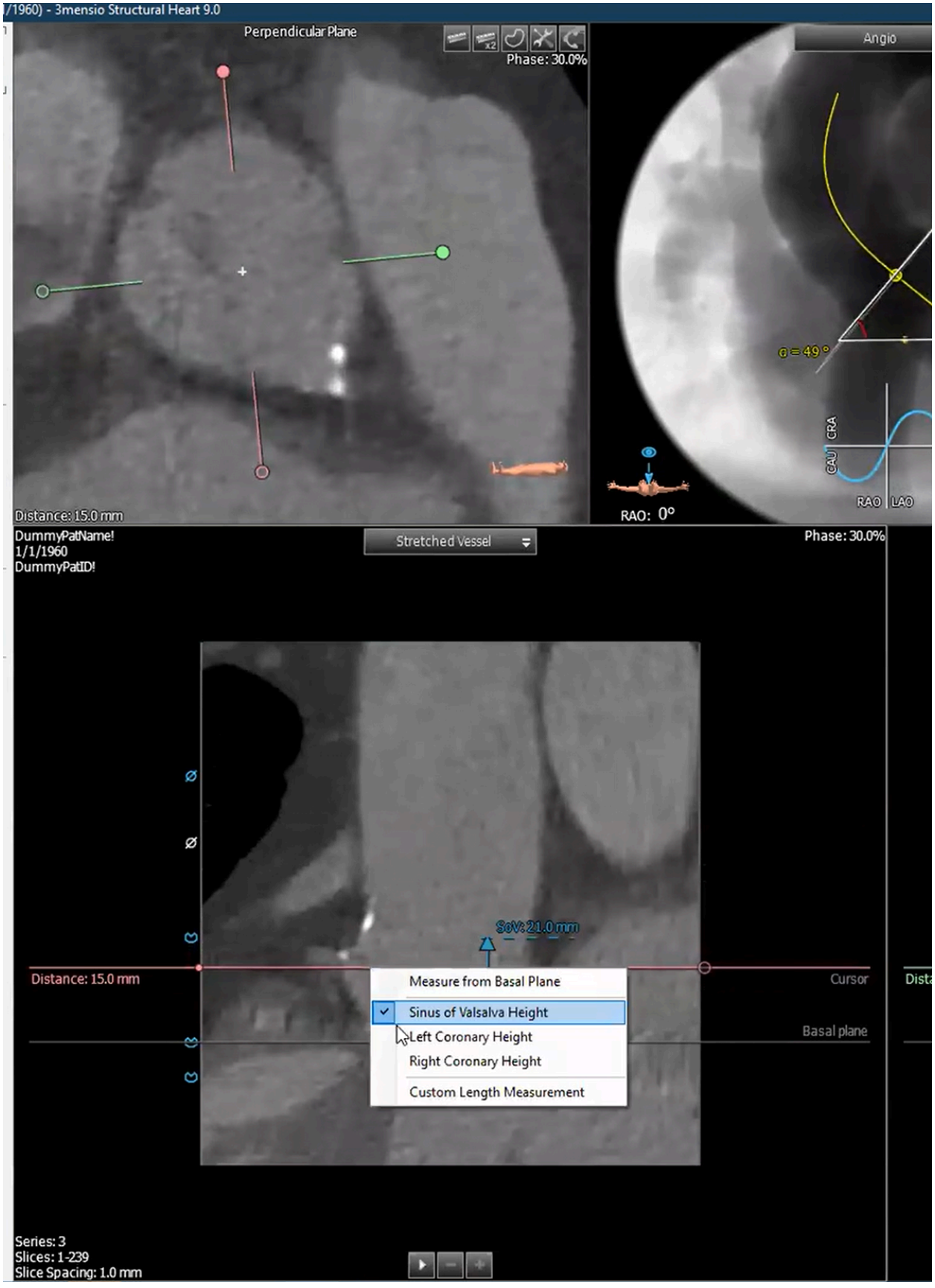
- Scroll above the sinotubular junction and find the widest part by eyeballing
- Click the rulerx2 icon (max/min) and measure two measurements perpendicular to each other
- Label as “ascending aorta diameter”.
- Save



Measure coronary height (target the inferior aspect of the coronary artery ostia)
Solid R for RCA; Hollow Green for LCA

- RCA
    - In the axial plane, find the RCA and scroll until it disappears.
    - Position the closed pink dot/plane in line with where the RCA was and scroll inferiorly on coronals to find point most inferior to ostia.
    - Do the same in the coronal plane (bottom Left) and assign “right coronary height” to it.
    - Move the measurement to the middle next to the SoV measurement

- LCA
    - In axial plane, find the LCA and scroll until it disappears.
    - Position the green measurement plane in line with where the LCA was.
    - In the bottom right box label the measurement as “left coronary height”


/1960) - 3mensio Structural Heart 9.0
Perpendicular Plane
Phase: 30.0%
Angio
θ = 49 °
CRA
CAU
RAO
LAO
RAO: 0°
Distance: 15.0 mm
DummyPatName!
1/1/1960
DummyPatID!
Stretched Vessel
Phase: 30.0%
SoV: 21.0 mm
Distance: 15.0 mm
Measure from Basal Plane
Sinus of Valsalva Height
Left Coronary Height
Right Coronary Height
Custom Length Measurement
Cursor
Basal plane
Series: 3
Slices: 1-239
Slice Spacing: 1.0 mm

