



*Department of Pediatric Cardiology  
&  
Adult with Congenital Heart Disease*

*IRCCS- Policlinico San Donato  
San Donato Milanese – Milano*



**Massimo Chessa** – Cosa possiamo fare senza la cardiocirurgia. Come è possibile evitare l'intervento cardiocirurgico e riparare l'anomalia anatomico-funzionale.



In the modern era of emergent pharmacological and percutaneous therapy, ventricular wall ruptures are rare with interventricular septal rupture accounting for 0.2% of all myocardial ruptures

*Crenshaw BS, Circulation 2000; 101: 27-32.*



## Percutaneous repair of acutely ruptured myocardium is challenging

The first experience by Landzberg and Lock involved a single centre experience of percutaneous closure of post infarction VSD's using the older closure devices, (the Clam-shell double umbrella and the Cardio SEAL).



*Landzberg MJ. Semin Thorac Cardiovasc Surg 1998; 10: 128-132.*

*Crenshaw BS, Circulation 2000; 101: 27-32.*

*Menon V, J Am Coll Cardiol 2000; 36: 1110-1116.*



## Adverse Substrate

- Defect too big
- Cardiogenic shock/Renal failure/Sepsis
- Advanced age
- Surgical turn-downs
- Co-Morbidity



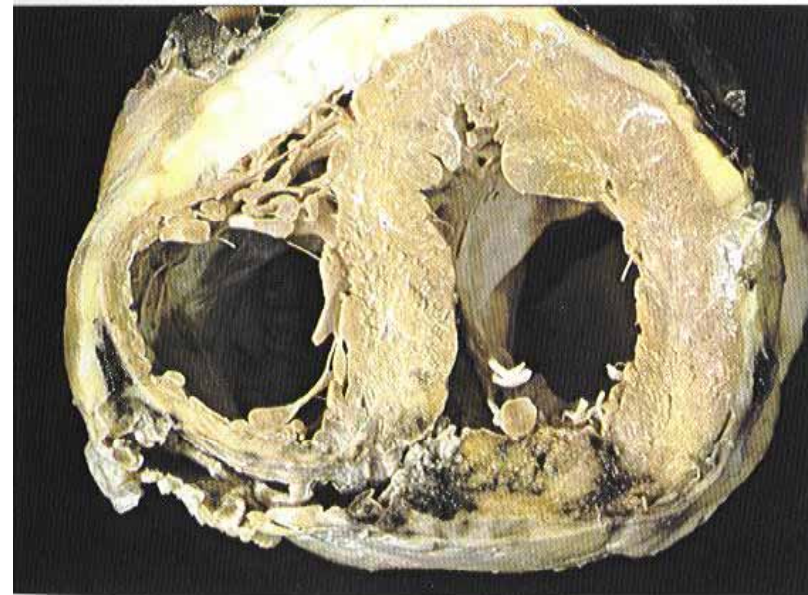
# Items of concern

- VSD size and morphology

Congenital VSD



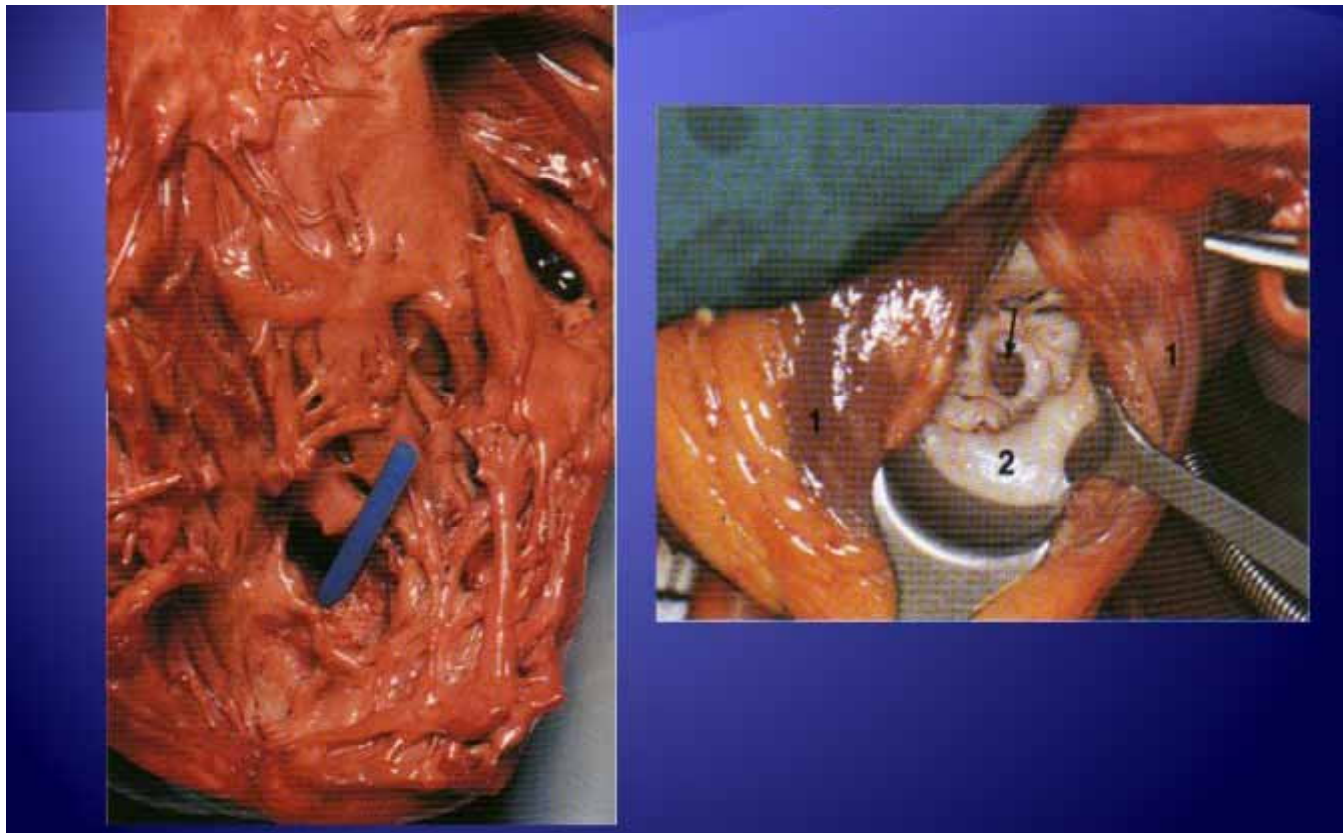
Post MI VSD





# Items of concern

- VSD size and morphology





## Who should we select?

- All comers
- Patients in good condition at referral
- After stabilization (IABP), observation and stenting of Infarct related artery
- Survivors for > 3 weeks (Trial of life)
- Residual/recurrent defects



## Ideal Patient

- Residual defect with chronic heart failure
- Survivors of “Trial of Life”





