



**V Curso “José Gabay” para Intervencionistas
em Treinamento de ProEducar**

SOLACI Congress 2014

Transcatheter Aortic Valve Implantation: Step by Step

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São Paulo – Brasil



The procedure overview

- **3 principles for successful TAVI:**
 - ✓ *Patient selection*
 - ✓ *Teamwork = Heart Team*
 - ✓ *Attention to the technical details of the procedure*

The procedure overview

➤ Before the procedure:

- ✓ *General Anesthesia / Conscious Sedation*
- ✓ *Monitor ECG and hemodynamics*
- ✓ *Review TEE findings*
- ✓ *Insert and test pacemaker – IJV for CoreValve
FV for Sapien XT*
- ✓ *Essential material on table (sheaths, guidewires, catheters)*
- ✓ *Check contrast volume on power injector (50/50 saline and contrast) and define who is responsible for specific actions (pacing, injectors)*

The procedure overview

➤ **Fundamental steps:**

- ✓ *Vascular access*
- ✓ *Cross stenotic native valve and position LV stiff wire*
- ✓ *Balloon aortic valvuloplasty*
- ✓ *Transcatheter heart valve deployment*
- ✓ *Assess results: haemodynamics / TEE / angio*

The procedure overview

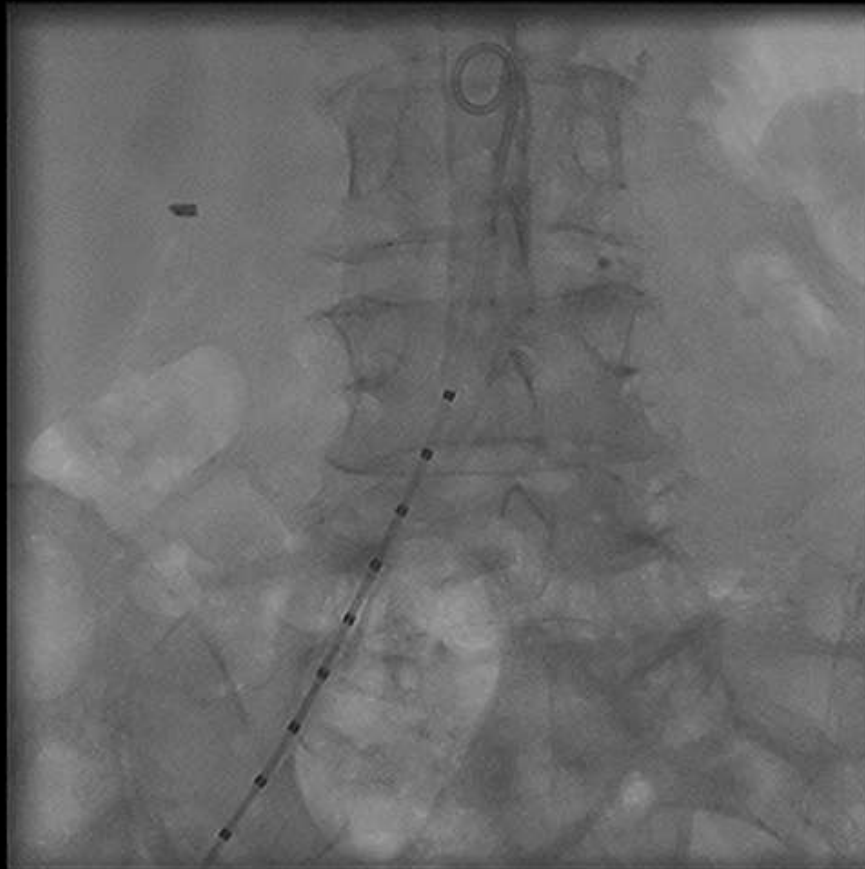
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- ✓ ***Obtain vascular access***
- ✓ ***Cross stenotic native valve and position LV stiff wire***
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Arterial Access

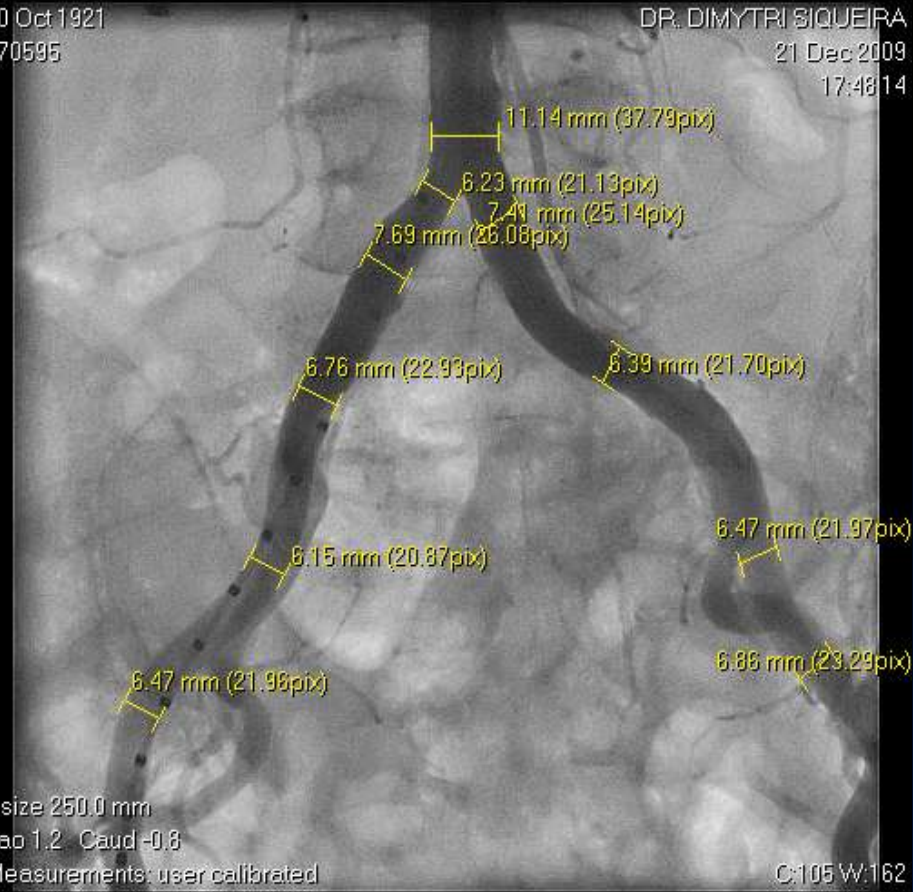
Basic Guidelines

Determine the size of common femoral artery, and external and common iliac arteries



10 Oct 1921
170595

DR. DIMYTRI SIQUEIRA
21 Dec 2009
17:48:14



Il size 250.0 mm
Lao 1.2 Caud -0.8
Measurements: user calibrated
Zoom (1.000x). Sharpen (25%)

C:105 W:162
52/122

Arterial Access

Basic Guidelines

Focus on calcification, especially at bifurcations

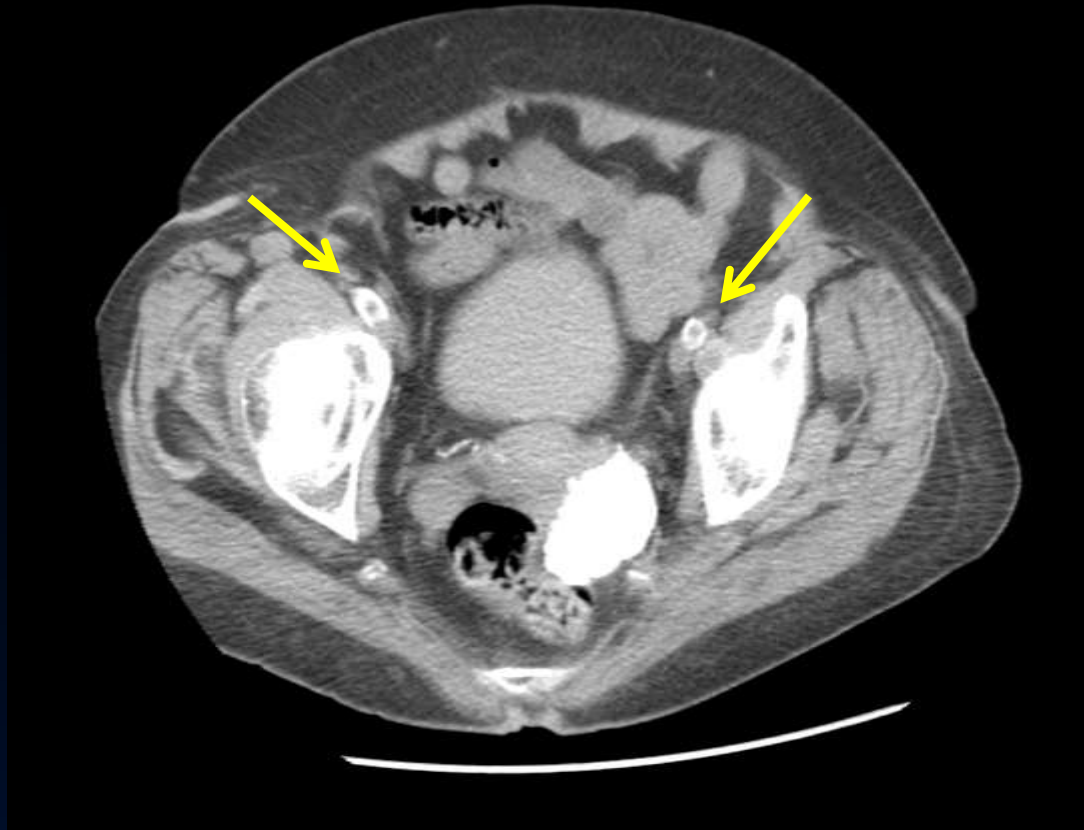
(CTA or CT w/o contrast - very helpful)



Arterial Access

Basic Guidelines

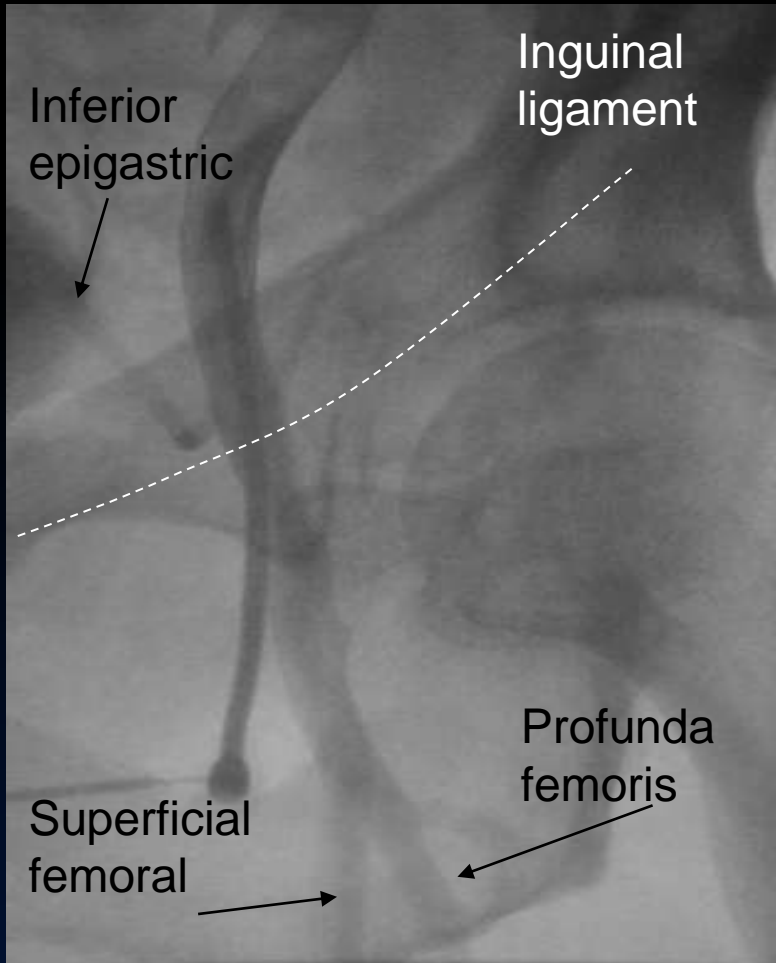
Be extremely cautious with circumferential calcium



