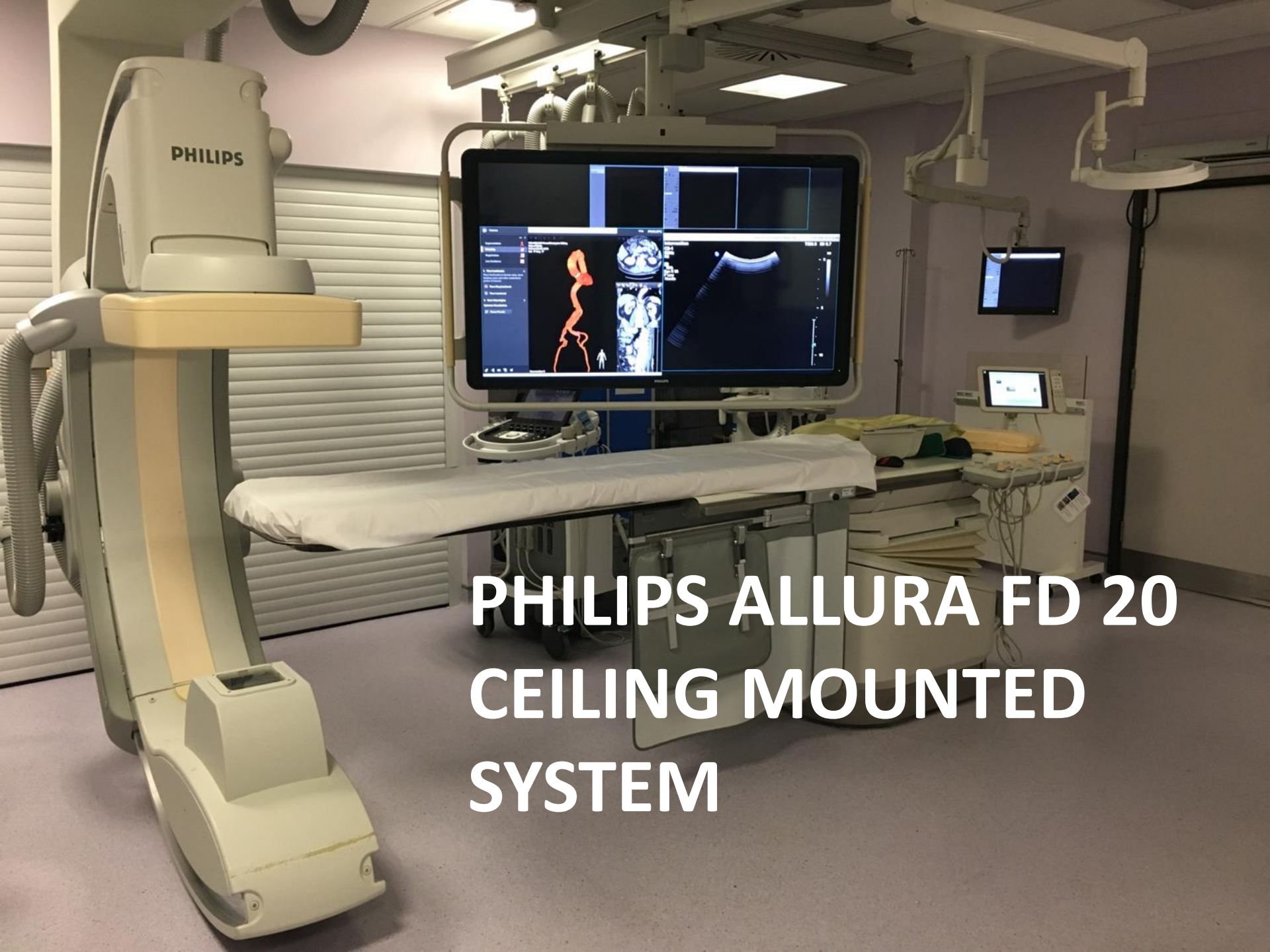


Fusion Imaging using Vessel Navigator for TIPSS procedure

PATRICK DOHERTY
INTERVENTIONAL RADIOGRAPHER
ROYAL VICTORIA HOSPITAL
BELFAST





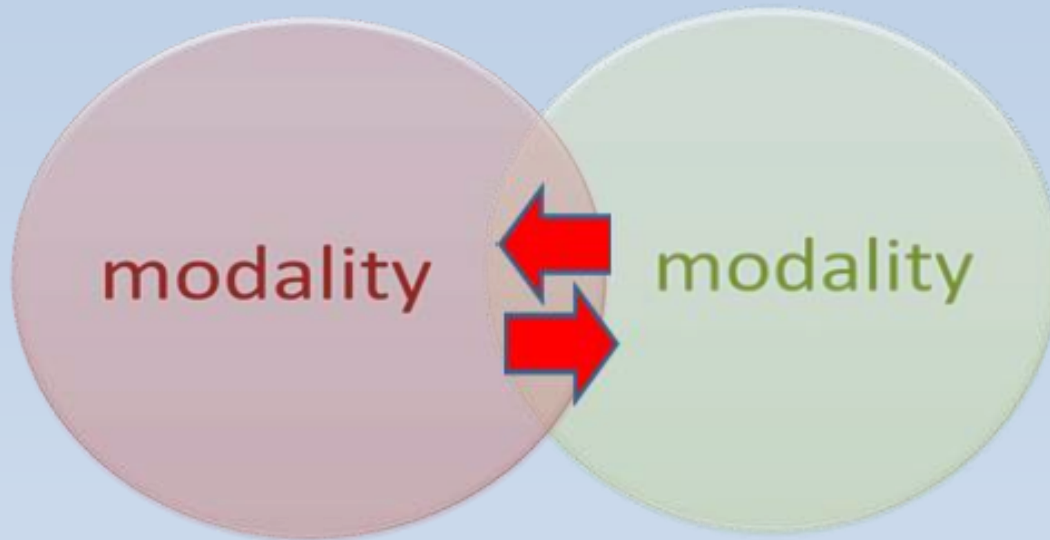
**PHILIPS ALLURA FD 20
CEILING MOUNTED
SYSTEM**

PHILIPS ALURA FD 20 BIPLANE FLOOR MOUNTED SYSTEM



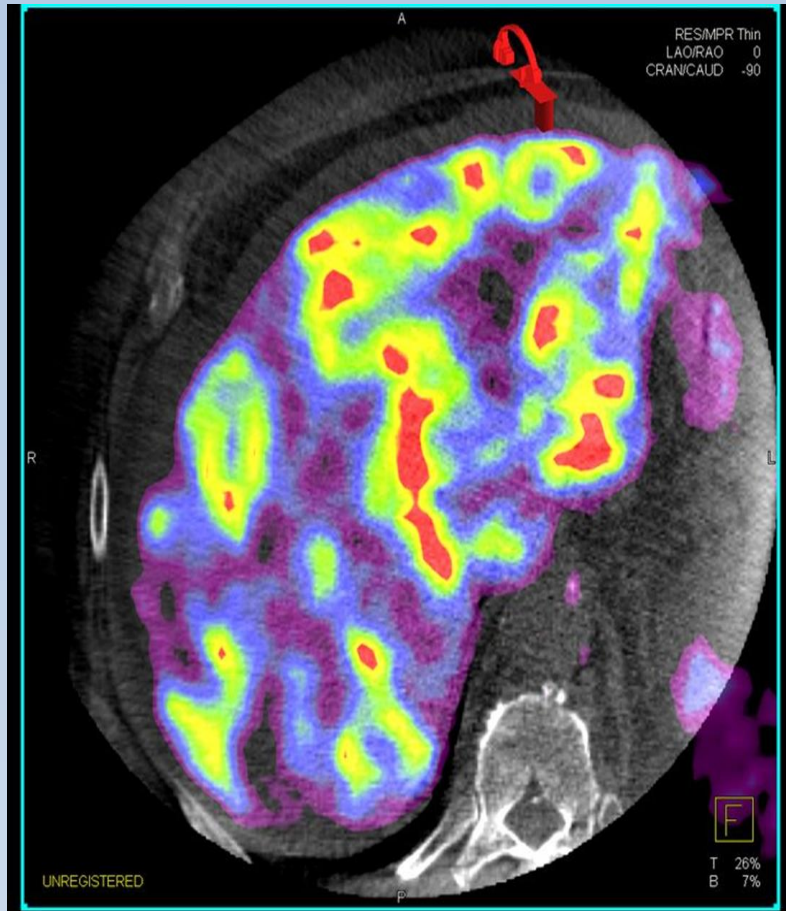
Fusion Imaging

Image fusion is the process of registering and combining imaging modalities to use during interventional cases to improve image quality, dose reduction and procedural time.