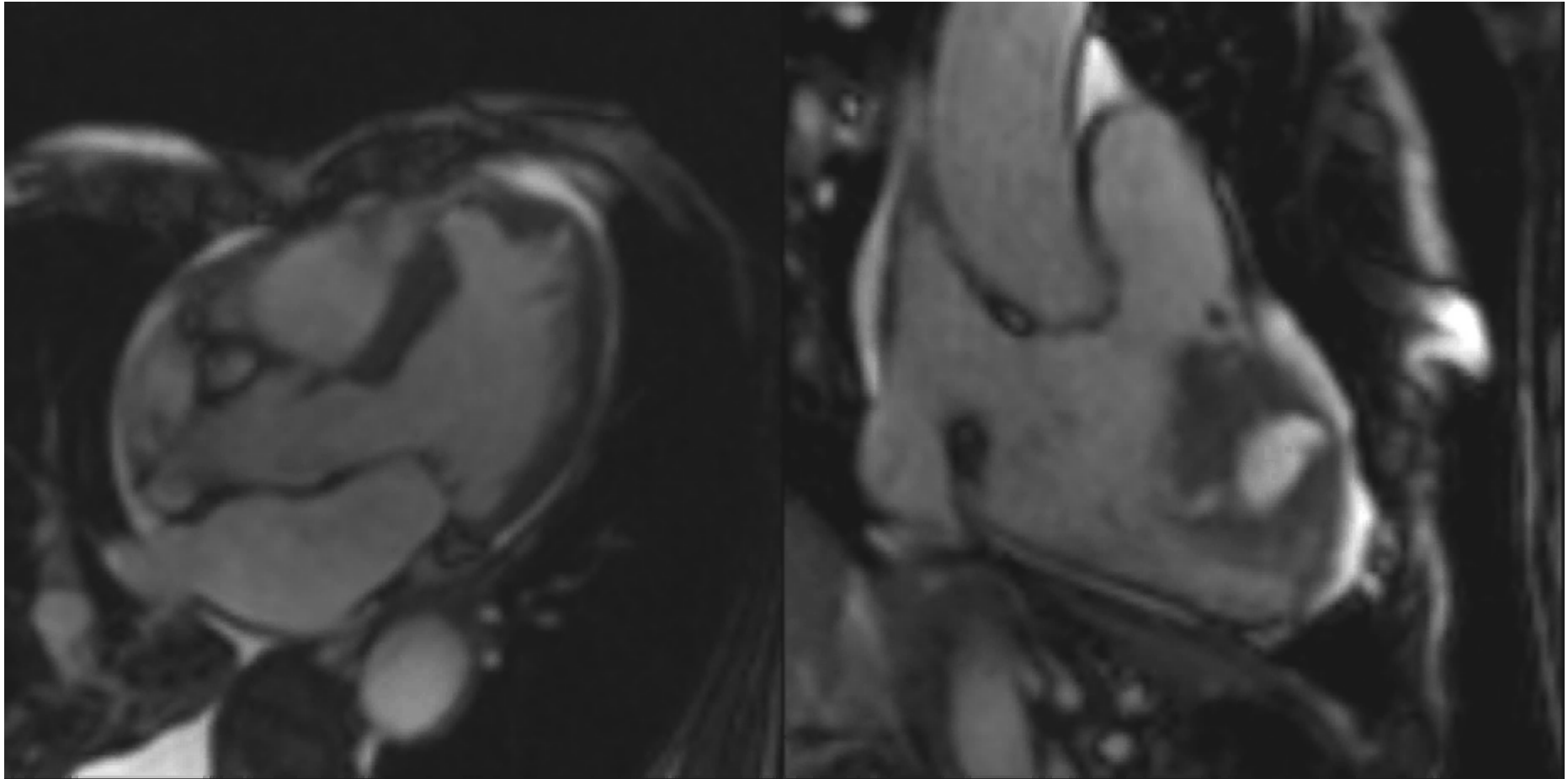
## Who should we turn down ?

- Moribund patients despite IABP/Inotropes
- Unsuitable defect - too large
- Acutely presenting large defects where early surgery may produce more survivors





# Imaging for Case Selection

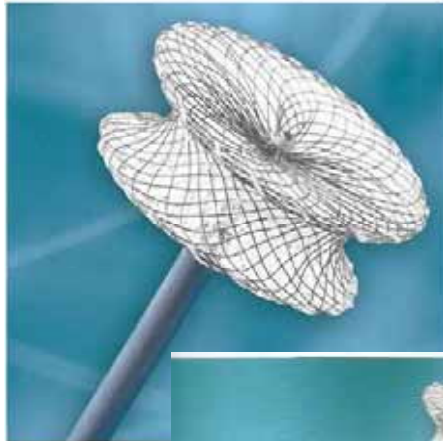


Courtesy Dr Mark Turner

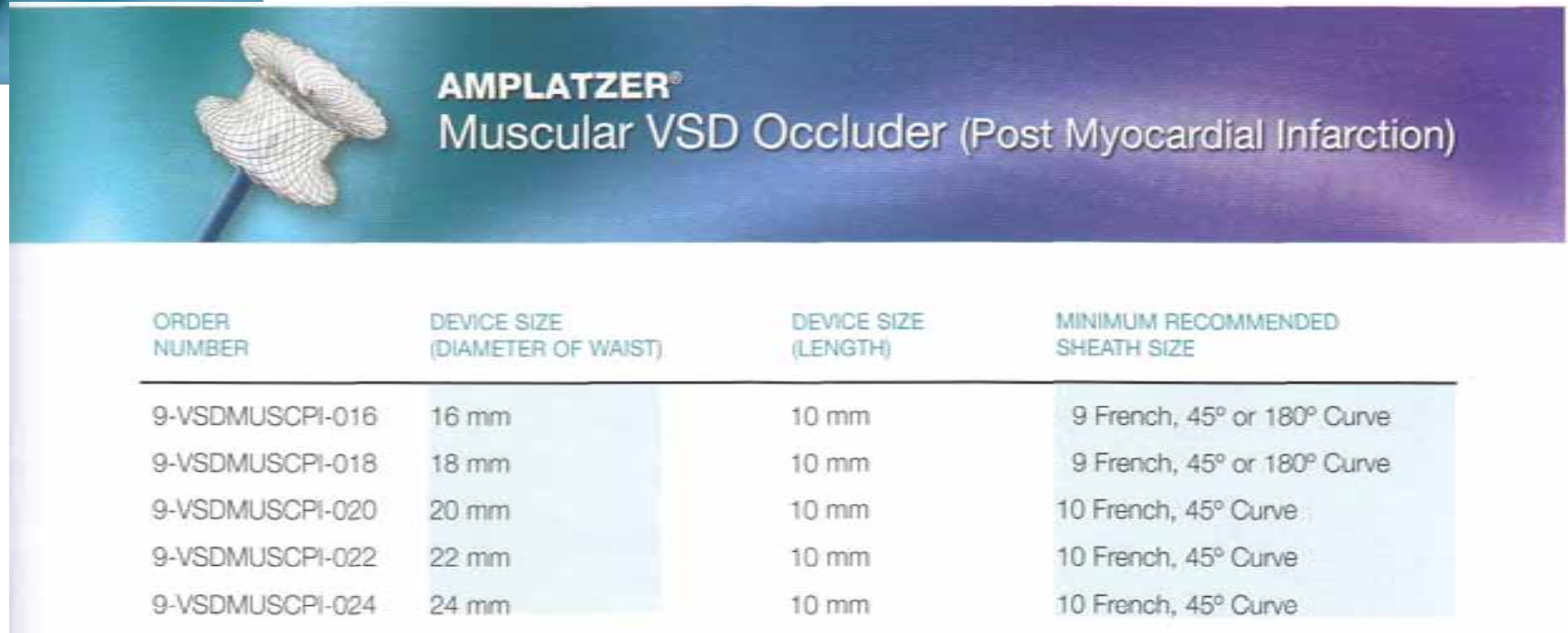


Trying to overcome the initial difficulties the Amplatzer Muscular Device was used.

*Chessa M. J Invasive Cardiol. 2002 Jun;14(6):322-7.*



## AMPLATZER Post-Infarction Muscular VSD Occluder (AGA Medical Corp.)



**AMPLATZER®**  
Muscular VSD Occluder (Post Myocardial Infarction)

ORDER NUMBER	DEVICE SIZE (DIAMETER OF WAIST)	DEVICE SIZE (LENGTH)	MINIMUM RECOMMENDED SHEATH SIZE
9-VSDMUSCPI-016	16 mm	10 mm	9 French, 45° or 180° Curve
9-VSDMUSCPI-018	18 mm	10 mm	9 French, 45° or 180° Curve
9-VSDMUSCPI-020	20 mm	10 mm	10 French, 45° Curve
9-VSDMUSCPI-022	22 mm	10 mm	10 French, 45° Curve
9-VSDMUSCPI-024	24 mm	10 mm	10 French, 45° Curve