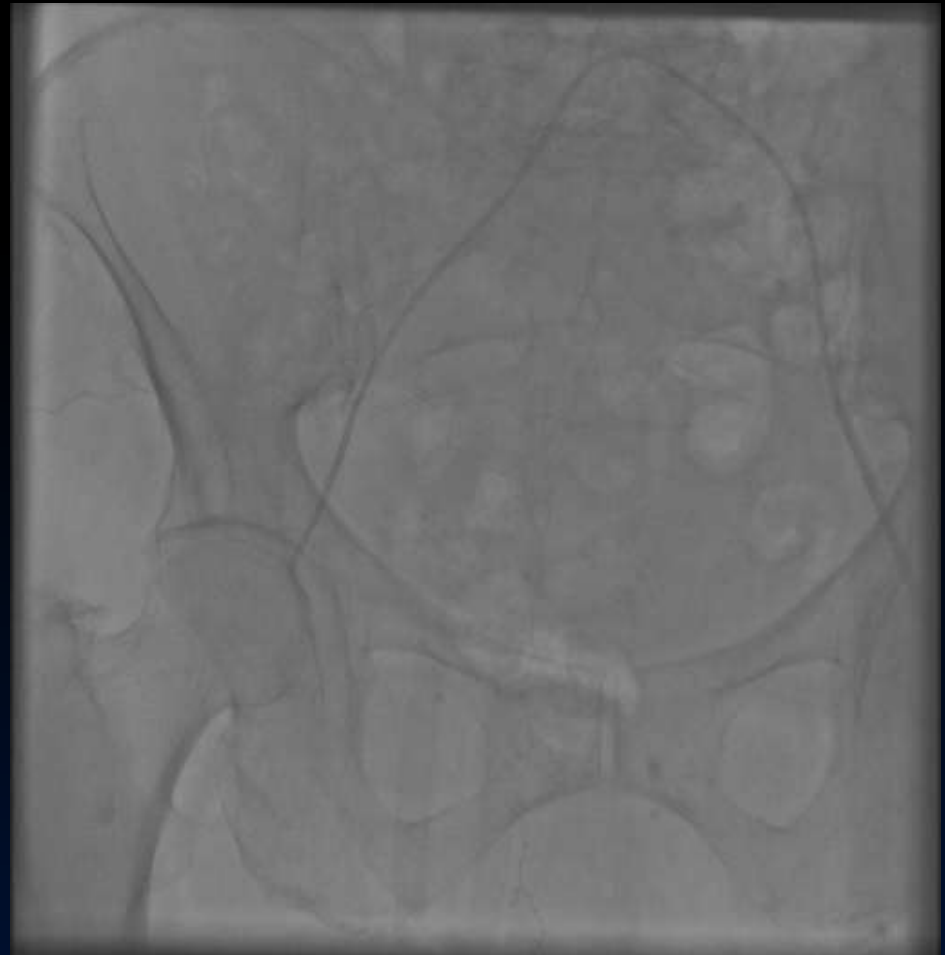
Arterial Access

Rules for a Perfect Puncture

Landmarks for puncture
from prior angiogram



Locate puncture site before 16-18F
sheath (contralateral injection)





Placing Large Sheath

- **Option 1:**

- 6F-7F sheath: 2 Percloses, place stiff wire in descending aorta with JR or Pig-Tail
- 16-18F sheath: cross the valve, get pressure measurements for gradient determination, place stiff wire in the LV, perform BAV and Sapien XT or CoreValve implantation

- **Option 2:**

- 7 F or 8 F sheath: 2 Percloses, cross valve, get pressure measurements for gradient determination, place stiff wire in the LV
- 18F sheath: BAV and Sapien XT or CoreValve implantation



Positioning of Pigtail

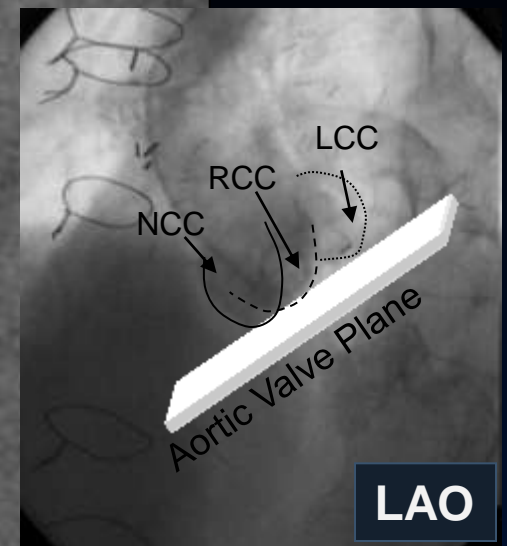
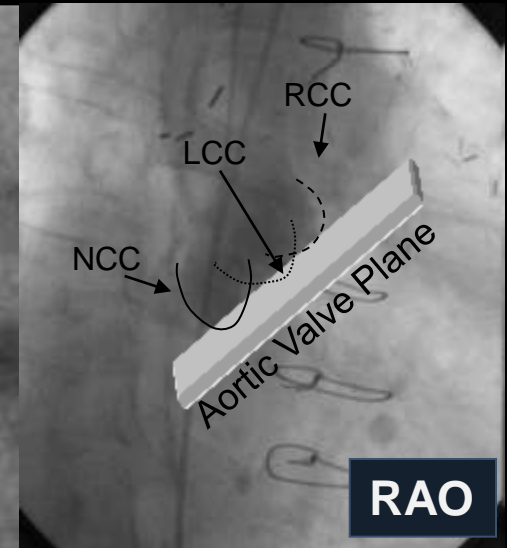
All 3 sinuses and valve cusps should be in same plane

LAO Cranial

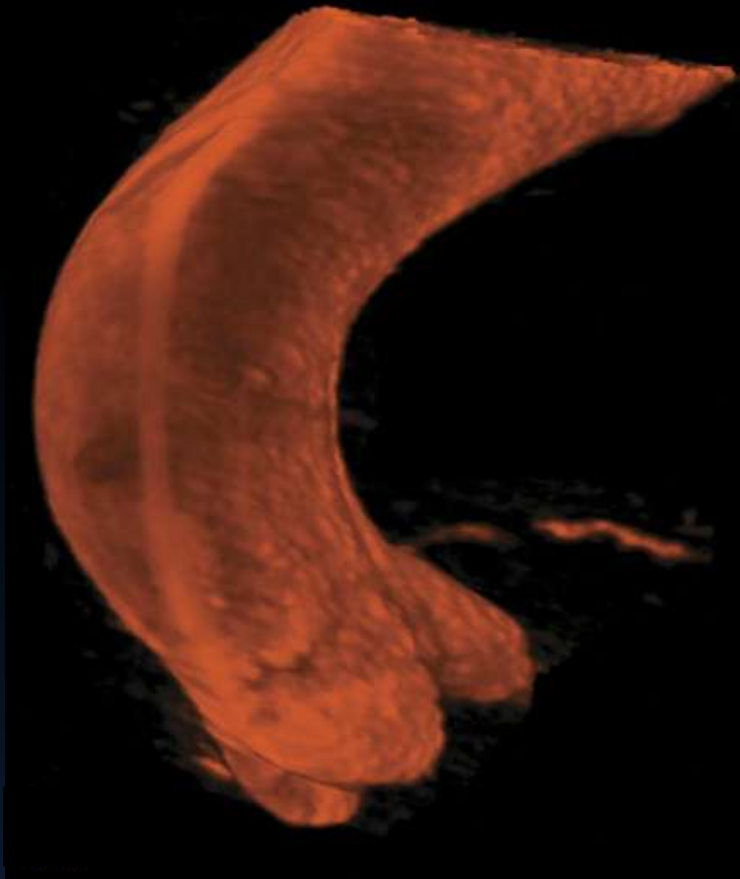
3

2

1



Finding the “working projection”



**Intraoperative
rotational angiography with 3-D
reconstruction (Dyna CT, Siemens)**



CT Angiography

The procedure overview

➤ Fundamentals steps:

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Crossing the Stenotic Aortic Valve

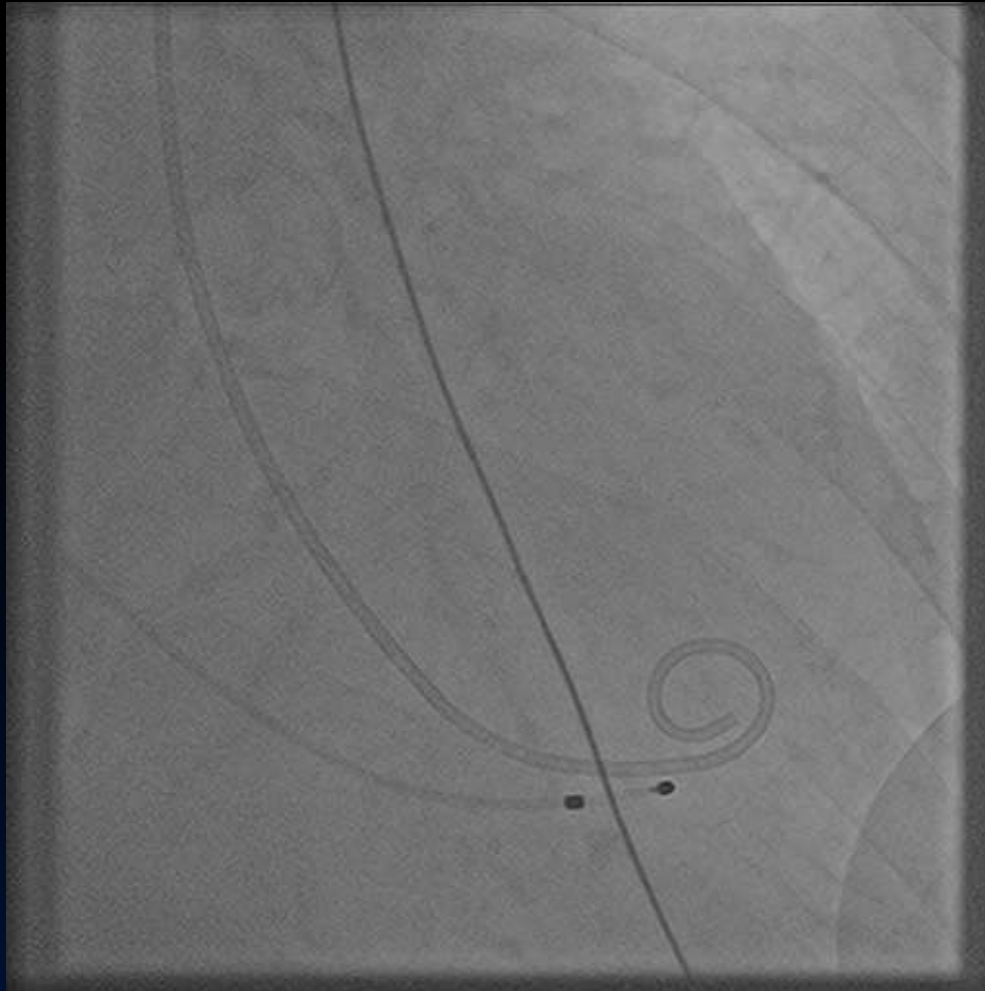


- Use both LAO and RAO projection
- Left Amplatz catheter (5F AL 1 & 2)
- 0.35" regular, straight wire
(Terumo hydrophilic RADIFOCUS
in difficult cases)
- Avoid coronaries and SVG
- Cross and advance wire into LV