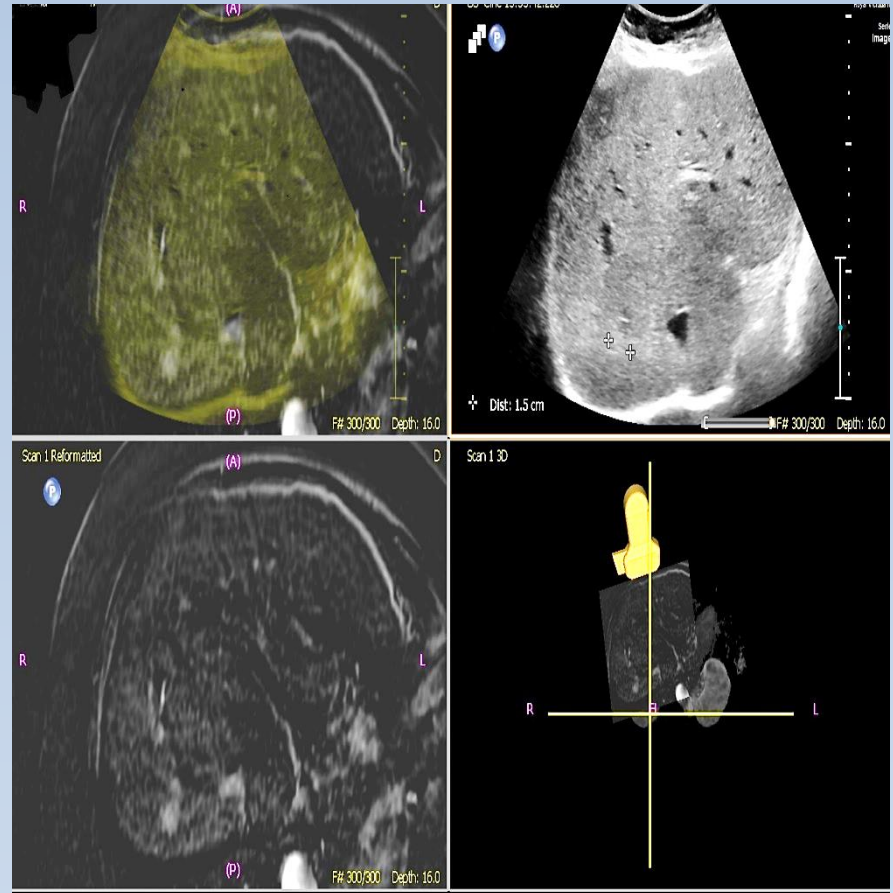


EXAMPLE FUSION IMAGING

PET/CT



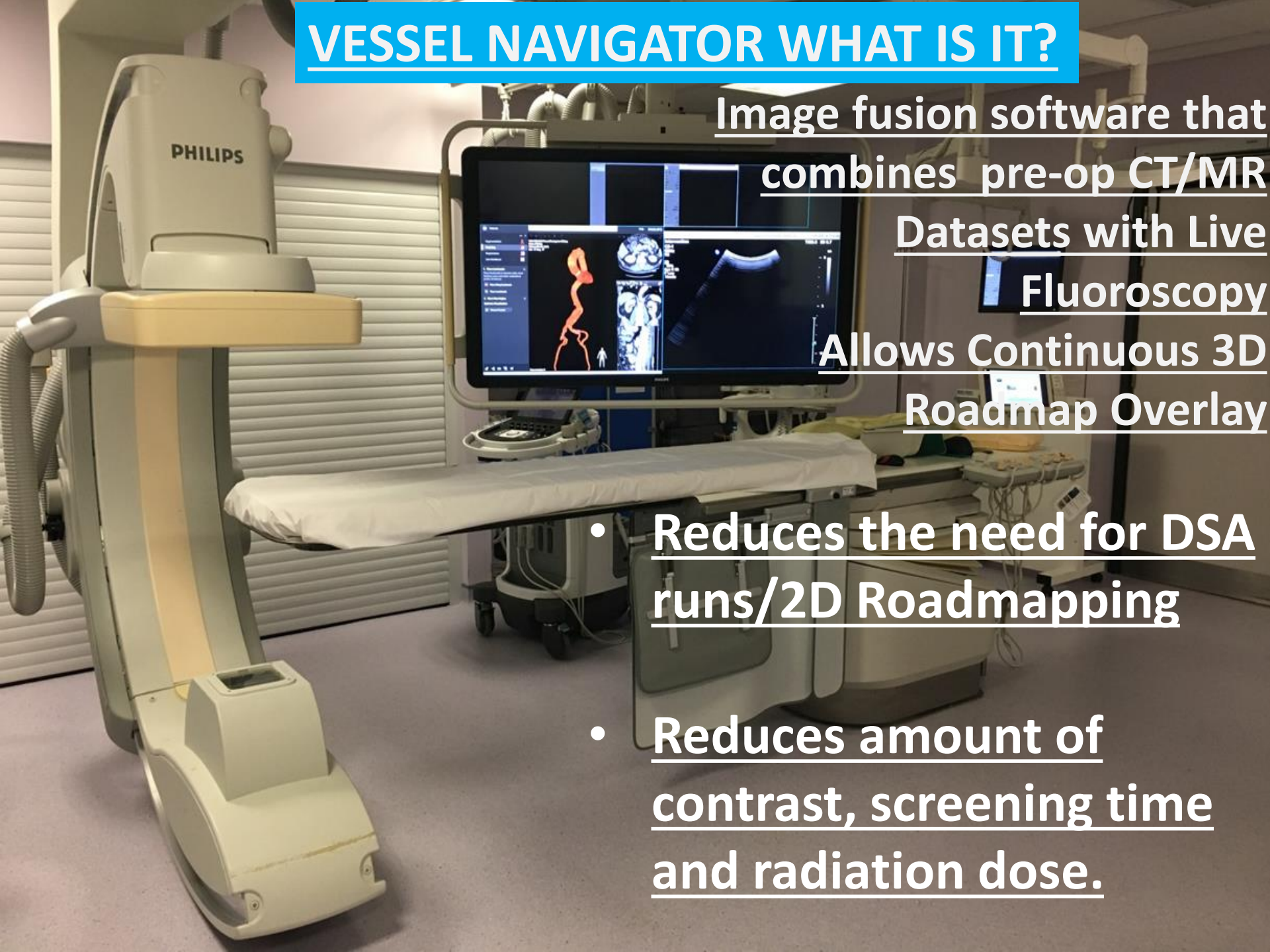
US/MR



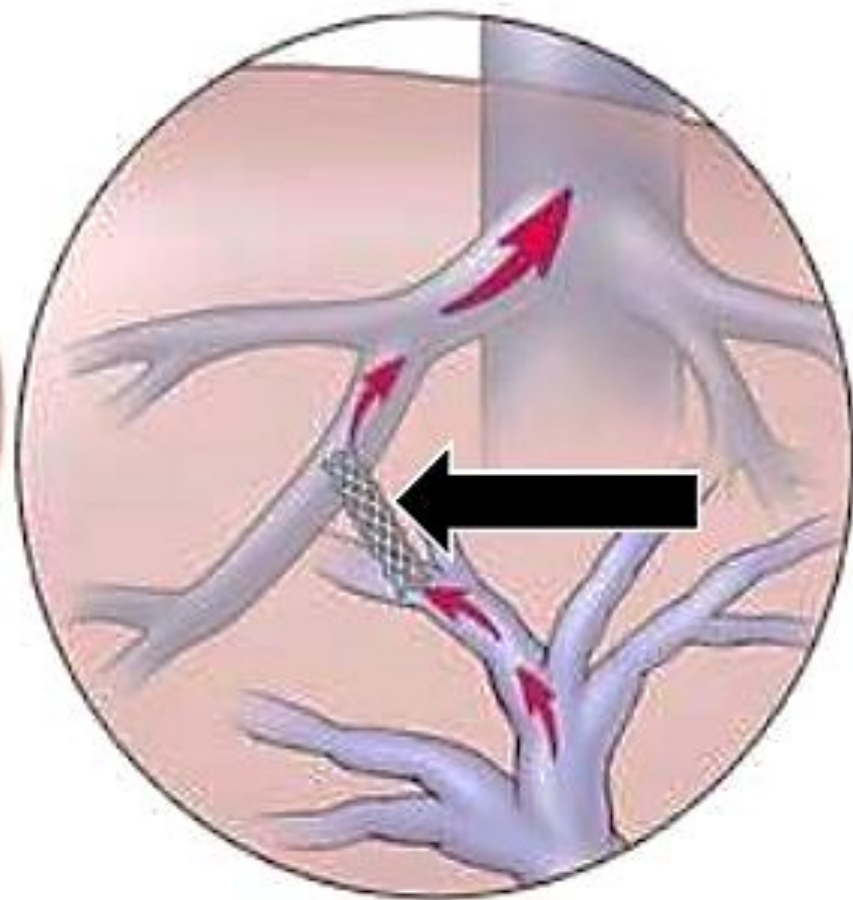
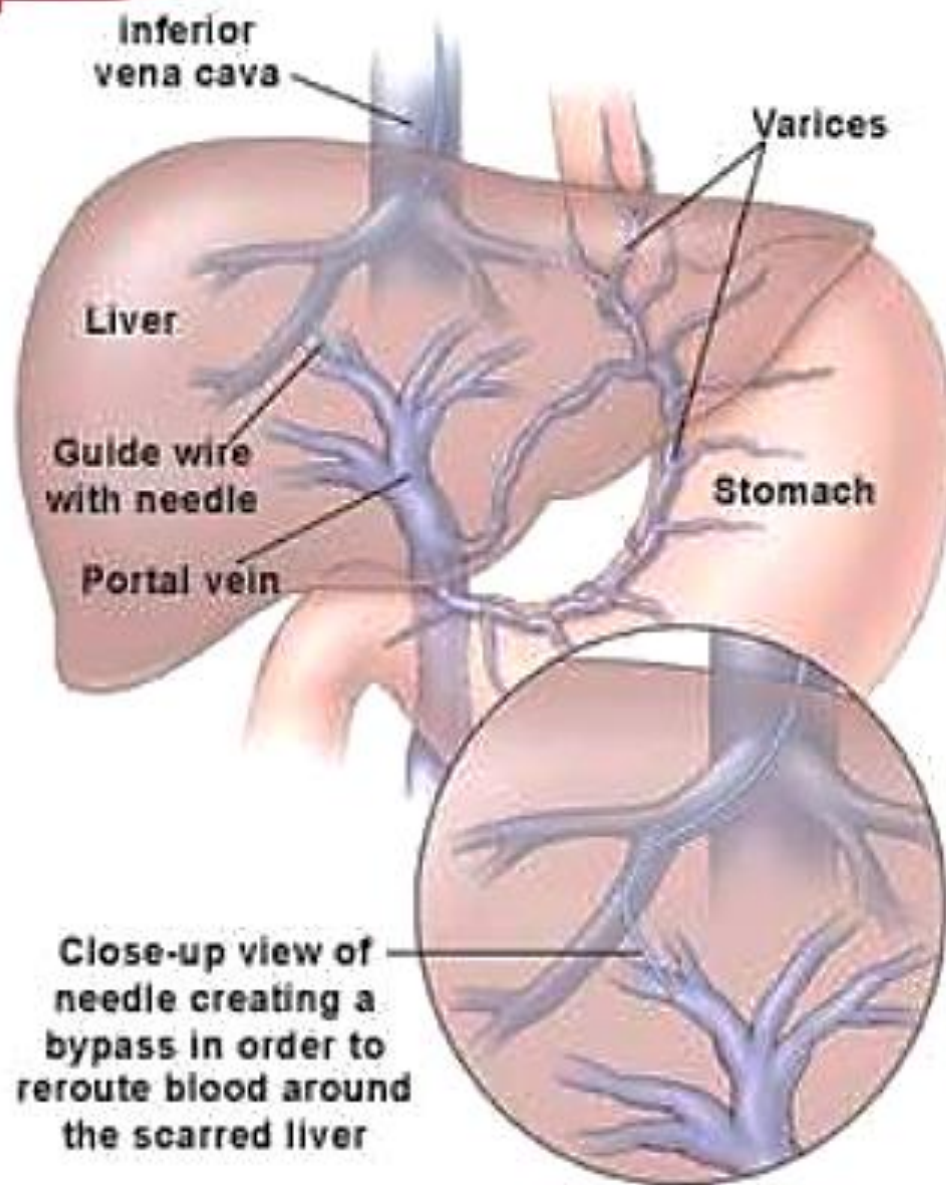
VESSEL NAVIGATOR WHAT IS IT?

Image fusion software that
combines pre-op CT/MR
Datasets with Live
Fluoroscopy
Allows Continuous 3D
Roadmap Overlay

- Reduces the need for DSA
runs/2D Roadmapping
- Reduces amount of
contrast, screening time
and radiation dose.