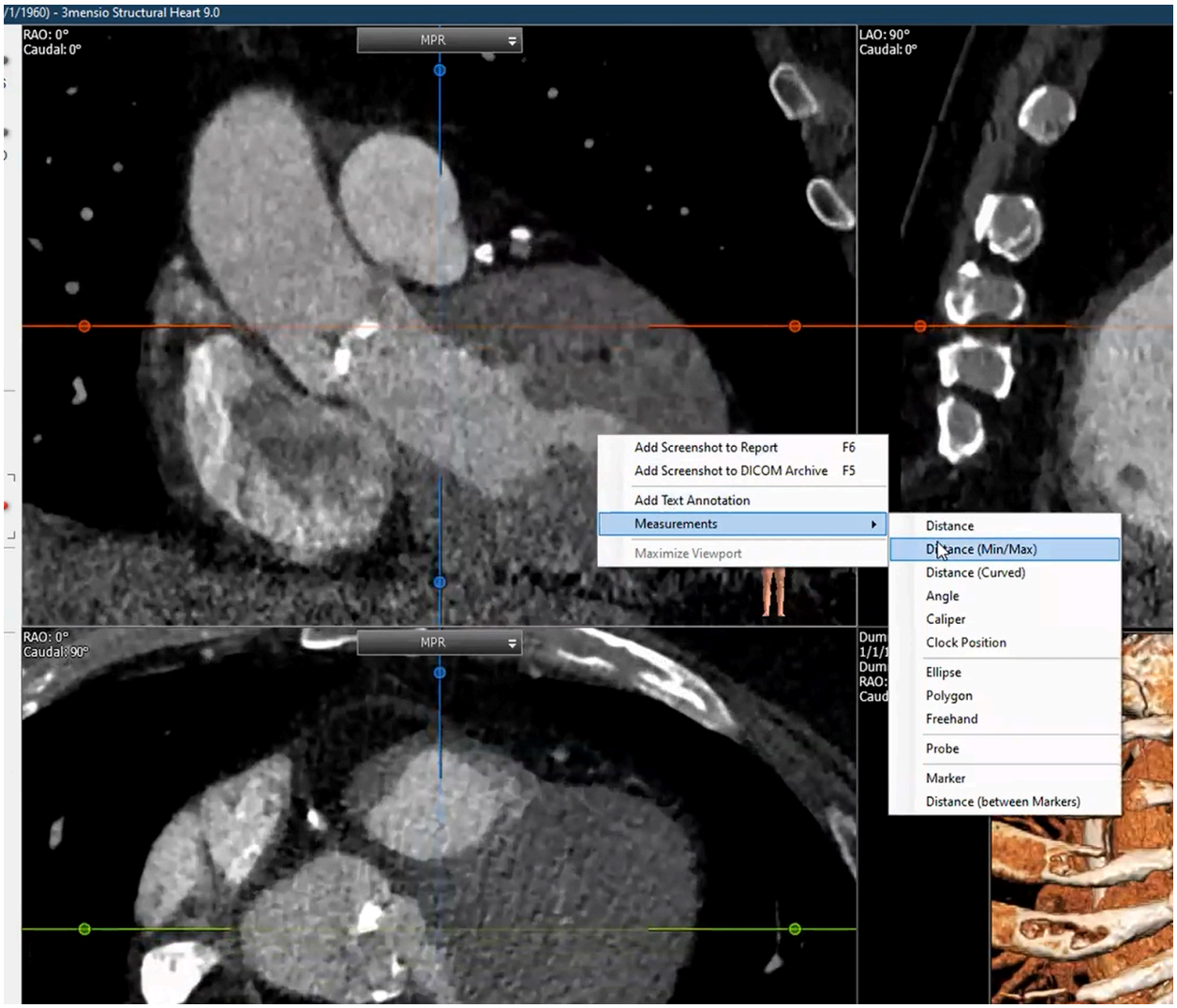
INTRAMEMBRANOUS SEPTUM

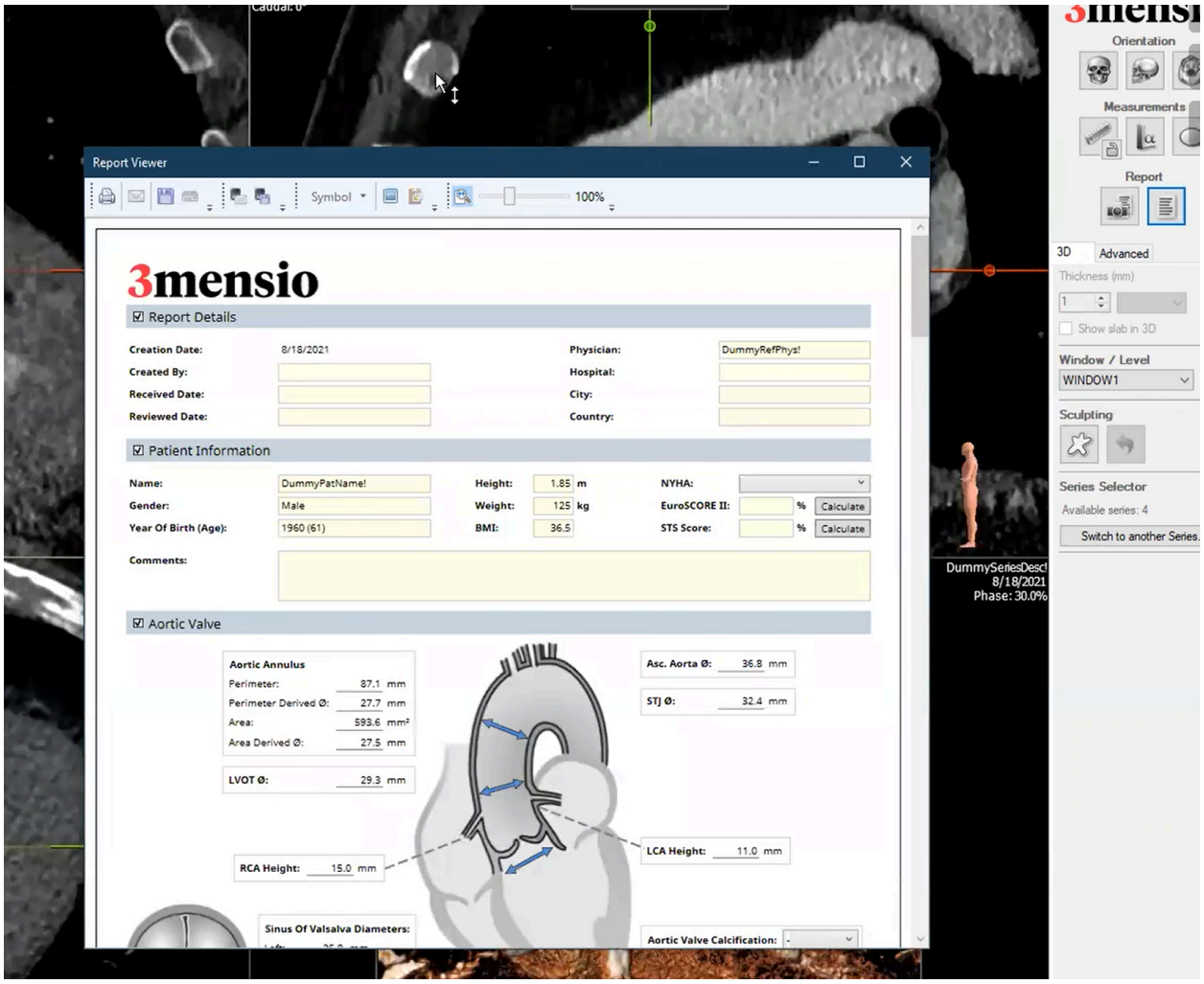
Measure the membranous portion of the intramembranous septum.

- In the left toolbar click “3D”
- Find the membranous septum