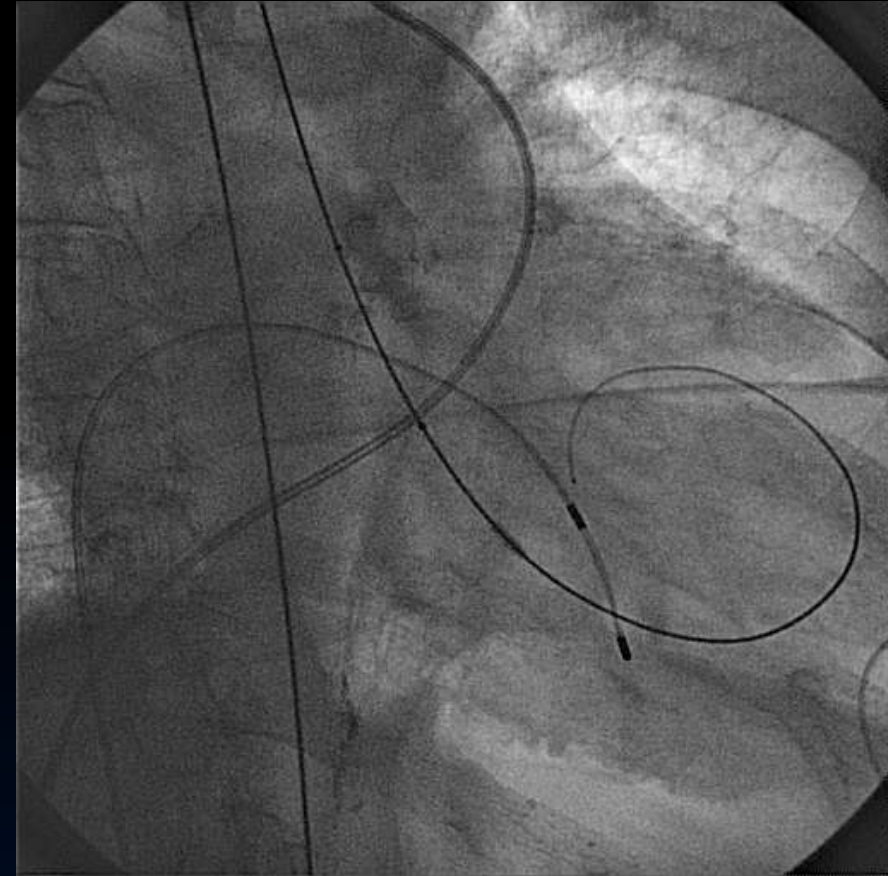
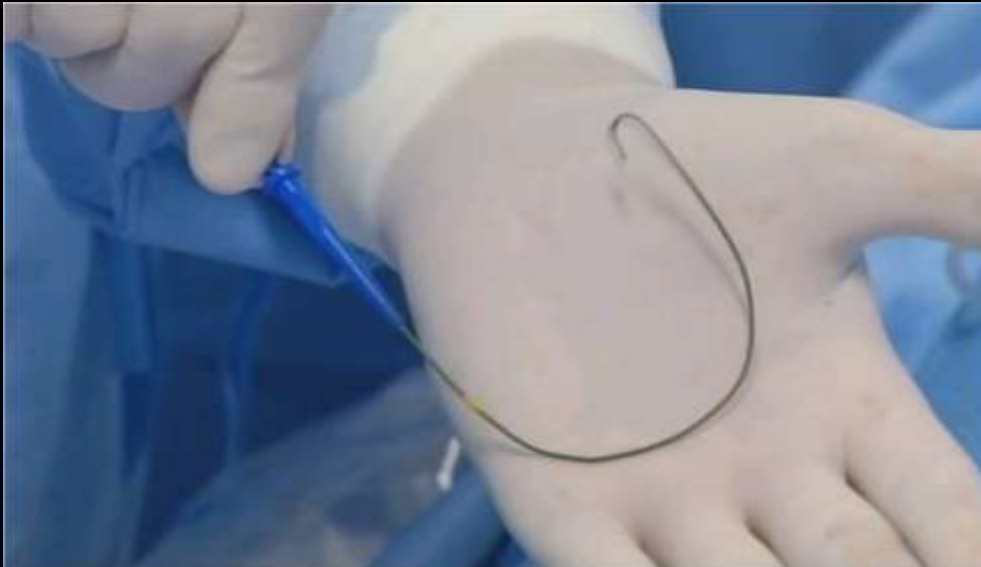
Wire Shape and Position

Use pig-tail to position extra-stiff or super-stiff wire (in RAO projection)





Wire Shape and Position



Place 0.035" extra-stiff or super-stiff guidewire with soft tip via the pigtail into LV (RAO projection)
- Shape the distal tip with a broad curve

The procedure overview

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Rapid pacing during BAV

- Extremely cautious with PM placement / positioning
- Prefer to use balloon-tipped 4 or 5F pacemaker
- Use LAO projection to ensure septal orientation

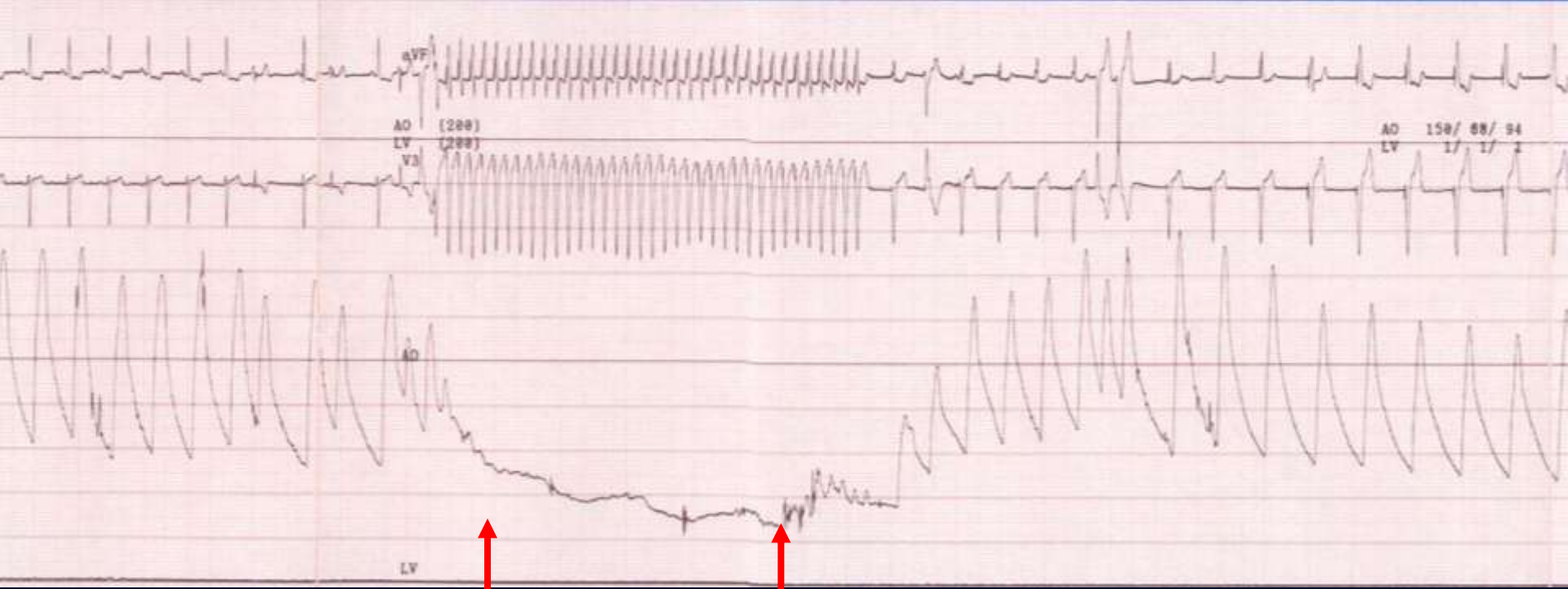




Rapid pacing during BAV

RV temporary pacing lead - via FVein or IJVein sheath

If 1:1 capture does not occur at 180-200 BPM, then initiate pacing at 100 BPM (after 1:1 capture increase to 180)

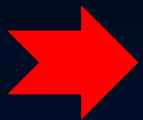


Inflate

Deflate



BAV Technique



Have the valve crimped and ready to go before BAV
Especially important for decompensation after BAV