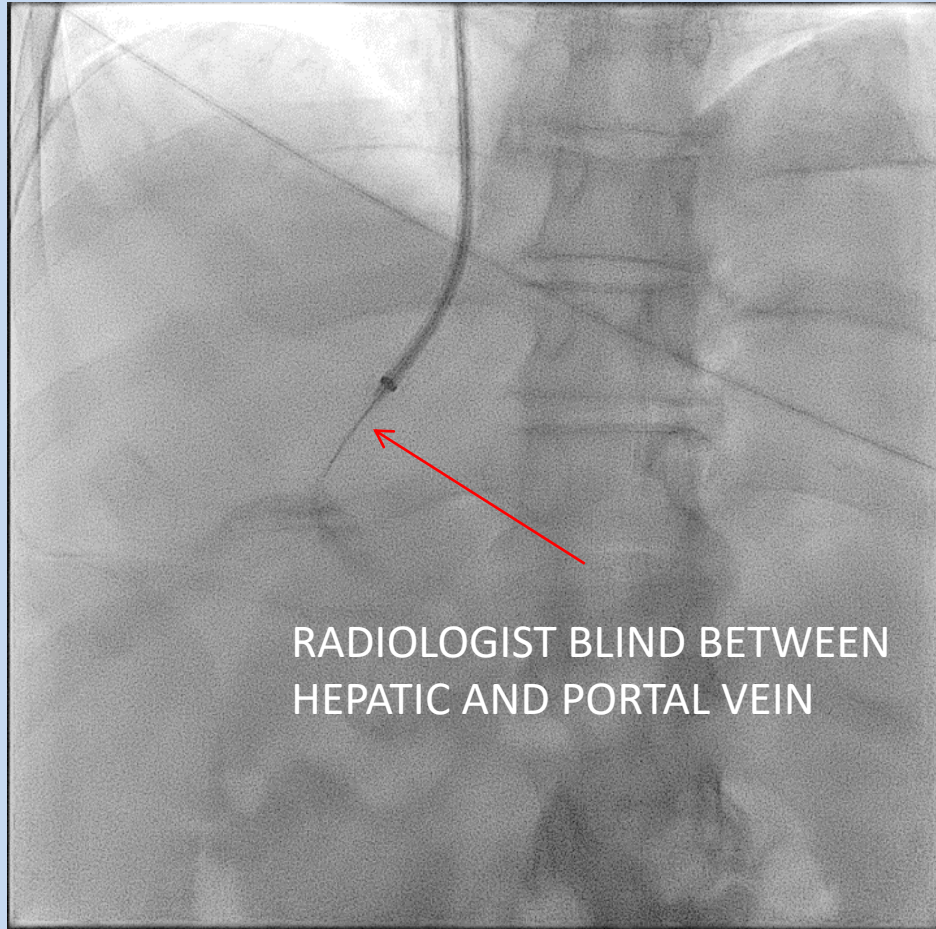


TIPS PROCEDURE²⁹



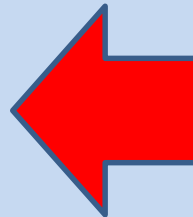
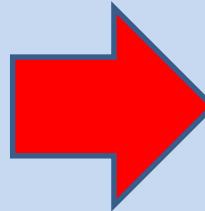
CURRENT PRACTICE

Navigation of curved needle from hepatic vein to portal vein very difficult using fluoroscopy with hepatic venography only and can be very time consuming for radiologist



WHY USE?

Combination of imaging modalities CT/FLUORO significantly improves accuracy of needle path and stent deployment from hepatic to portal vein



CRITERIA FOR IMPORTED CT SCAN

A Philips CT scanner is the central focus, with a patient bed positioned in front of it. The room is dimly lit with blue ambient lighting. The scanner has two small monitors on either side of the gantry. The patient bed is covered with white linens and has a blue cushion at the head. To the right, there is a mobile cart with various medical supplies. The background shows shelves with boxes and other medical equipment.

POINTS TO REMEMBER

- RECENT SCAN WITHIN 3MONTHS – WILL REDUCE CHANCE OF ANATOMICAL CHANGES
- MAX CONTRAST ENHANCMENT OF PORTAL VEIN AND HEPATIC VEINS
- NO TILT OF GANTRY AND PATIENT POSTIONED SUPINE THIS WILL IMPROVE ACCURACY OF 2D/3D REGISTRATION

VESSEL NAVIGTOR WORKFLOW

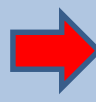
PERFORMED PRE-PROCEDURE



SEGMENTATION



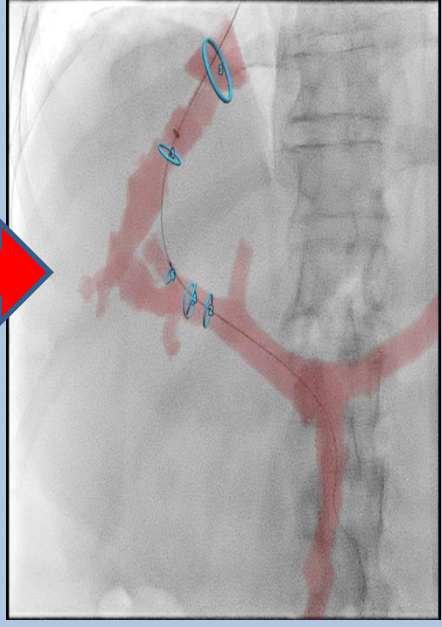
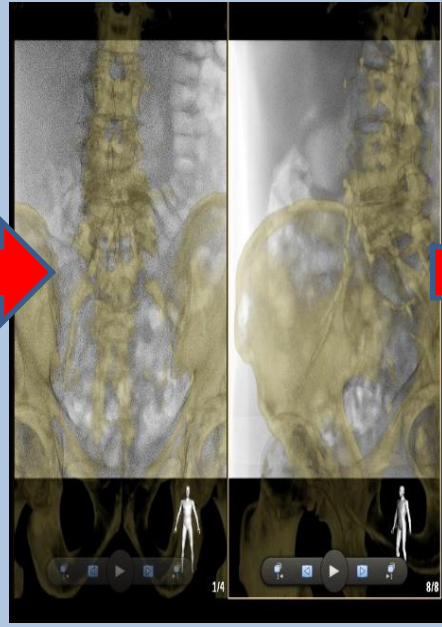
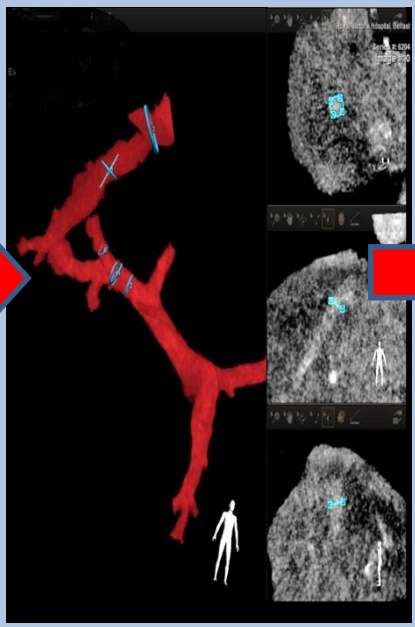
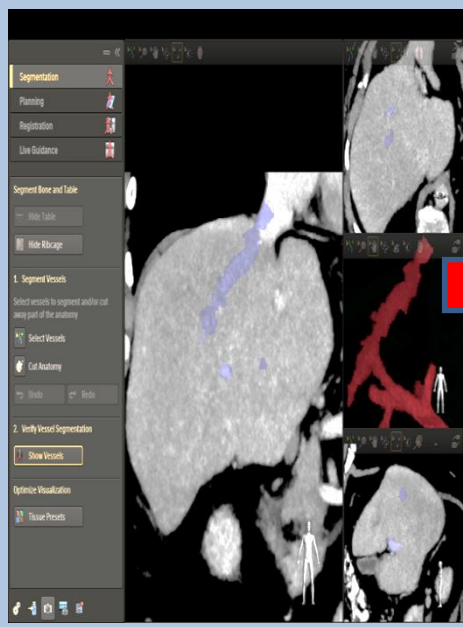
PLANNING