## AMPLATZER Post-Infarction Muscular VSD Occluder (AGA Medical Corp.)

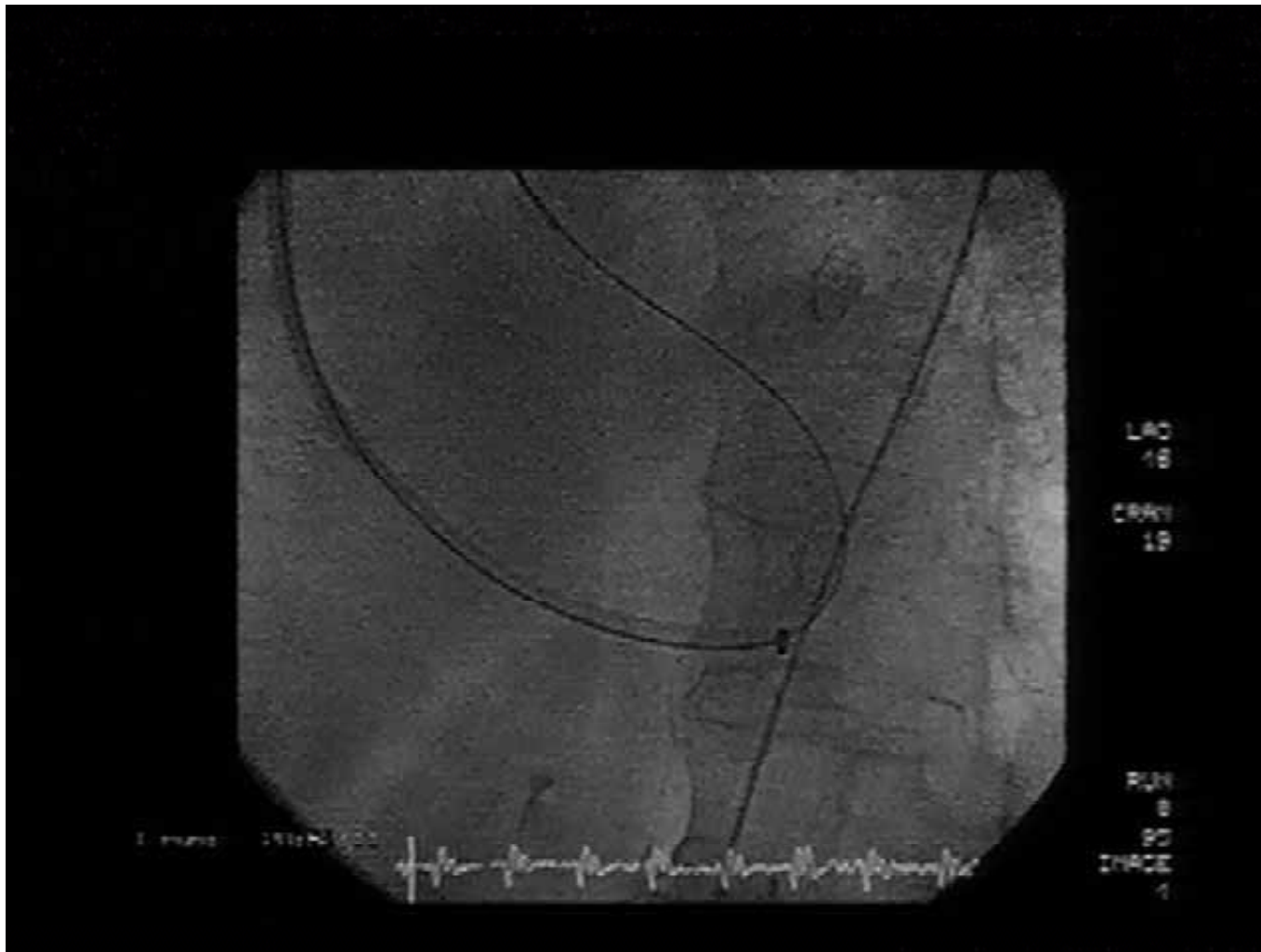
The Amplatzer postinfarction muscular VSD device (PIMVSD) is a nitinol construct with sizes ranging from 16-24 mm and a connecting waist of 10 mm in length.

The LV and RV disks are 5 mm larger than the waist. Amplatzer devices are self-centering and obtain occlusion of the VSD via in situ thrombosis of the waist. In addition, Amplatzer devices are retrievable after deployment for repositioning if the initial result is unsatisfactory.

They are not retrievable, however once the procedure is completed.

