

CIRA Case of the Week
October 2016

Case Courtesy of Dr. Jonathan Farrell
University of Calgary, AB

Clinical Presentation

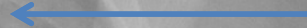
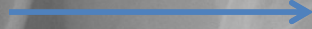
- 26 year old female
- PMHx
 - IV drug abuse
 - Hepatitis C
- Admission
 - Via Ambulance
 - Acute dyspnea, chest pain
 - Hypotension, tachycardia, hypoxia

2.08mAs 95kVp
06.08.2015 15:11:39

PORTABLE

REX#: 414 Tech:
Chest AP Upright LANDSCAPE

AP

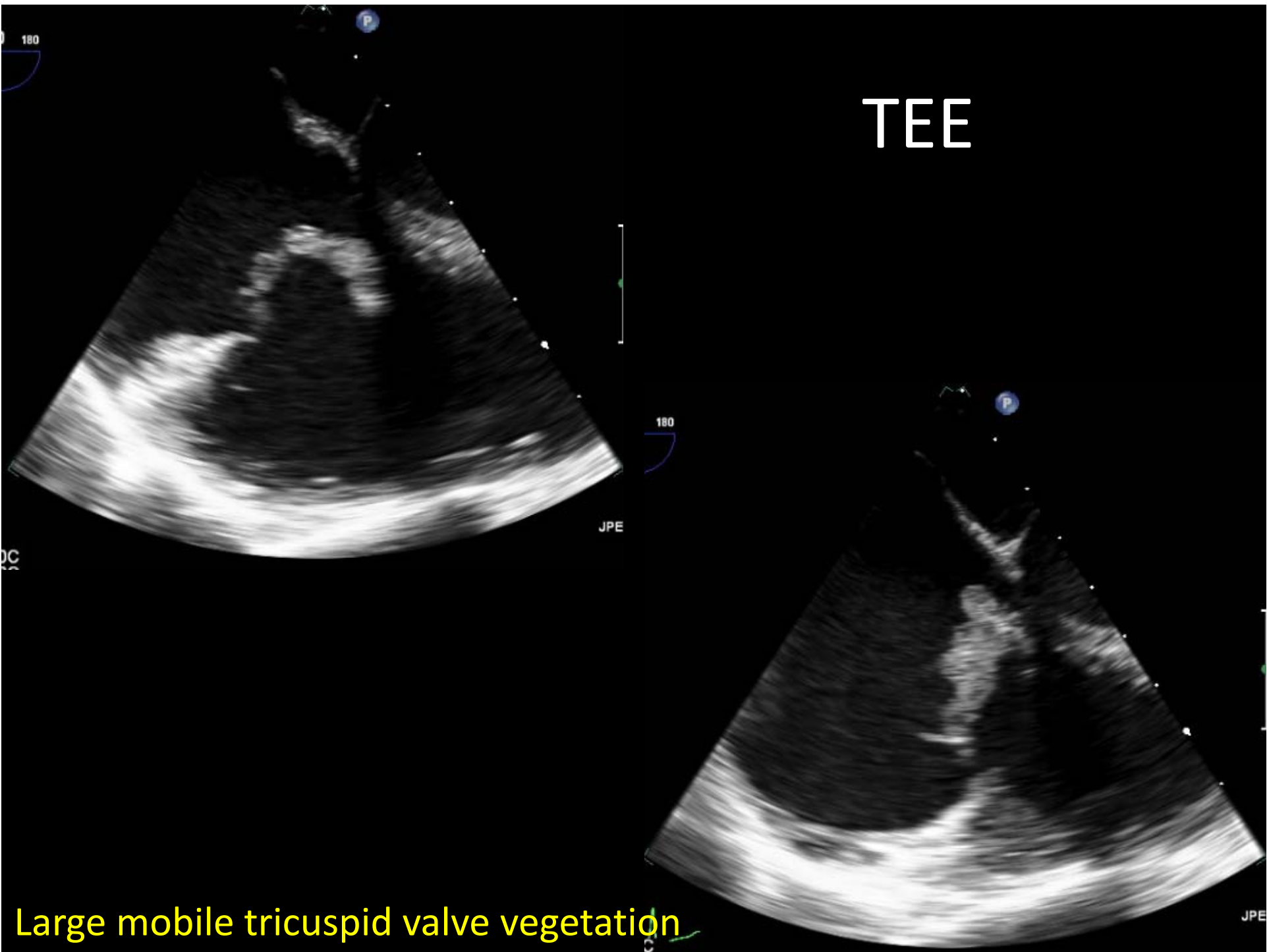


Multiple bilateral confluent airspace opacities



**Multiple bilateral cavitating nodules
with background air space opacification**

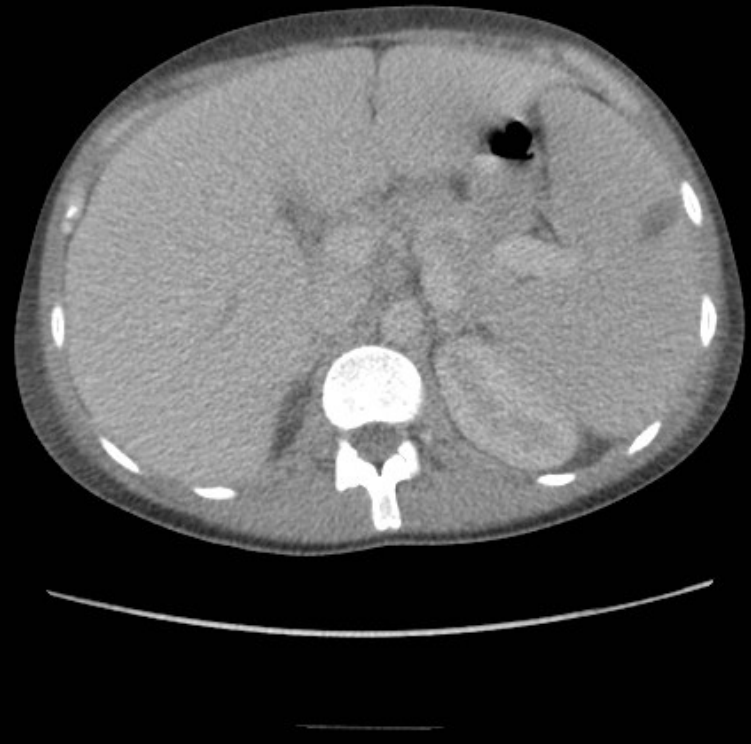
TEE



Large mobile tricuspid valve vegetation

Diagnosis

- **Infective Tricuspid Endocarditis with Septic Pulmonary Emboli**
 - Polymicrobial: MSSA/Streptococcus/Prevotella
 - Treated with IV antibiotics
 - Left against medical advice after 1 week
- **Re-admission**
 - Found collapsed in an alley 1 week later
 - Septic shock
 - ICU
 - IV antibiotics restarted - Vancomycin/Ceftriaxone/
Metronidazole



Progression of cavitating nodules and splenic infarct

Admission

- Serial echocardiography in ICU
 - 4 Studies (3 weeks)
- **Disease progression despite IV antibiotics**
 - Large mobile tricuspid vegetation with multiple smaller vegetations
 - Affecting all three leaflets
 - Increasing in number and size
 - Severe TR
 - Mild-moderate impaired LV function
 - RV strain

Challenge

- Large mobile right atrial masses represent both a diagnostic and therapeutic challenge due to the risks of **misdiagnosis** and **catastrophic pulmonary thromboembolism**
- MDT
 - IR/Cardiology/Cardiothoracic surgery/Cardiac ICU
- Options:
 1. Systemic anticoagulation
 2. Surgical embolectomy
 3. **Endovascular catheter-directed therapy**

Procedural Planning

- Endovascular catheter-directed therapy
 - AngioVac Aspiration System
 - Lack of maneuverability of the AngioVac Cannula potentially limits intracardiac use
 - How can we accurately target the tricuspid valve vegetations?

Custom Reshaping of the Vortex Cannula with Steam



- ESteam
- Reshape distal AngioVac cannula at 135 degrees with the apex 3-4 cm from the cannula tip for 3 mins
- Submerged under frozen sterile normal saline for 3 mins
- Remodeled Vortex cannula assumed a 35-55 degree angle