REGISTRATION



LIVE GUIDANCE



SELECT VESSEL FOR FUSION

**ADD RING MARKERS
TARGET POINTS**

2D-3D REGISTRATION

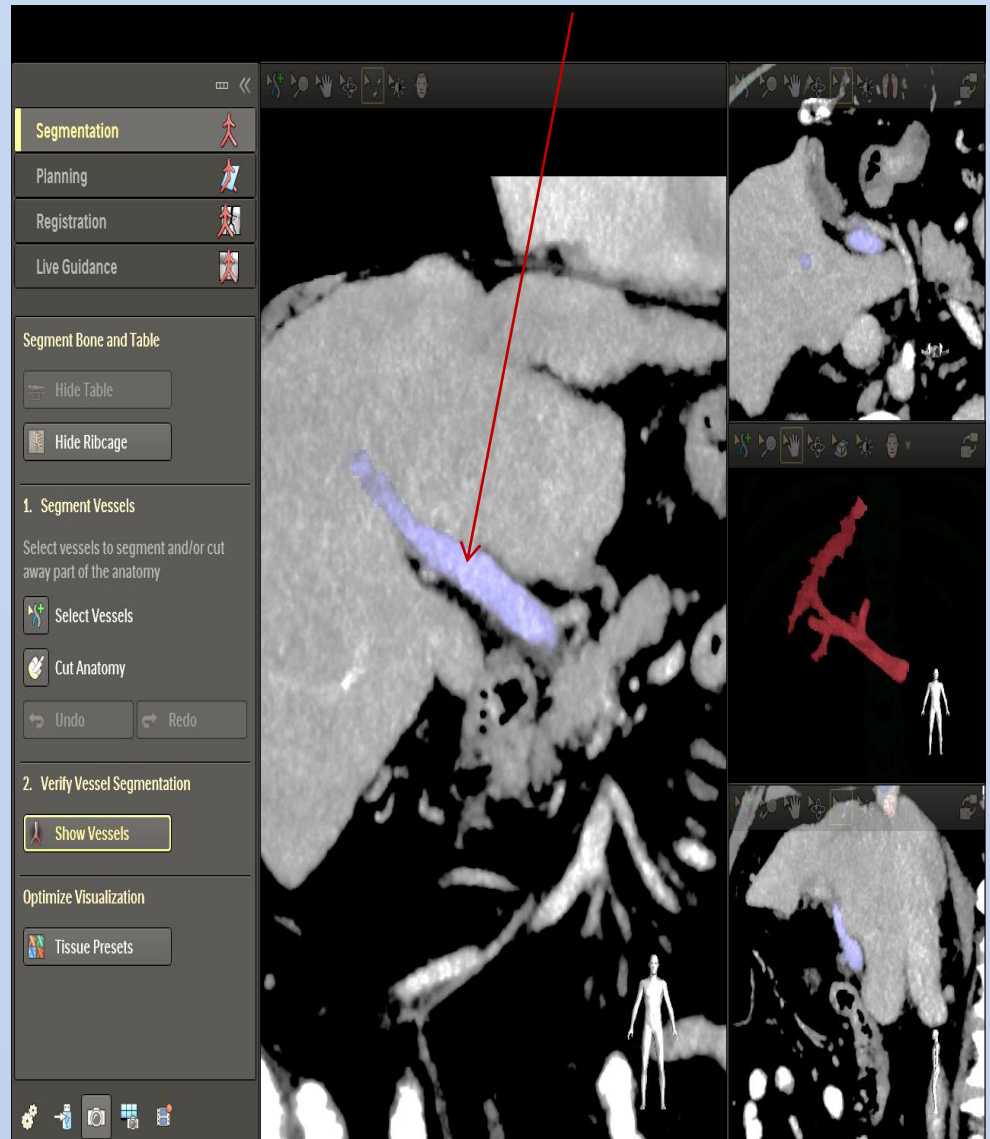
CONTINUOUS 3D ROADMAPPING

SEGMENTATION

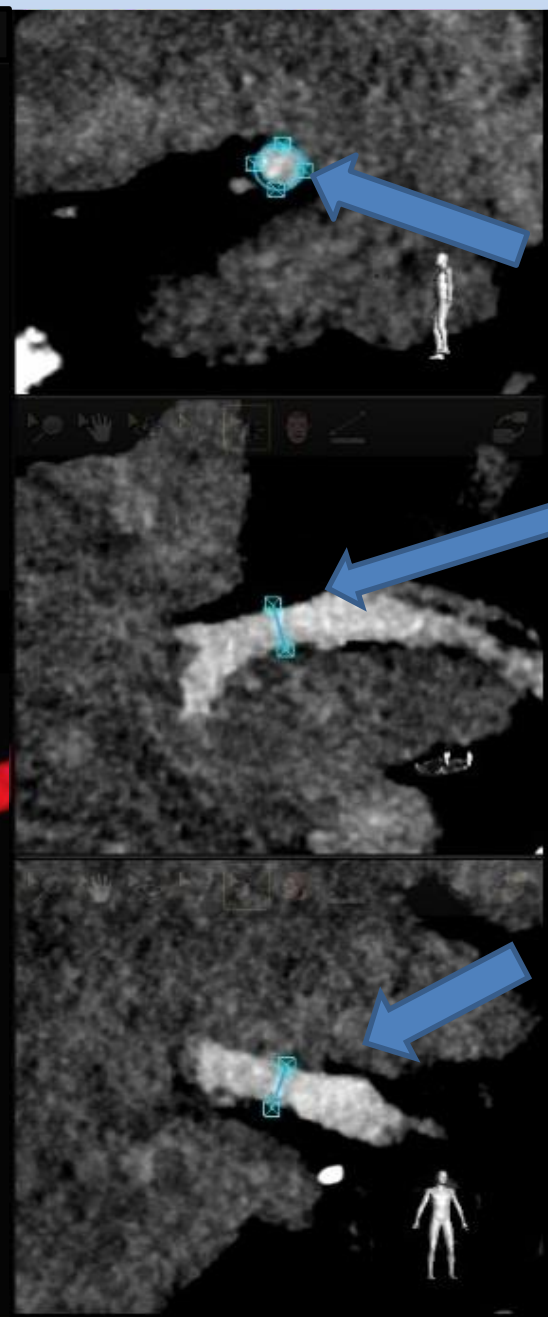
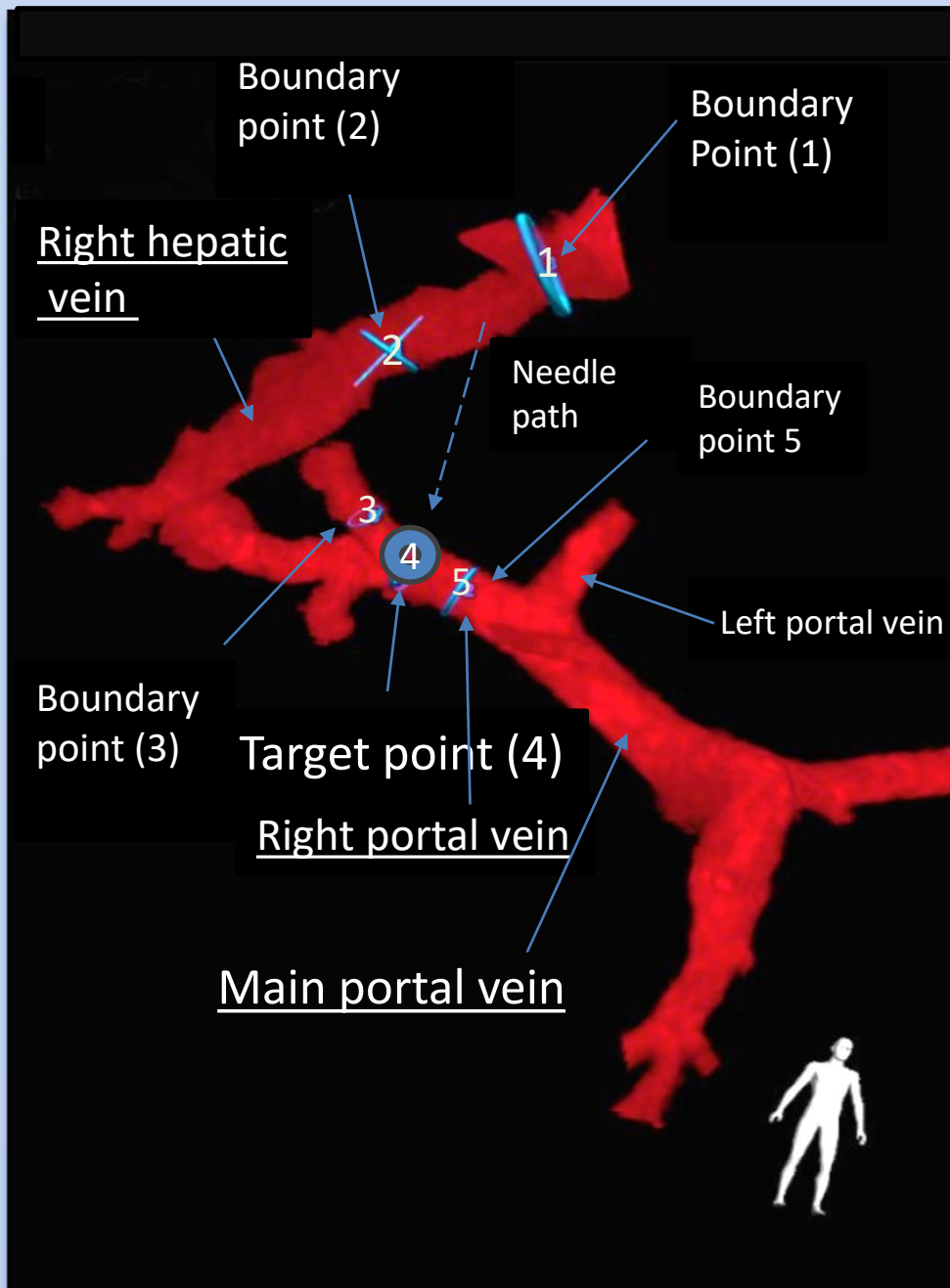
RIGHT HEPATIC VEIN



PORTAL VEIN



PLANNING



RIGHT PORTAL VEIN (AXIAL)

RIGHT PORTAL VEIN (CORONAL)

RIGHT PORTAL VEIN (SAGGITAL)

2D-3D REGISTRATION

AP

45 DEGREES OBLIQUE

The screenshot displays a 2D-3D registration software interface. On the left is a control panel with the following sections:

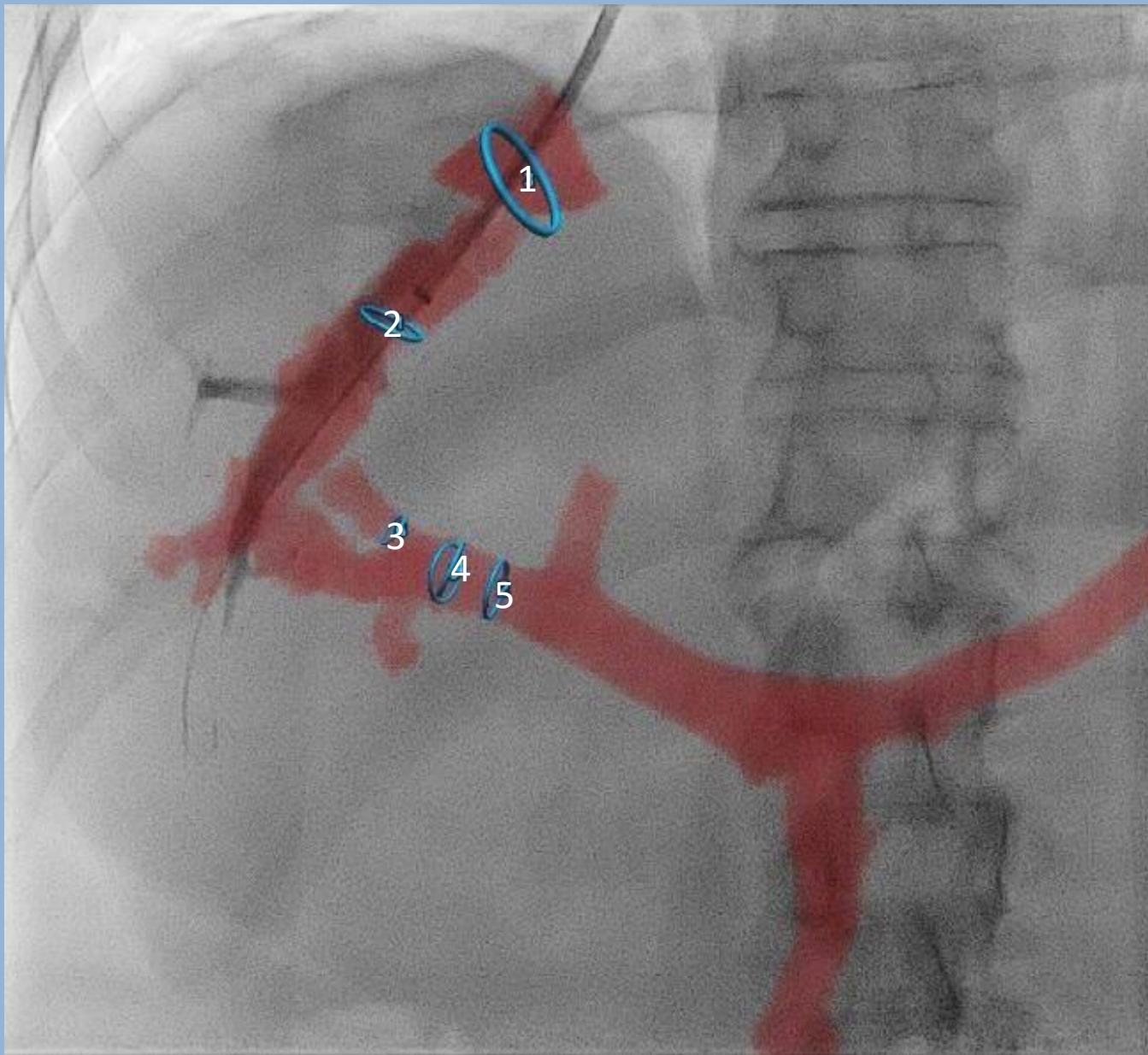
- Registration** (highlighted)
- 1. Registration Method: 2D images
- 2. Acquire images from 2 angles
- 3. Align volume with images
- Modify alignment**
 - Translate Volume
 - Roll Volume
 - Rotate Volume
 - Reset Alignment
- Verify alignment**
 - Auto Fade
- Optimize Visualization**
 - Boost Bone
 - Tissue Presets

The main area shows two panels:

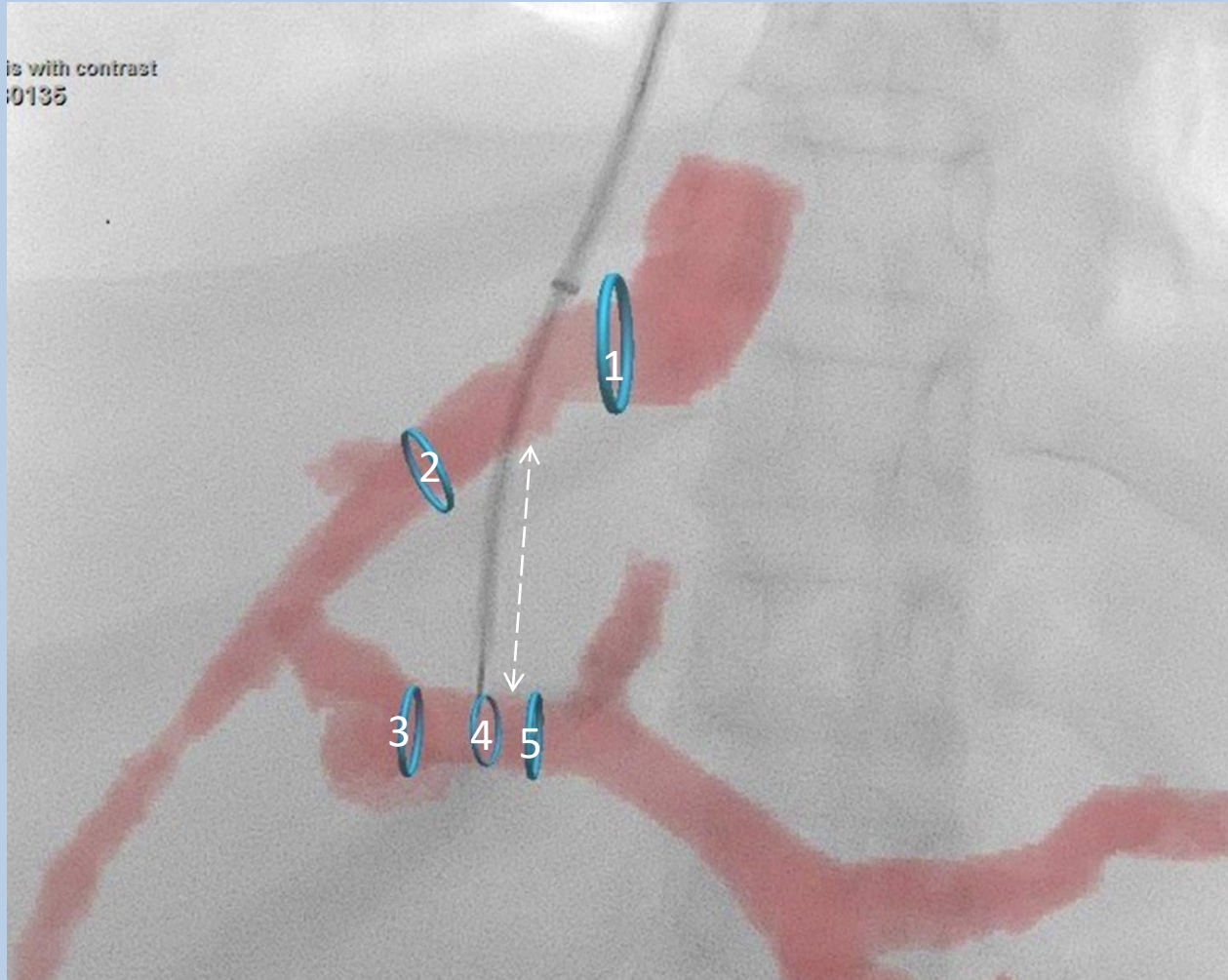
- Ref 1** (Anteroposterior view): Rot 0° Ang 0°. Shows a 3D bone model and a 2D X-ray image with yellow dashed arrows indicating alignment points.
- Ref 2** (45 Degrees Oblique view): Rot 46° Ang 0°. Shows a 3D bone model and a 2D X-ray image with yellow dashed arrows indicating alignment points.

At the bottom of each panel is a small human figure and a navigation bar with a play button and page indicators (5/5 for Ref 1, 4/6 for Ref 2).