The procedure overview

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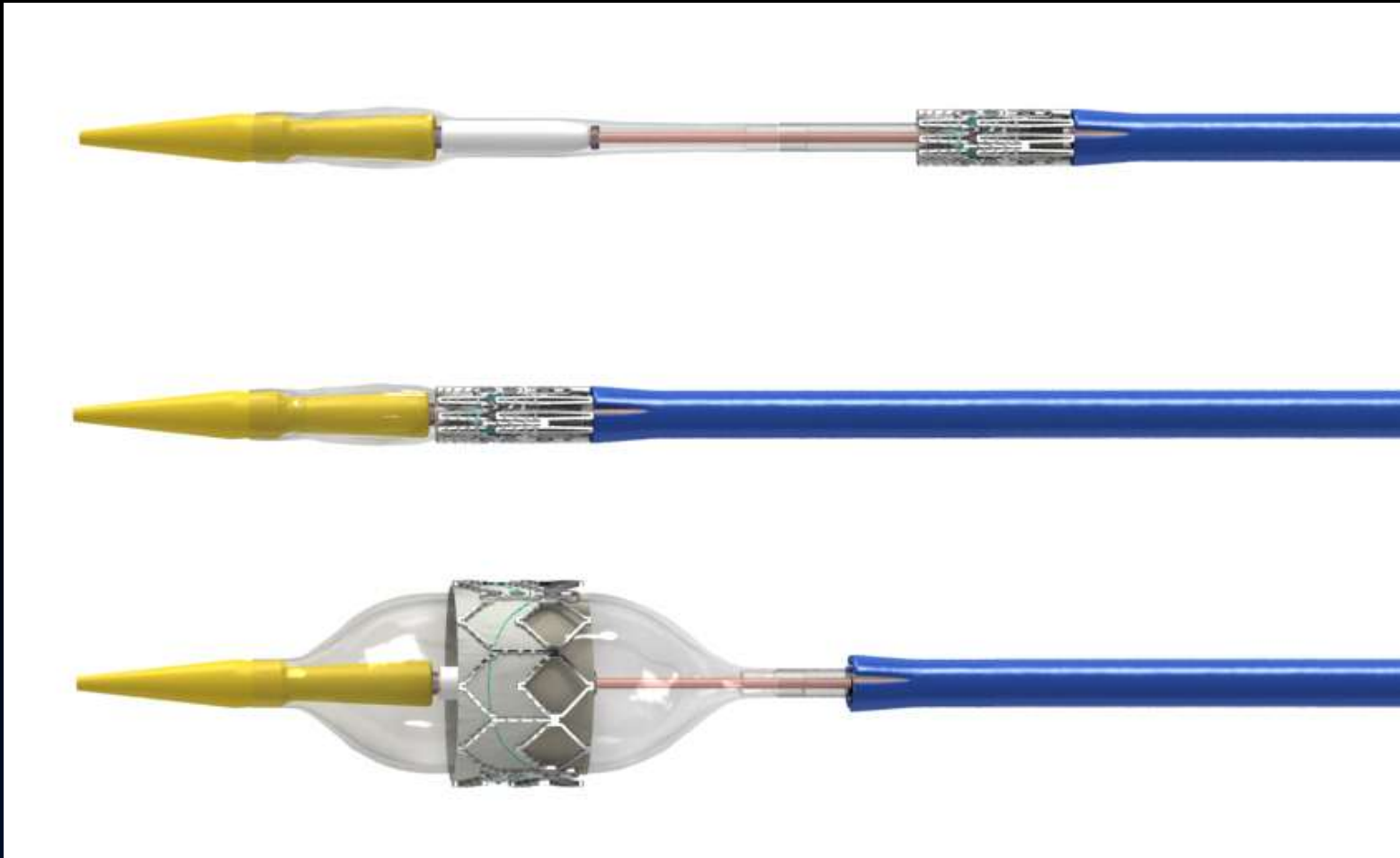
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SAPIEN XT (Edwards Lifesciences Inc.) Implantation steps

Sapien XT Transcatheter Heart Valve

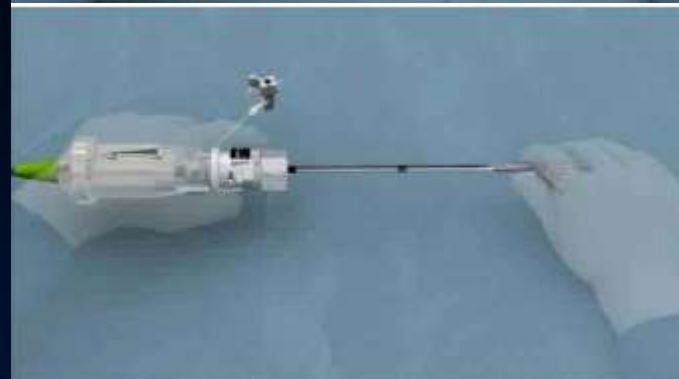
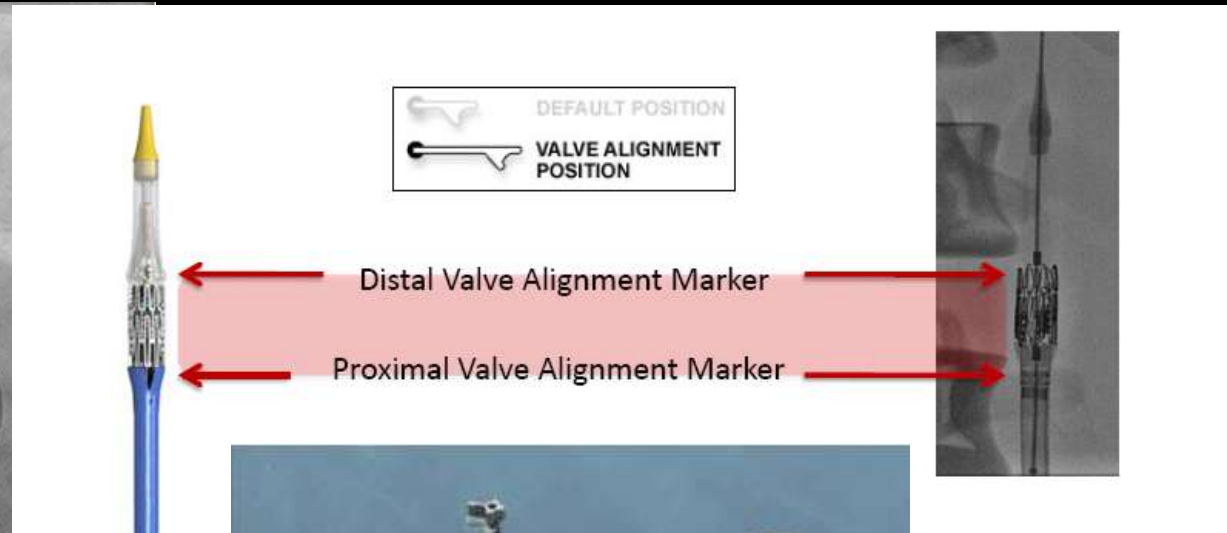
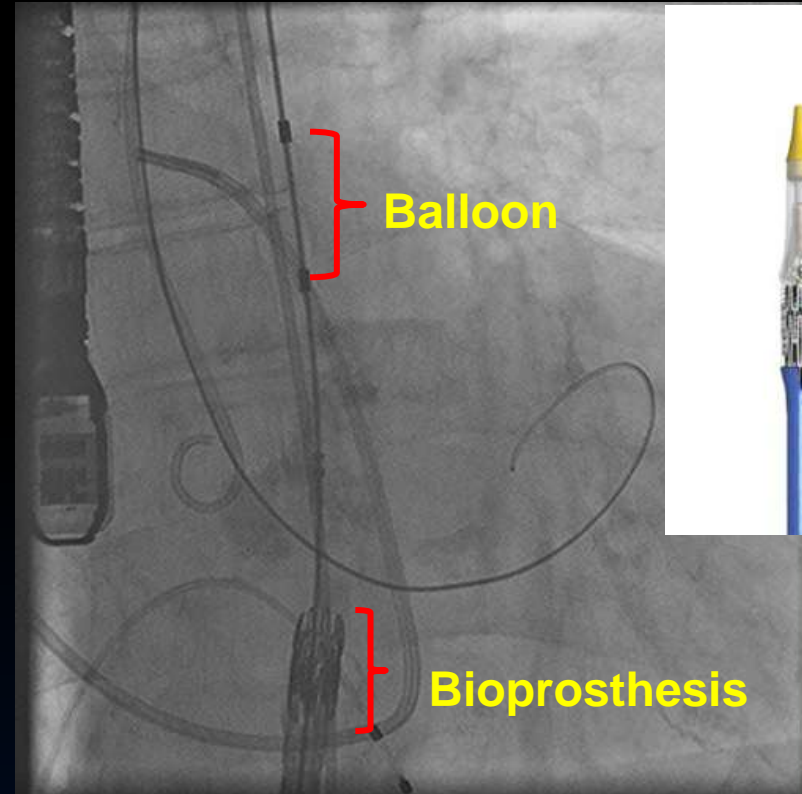
NovaFlex delivery system