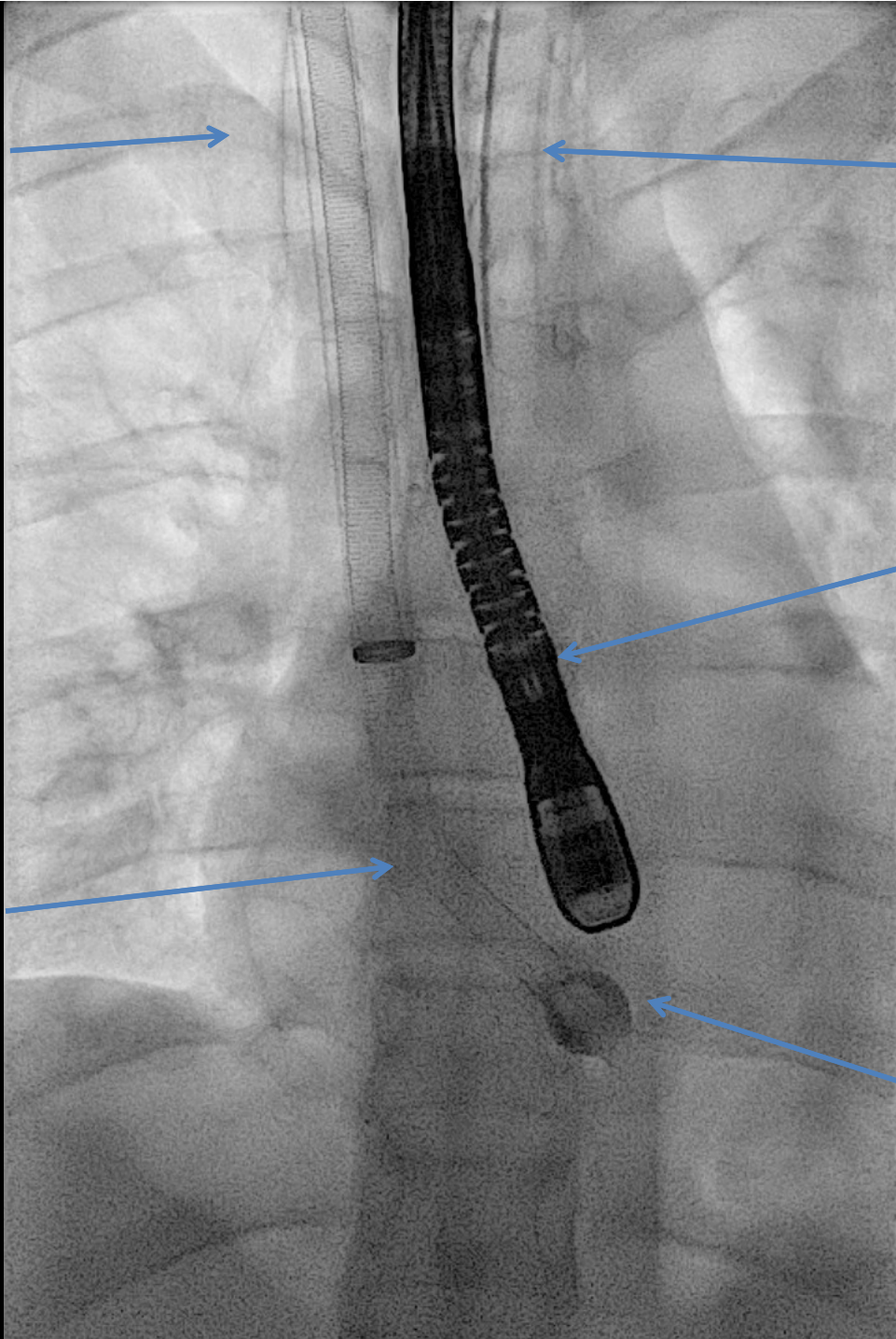
26 Fr Sheath

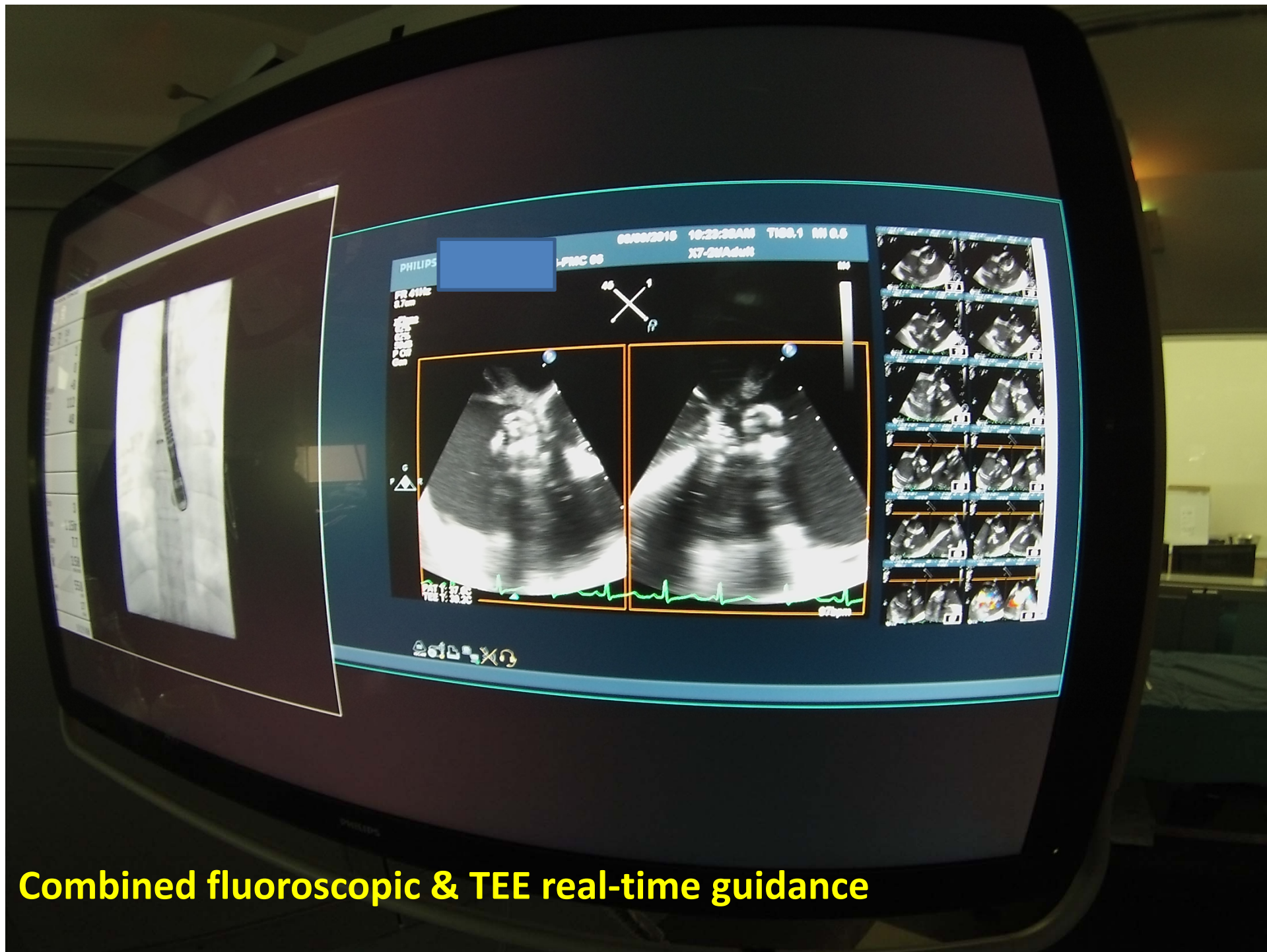
