



## *Echographie standard en salle de cathétérisme et fusion d'image*

**Sébastien Hascoët**, *Cardiologie pédiatrique et congénitale, Hôpital Marie Lannelongue*

**Echocardiographie**  
**transthoracique**  
**transoesophagien**  
**intracardiaque**

**2D – 2D Multiplan – 3D**

**Fusion echocardiographie fluoroscopie**

# Echocardiographie transthoracique

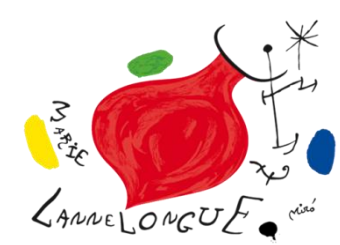
Non invasif

Cathé sous anesthésie locale

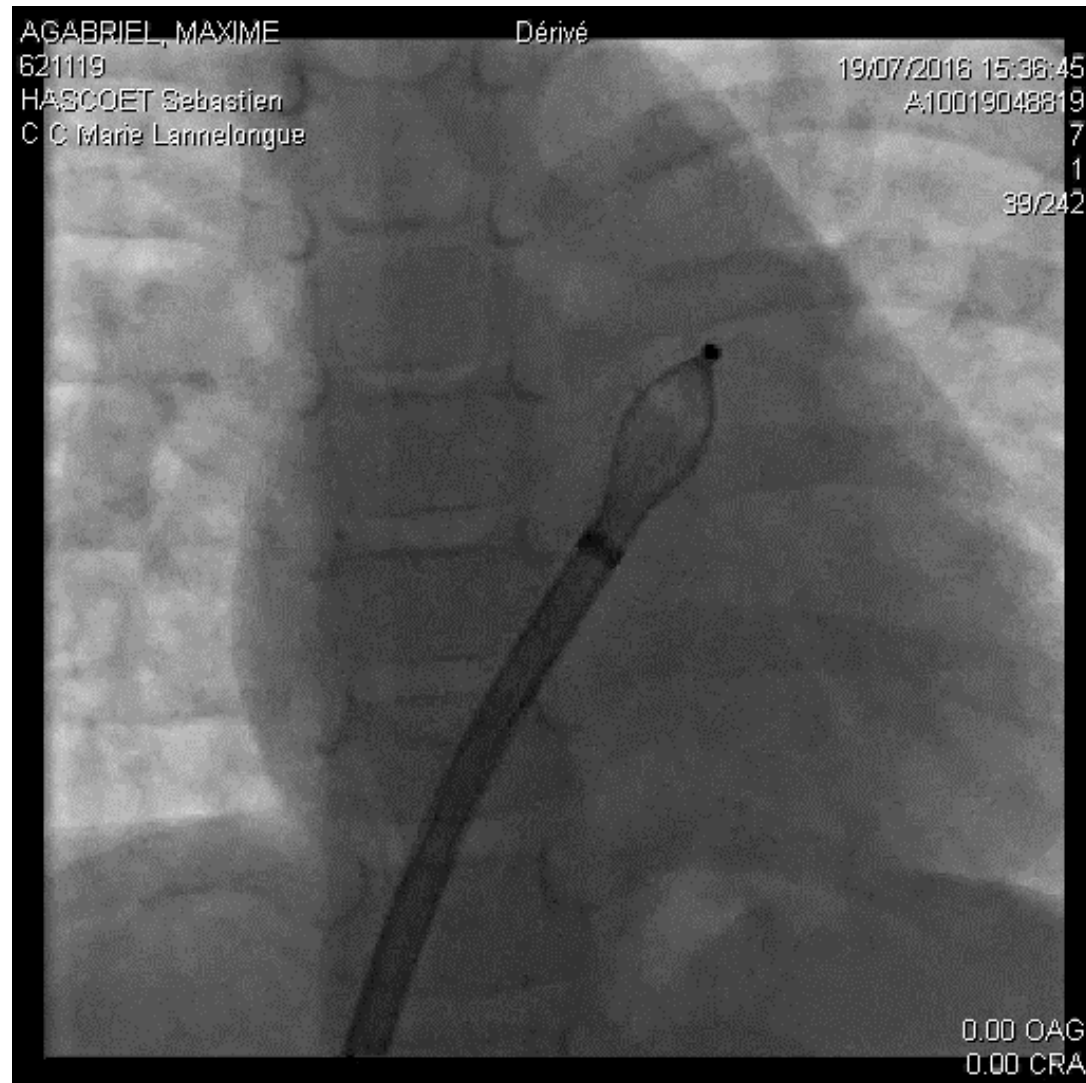
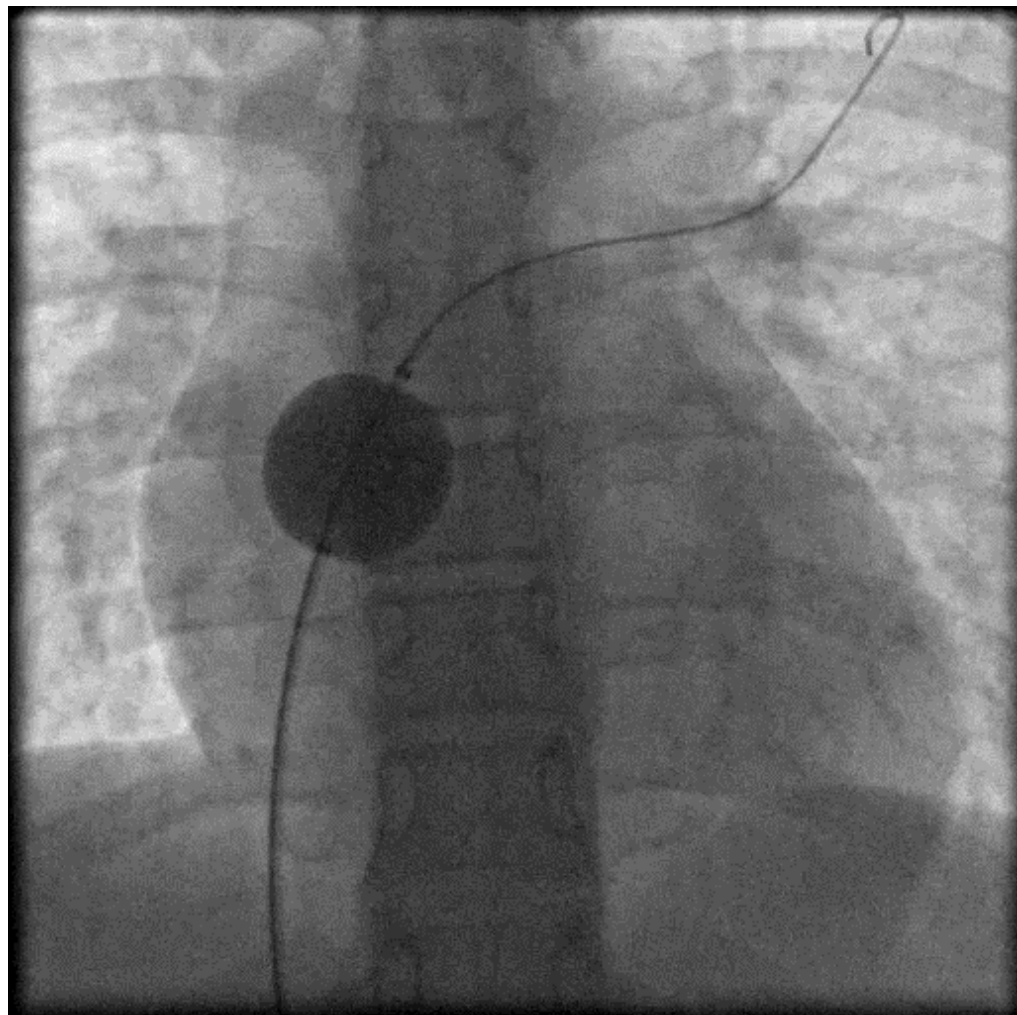
Un seul operateur



*Baruteau, Hascoet et al., J. Thorac; Dis. 2017*



# Ex : CIA



UE



UE







# ECHO INTRA-CARDIAQUE

AcuNav 10F Puiss M

CI 0.7 ITm 0.7

Comp4 Proc P2

GN 21/ /

46ips 6.4cm

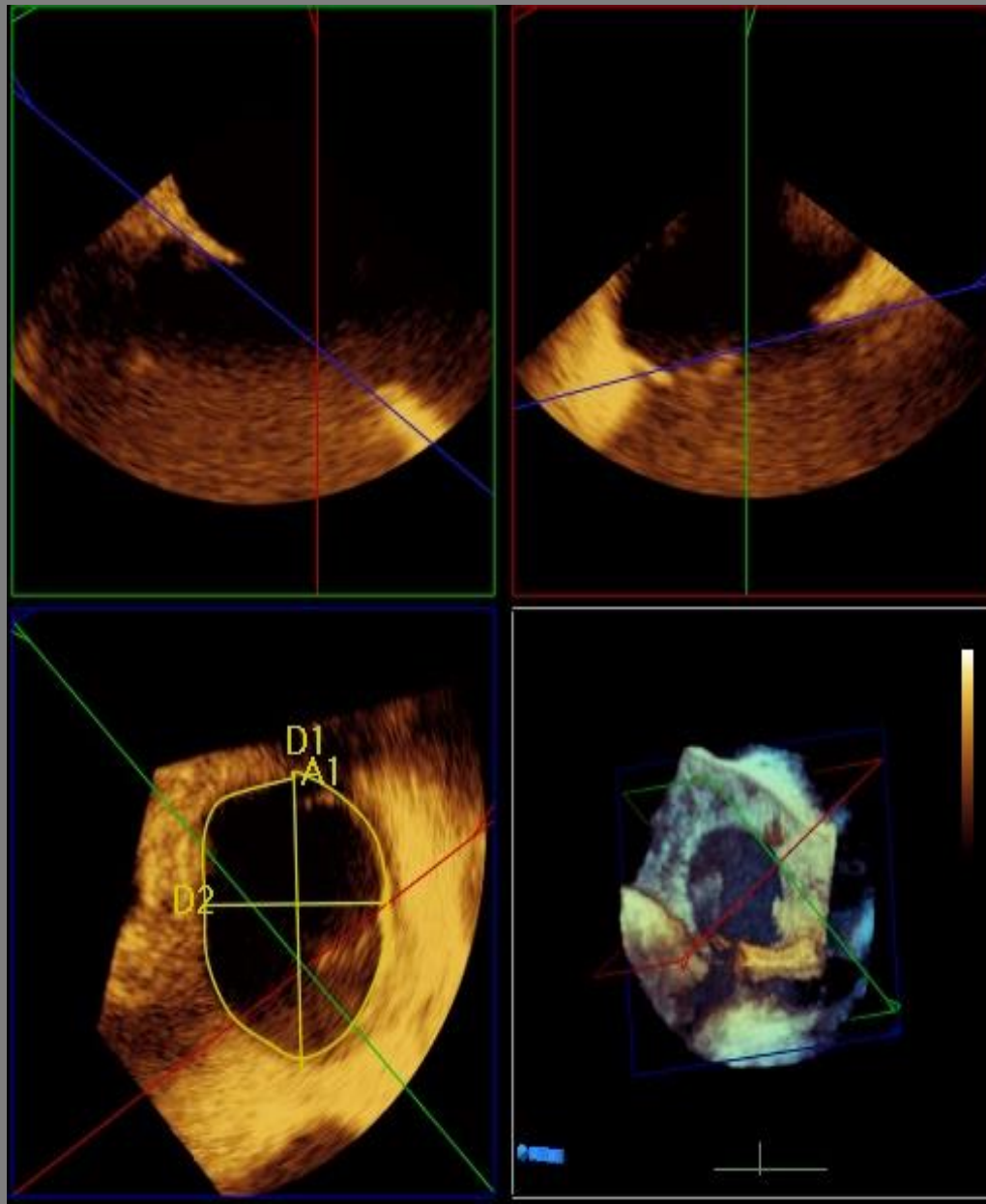
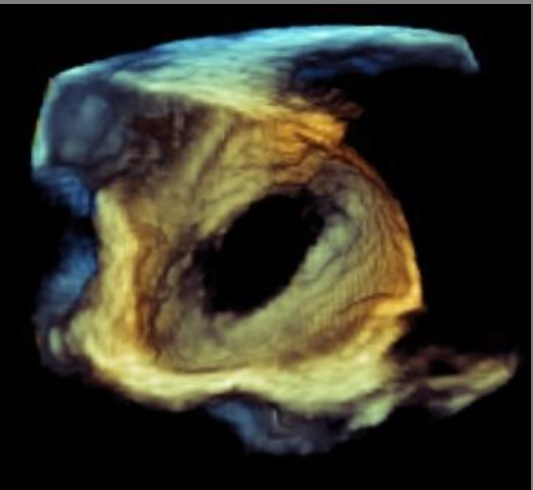
Fréq É