Sapien XT Implantation steps

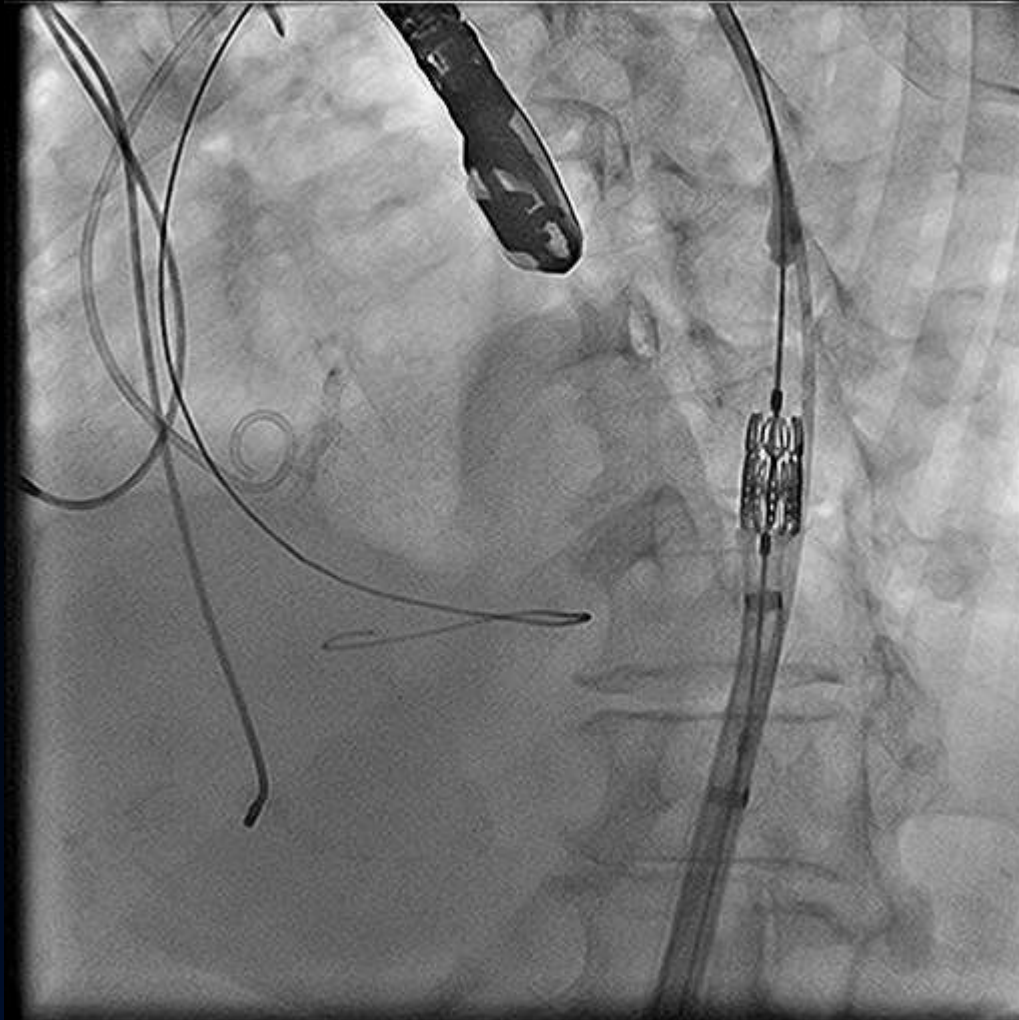
Valve alignment





Sapien XT Implantation steps

Crossing the aortic arch

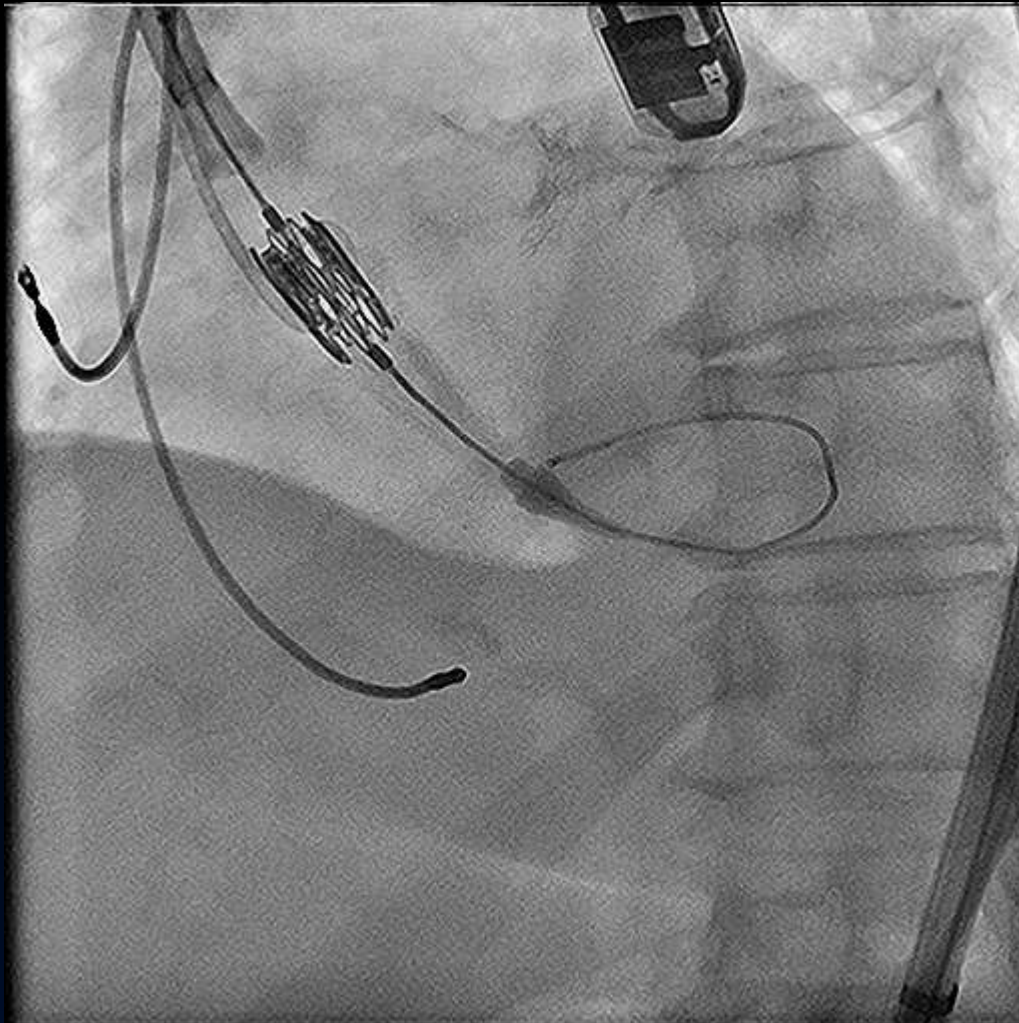


- **Ensure optimum wire position**
- **Rotate Flex Wheel to track over aortic arch**
- **Use LAO 30 to 40 to provide view of aortic arch**
- **Observe navigation through aorta**



Sapien XT Implantation steps

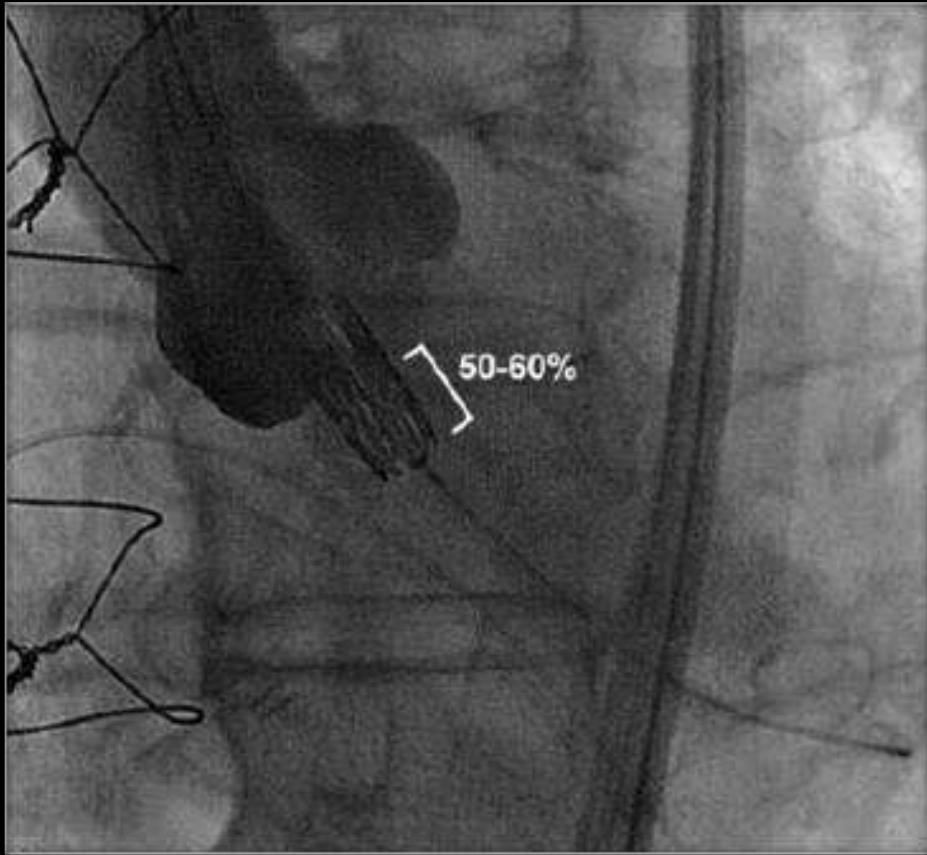
Retracting (pulling back) the Nova-Flex sheath



- **Pull back the flex catheter just proximal to the double marker**
- **May need to unflex the catheter**



Optimal Positioning of Sapien XT

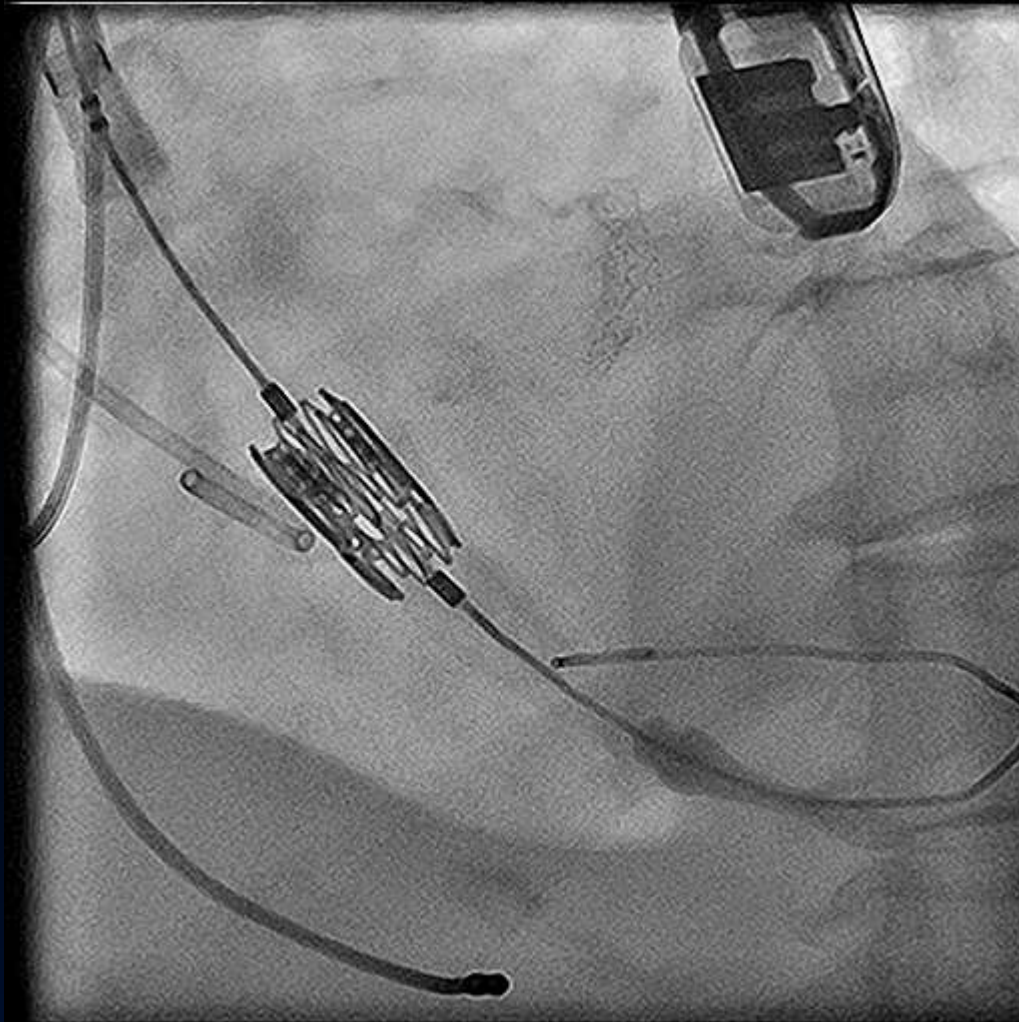


- **Confirm x-ray angles are correct**
- **Use calcified landmarks**
- **Small injections via pigtail**
- **TEE may help as adjunctive imaging**
- **Aortogram during rapid pacing can be useful**
- **Anticipate cranial motion**



Sapien XT Implantation steps

Sapien XT Implantation technique



2-step inflation:

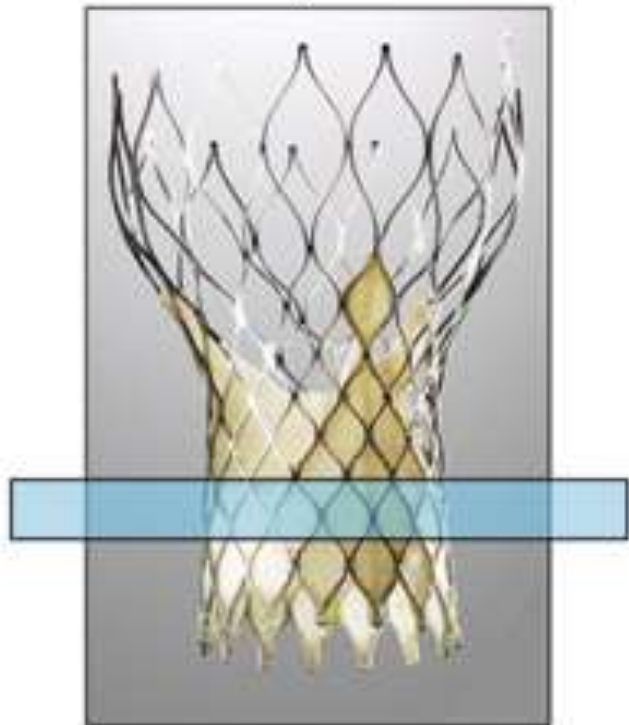
- . Rapid pacing
- . Inflate 30%
- . Angiography to ensure proper positioning
- . Pull the pig tail
- . Slow inflation, hold for 4-5 sec