- Right click and go to measurements drop down, click “distance” to measure
- Label as membranous septum.
- Save

Review the snapshots in report

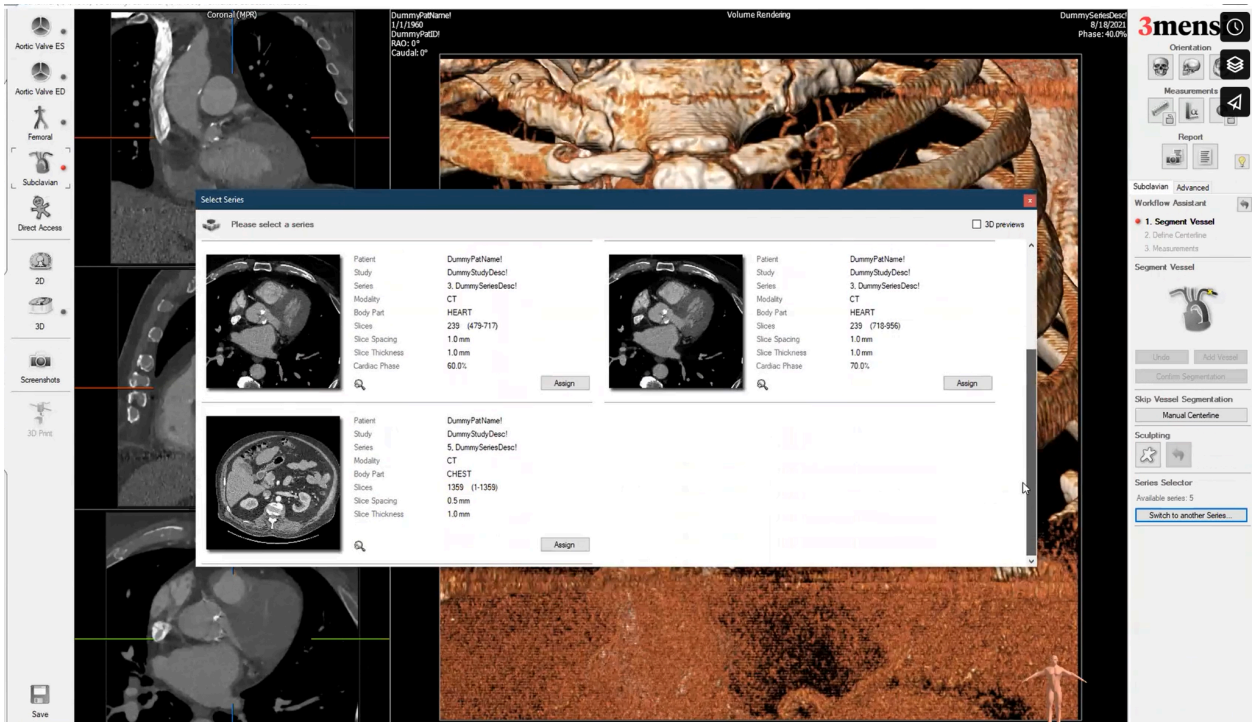
- Look in right tool box and click on the right icon underneath “report”