ETT

TEE

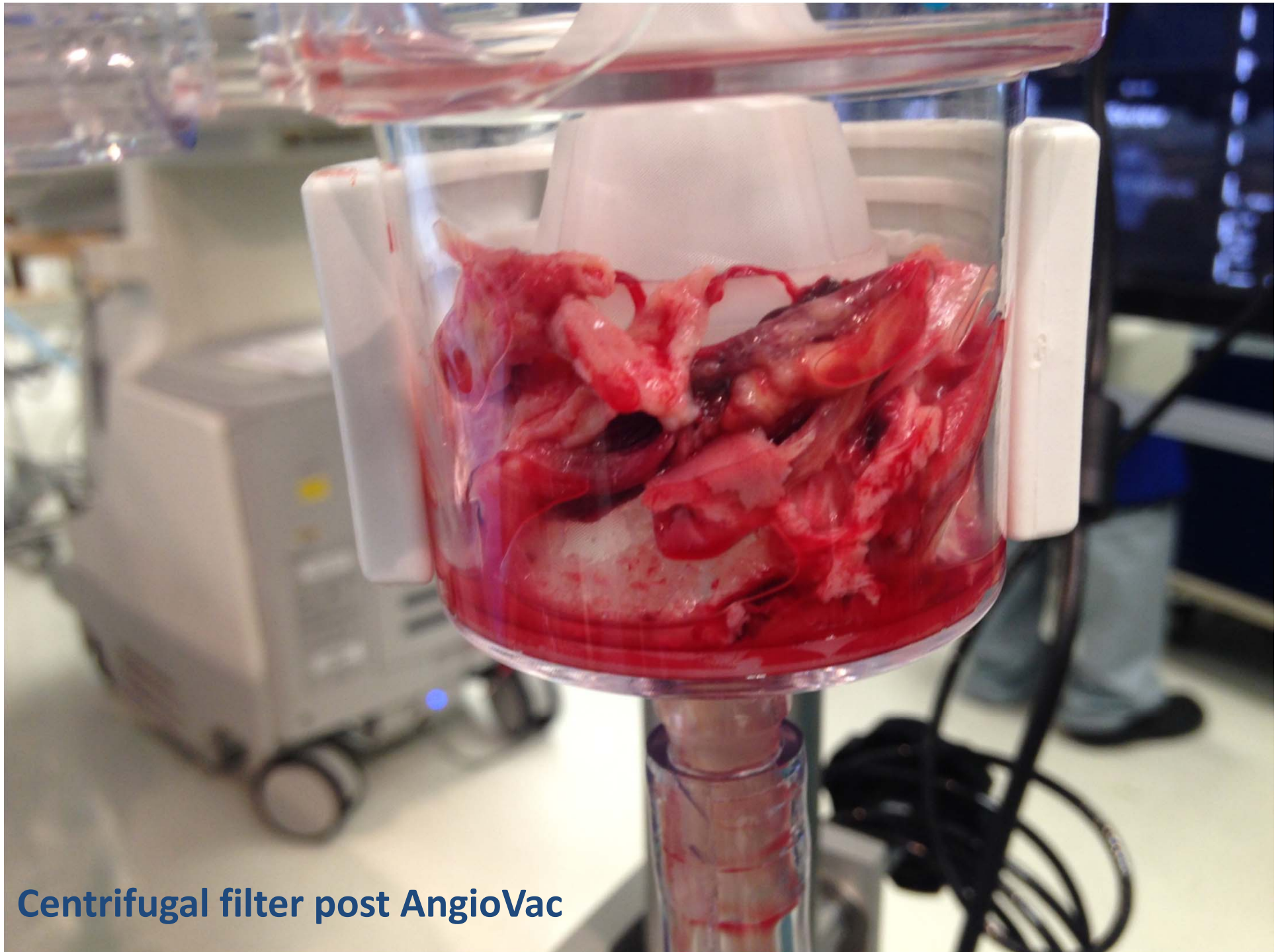
Vortex cannula

**Distal tip
augmentation**