CoreValve (Medtronic Inc.) Implantation steps

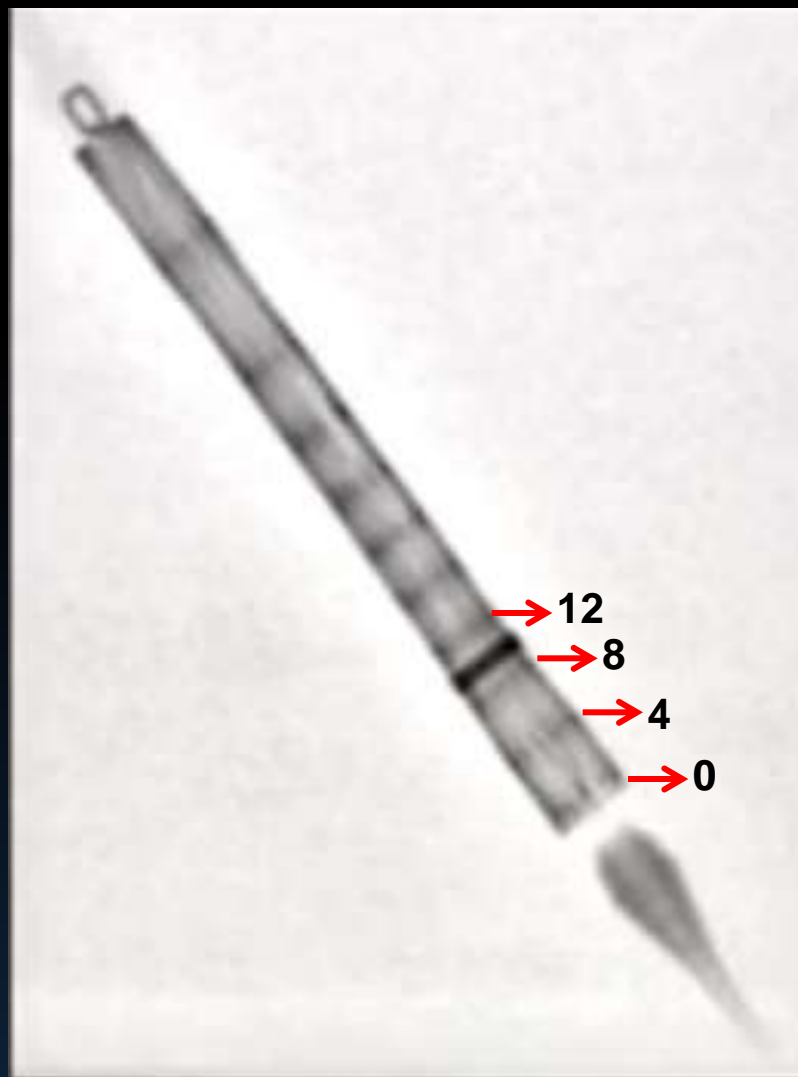
Optimal landing zone for Corevalve

CoreValve 26, 29 and 31 mm



Height of skirt 12 mm

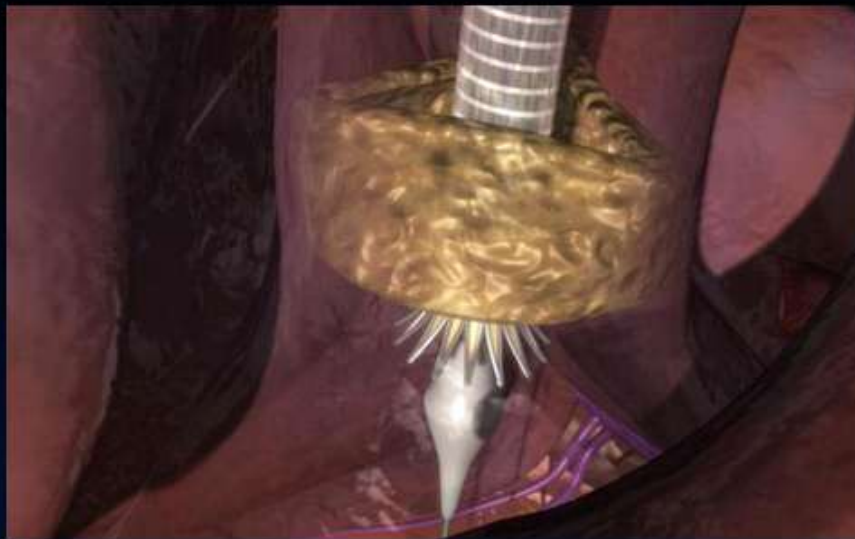
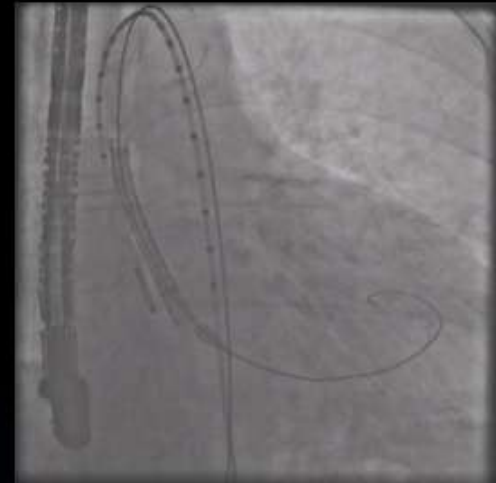
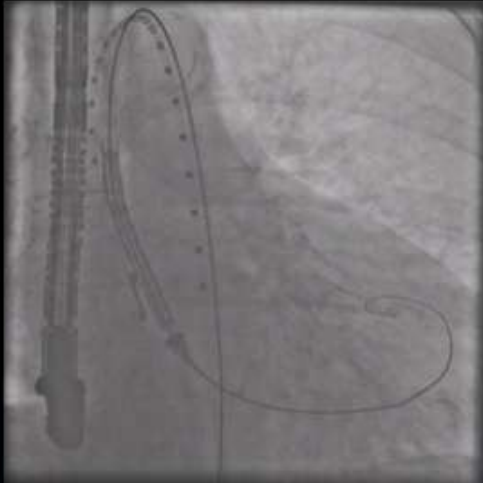
 Optimal landing zone



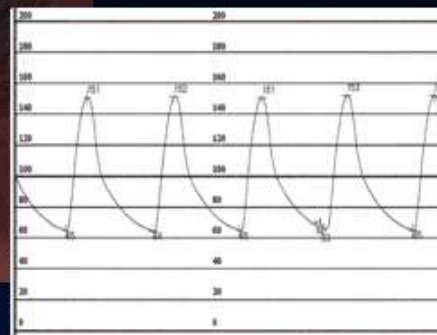


Deployment of Corevalve

First stage



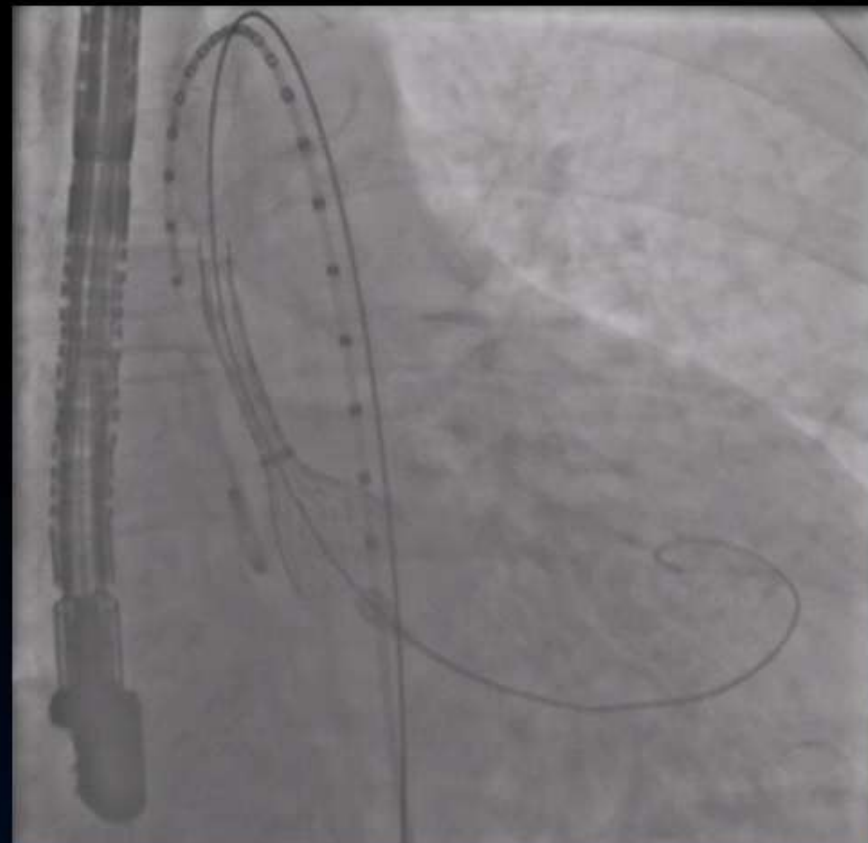
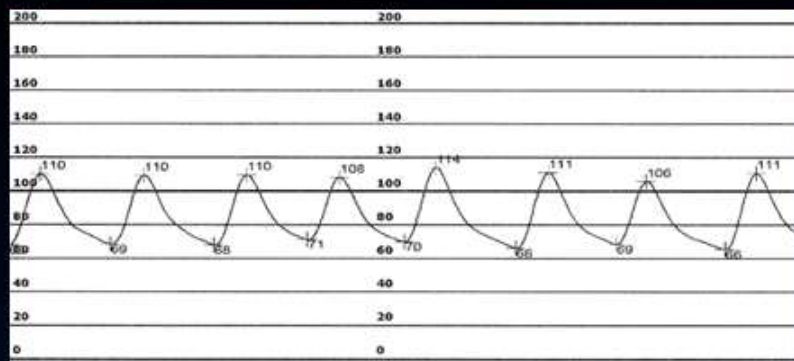
At this stage, you have time...remember that AR or AV block post TAVI could impact prognosis





Deployment of Corevalve

Second stage



Annulus contact, pressure will drop in a minute ...