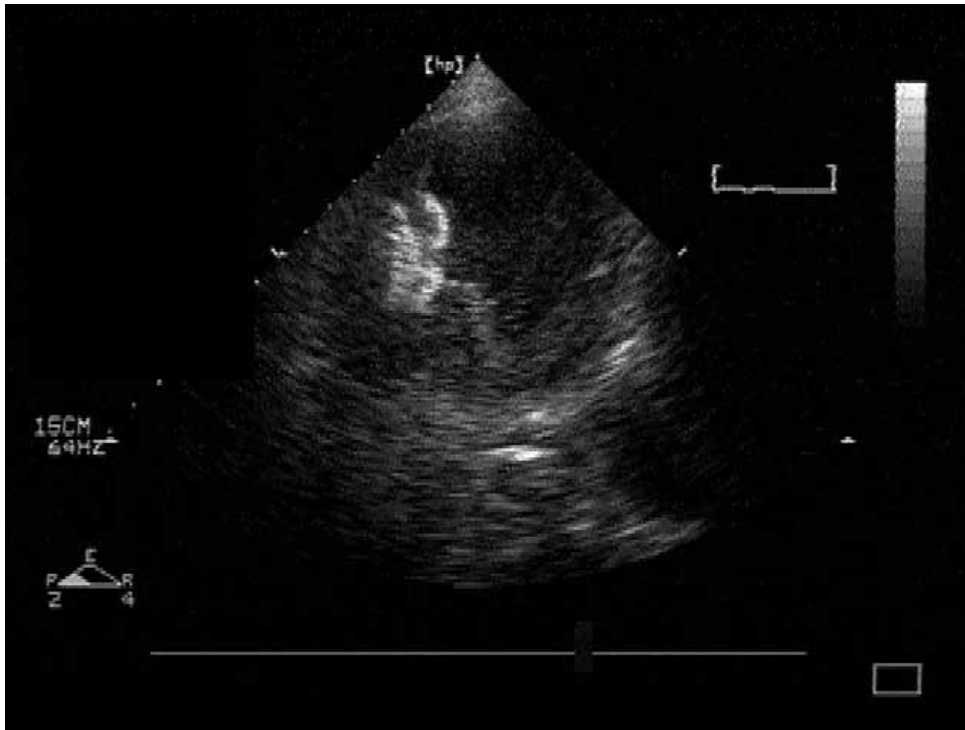


## Acute post-MI VSD: device implantation

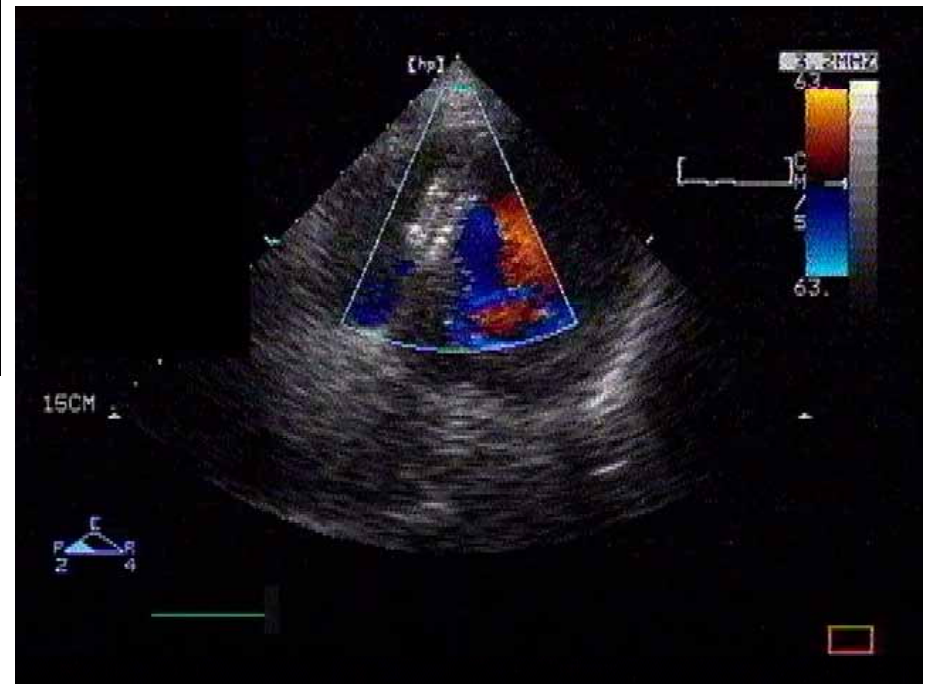




# Early after the procedure

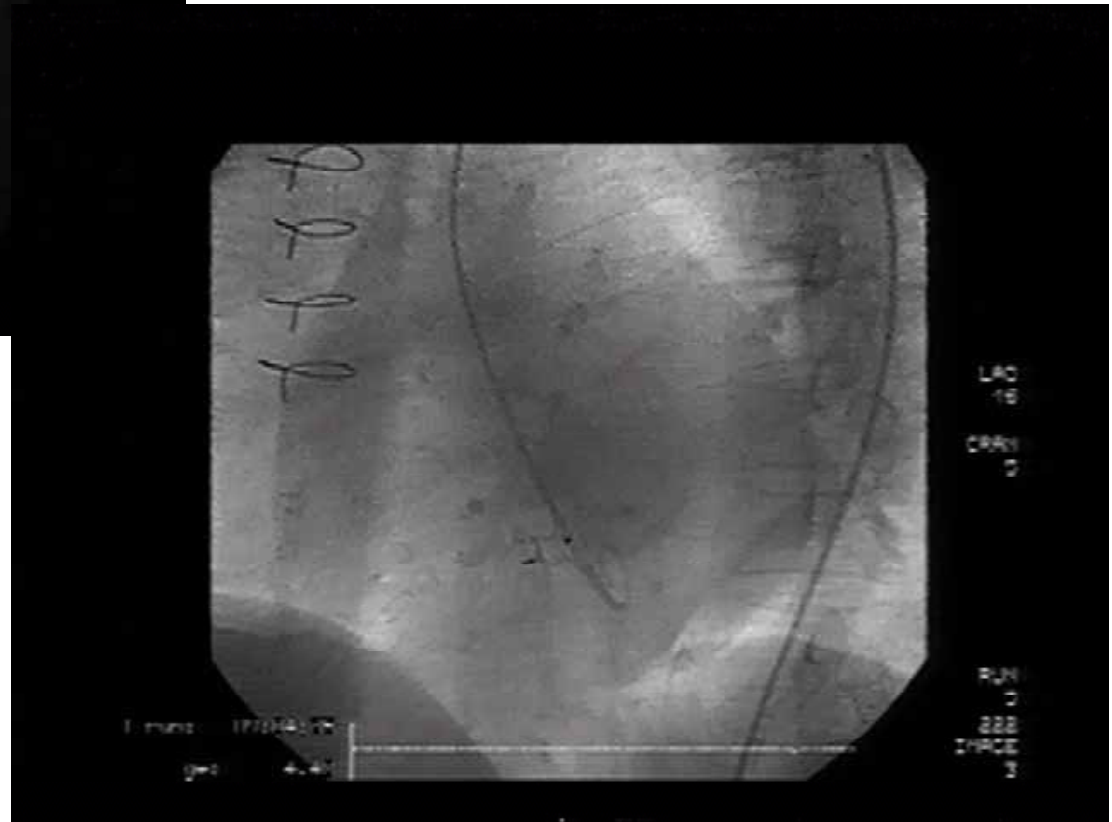
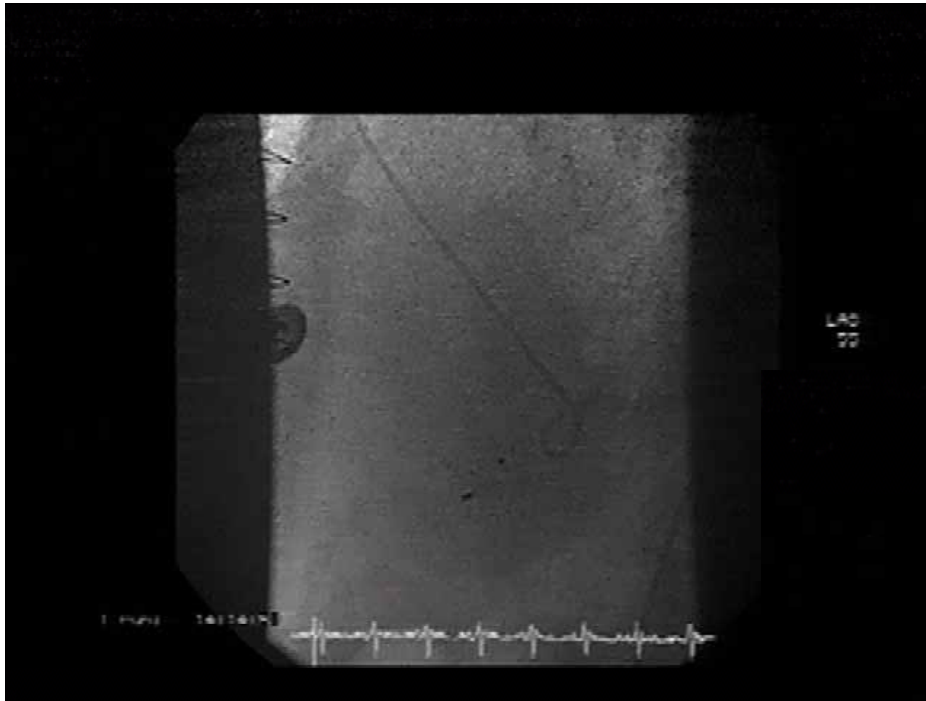


48 hours later





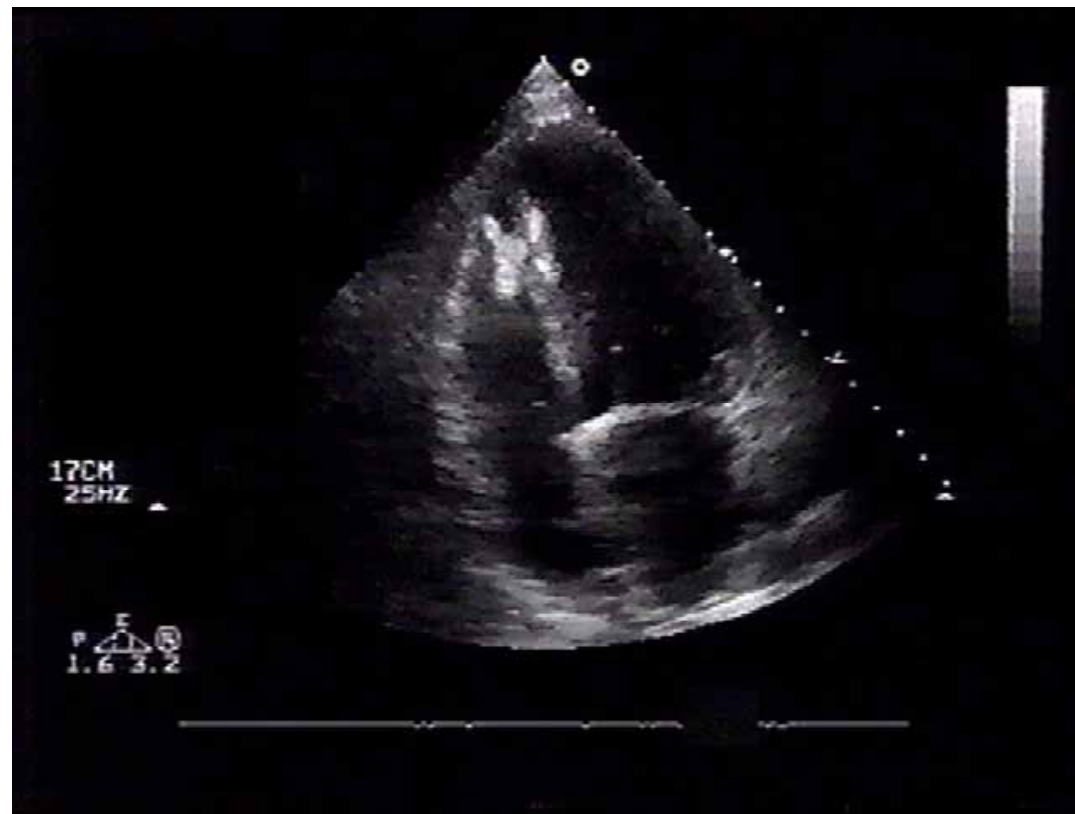
# Acute post-MI VSD: device implantation