Boucle 38 / 64

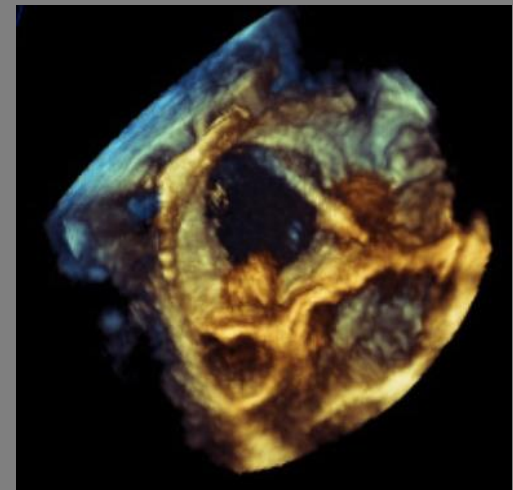
18:07:07

18 Fév 2011



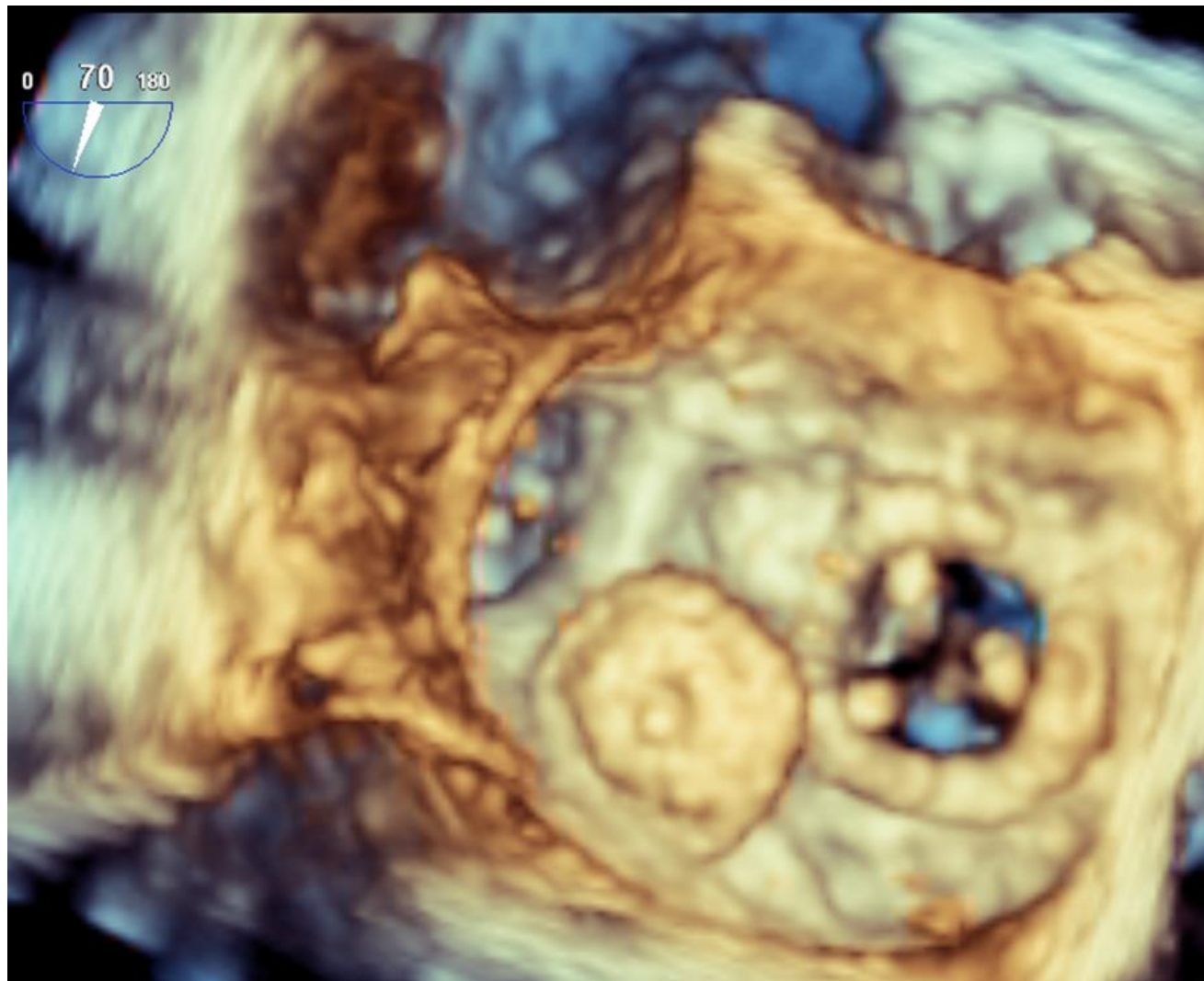


Distance(s)  
D1 = 3.48 cm I X  
D2 = 2.62 cm I X  
Surface(s)  
A1 = 6.96 cm<sup>2</sup> I X



# ETO 3D

*Hascoet et al., EHJCI 2015*



CLINICAL RESEARCH

## Multimodality imaging guidance for percutaneous paravalvular leak closure: Insights from the multi-centre FFPP register

*Imagerie multi-modalités des fuites paravalvulaires: données de l'observatoire multicentrique FFPP*

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Francois Bagate<sup>c,d</sup>, Julien Guihaire<sup>a</sup>, Agathe Potier<sup>a</sup>,  
Khaled Hadeed<sup>e</sup>, Yoan Lavie-Badie<sup>f</sup>,  
Hélène Bouvaist<sup>g</sup>, Claire Dauphin<sup>h</sup>, Fabrice Bauer<sup>i</sup>,  
Mohammed Nejjari<sup>j</sup>, Remy Pillière<sup>c</sup>, Eric Brochet<sup>k</sup>,  
Lionel Mangin<sup>l</sup>, Guillaume Bonnet<sup>m</sup>, Vlad Ciobotaru<sup>n</sup>,  
Guillaume Leurent<sup>o</sup>, Najib Hammoudi<sup>p</sup>,  
Adel Aminian<sup>q</sup>, Clément Karsenty<sup>e,f,r</sup>,  
Christian Spaulding<sup>f</sup>, Sébastien Armero<sup>s,t</sup>,  
Frederic Collet<sup>5</sup>, Didier Champagnac<sup>u</sup>,  
Julien Ternacle<sup>d</sup>, Martin Kloeckner<sup>a</sup>,  
Benoit Gerardin<sup>a</sup>, Marc-Antoine Isorni<sup>a</sup>

<sup>a</sup> Faculté de médecine Paris-Sud, hôpital Marie-Lannelongue, université Paris-Sud, Paris-Saclay, 92350 Le Plessis-Robinson, France

