

Atrial septal defect

Ventricular septal

defect

Anatomy, physiology and indications to transcatheter treatment

DIFFERENT TYPES OF ASD

- Proper assessment is crucial to determine the strategy of treatment
- TTE, TEE, ICE, 3D Echo, MR

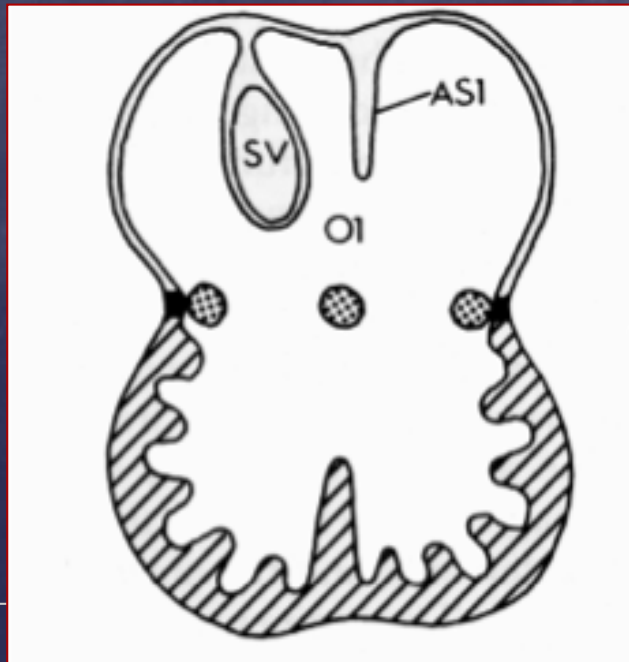
DIFFERENT TYPES OF ASD

- ✓ Ostium secundum defect
- ✓ Ostium primum
- ✓ Coronary sinus defect
- ✓ Sinus venosus defect

DIFFERENT TYPES OF ASD

Development of the atrial septum

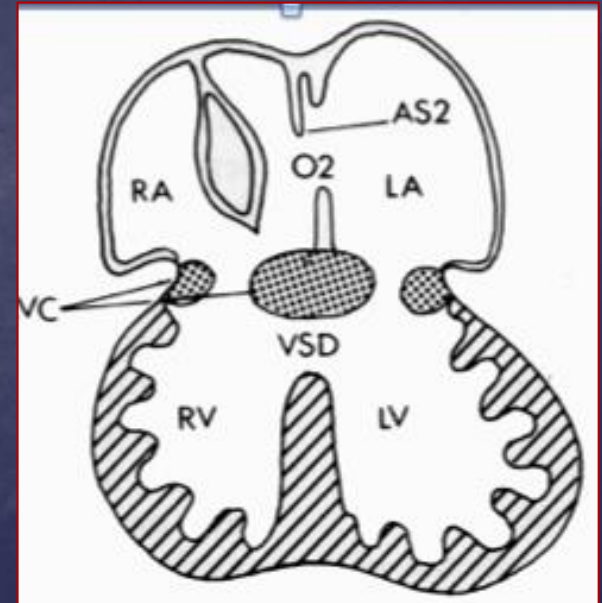
- Septum primum from the superior aspect of the atria towards the endocardial cushions



DIFFERENT TYPES OF ASD

Development of the atrial septum

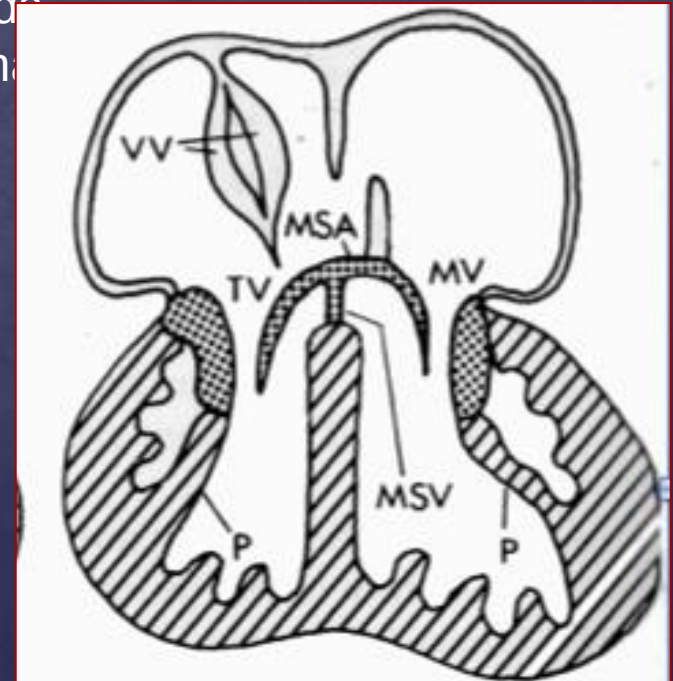
- After the fusion, the superior part of the septum primum disappears and the inferior part becomes the flap valve of the fossa ovalis