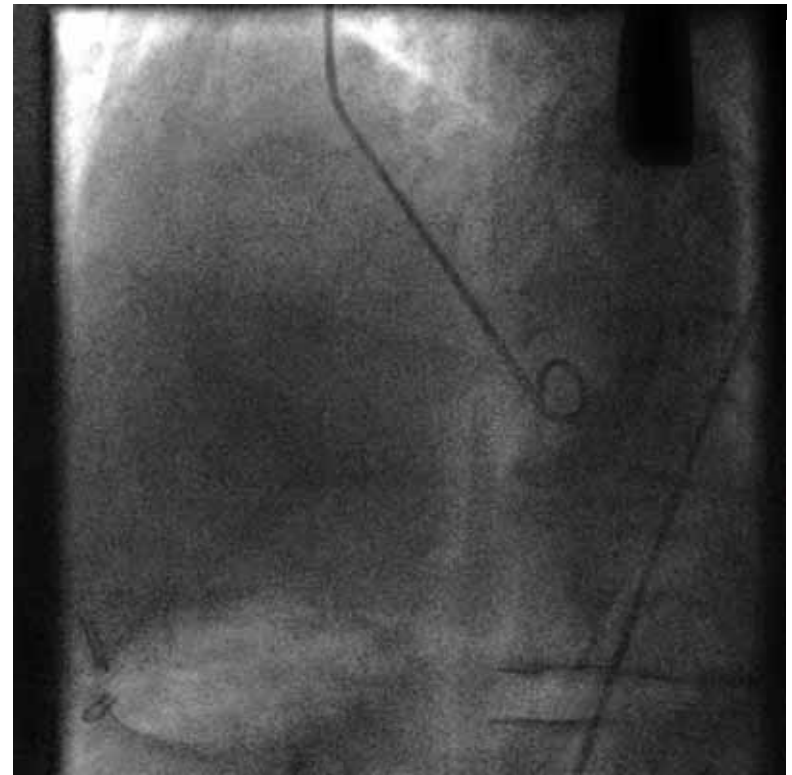
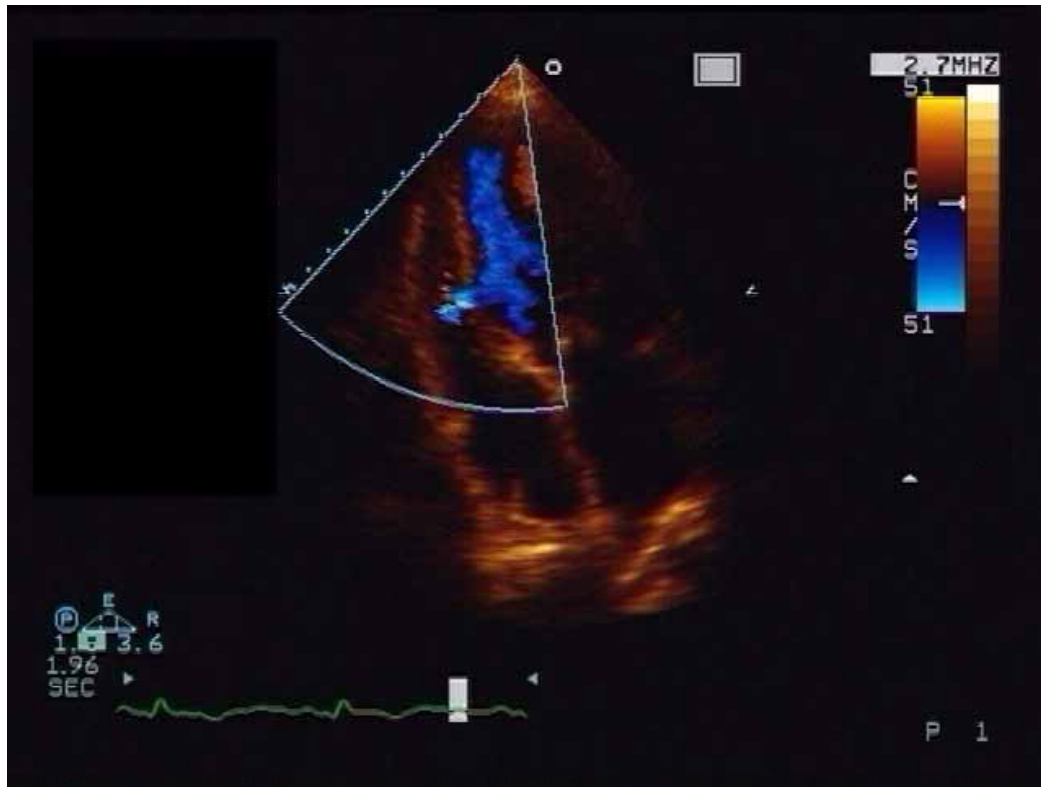