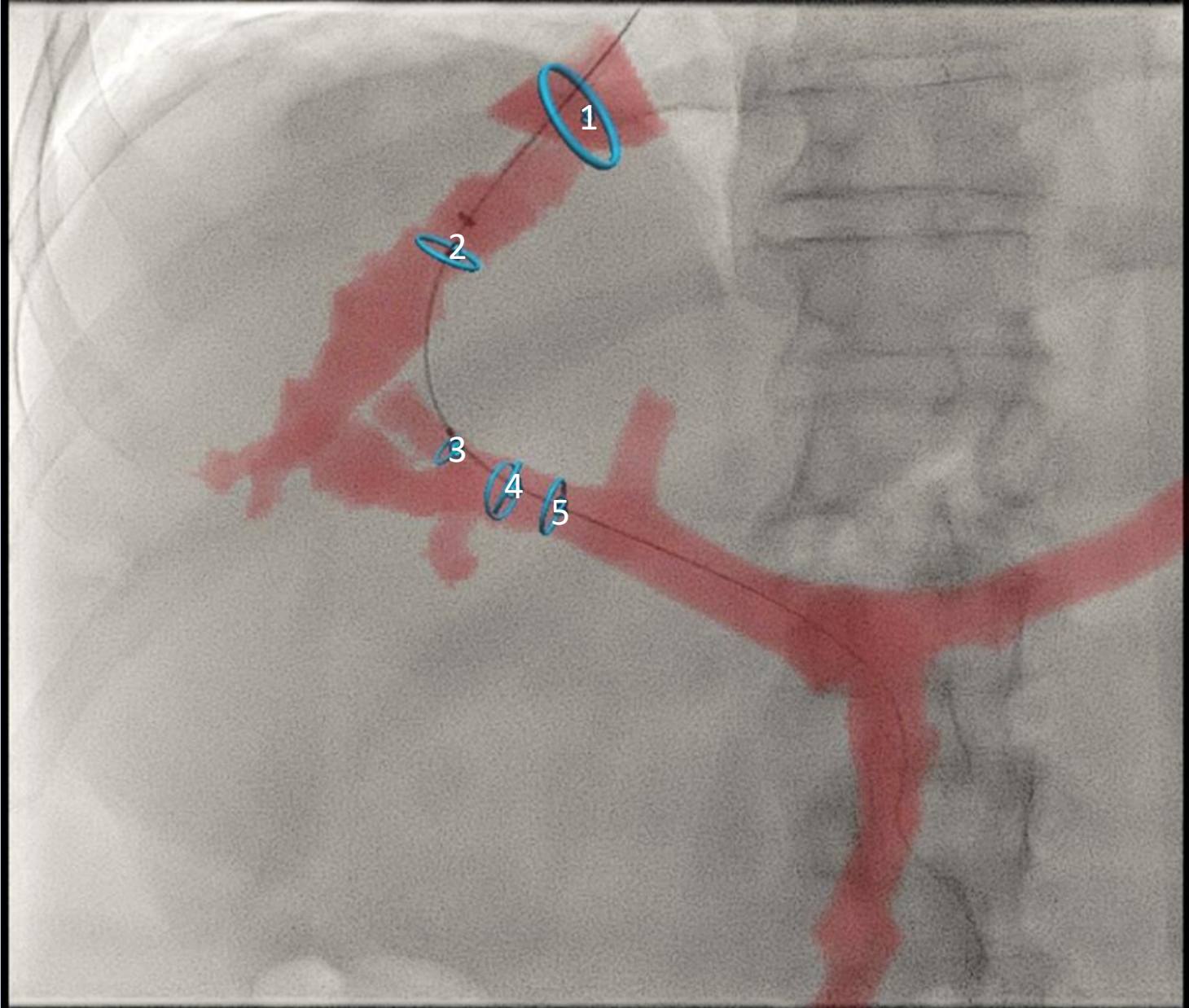
LIVE GUIDANCE -CHECK REGISTRATION



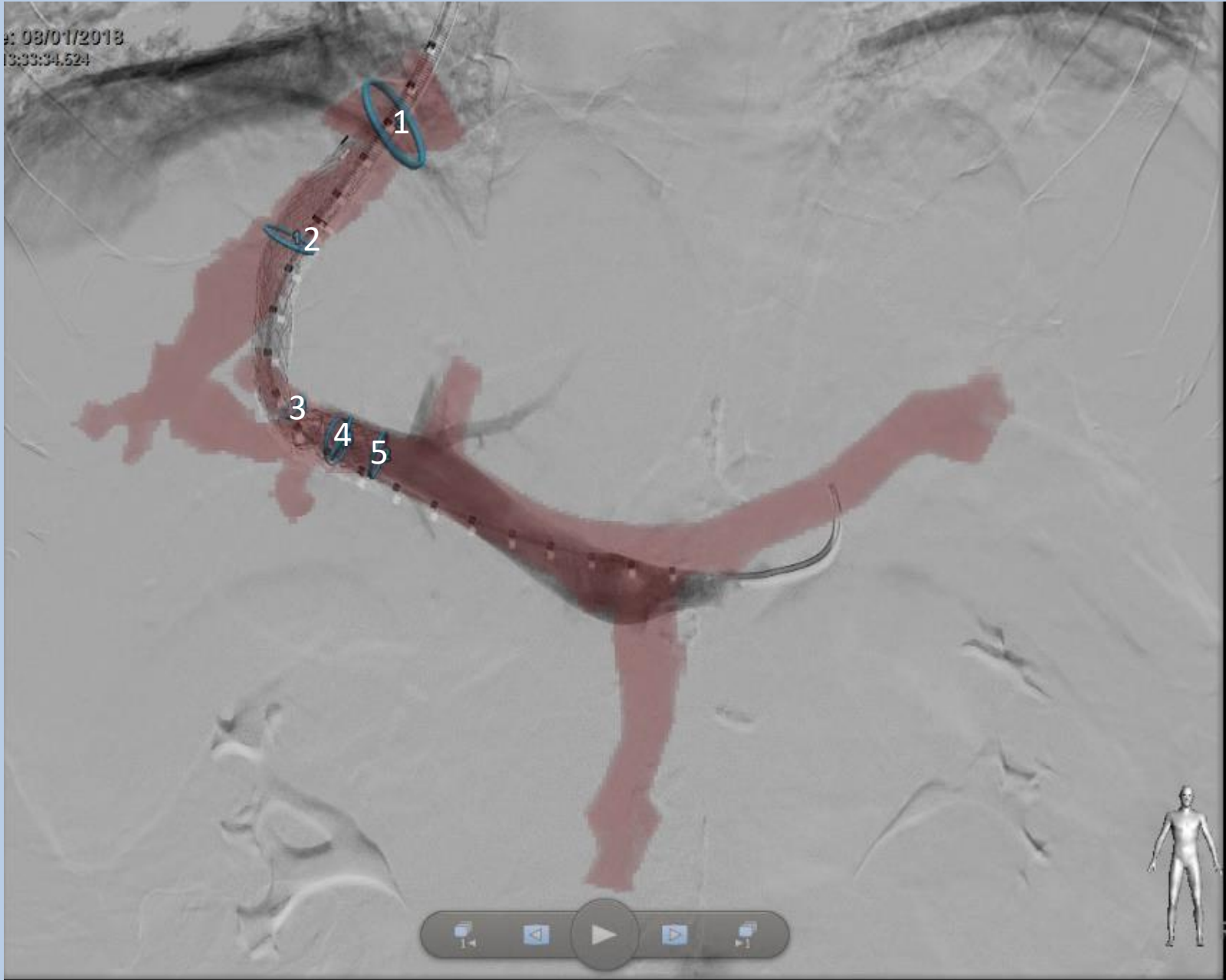
NEEDLE PATH



GUIDE WIRE



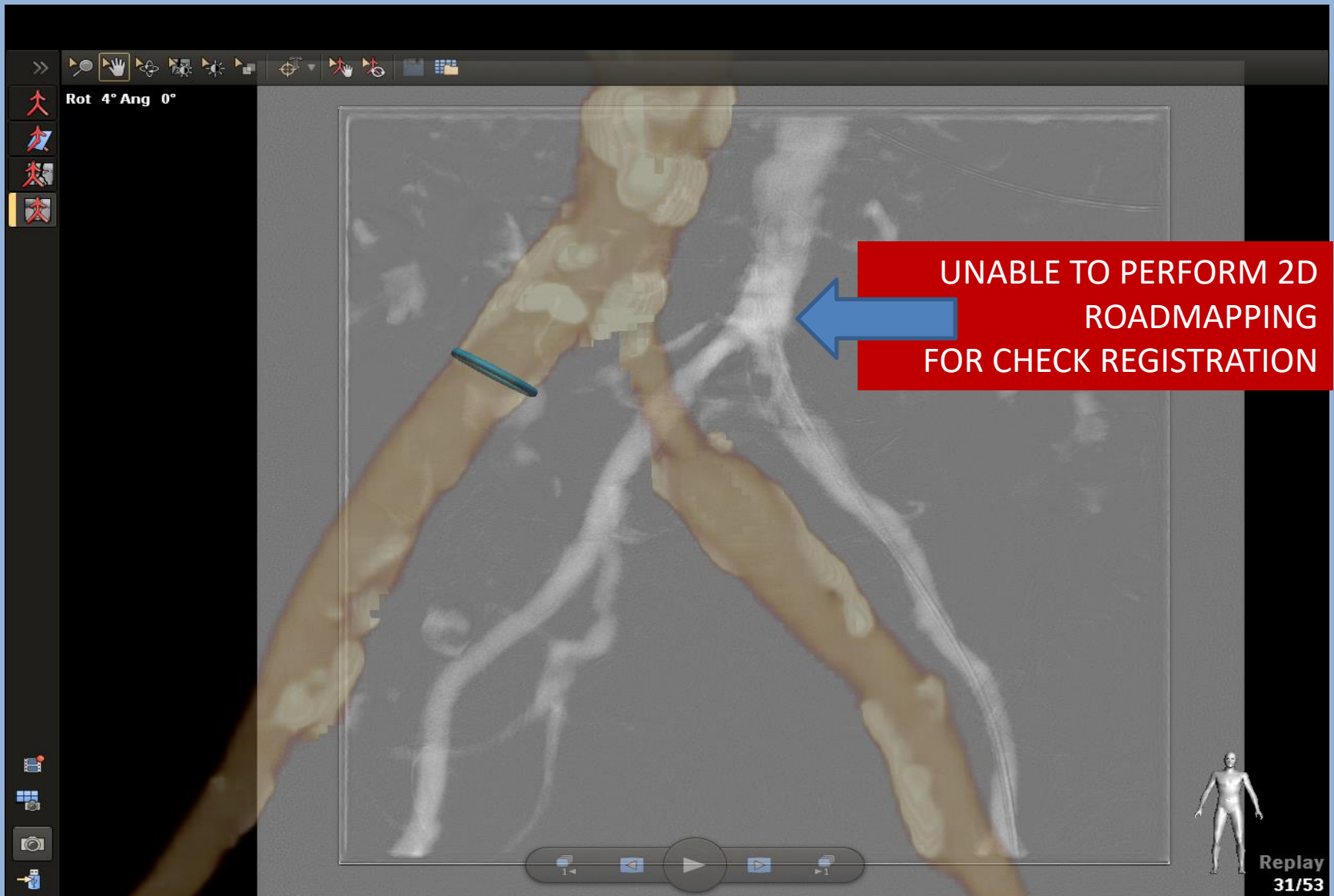
STENT PLACEMENT



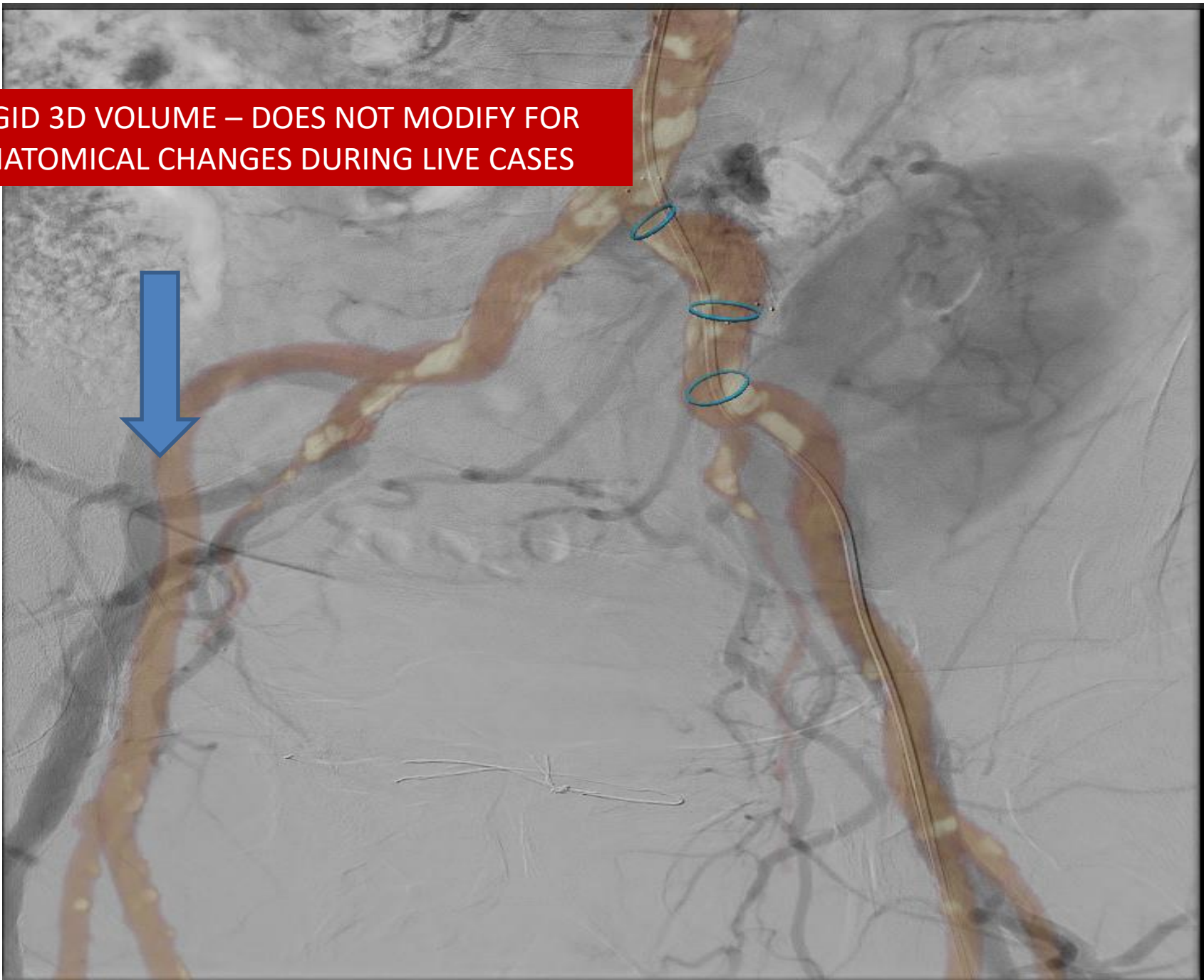
CHECK ANGIO



DISADVANTAGES

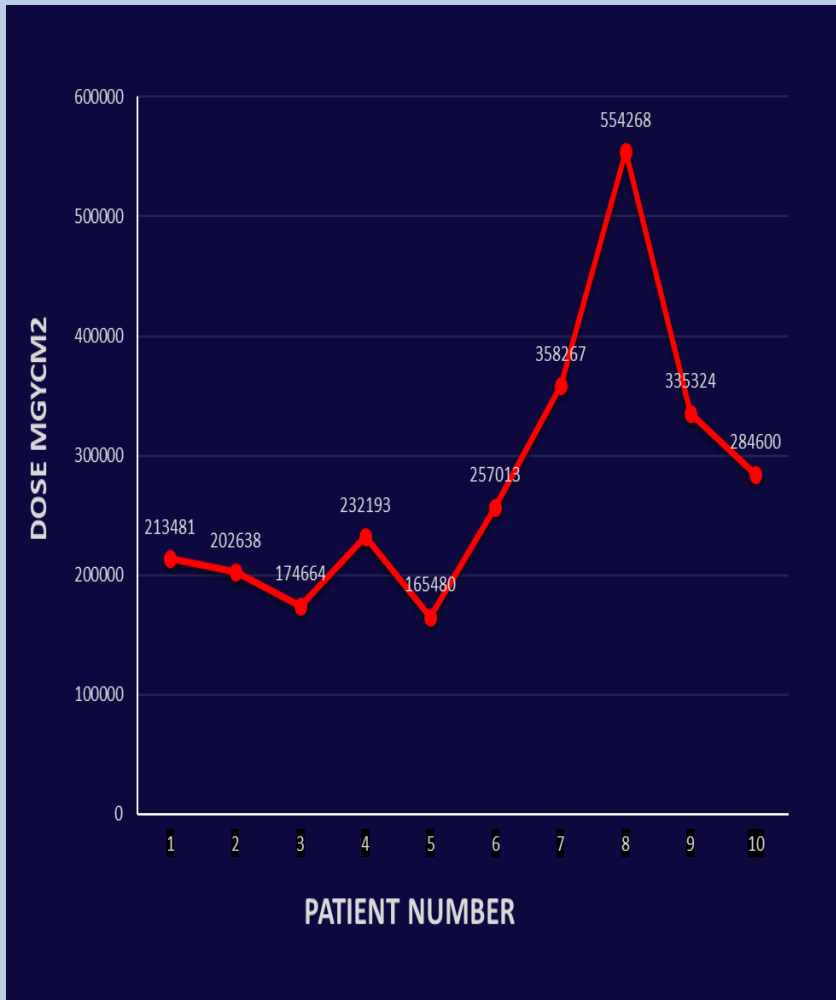


RIGID 3D VOLUME – DOES NOT MODIFY FOR ANATOMICAL CHANGES DURING LIVE CASES

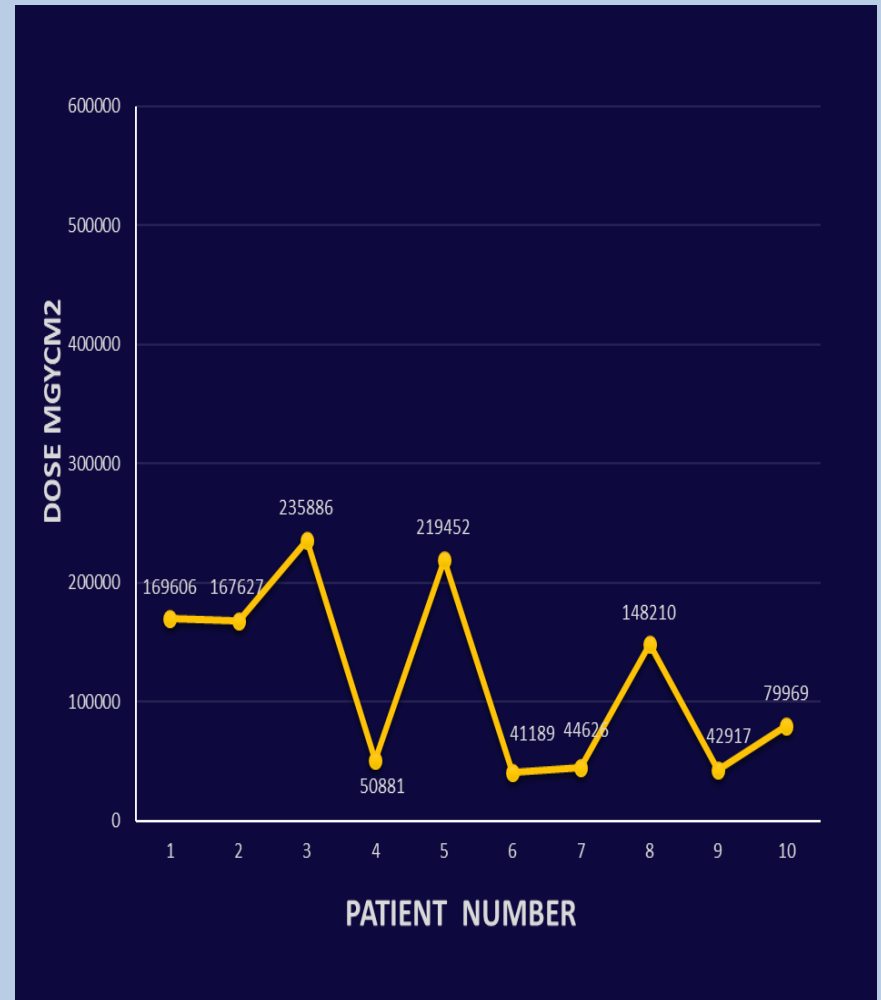