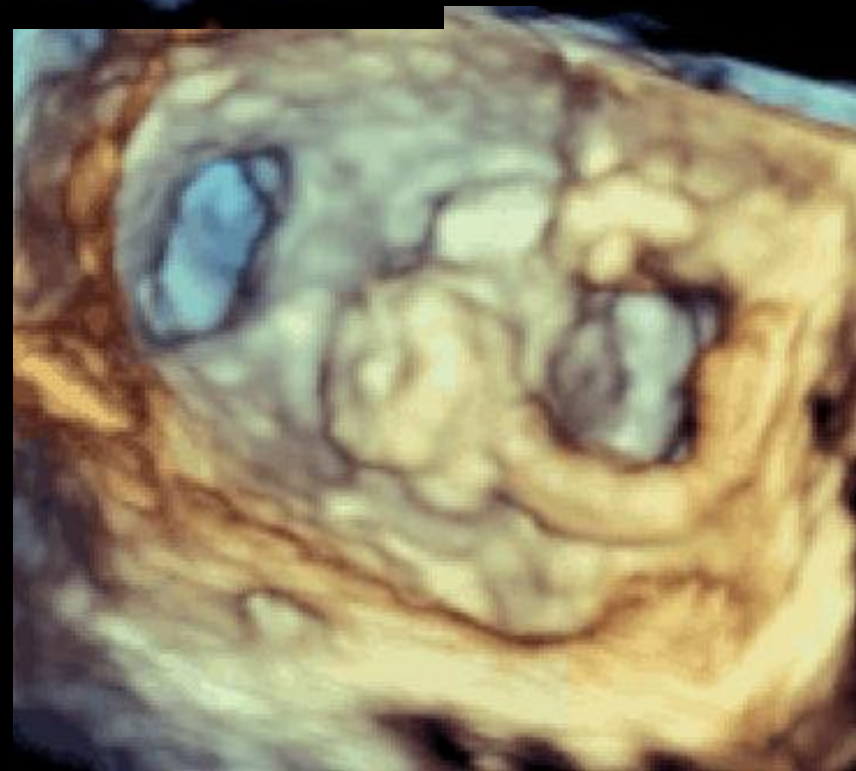
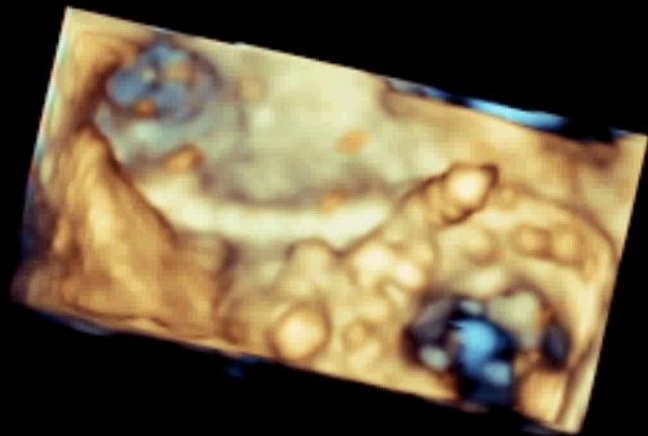
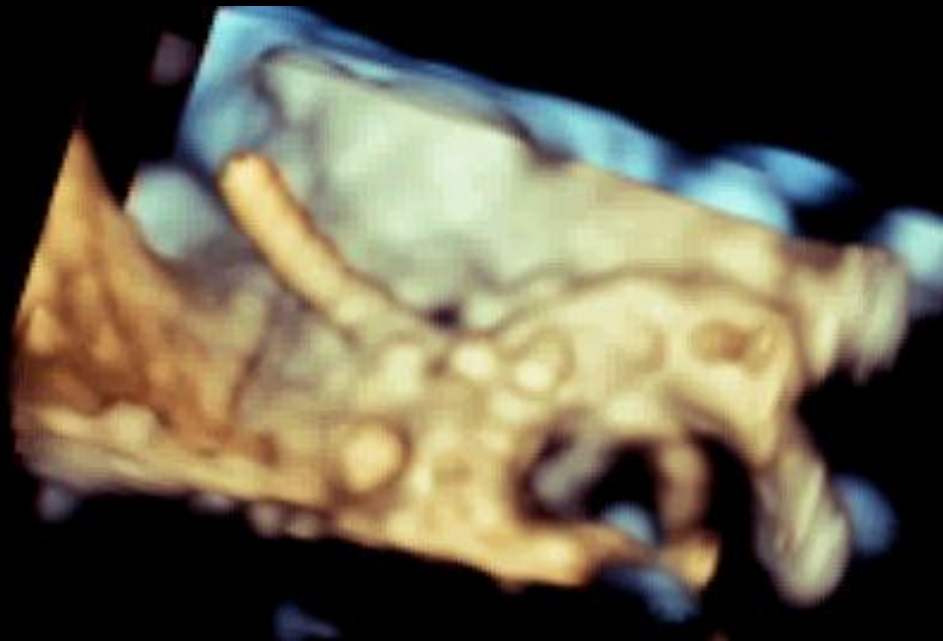
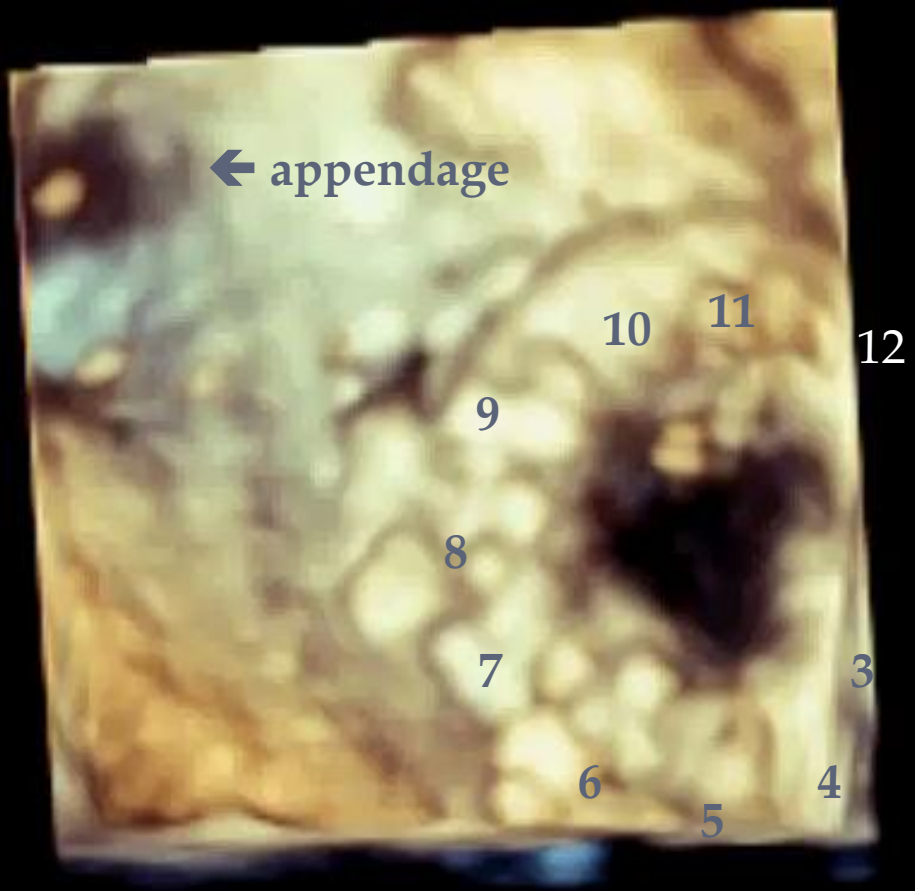
<sup>b</sup> Department of cardiology, medical university of Silesia, 40055 Katowice, Poland

<sup>c</sup> Centre de réanimation et d'intervention cardio-vasculaire, clinique Ambroise-Paré, 92200 Neuilly-sur-Seine, France

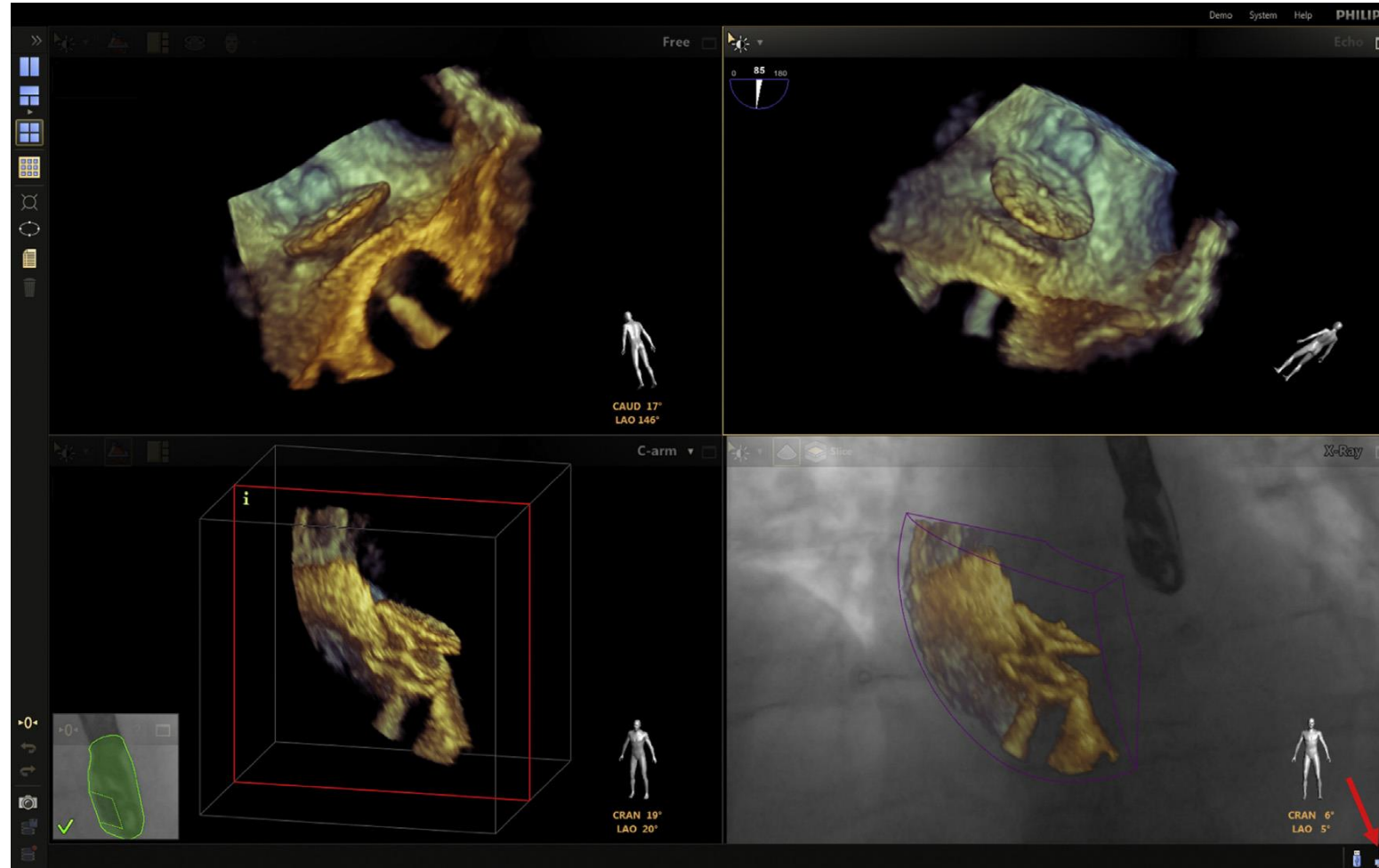
<sup>d</sup> Hôpital Henri-Mondor, cardiologie, Assistance publique des Hôpitaux de Paris, Inserm U955, 94010 Créteil, France