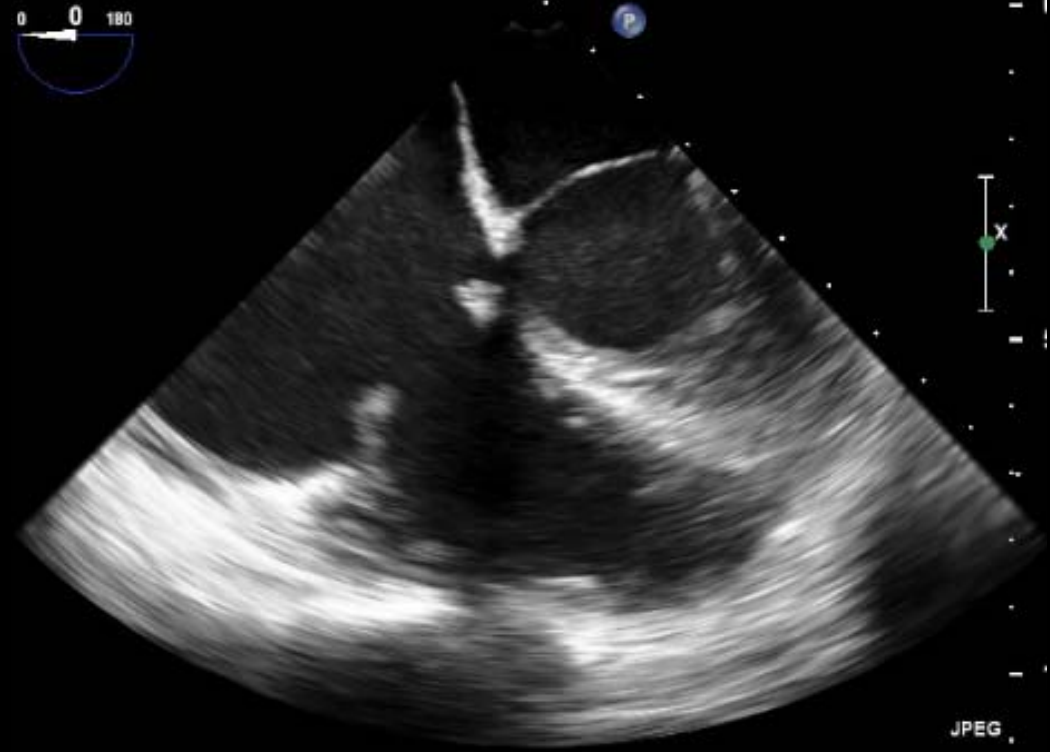
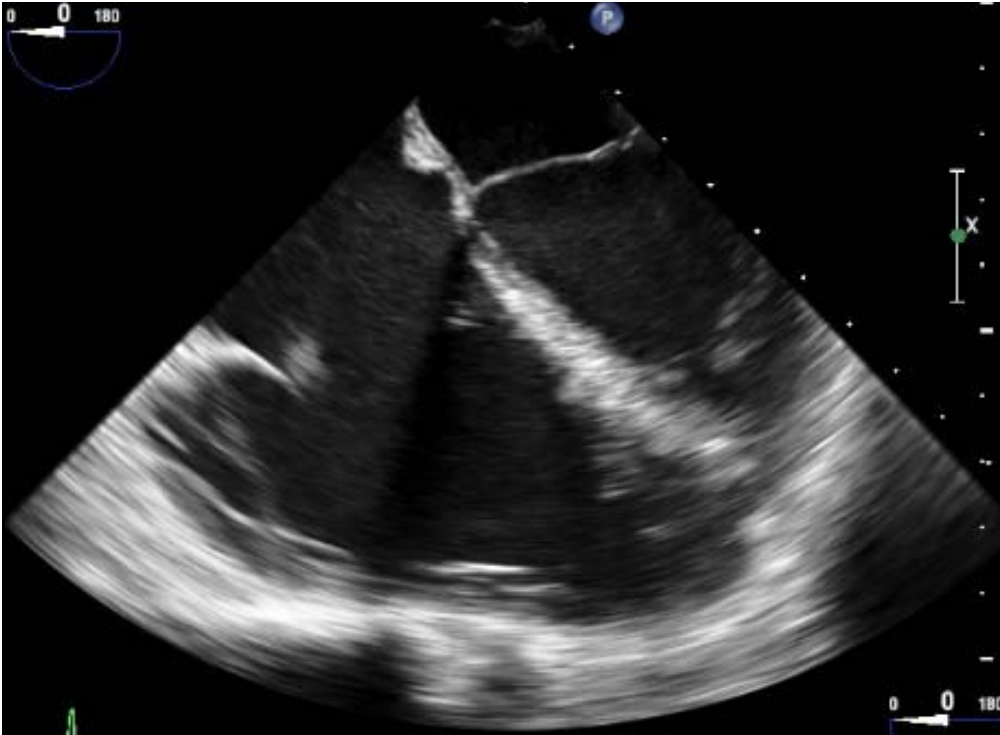