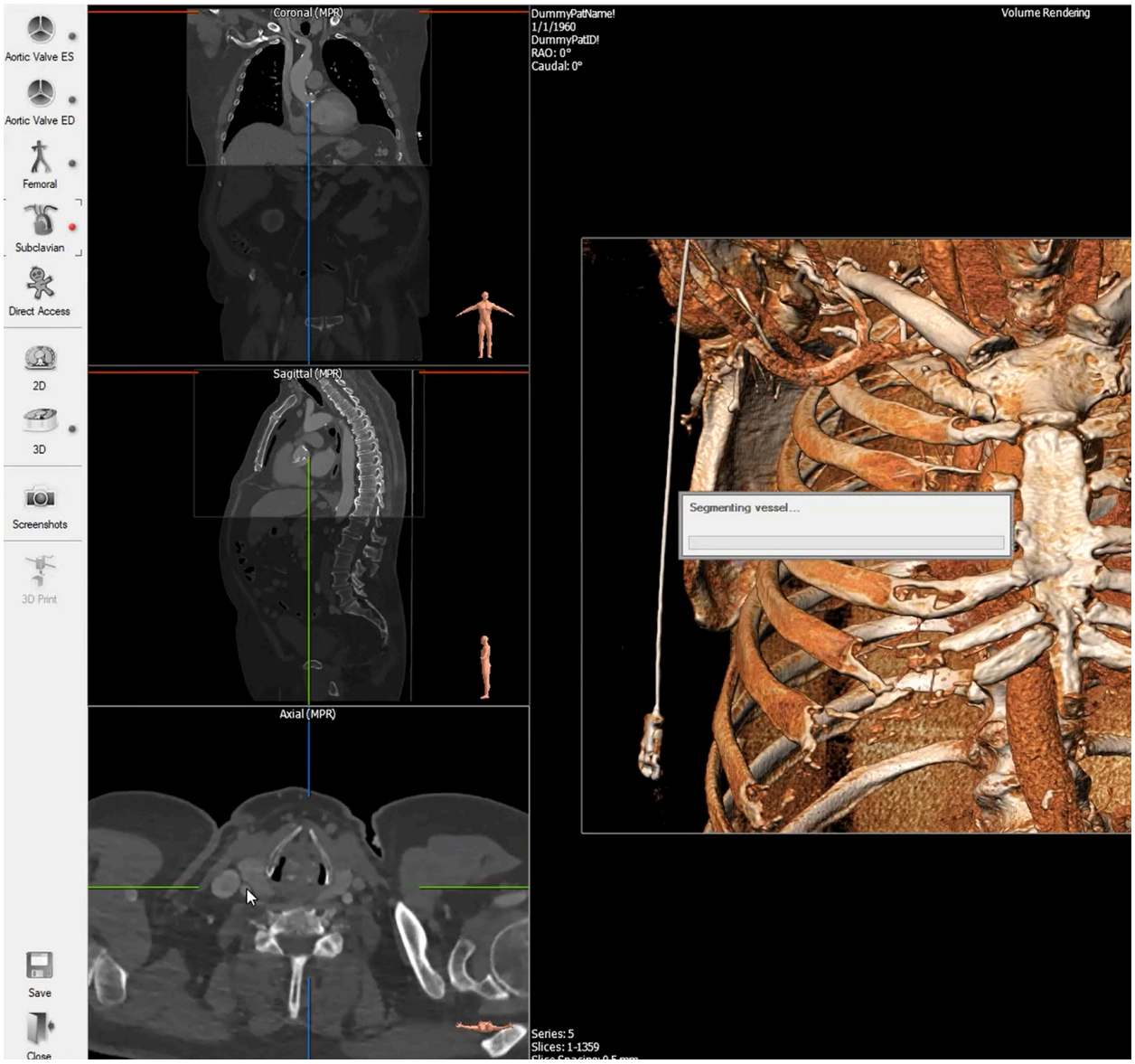
VASCULAR MEASUREMENTS

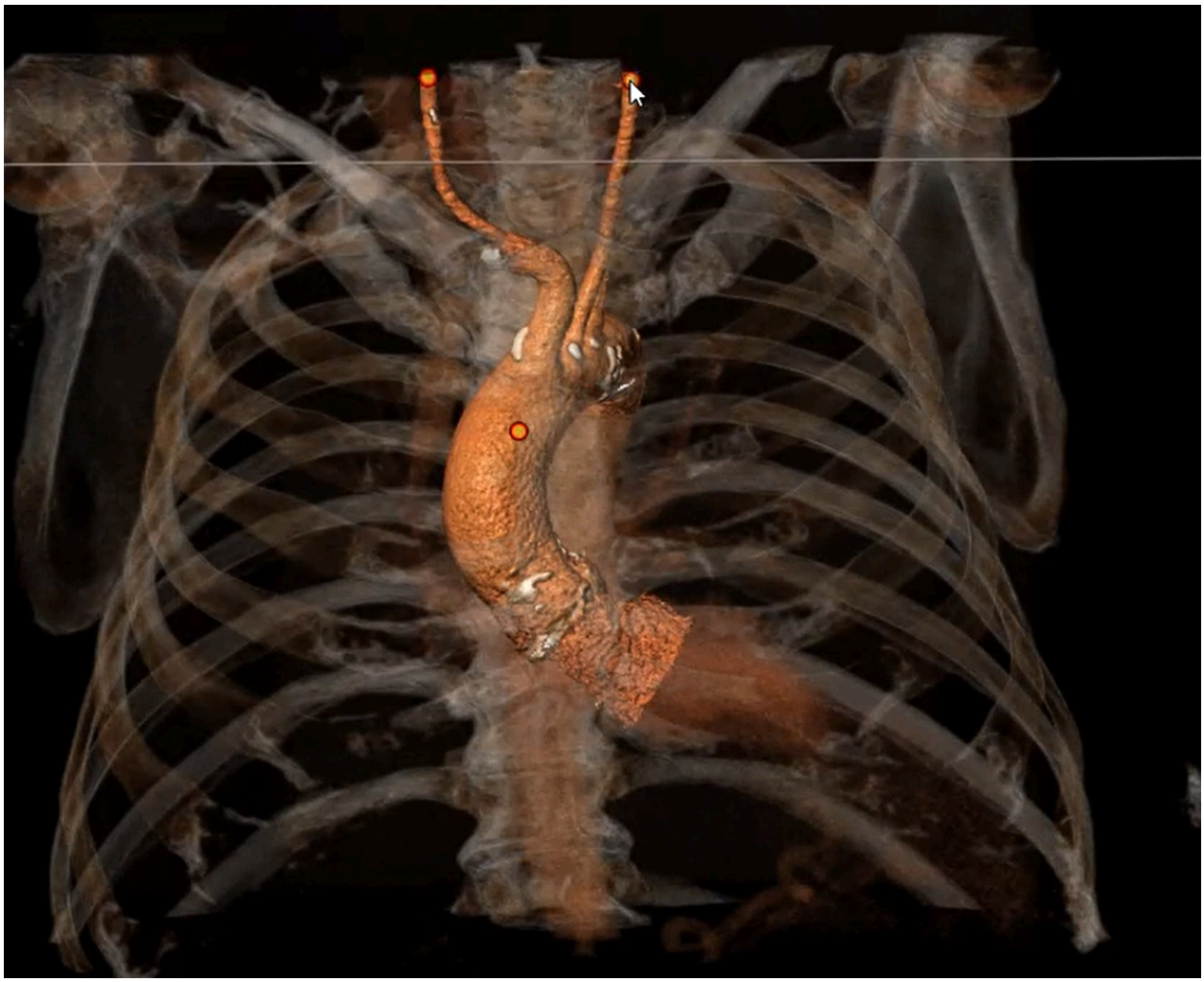
Return to “study list” on left side
Find the CTA of the chest (around 1400 images).
Double click to load.
Click on “subclavian” in right tool box
In the right tool box click “switch to another series” and click CT chest at the bottom of list.
Switch series to “CTA of chest thins”.



Segment vessels

- Reduce size of the sagittal image on the “sagittal (MPR)” box on left
- Click on the area of the L CCA
- Add vessel
- Click on area of R CCA.
- When both are aligned click “Confirm segmentation”
- Place markers on LVOT, L and R CCA


Aortic Valve ES
Aortic Valve ED
Femoral
Subclavian
Direct Access
2D
3D
Screenshots
3D Print
Save
Close
Coronal (MPR)
Sagittal (MPR)
Axial (MPR)
DummyPatName!
1/1/1960
DummyPatID!
RAO: 0°
Caudal: 0°
Volume Rendering
Segmenting vessel...
Series: 5
Slices: 1-1359