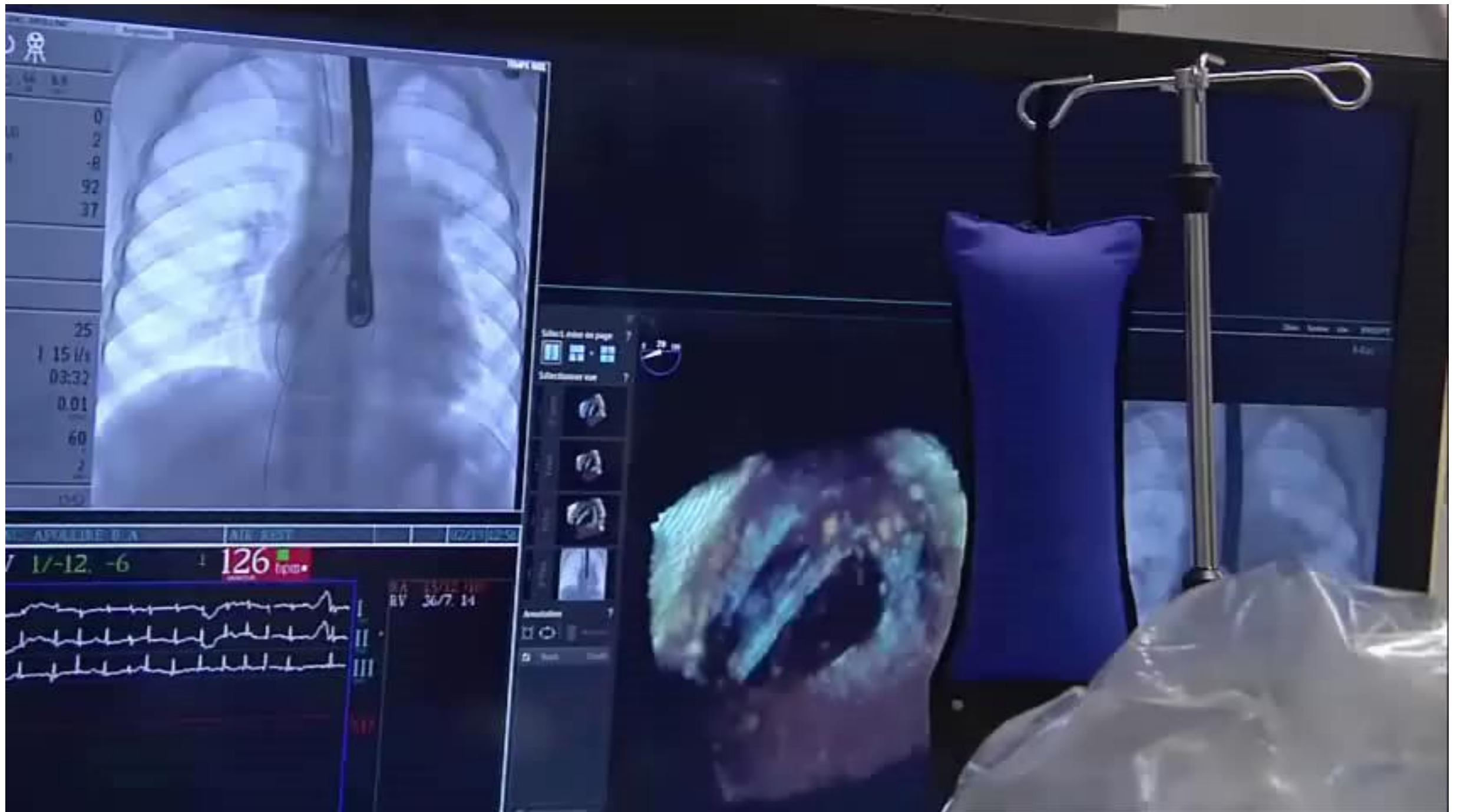
# ETO 3D





# Fusion Fluoroscopie - echocardiographie

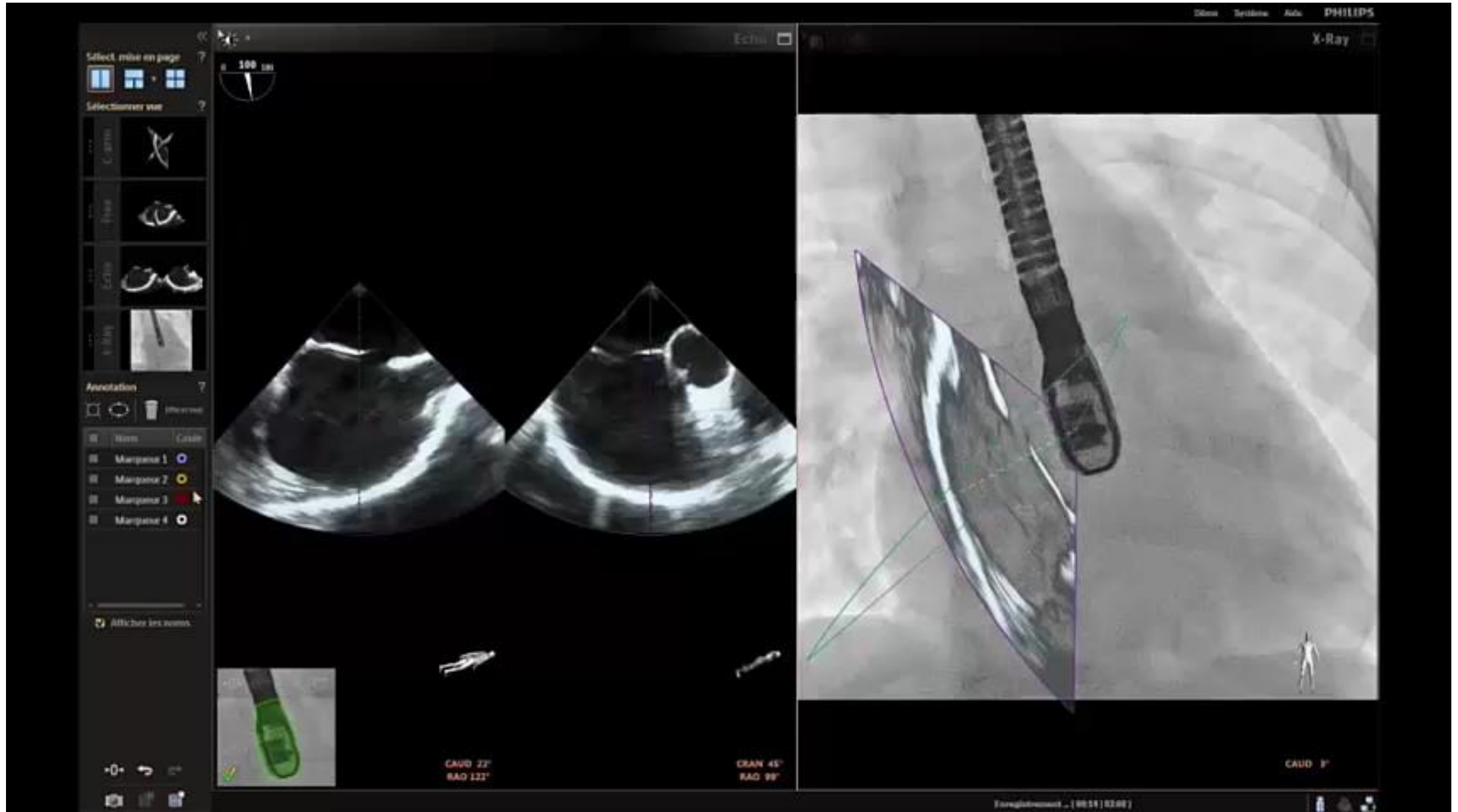






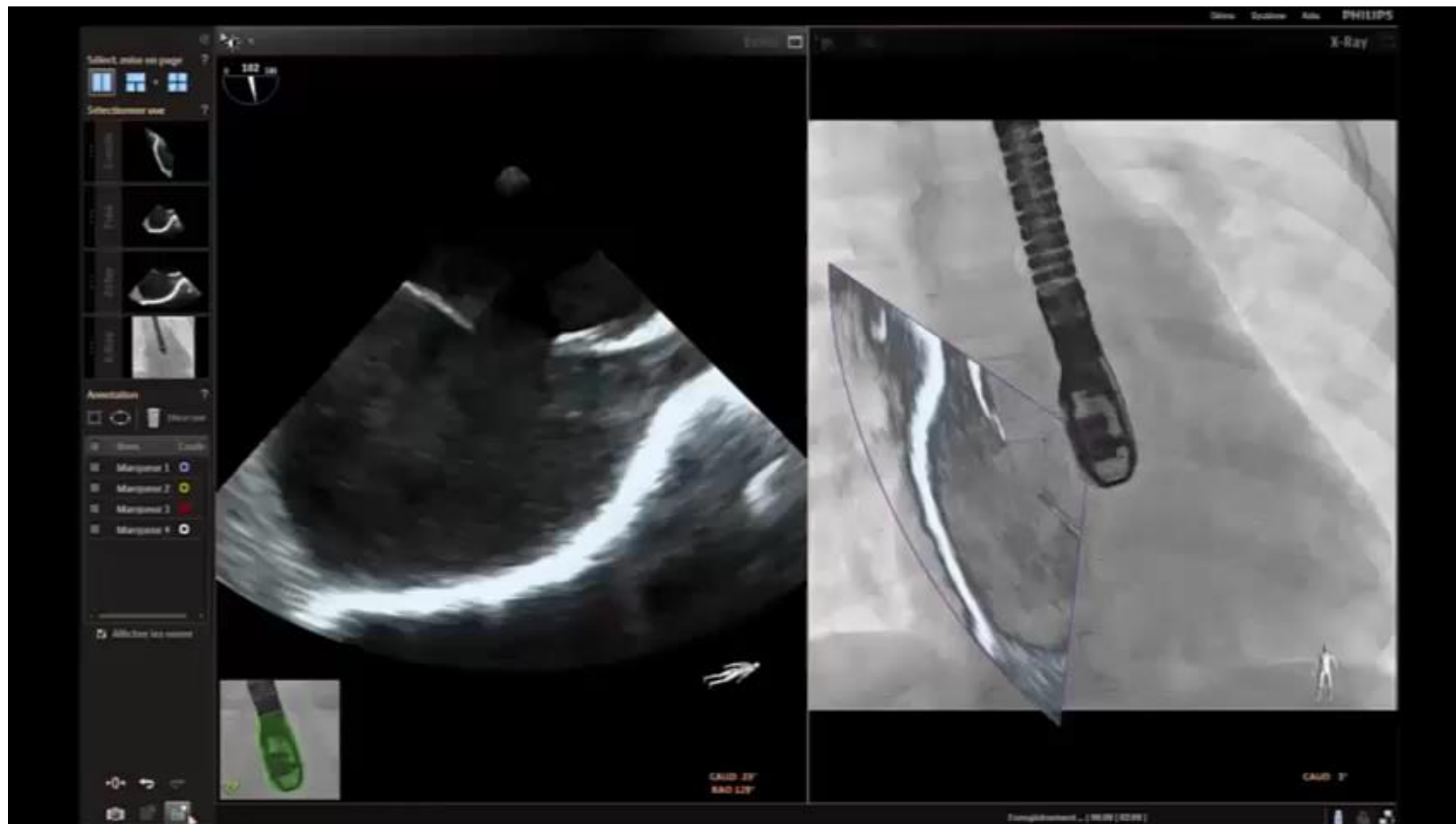
✓ Automatic Coregistration

✓ Live Tracking of the probe position

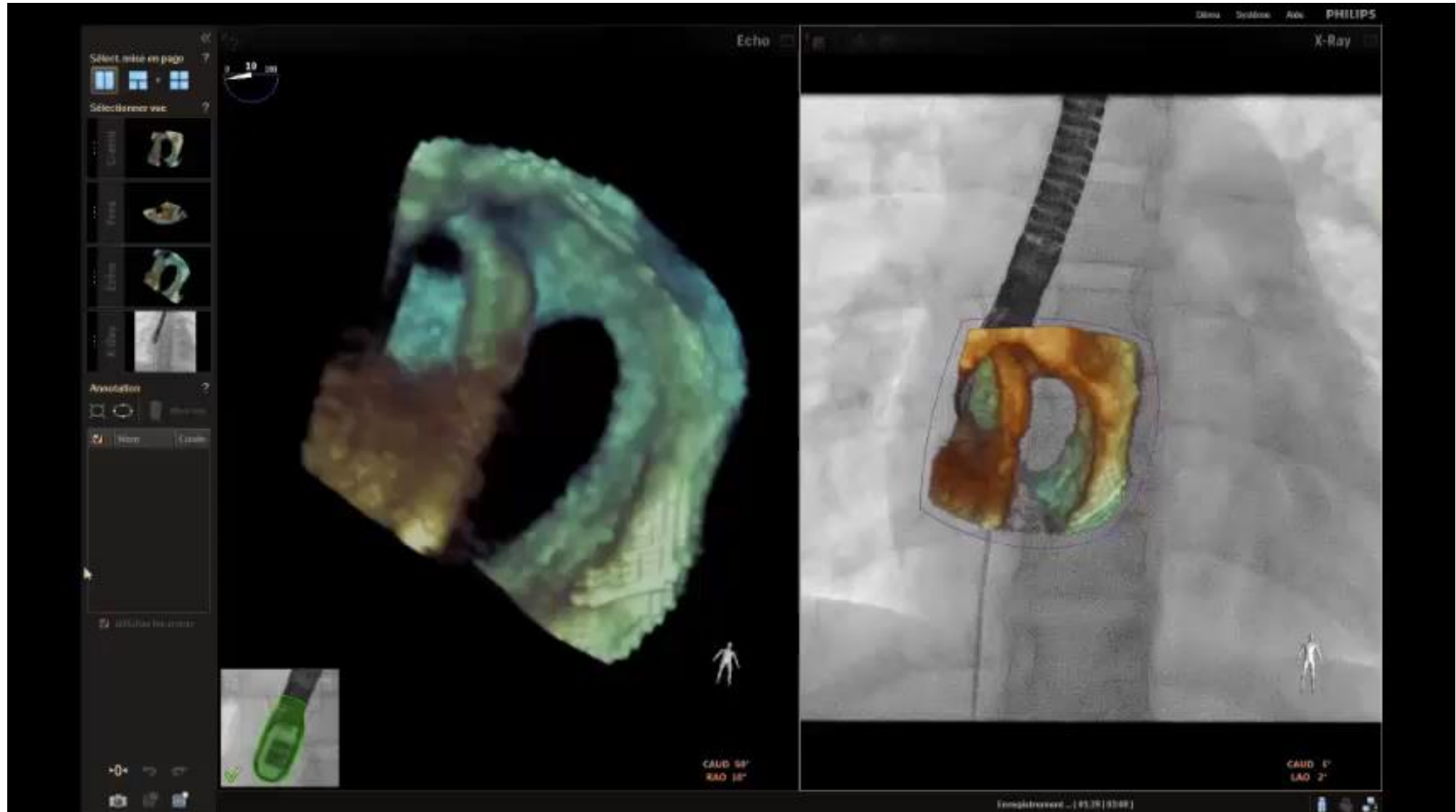




# Multimodality display options 2D

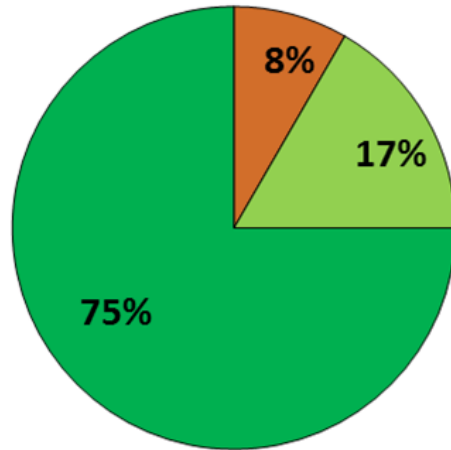


# Multimodality display options 3D

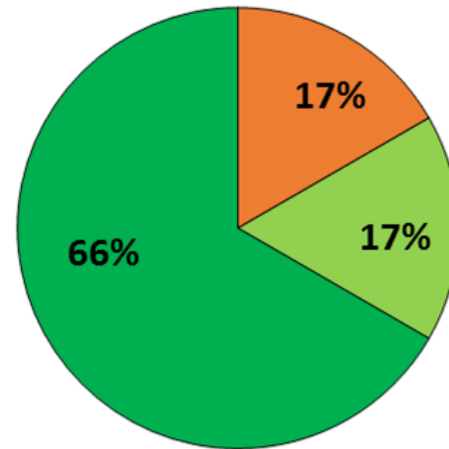


# Training and simulation

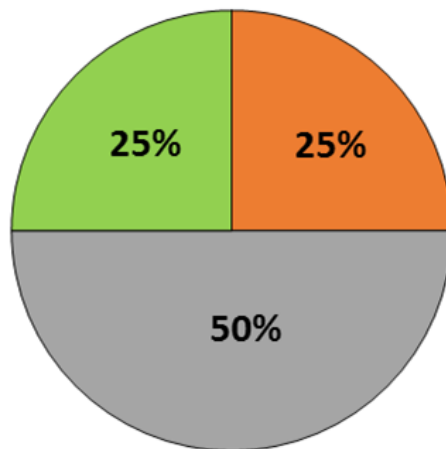