Combined fluoroscopic & TEE real-time guidance



Centrifugal filter post AngioVac

TEE Post



Post-Procedure Details

- Post AngioVac
 - TEE
 - Vegetation removed
 - Improvement in degree of TR & RV strain
 - Rapid and uneventful clinical recovery
 - Returned to ward within 1 week with resolution of septic emboli on CT
 - Discharged when antibiotic regimen completed
 - Micro:

Diagnosis

Soft Tissue, Heart, Tricuspid Valve, Excision:

- Consistent with infected vegetation and active endocarditis, with Gram-positive cocci (evaluated with tissue Gram stain), associated clinically with tricuspid regurgitation

Discussion

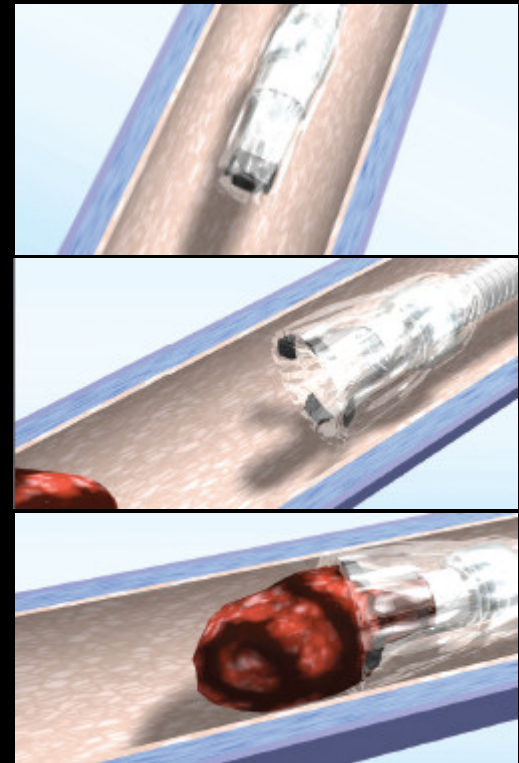
- **AngioVac aspiration system**
 - *FDA approved for the removal of undesirable intravascular material during veno-venous extracorporeal bypass for up to 6 hours*
 - Described in various clinical settings:
 - Venous thromboembolism
 - Caval and right atrial tumor thrombus
 - Cardiovascular implantable electronic leads
 - Infected valvular vegetations