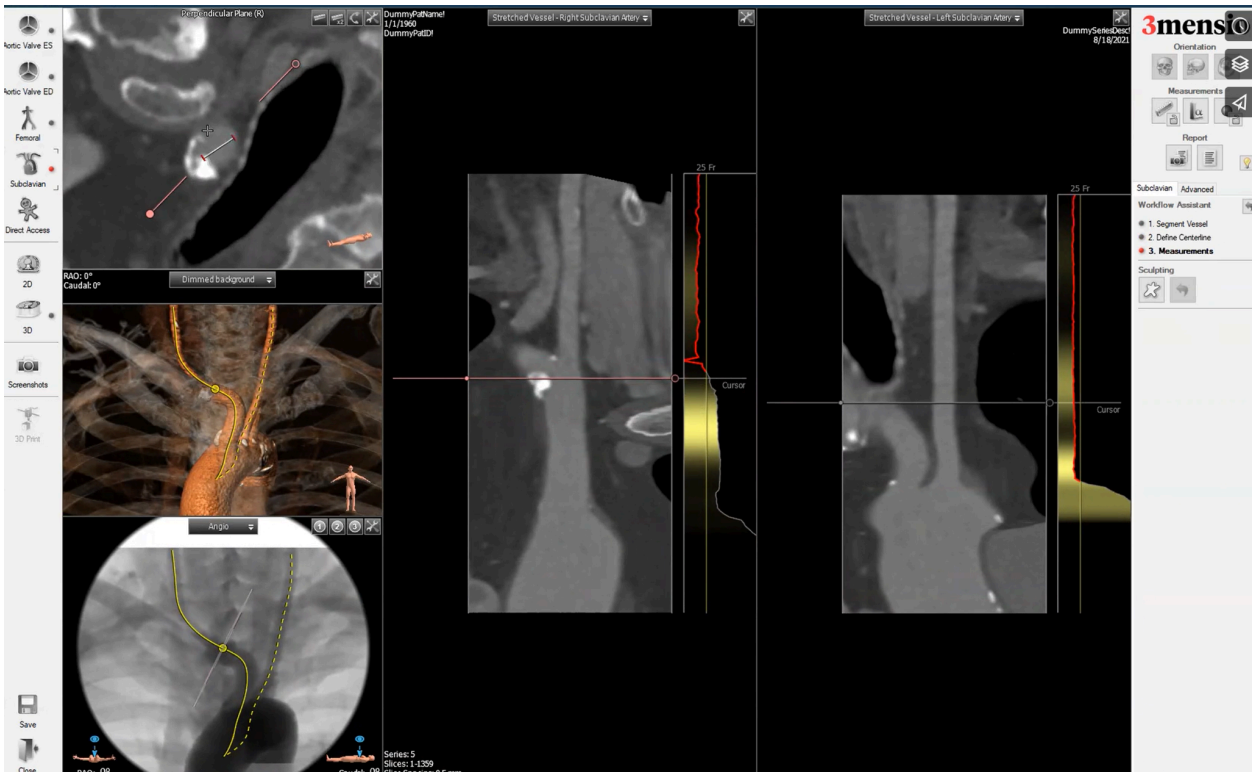
Define centerline

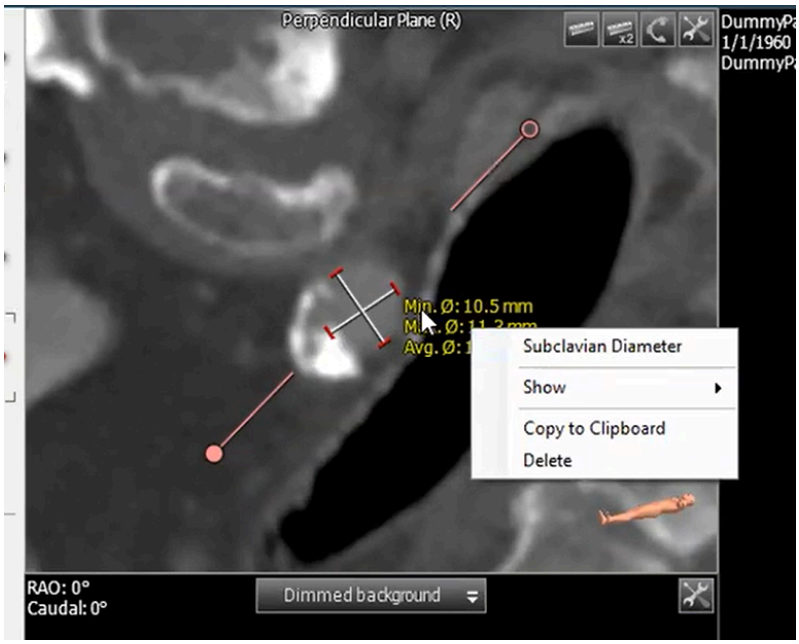
- Center the dots of both center lines within the middle of the vessels. Check by clicking with left button on the right snake view to spin the vessel once.
- Check the centerline within the curved MPR and ensure that the centerline is within the center of the vessel lumen.
    - Can adjust or delete points so centerline is accurate.
- Click confirm when done.

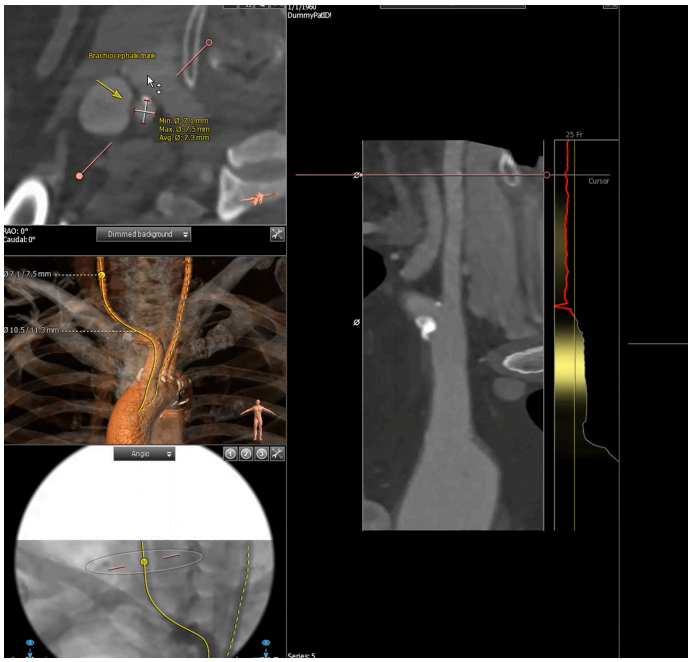
Measure vessels

- Measure brachiocephalic arteries
    - Now drag the red line in the middle box while looking in the top Left box to find the narrowest area within the brachiocephalic artery and measure the lumen with two perpendicular lines.
    - Scroll to the mid brachiocephalic vein and measure by clicking “measure x2”
    - Right click and add text annotation arrow and label it “brachiocephalic trunk”
    - Save

    - Add text annotation to the middle longitudinal view and take snap shot. Do the same for the RCC and LCC.
- Measure RCC
    - Repeat this process for the RCCA and add text and label annotation in top left box as “R CCA.”
- In the middle box label text annotation as “brachiocephalic and R CCA” and save
- Repeat this process for L CCA and label “L CCA” in the right box and save.