# Echo post procedure



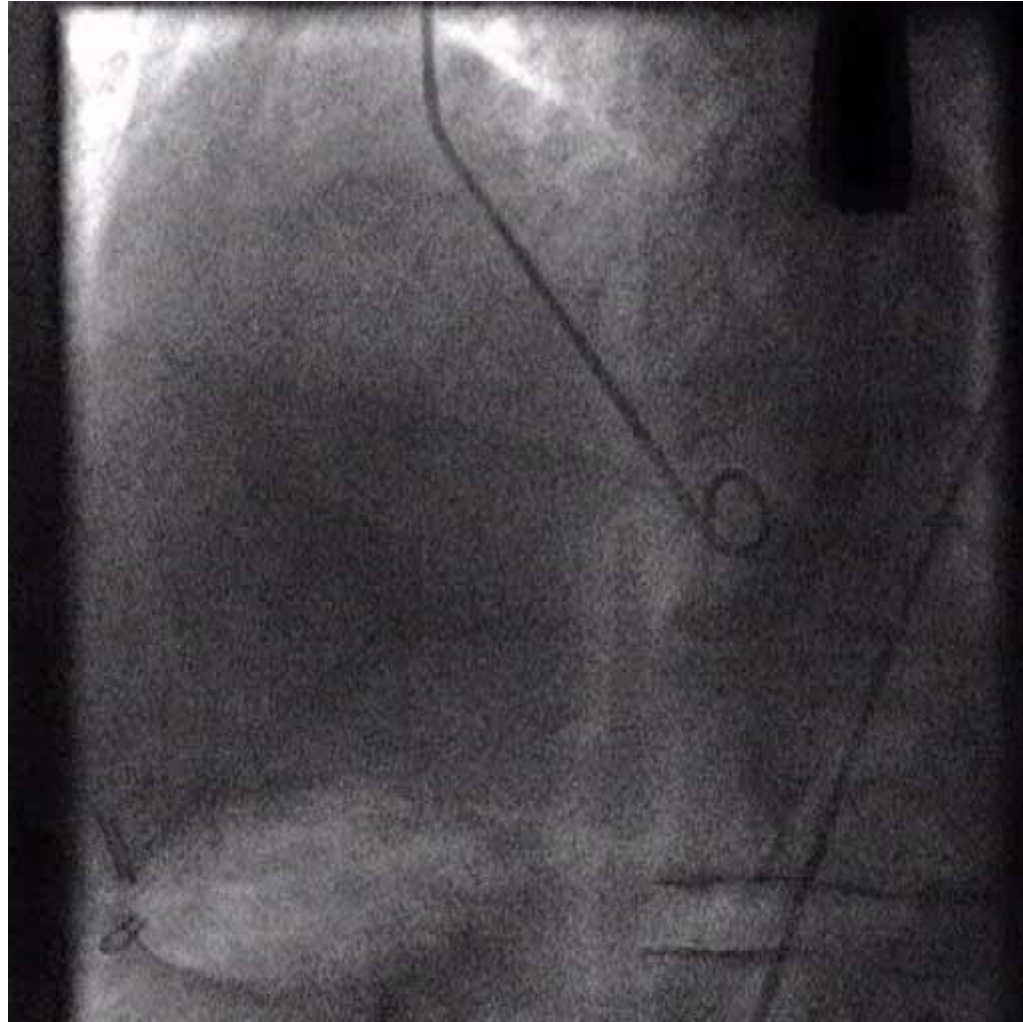


# Non acute post-MI VSD



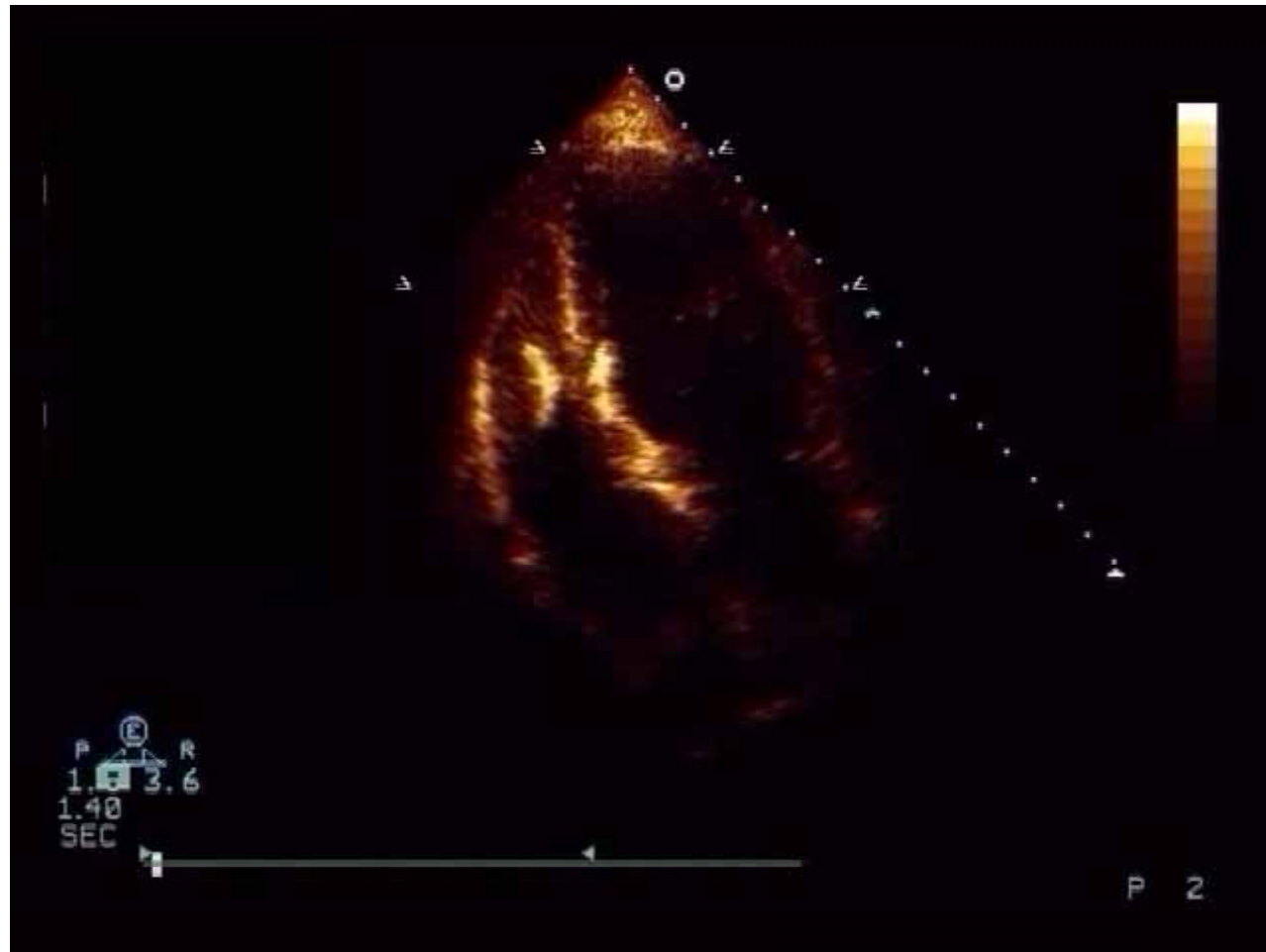


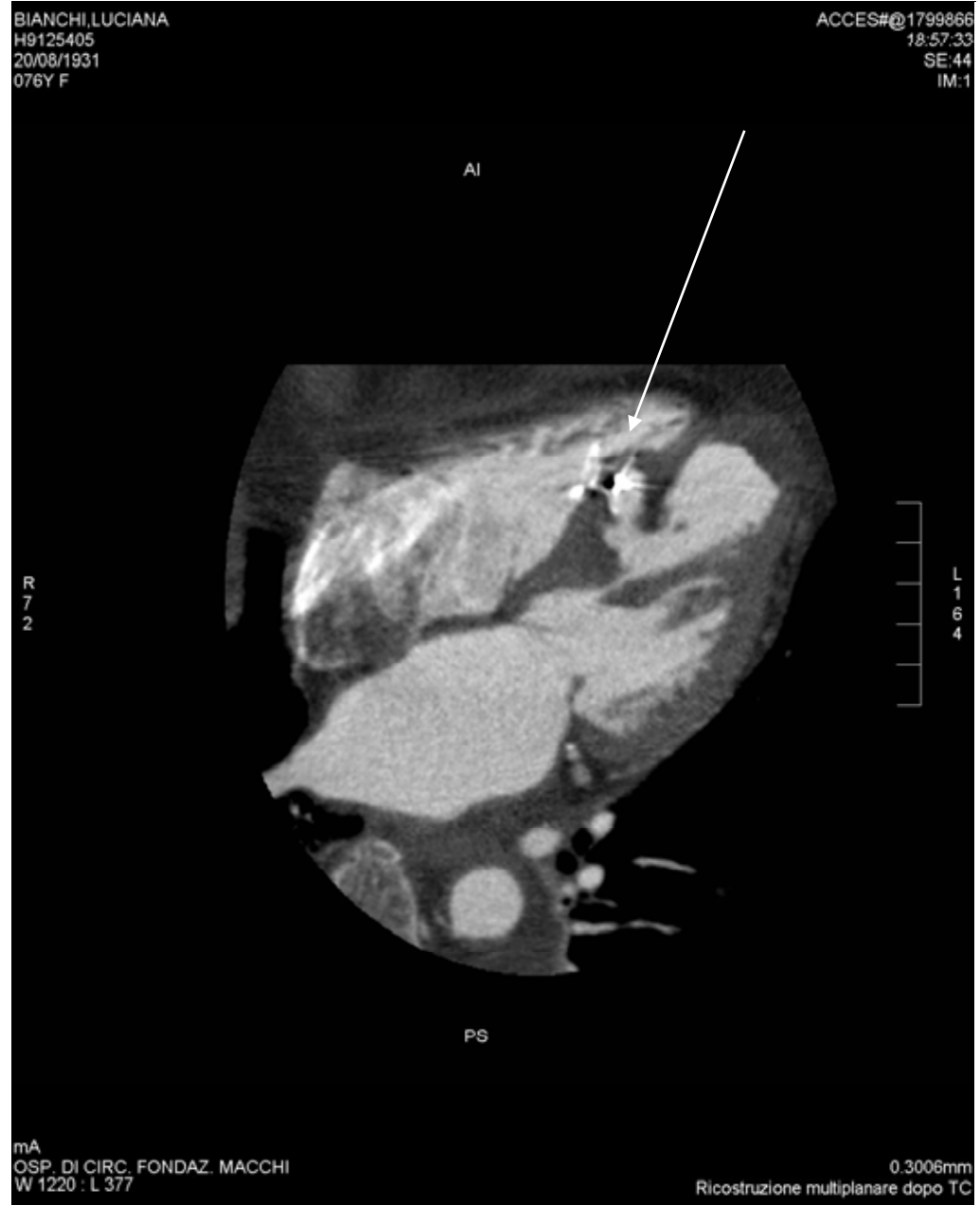