Multidisciplinary Approach

- **IR**
 - Radiologists, nurses, technologists
- **Cardiac surgeon**
 - Available
 - Procedure performed in hybrid ITOR suite
- **Vascular perfusionist**
 - Veno-venous extracorporeal bypass filtration circuit
- **Cardiac anesthetist**
 - TOE guidance
- **Industry representative**

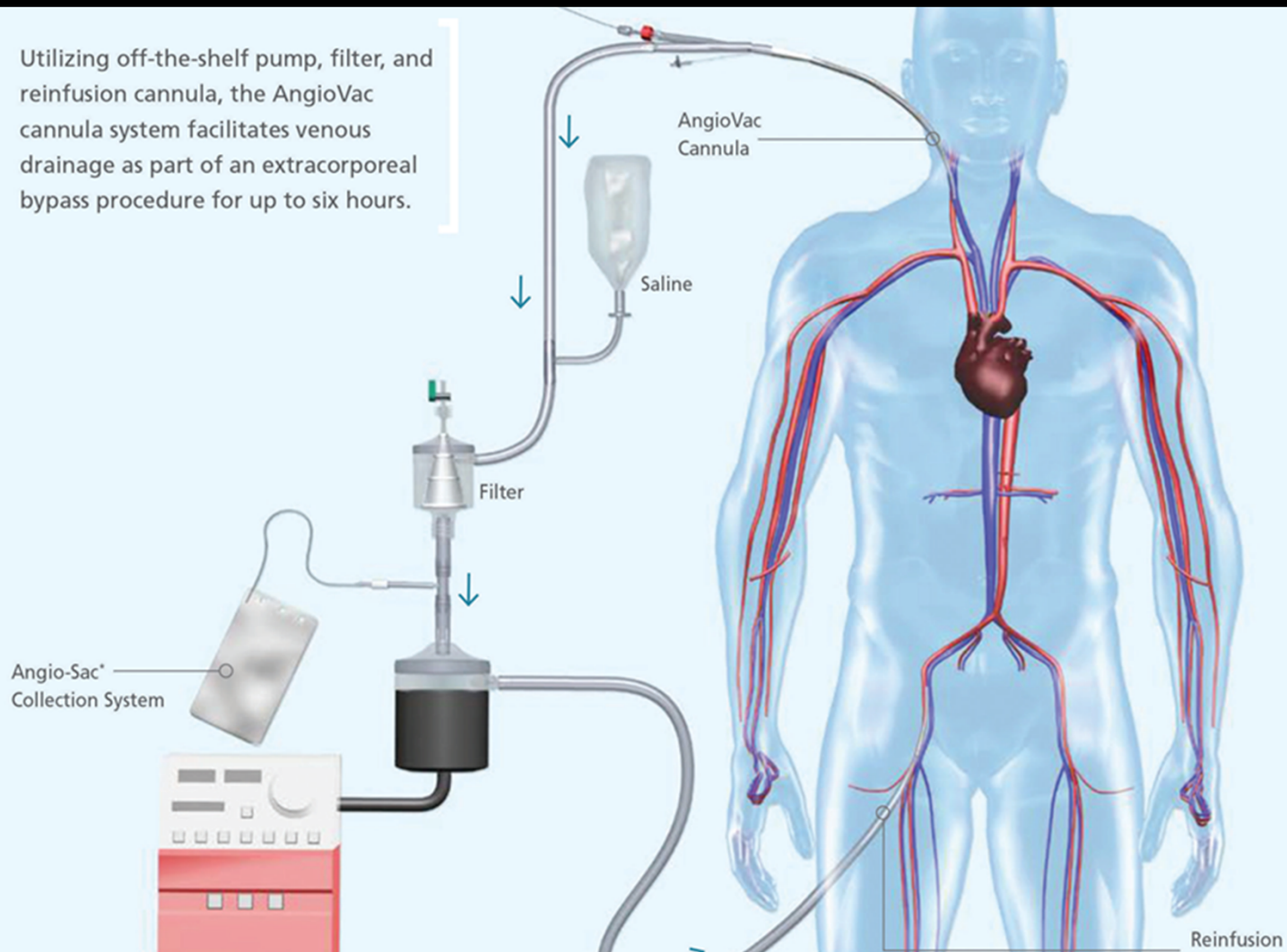
AngioVac Aspiration System

- **Veno-venous bypass filtration circuit**
 - 26 Fr DrySeal sheath – Vortex cannula
 - 16 Fr Reinfusion cannula
 - 3 – 5 L/min
- **Distal tip augmentation**
 - 1 ATM with 50/50 mixture of contrast/sterile water



AngioVac Aspiration System

Utilizing off-the-shelf pump, filter, and reinfusion cannula, the AngioVac cannula system facilitates venous drainage as part of an extracorporeal bypass procedure for up to six hours.