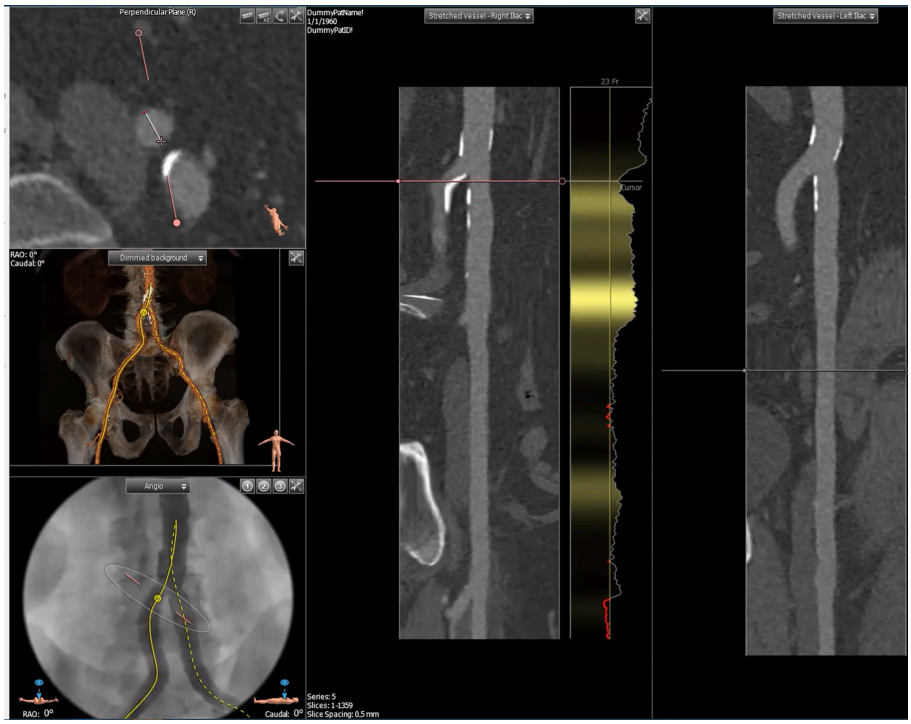
Segment femoral vessels

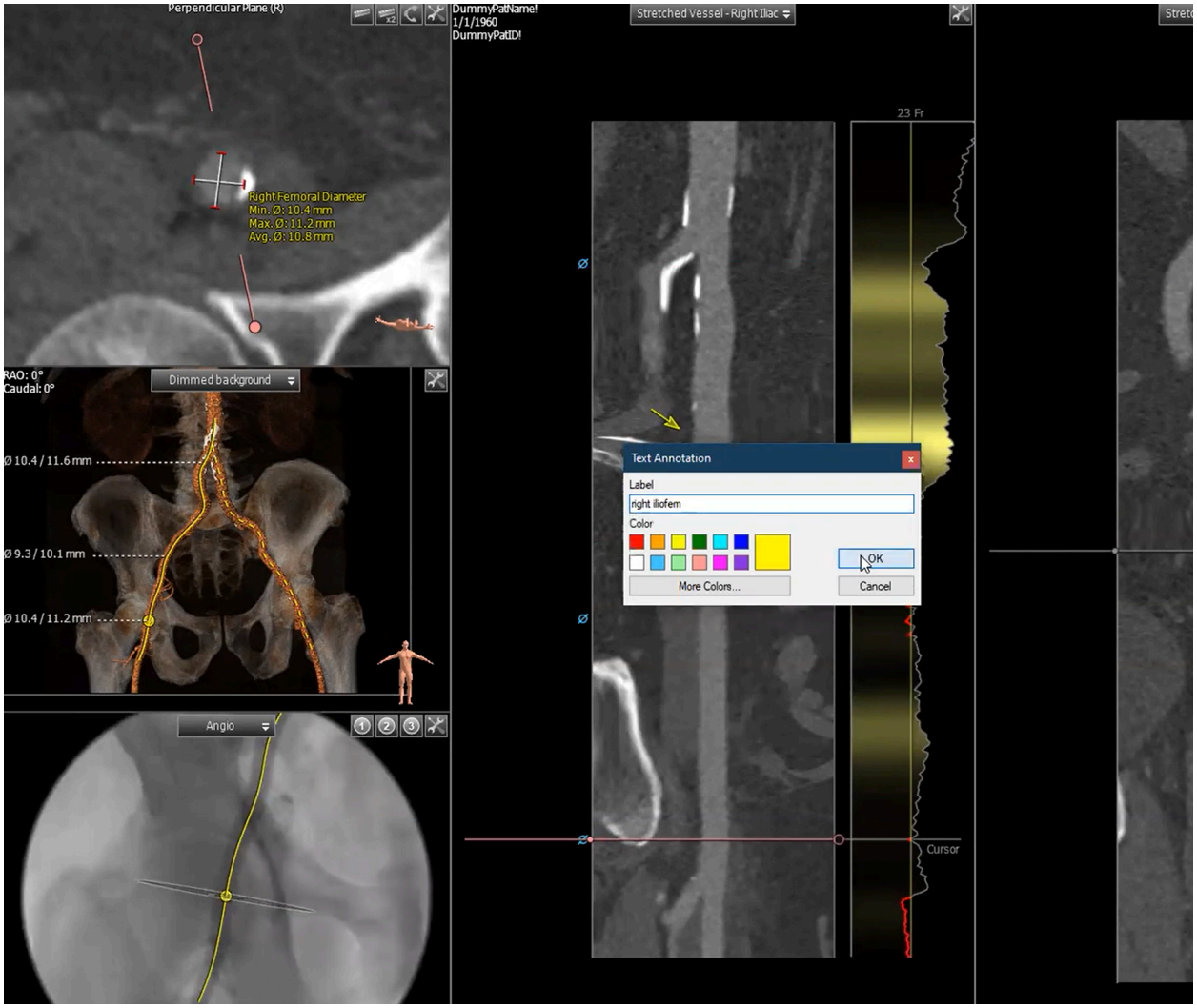
- Click on the femoral icon in the left tool box.
- Click Switch series
- Scroll to bottom and click on CTA chest
- Click on aorta above the bifurcation which will automatically select.
    - Can add a vessel if there is a segment missing.
- Save a AP and bilateral oblique views of this segmented view for the surgeons by saving the images.
- Confirm segmentation

- Click in three places: above bifurcation and within the superficial femoral arteries bilaterally.
- Usually the curved MPR are perfect. Confirm as before.