## **Non acute post-MI VSD**





# Echo post procedure

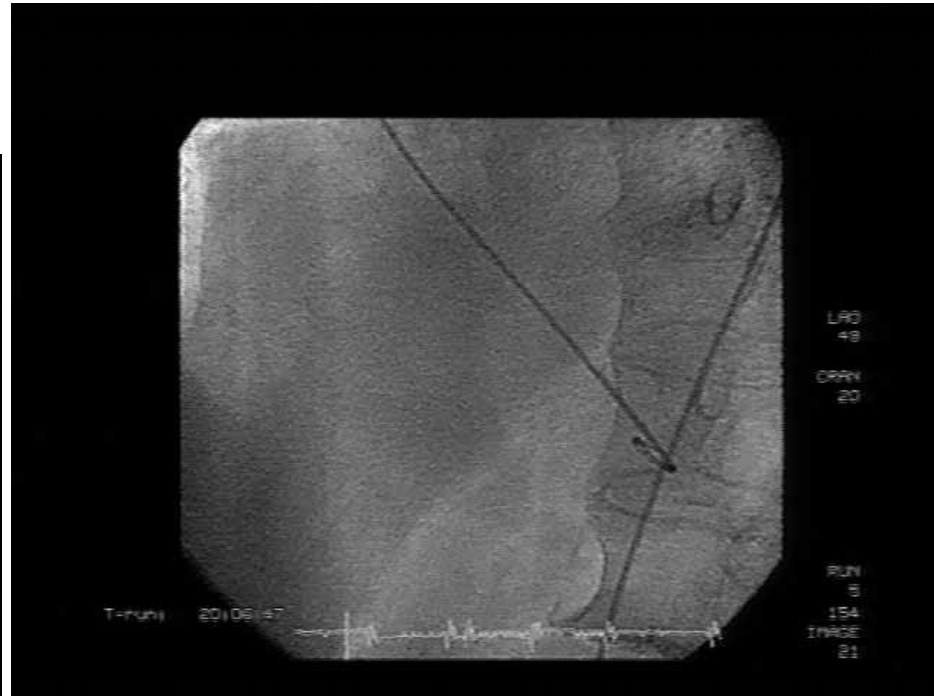
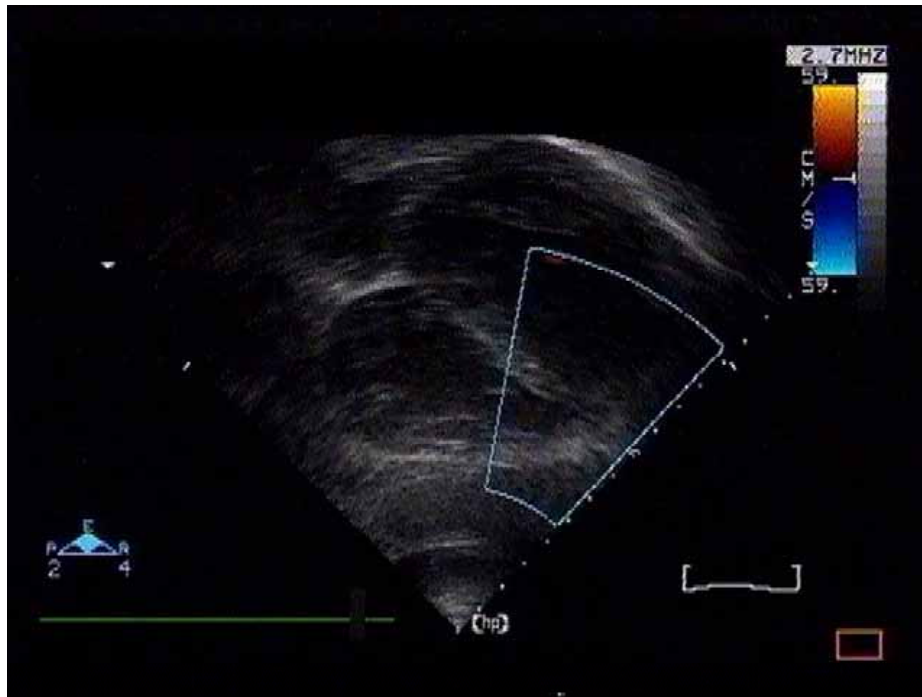