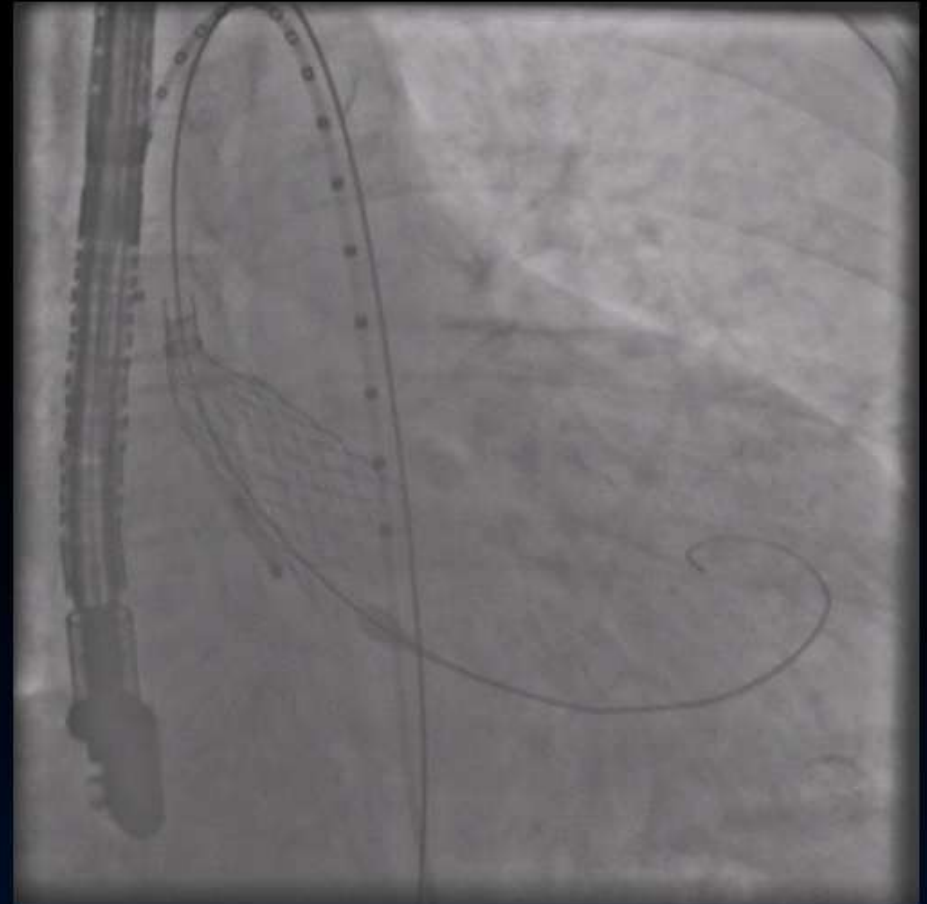
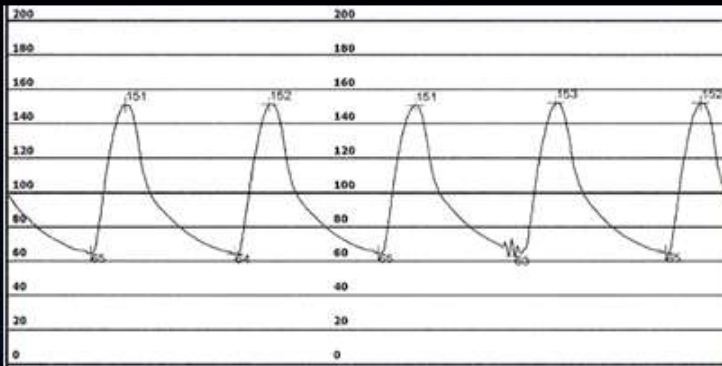
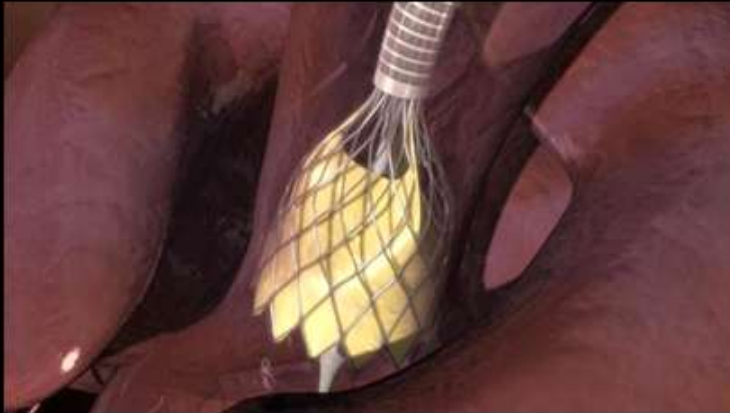
Slowly and coordinated, keep an eye on

haemodynamics. Always on fluoro !



Deployment of Corevalve

Third stage



**Now you have time again... Pressure returns to baseline .
Check position with pig tail injections.**

The procedure overview

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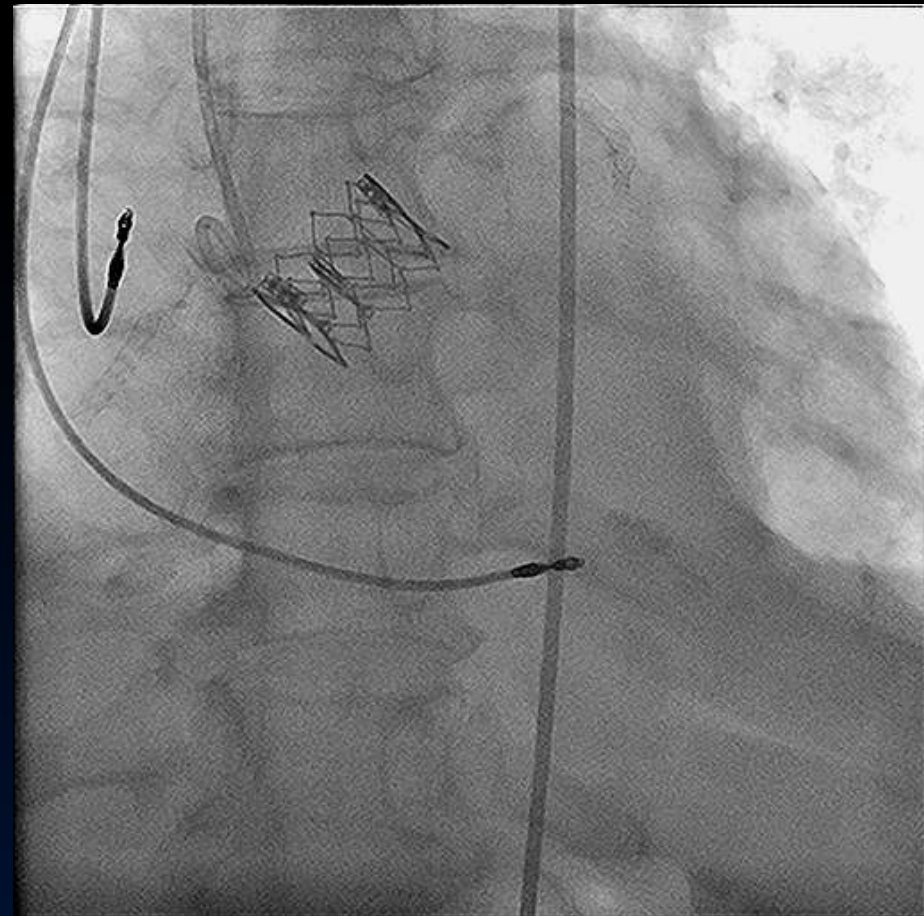
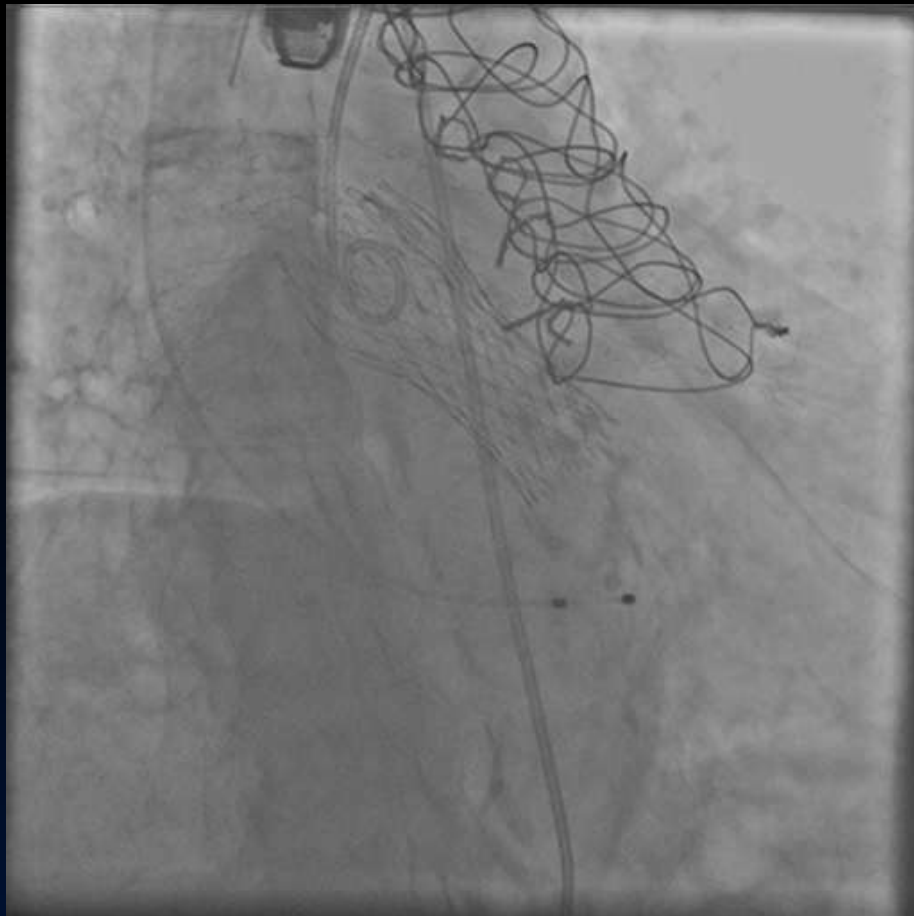
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Assessment immediately after TAVI

- **By TEE , look for:**
 - **Valve location & movement**
 - **Leaflet motion**
 - **Para-valvular AR**
 - **Valvular AR (after removing stiff wire)**
 - **Mitral regurgitation**
 - **LV wall motion**
 - **Pericardium**
 - **Aortic wall (haematoma / dissection ?)**

Assessment immediately after TAVI

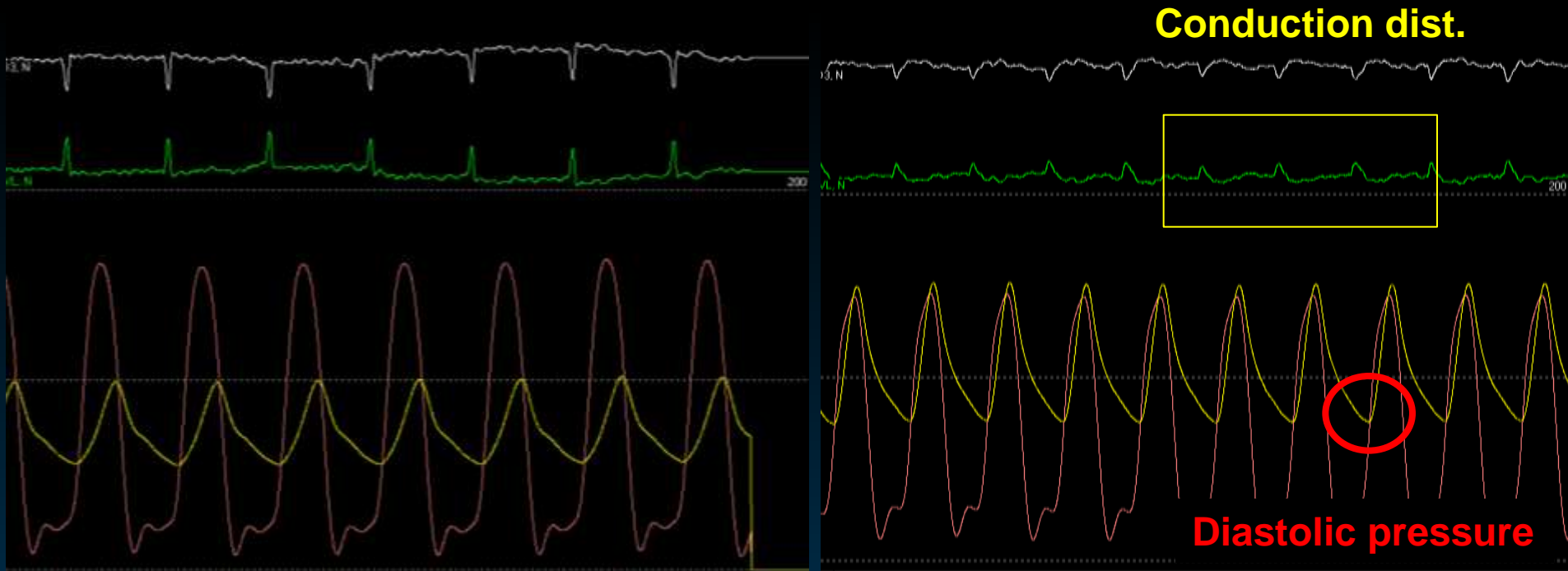
- **Assess**
 - **Valve location, expansion & movement**
 - **AR severity**
 - **Coronary patency**