A) EchoNavigator helps understanding



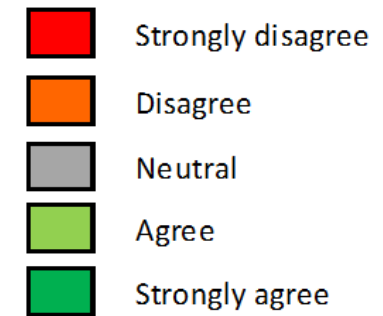
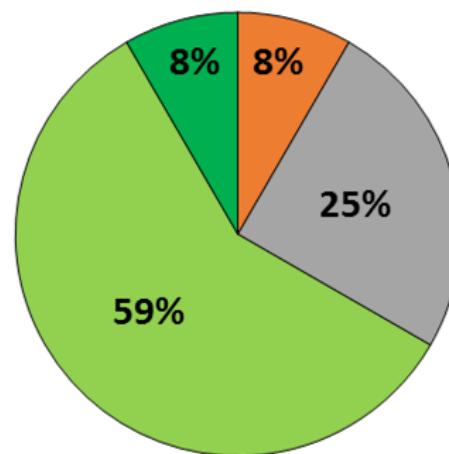
B) EchoNavigator helps following the procedure

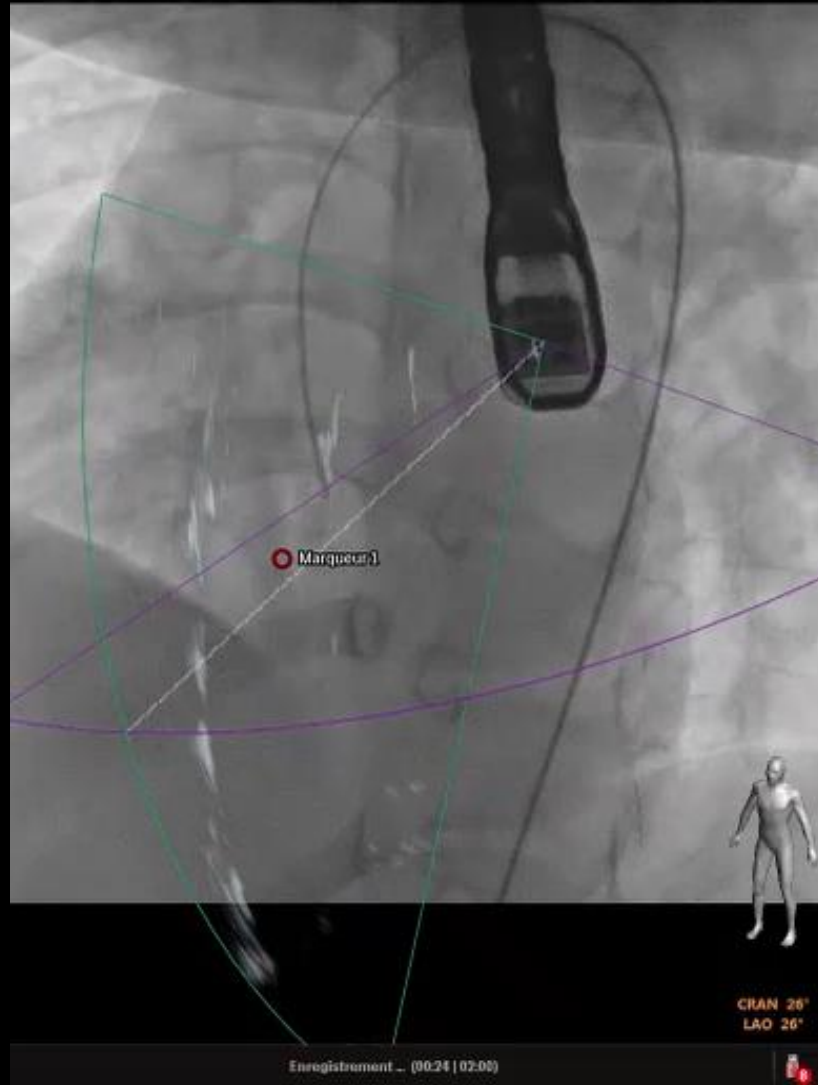
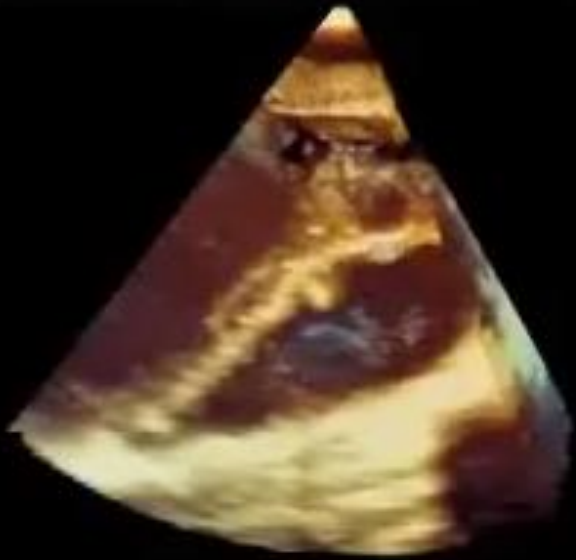


C) EchoNavigator decreases procedure duration



D) EchoNavigator is useful to guide the procedure





VSD closure  
Coil nit-occluder

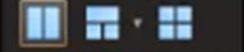
Courtesy CHU Toulouse Dr Hadeed



X-Ray

Echo

Sélect. mise en page ?



Sélectionner vue ?