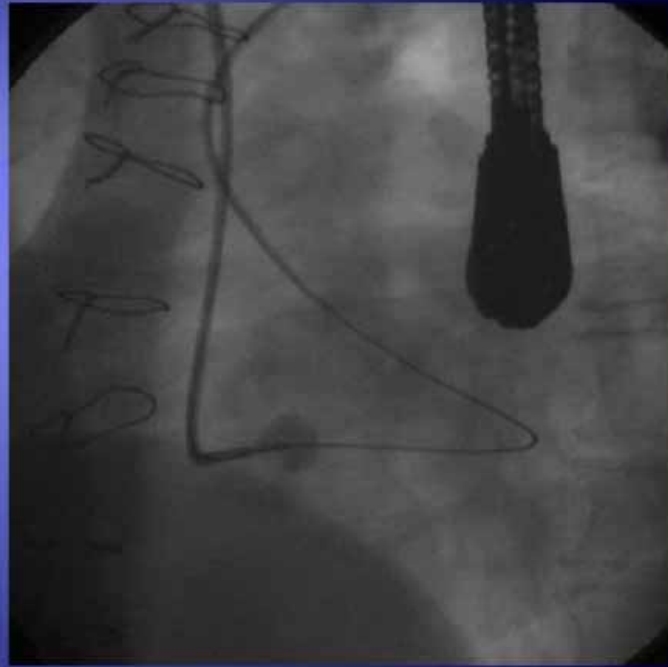
# What we learned

Difficult to size

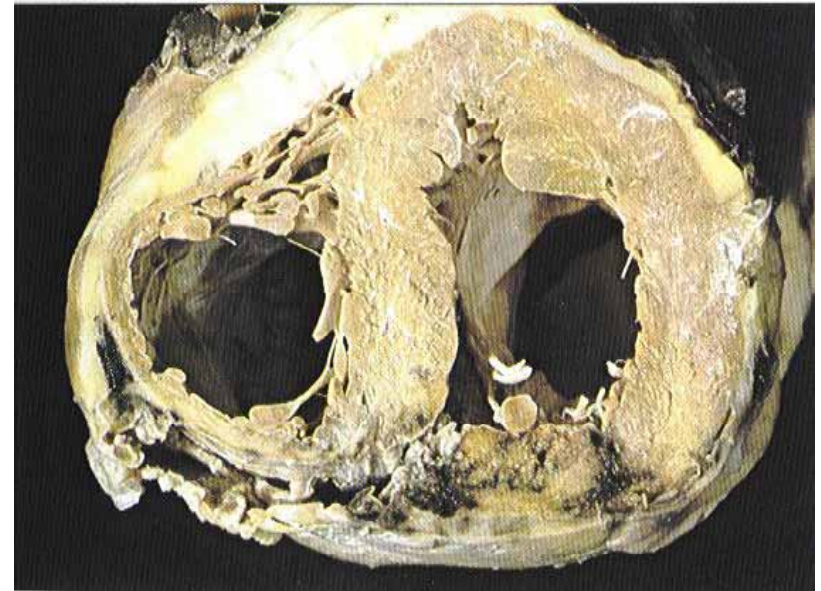




# Balloon sizing



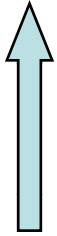
LAO





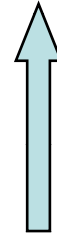
## What we learned

### • Acute



• Survival	34%
• Death	66%

### • Chronic



• Survival	91%
• Death	9%





## **What we learned**

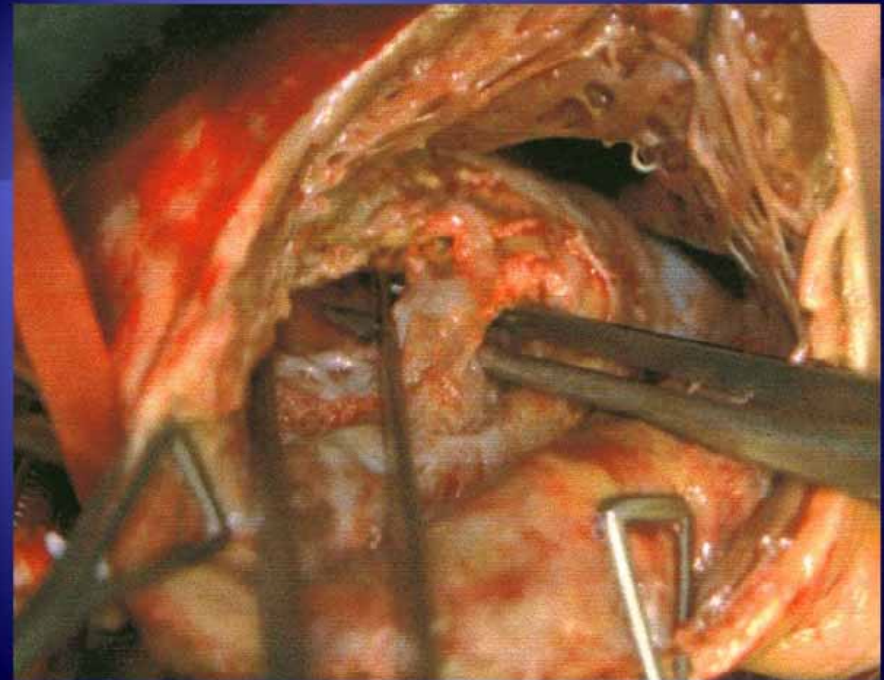
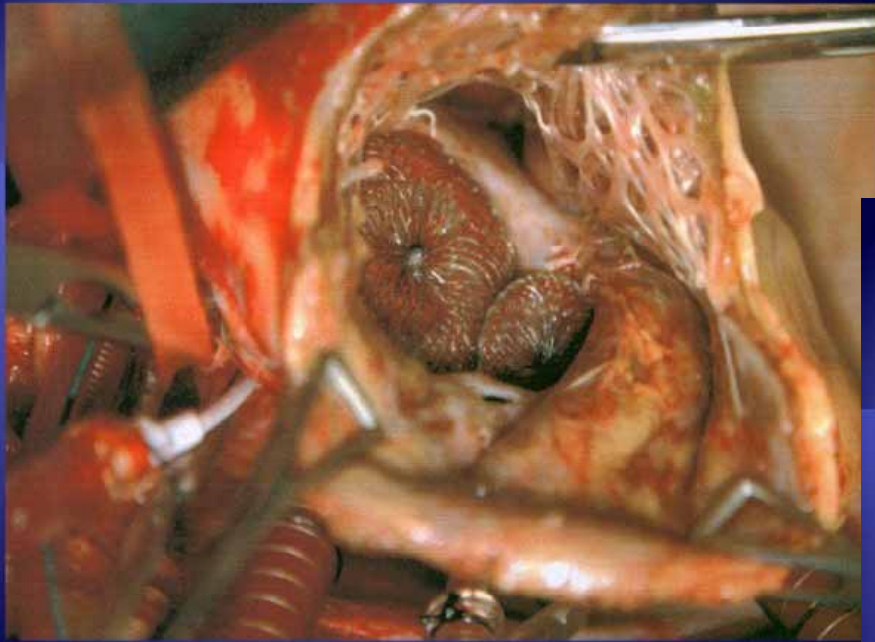
# **Complications**

- 1. Arrhythmias**
- 2. Avulsion of tricuspid septal leaflet while passing sheath through VSD**
- 3. Haemolysis managed medically**



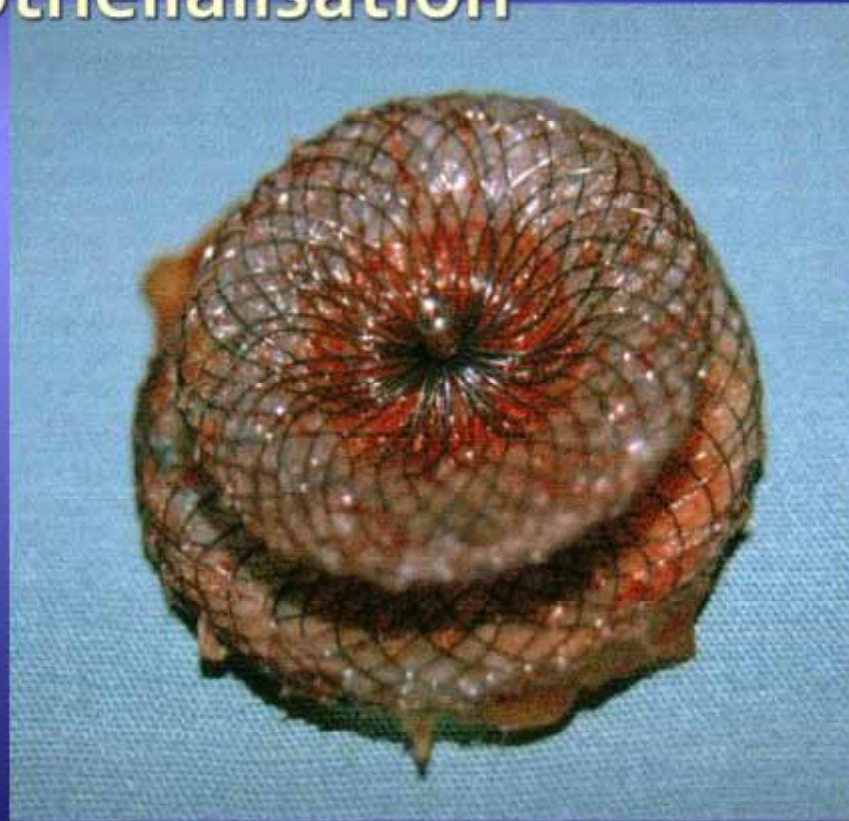
## What we learned

# Cross-over to surgery





# Endothelialisation





## Take Home Message

**\*ASO device implantation in acute phase of MI gave poor results.**

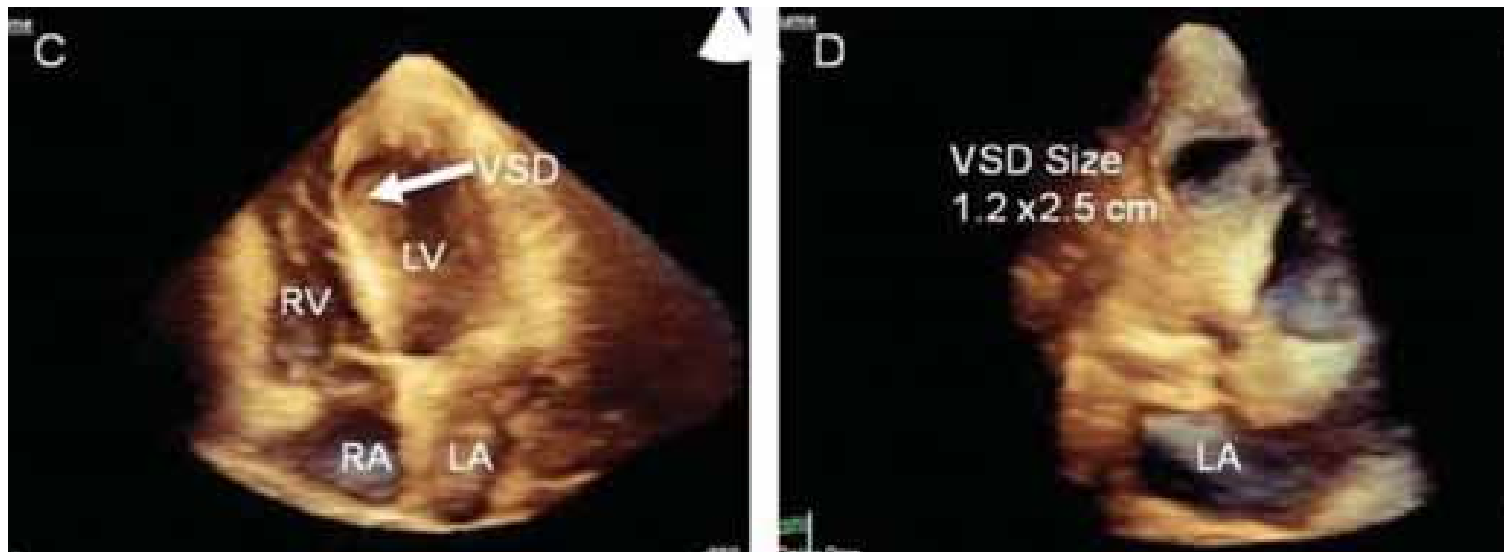
**\*Good results are obtained for “non acute”VSD’s or residual defects after surgery**

**\* Percutaneous closure may be a bridge to surgery**



## Take Home Message

**\*3D Imaging both before and during will further improve the efficacy of the procedure**





# Take Home Message

**\*Improvements in device and delivery systems are also required**



*Thank you  
for your attention*



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