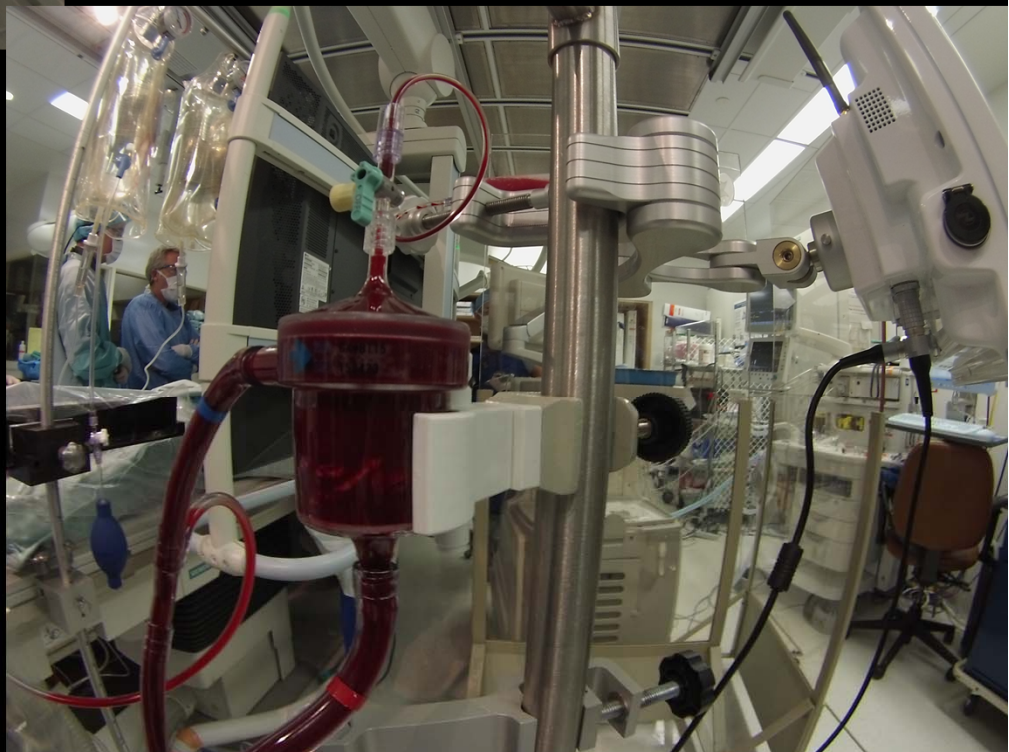




**Veno-venous bypass
centrifugal filtration circuit**



Centrifugal filter



Procedural Details

- Techniques to improve maneuverability & directionality in the right atrium
 1. Custom reshaping of the cannula
 2. Over-the-guidewire
 3. Through-and-through guidewire access
 4. PTA catheter deflection

Key Takeaways

- Custom reshaping of the AngioVac cannula using steam is safe and allows both improved maneuverability and directionality within the confines of the right atrium
- Combined TEE and fluoroscopic guidance is essential for engagement and successful extraction of right atrial intracardiac masses
- AngioVac aspiration should be considered for management of right atrial VTE, tumor thrombus & infected valvular vegetations

References

1. Salsamendi, J., Doshi, M., Bhatia, S. et al. Single centre experience with the angiovac aspiration system. *Cardiovasc Intervent Radiol.* 2015;38:998-1004
2. Nickel, B., McClure, T., Moriarty, J. A novel technique for endovascular removal of large volume right atrial tumor thrombus. *Cardiovasc Intervent Radiol.* 2015;38:1021-1024
3. Divekar, A.A., Scholz, T., Fernandes, J.D. Novel percutaneous transcatheter intervention for refractory active endocarditis as a bridge to surgery-angiovac aspiration system. *Catheter Cardiovasc Interv.* 2013;81:1008-1012
4. Todoran, T.M., Sobieszczyk, P.S., Levy, M.S. et al. Percutaneous extraction of right atrial mass using the angiovac aspiration system. *J Vasc Interv Radiol.* 2011;22(9):1345-1347