Measure vessels

- Find the narrowest part of the R common iliac arteries just below the bifurcation in the middle box and then measure the diameter in the perpendicular plane.
- Right click on measurements and select R common iliac measurement text.
- Take screen shot of the axial measurement plane with text as well as the middle coronal plane with “R common iliac” label pointing at level of axial plane.
- Scroll down and do the same for the R mid external iliac (before inguinal canal)
- Scroll down and do the same for R common femoral. Ensure that you are below the inguinal canal and when taking snap shot ensure that the Deep femoral artery can be seen in the plane so surgeons are confident they are sticking the correct artery.
- If there is wall calcification, can measure slightly into it due to blooming effect.
- Repeat for the left side and save along the way.





Review report pictures (ensure the report follows the following order)

- Sinus of valsava measurements
- SInus of valsalva area
- Annuluus dimension area
- LVOT diameter area
- Hokey puck VR
- Hokey puck MIP
- FLuoroscopic image with angle
- SoV height coronal picture
- Sinotubular junction axial area
- Ascending aorta diameter
- Right coronary height on coronal plane
- L coronary height on coronal
- AP segmented view of femoral arteries
- L oblique of femoral arteries

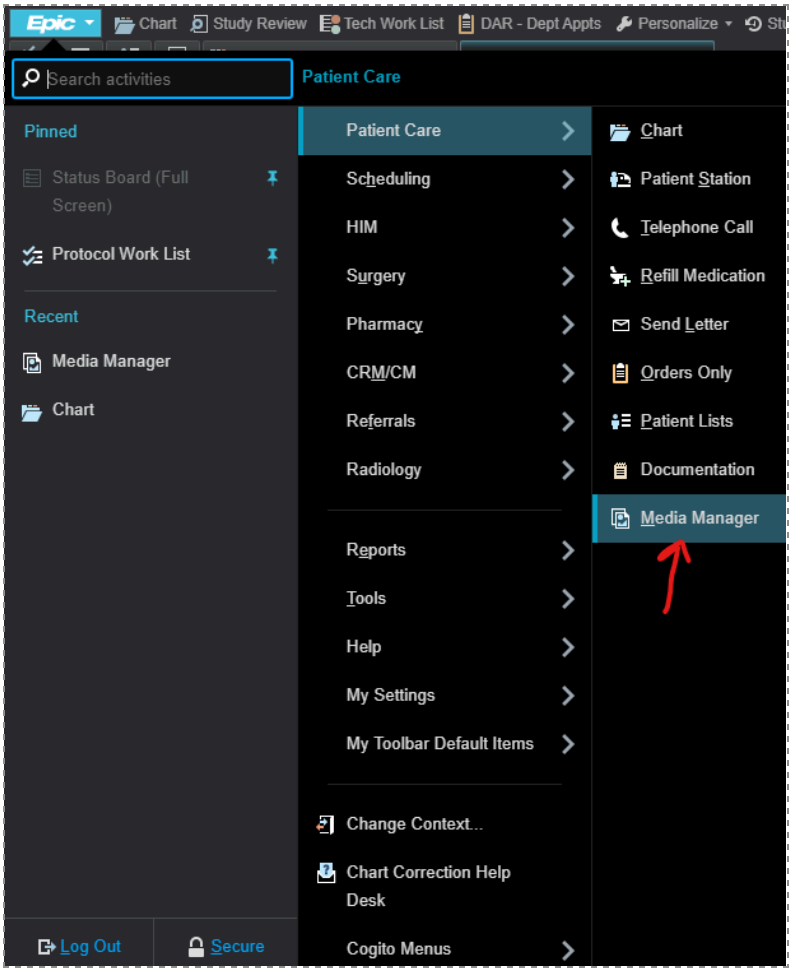
- R oblique of femoral arteries
- R common iliac diameter perpendicular plane
- R common iliac coronal stretch vessel
- R external iliac diameter in perpendicular plane
- R external iliac coronal stretch vessels
- R femoral diameter perpendicular plane
- R femoral stretched vessel
- L common iliac diameter perpendicular plane
- L common iliac coronal stretch vessel
- L external iliac diameter in perpendicular plane
- L external iliac coronal stretch vessels
- L femoral diameter perpendicular plane
- L femoral stretched vessel
- Brachiocephalic trunk perpendicular
- R CCA perpendicular plane
- R CCA R brachiocephalic stretched vessel view
- L CCA perpendicular plane
- L CCA stretched vessel view
- Membranous semptum

Review report

- Click show report
- In the report details write the attendings name in the “created by:” section
- Under the comments section include your name “prepared by [name]”
- Save in two places: save report to DICOM archive and export report.

Upload TAVR to EPIC

- Epic button at top left -> patient care -> media manager
- Enter MRN at click “okay”
- Click “add new media” at the top
- Document type “image report”
- Click “find orders” and select the “CT HEART AORTIC VALVE” from the list. Click “accept”
- Click “import” and navigate to the folder where you saved your TAVR report
- Made the description “last name_first name_TAVR heart and access”
- Click “accept” down below


Epic
Chart
Study Review
Tech Work List
DAR - Dept Appts
Personalize
Search activities
Patient Care
Pinned
Status Board (Full Screen)
Protocol Work List
Recent
Media Manager
Chart
Patient Care
Scheduling
HIM
Surgery
Pharmacy
CRM/CM
Referrals
Radiology
Reports
Tools
Help
My Settings
My Toolbar Default Items
Change Context...
Chart Correction Help Desk
Cogito Menus
Chart
Patient Station
Telephone Call
Refill Medication
Send Letter
Orders Only
Patient Lists
Documentation
Media Manager
Log Out
Secure