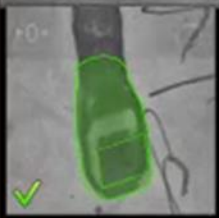
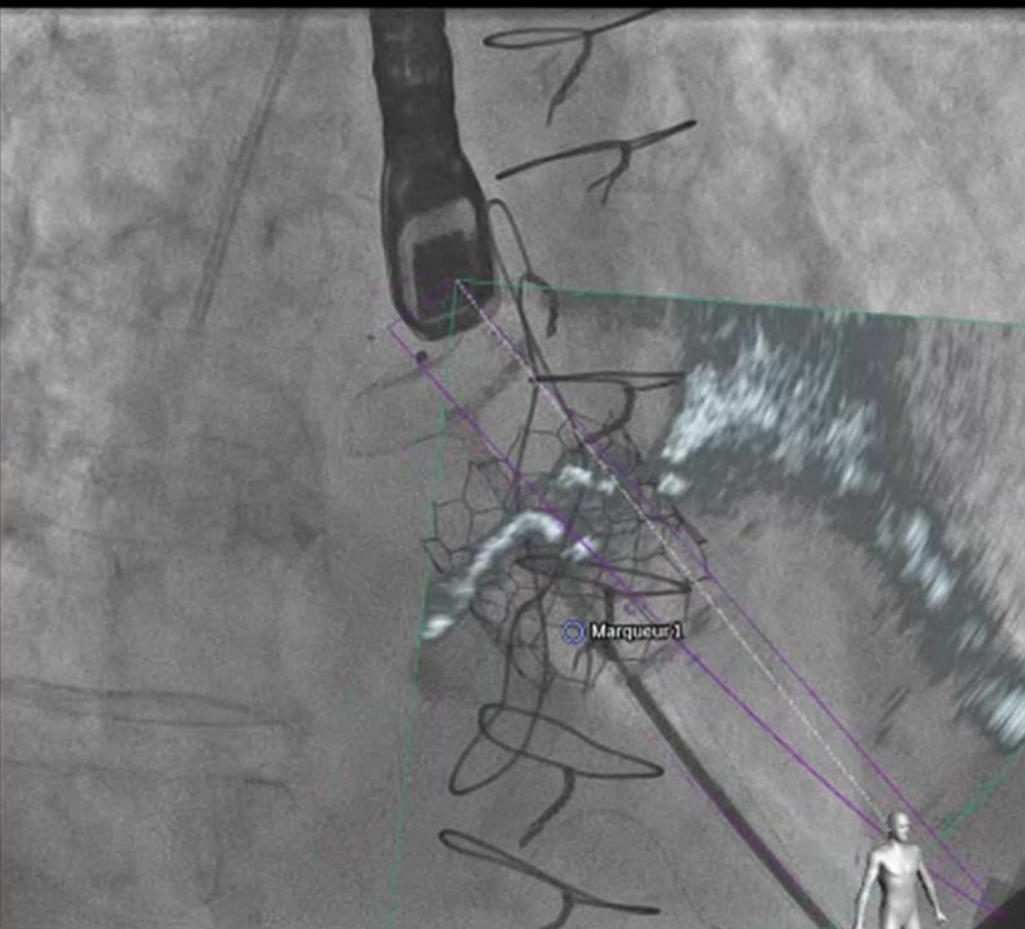
Annotation ?



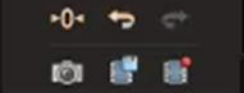
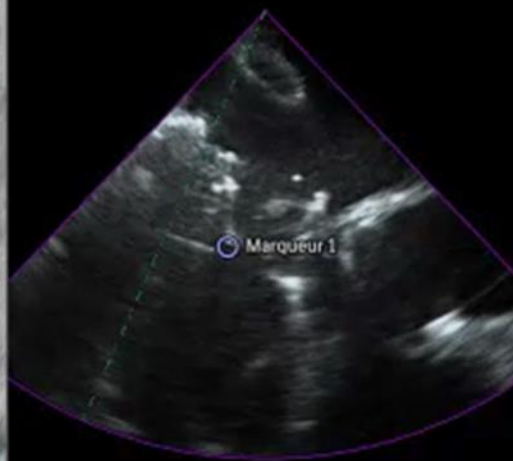
Noms Coule

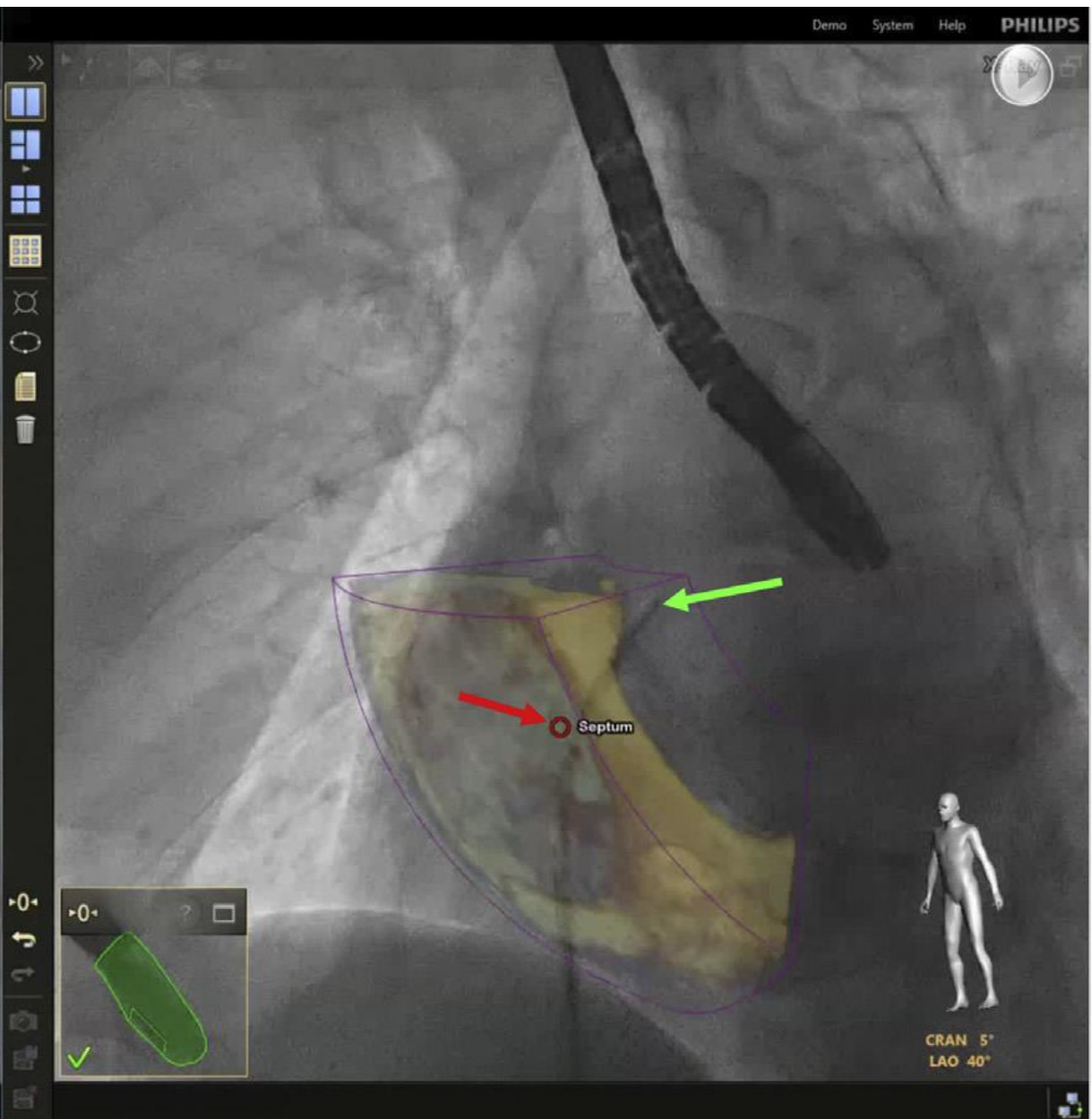
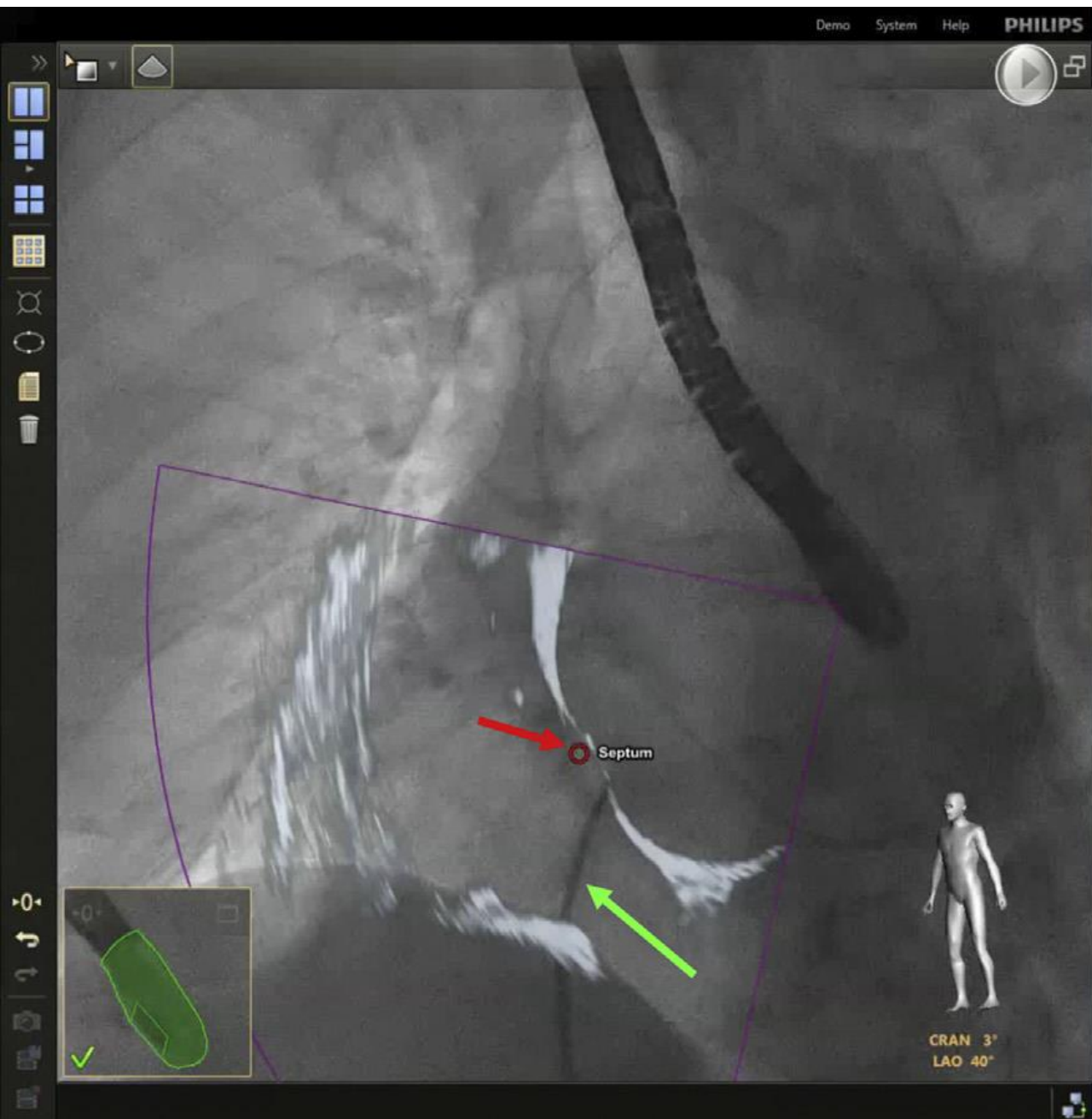
Marqueur 1

Afficher les noms



CRAN 12°  
RAO 32°





Ternacle ACVD 2018



Sélect. mise en page ?