Assessment immediately after TAVI

- Assess

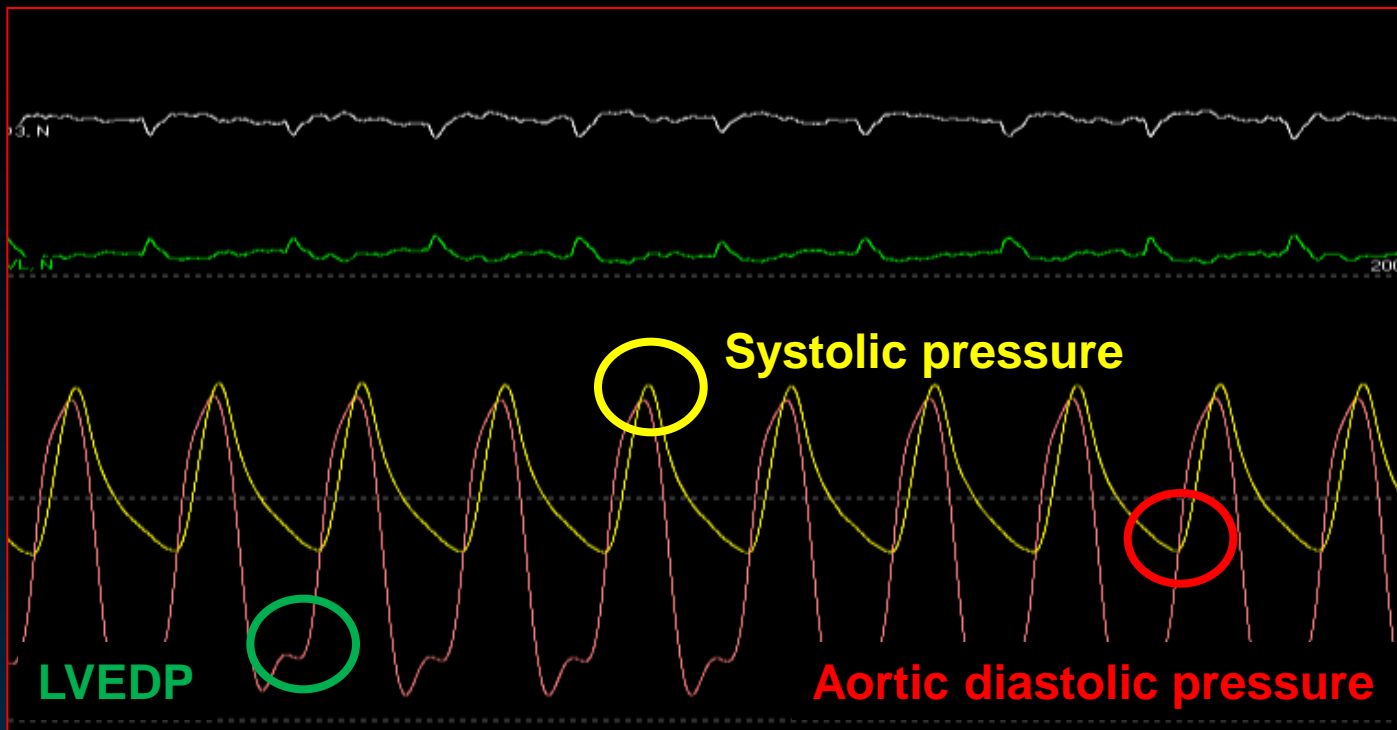
- BP waveform, gradient, diastolic pressure
- HR, PAP
- ECG, ST-T, conduction disturbances



Assessment immediately after TAVI

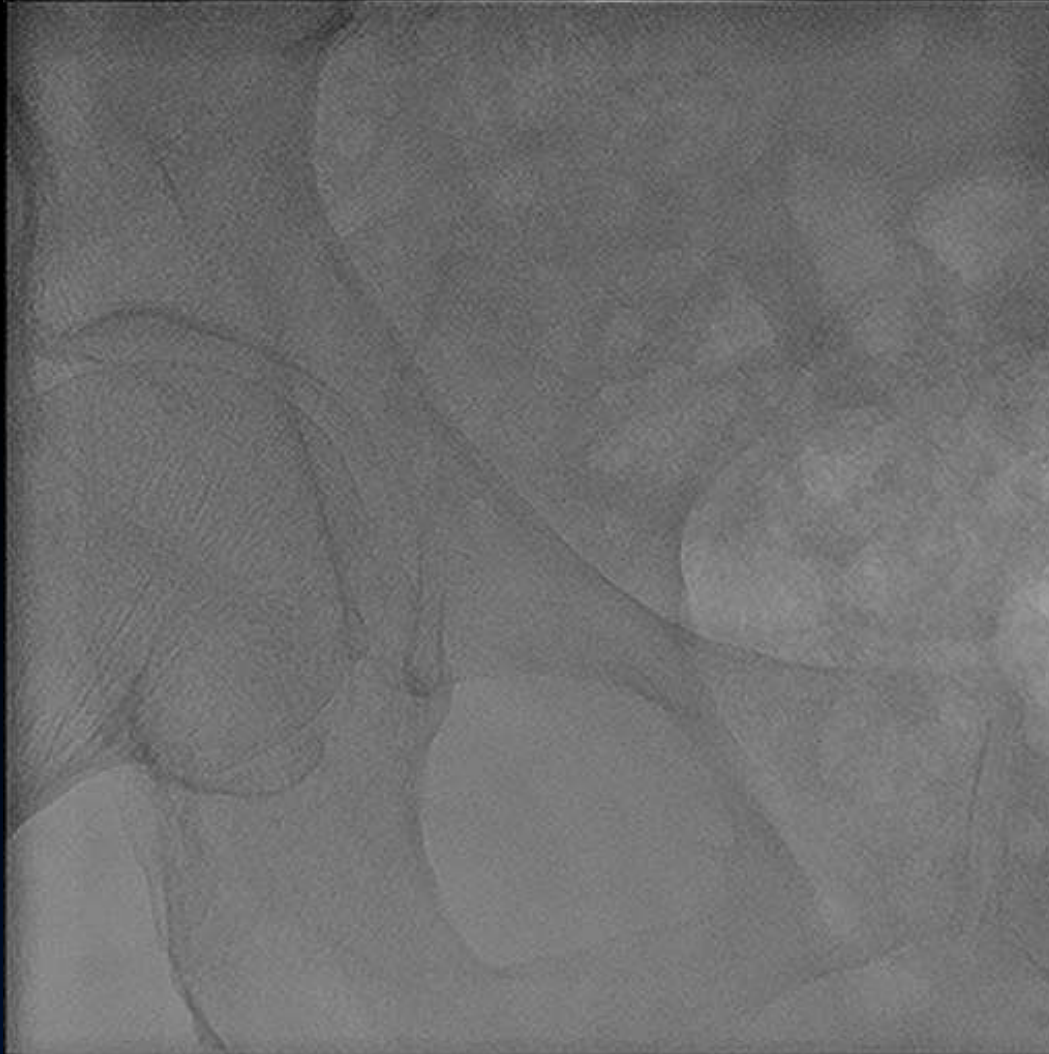
AR index – prognostic information

$$\frac{\text{Aortic diastolic pressure} - \text{LVEDP}}{\text{Systolic aortic pressure}} \times 100$$



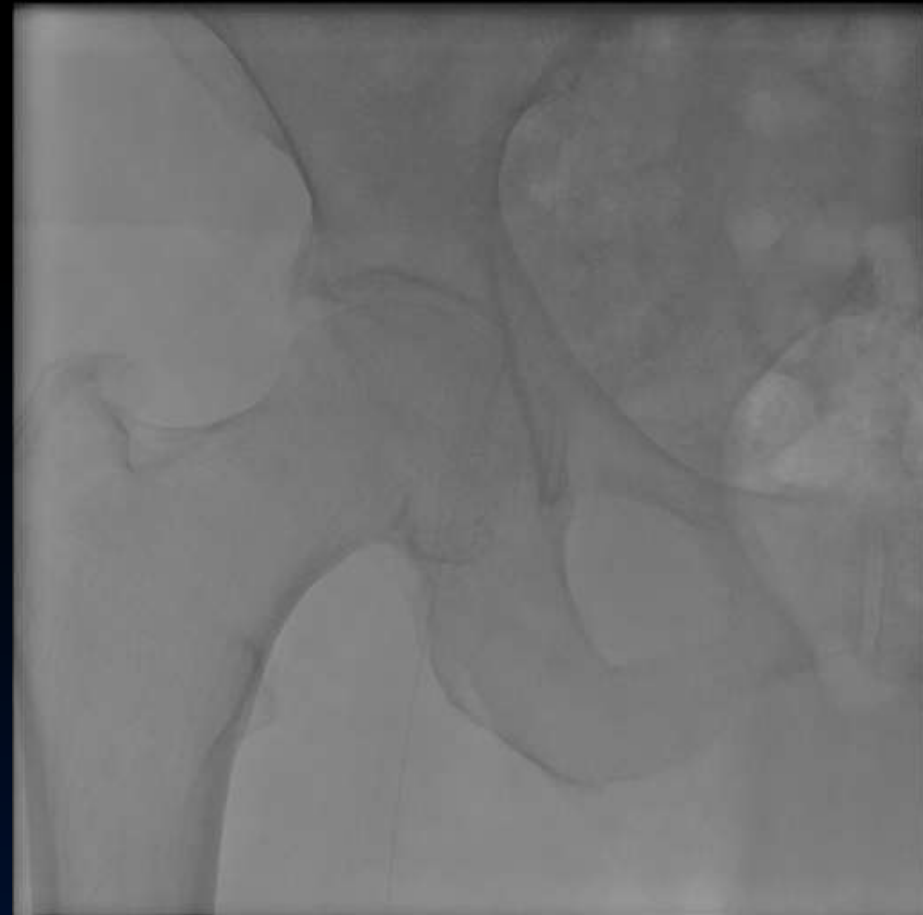
Angiography after access closure

Many complications are detected after sheath removal



Angiography after access closure

Many complications are detected after sheath removal
and must be treated promptly





The procedure overview

Conclusions

- **Transcatheter AVI is a Unique Procedure:**
 - **Attention to the technical details of implantation is mandatory for a successful TAVI**
 - **Staff members must act in perfect coordination during the crucial seconds**
 - **We should optimize the chances for success and mitigate against the risk of failure**
 - **Detailed post-op deconstruction of cases accelerates learning curve and improves team cohesion**