DOSE COMPARISON


WITHOUT FUSION IMAGING



WITH FUSION IMAGING



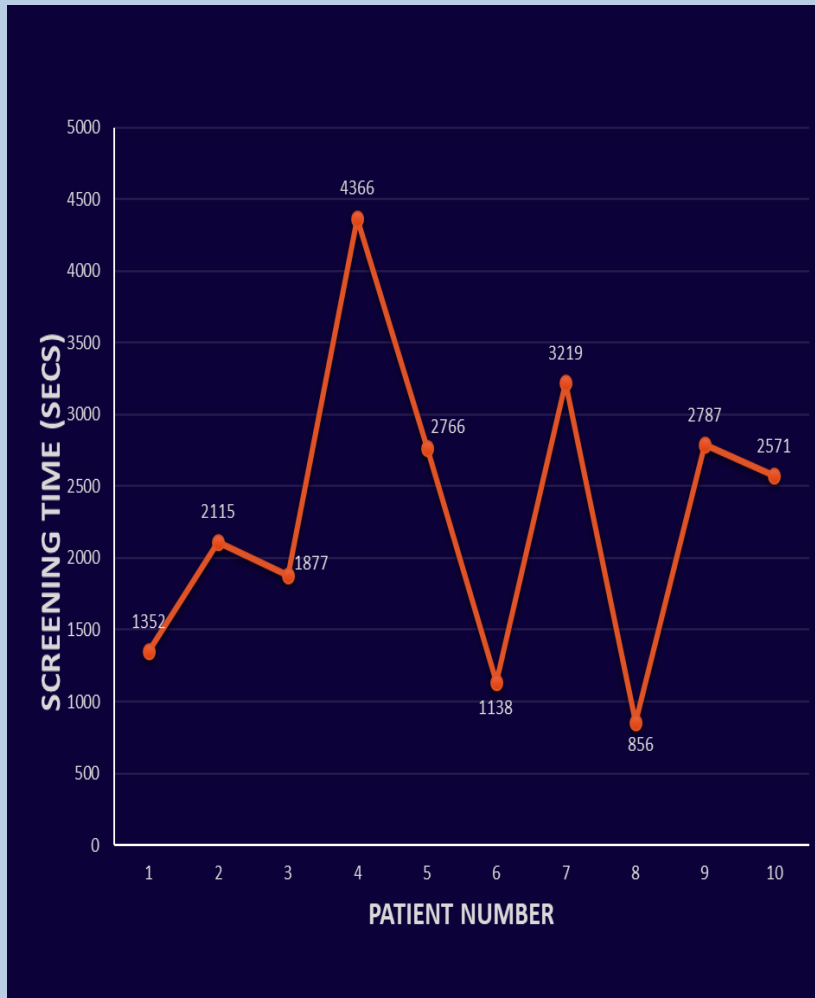
 GROUP A (JAN18-JULY 19)

 GROUP B (JAN18 – JULY 19)

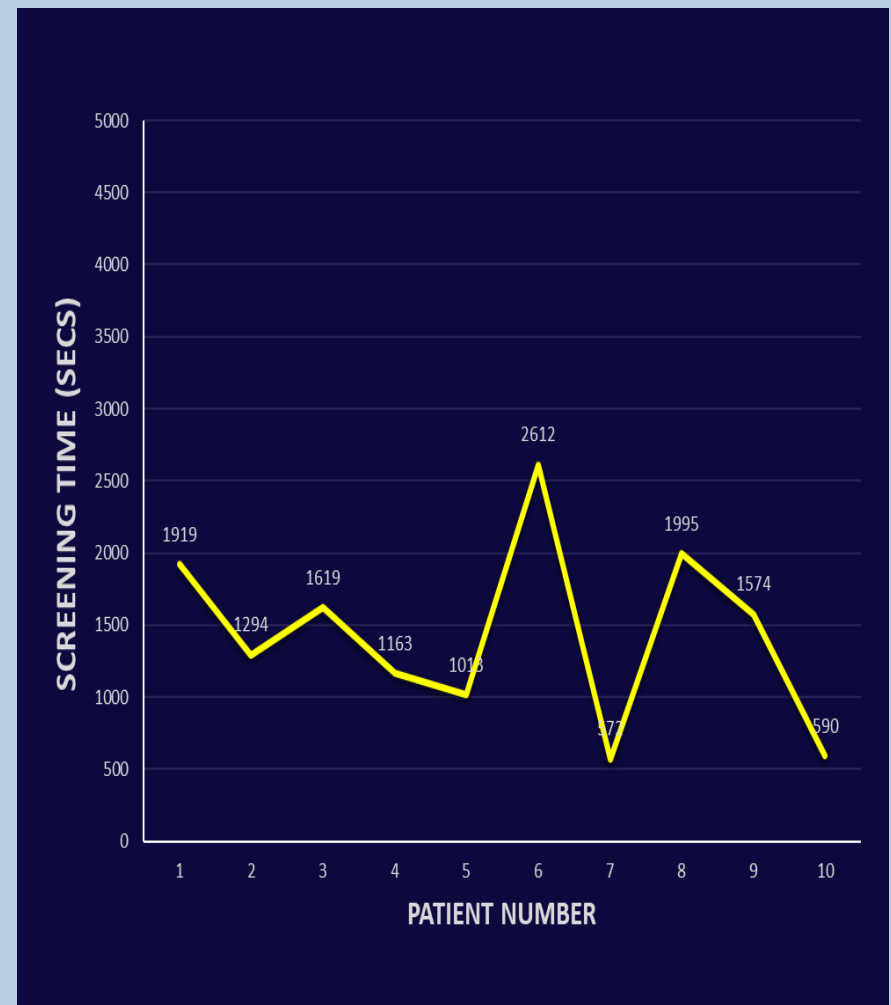
*Comparison of Mean average between groups =
43% Reduction in Dose*

SCREENING TIME COMPARISON


WITHOUT FUSION IMAGING



WITH FUSION IMAGING



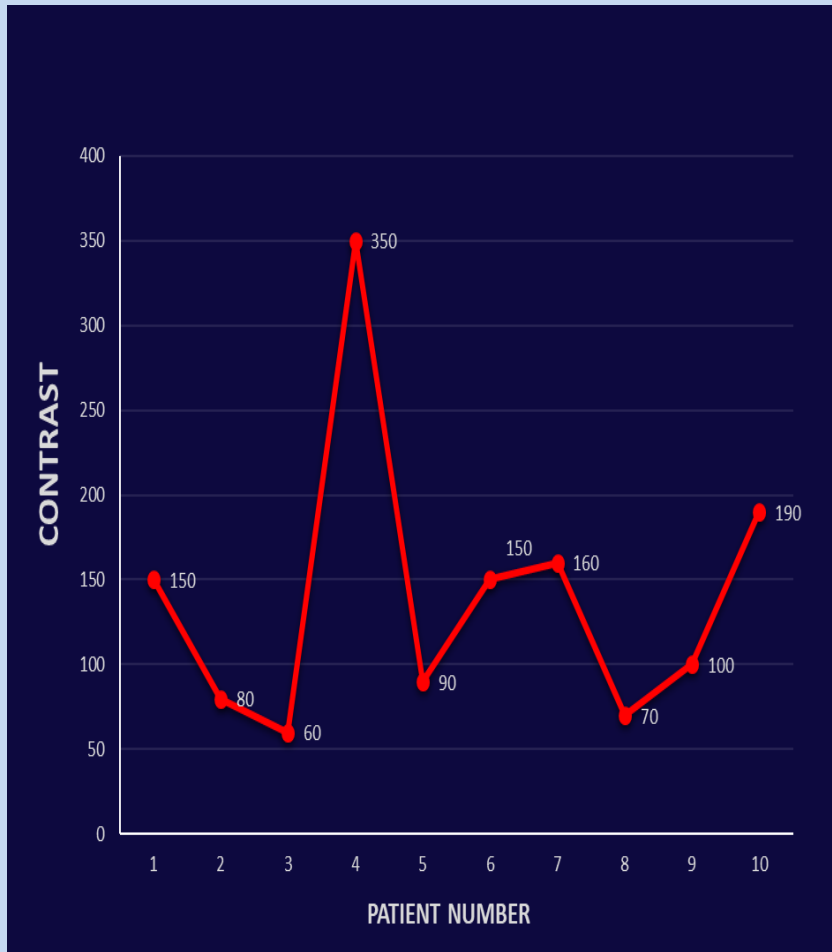
 GROUP A (JAN18-JULY 19)

 GROUP B (JAN 18 – JULY 19)