Sélectionner vue ?

C-arm



Libre



Echo



X-Ray

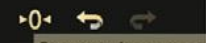
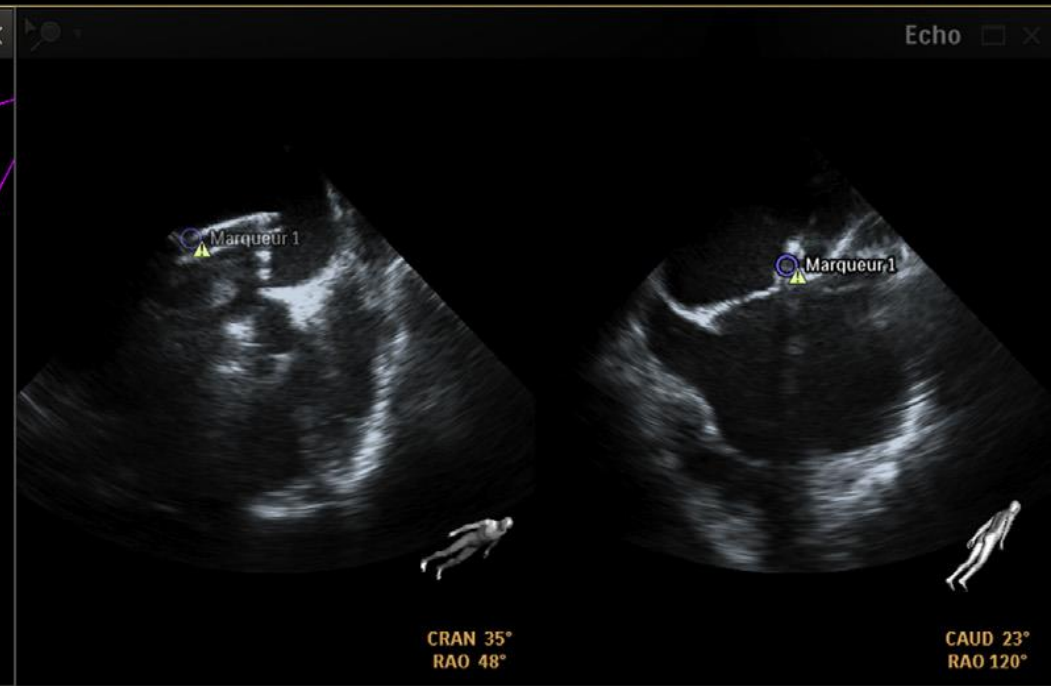
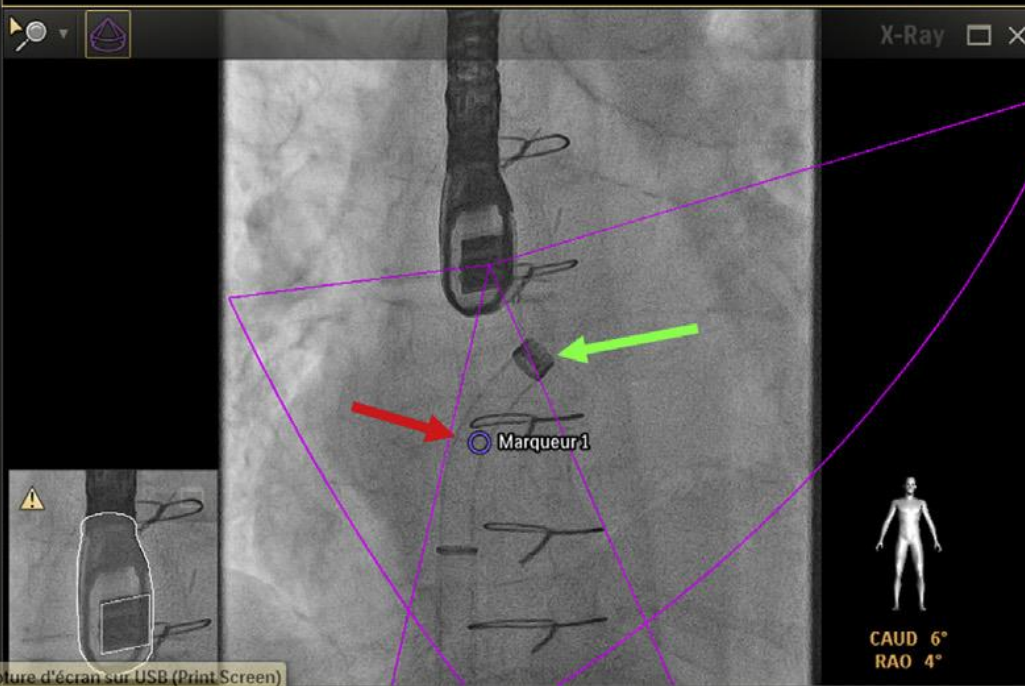
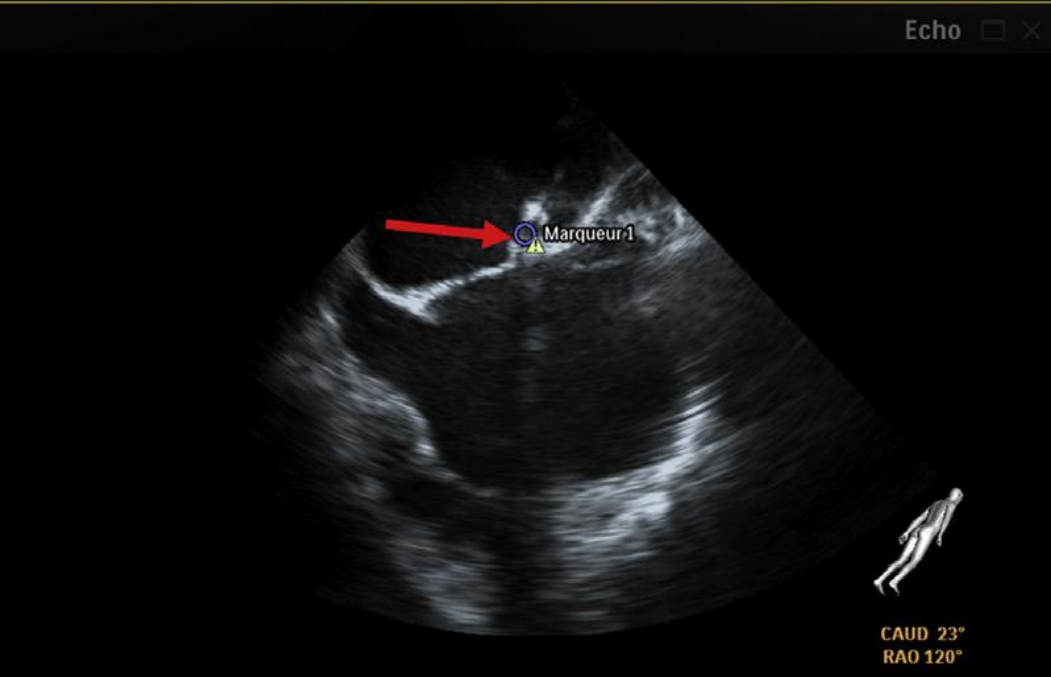
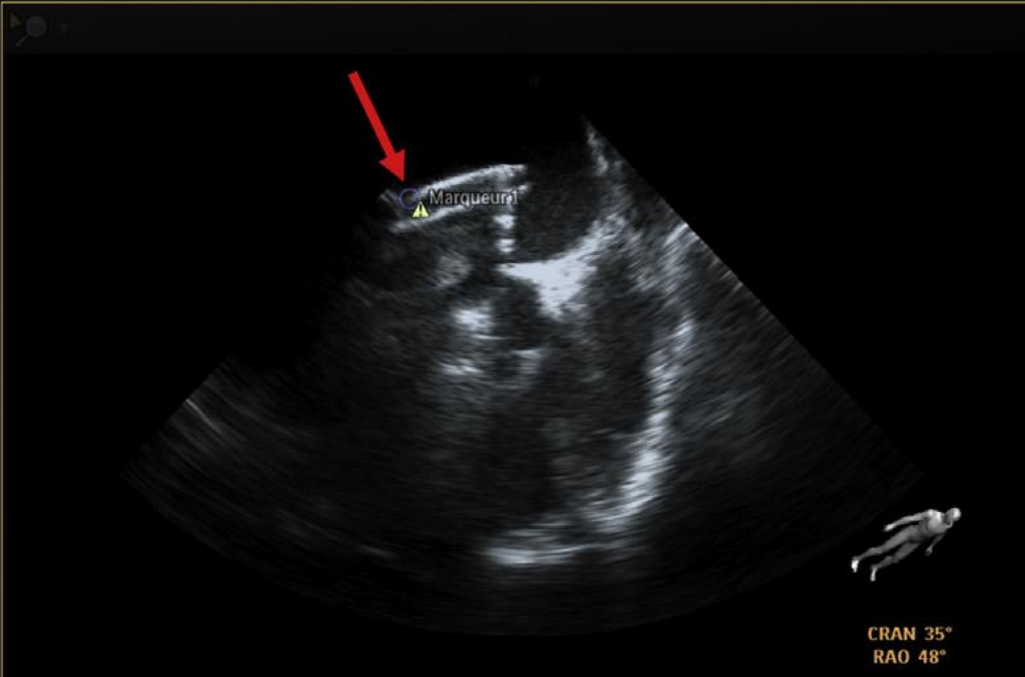


Annotation ?



Nom Coule:

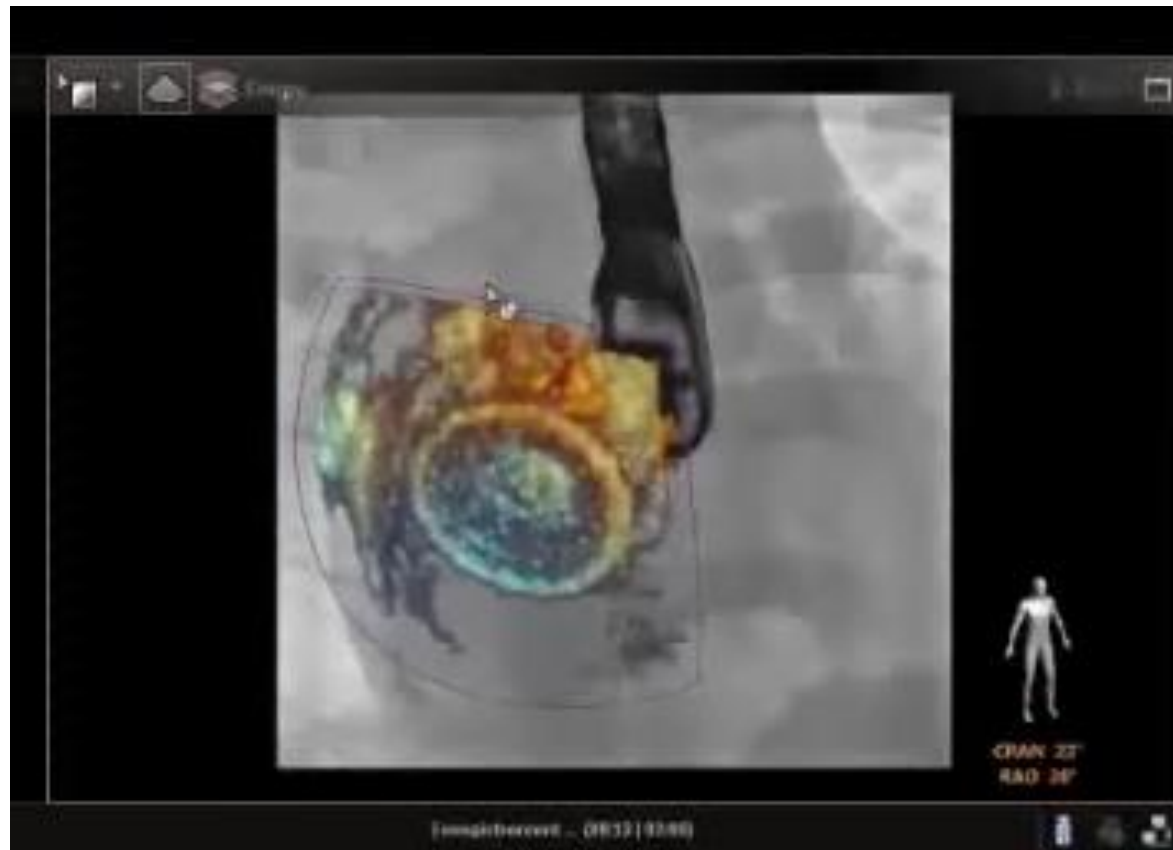
Marqueur 1



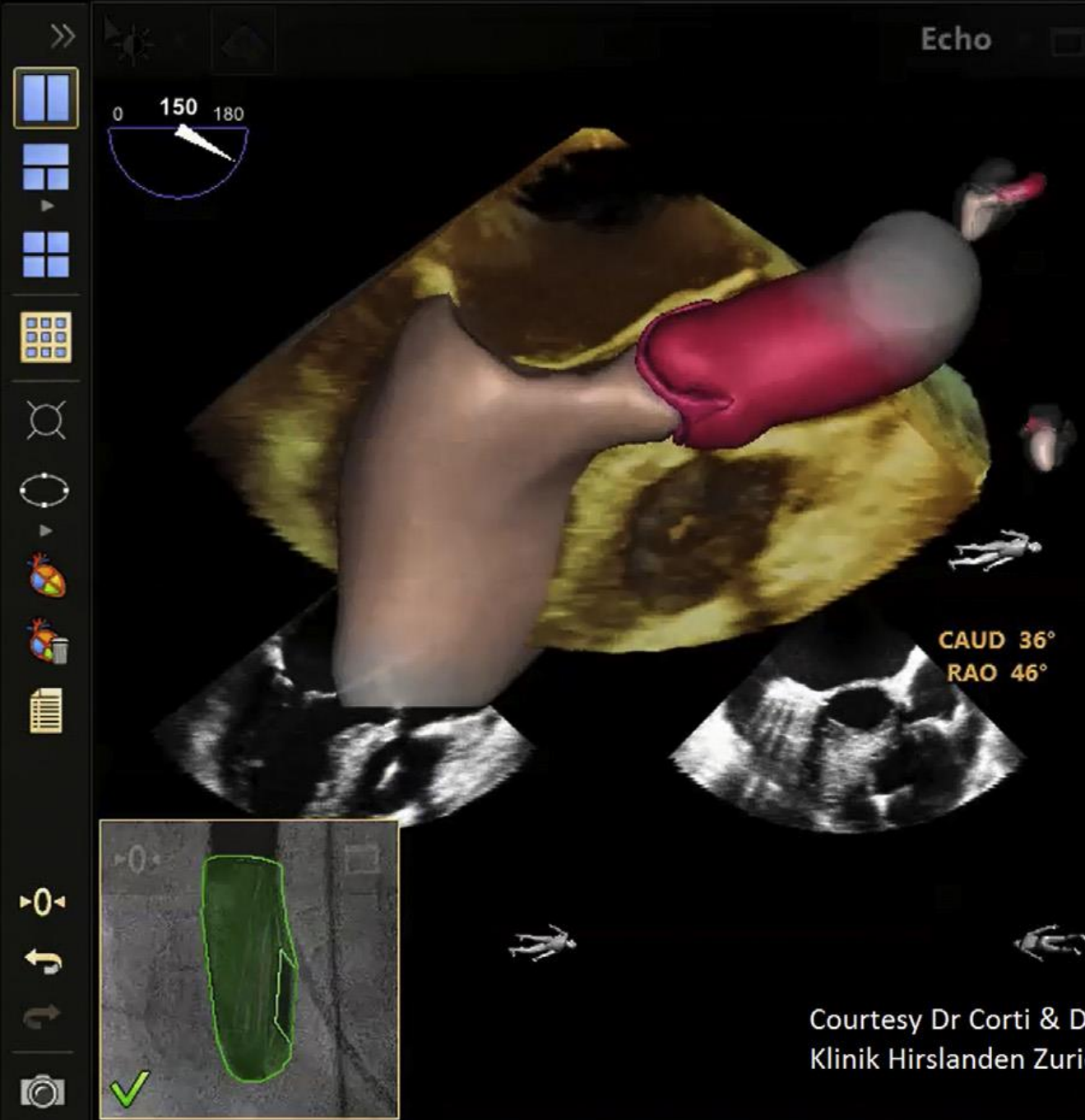
Sauvegarder une capture d'écran sur USB (Print Screen)

## Limits

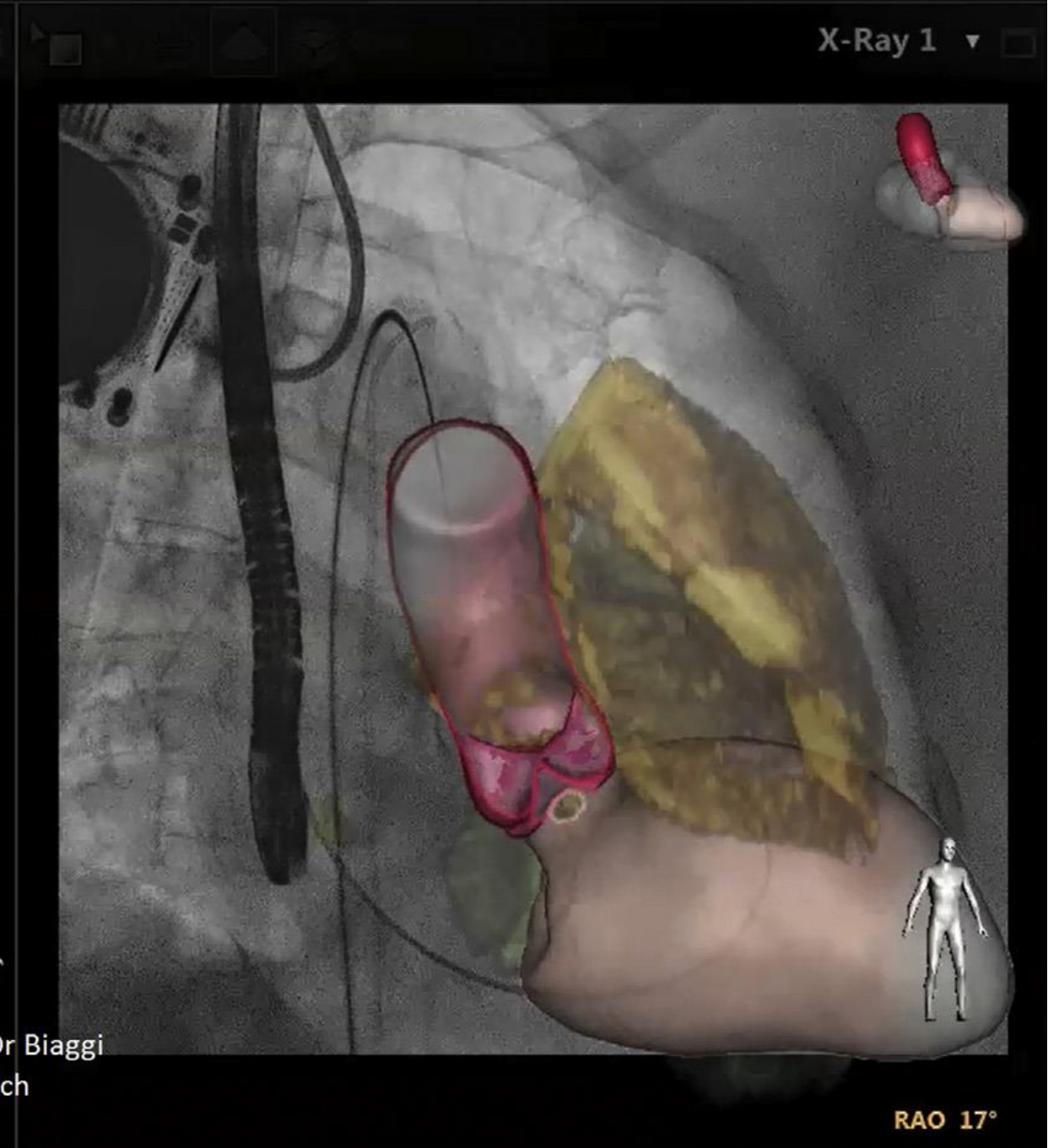
- Philips system only - Tracking instability – Irradiation - Echocardiologist experience
- 3D TEE probe - Extra-cardiac vessels – no marker tracking

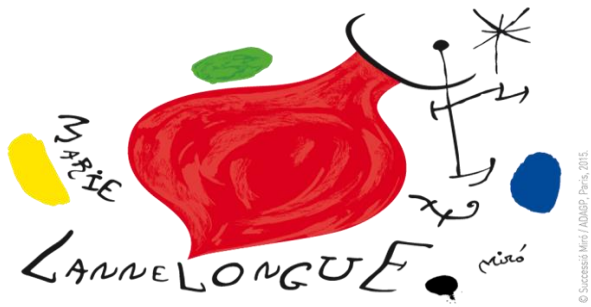






Courtesy Dr Corti & Dr Biaggi  
Klinik Hirslanden Zurich





## *Echographie standard en salle de cathétérisme et fusion d'image*

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