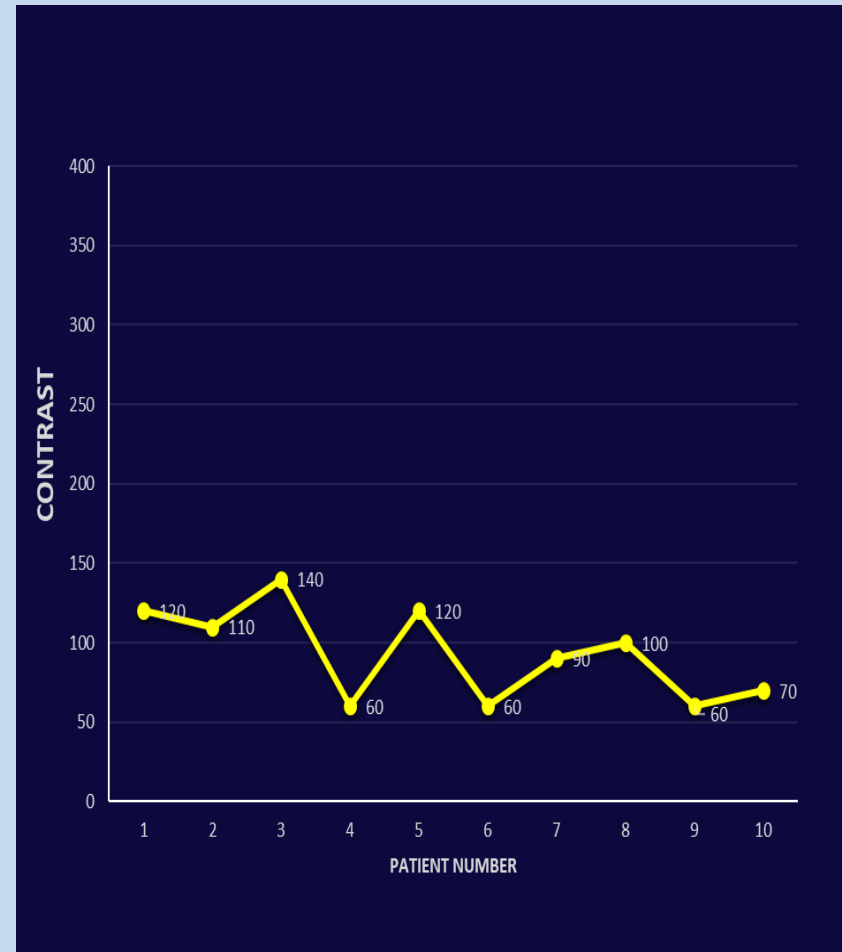
Comparison of Mean average between groups= 62% Reduction in screening time

CONTRAST COMPARISON


WITHOUT FUSION IMAGING



WITH FUSION IMAGING



 GROUP A (JAN18-JULY 19)

 GROUP B (JAN18 – JULY 19)

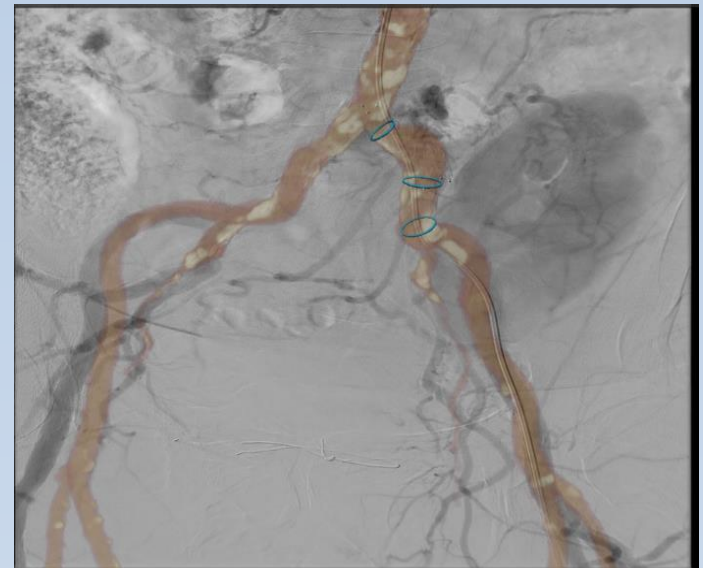
Comparison of Mean average between groups = 66% Reduction in contrast usage

APPLICATION TO OTHER PROCEDURES

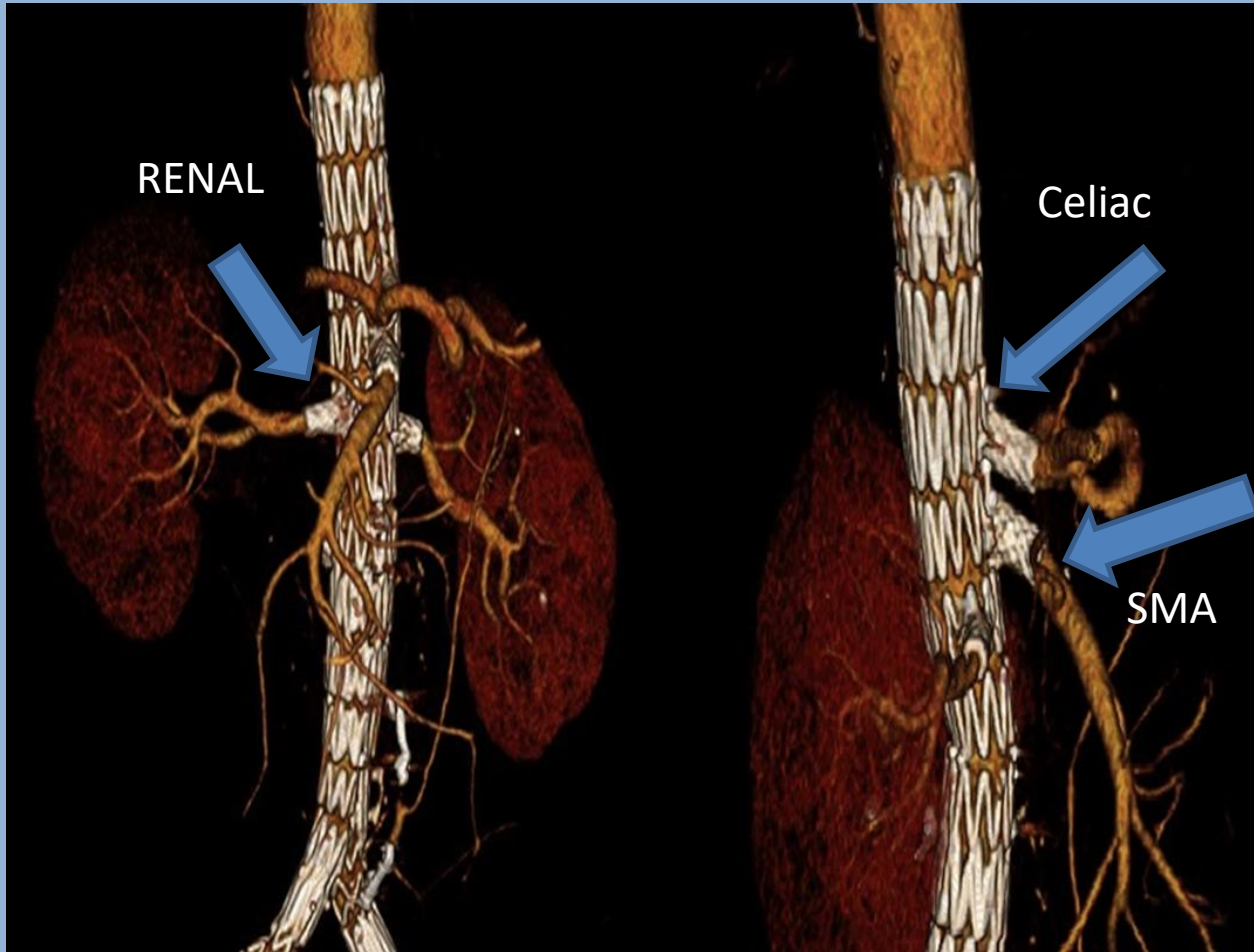
EVAR/TVAR



ILIAC ANGIOPLASTY/STENTING



FEVAR



APPLICATION TO OTHER PROCEDURES

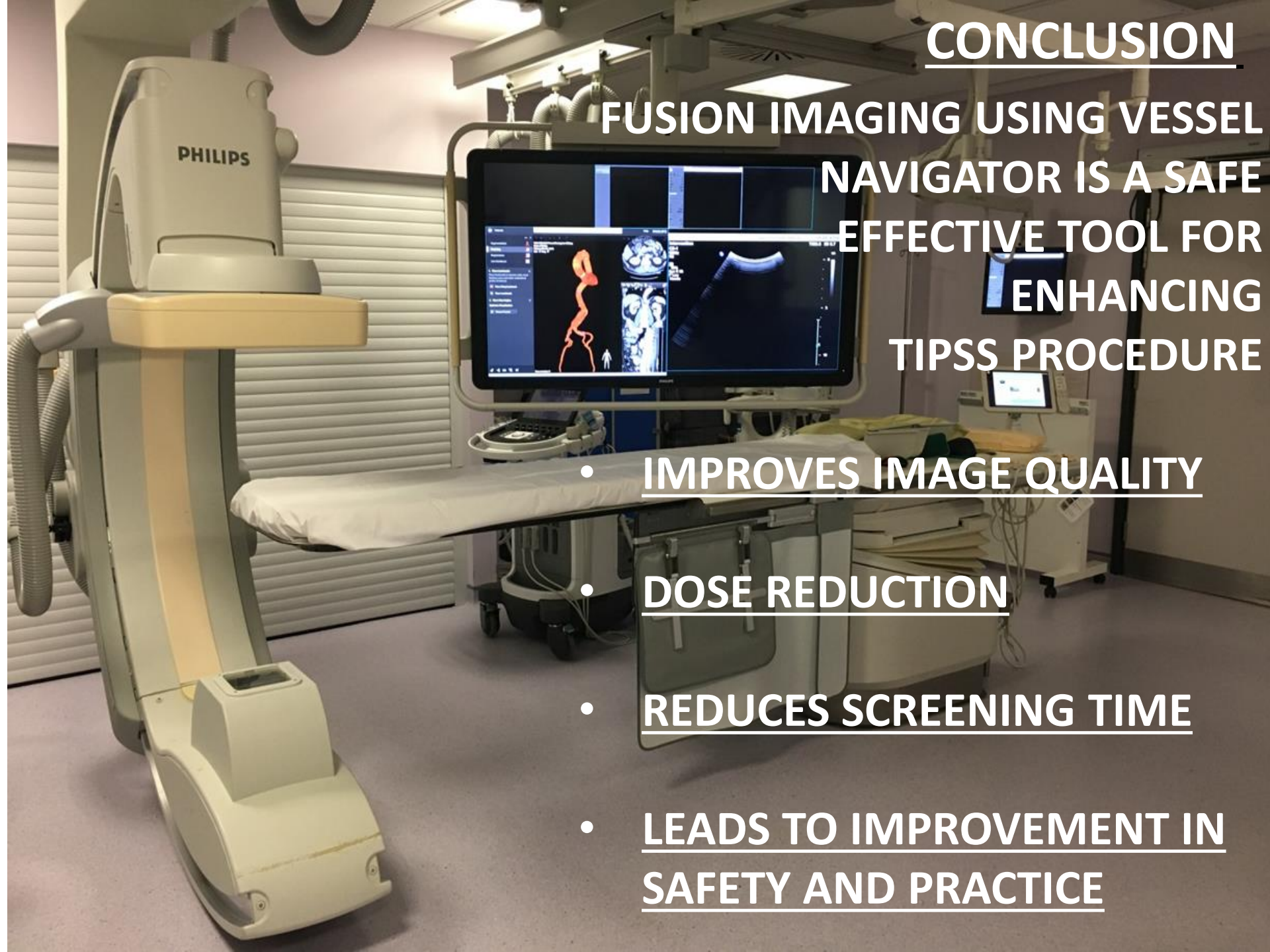
SMA STENTING



CONCLUSION

FUSION IMAGING USING VESSEL NAVIGATOR IS A SAFE EFFECTIVE TOOL FOR ENHANCING TIPSS PROCEDURE

- IMPROVES IMAGE QUALITY
- DOSE REDUCTION
- REDUCES SCREENING TIME
- LEADS TO IMPROVEMENT IN SAFETY AND PRACTICE



QUESTIONS?