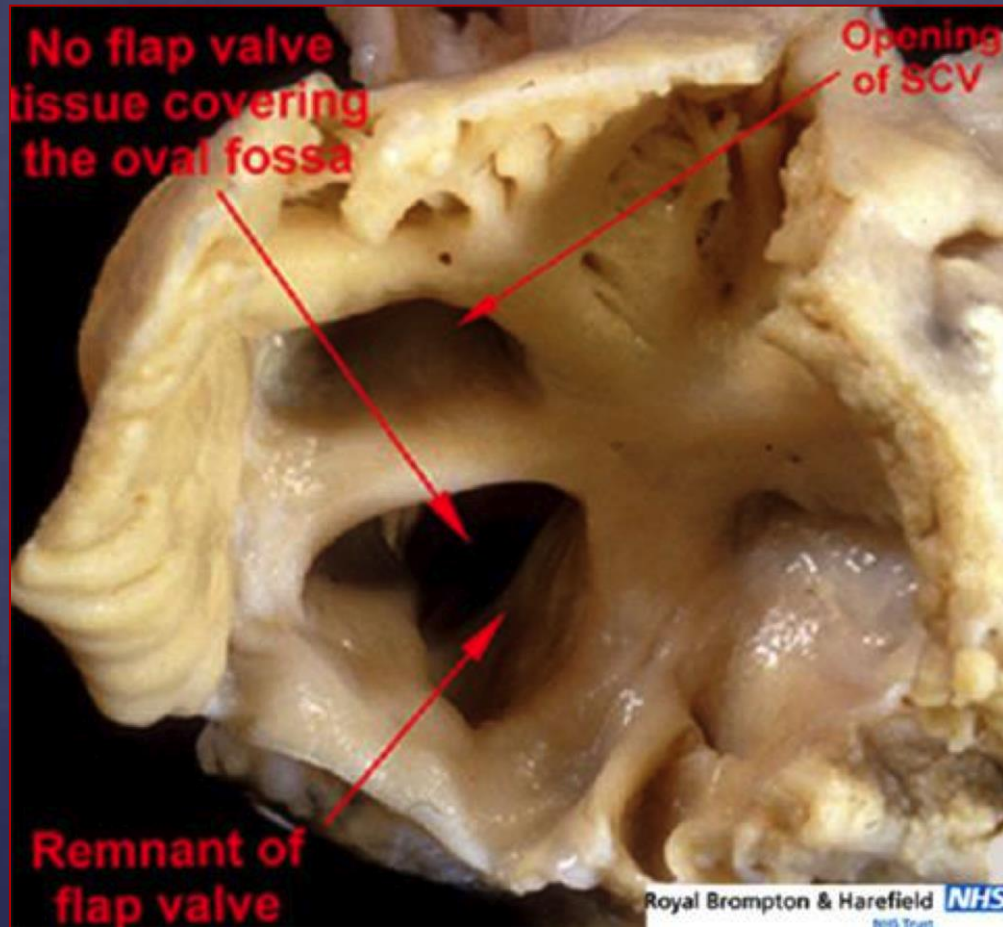
DIFFERENT TYPES OF ASD

Development of the atrial septum

- After the integration of the pulm veins into the left atrium, the superior wall of the atria infolds creating the “so called” septum secundum that overlaps the flap valve

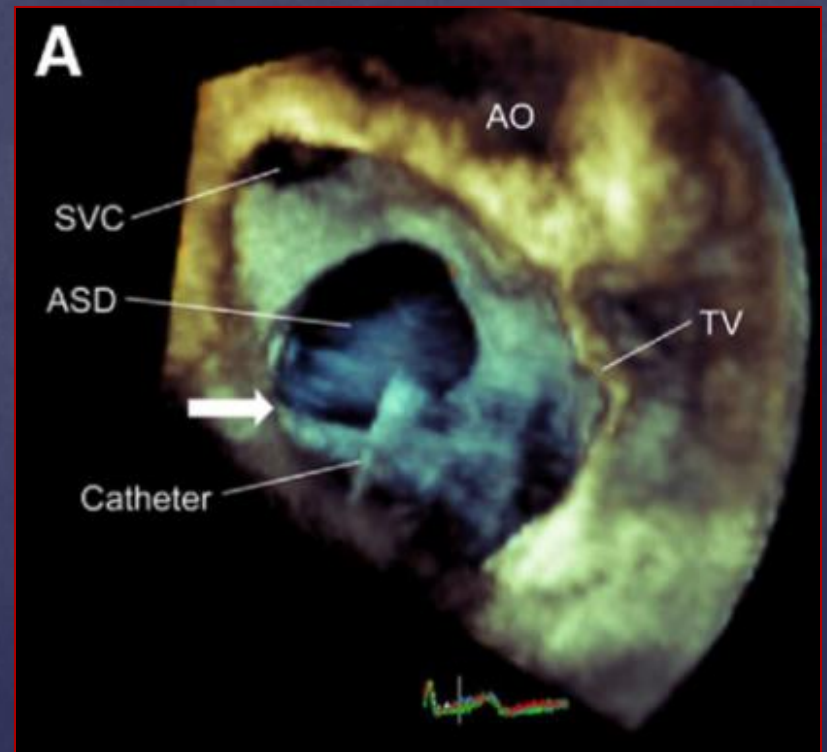
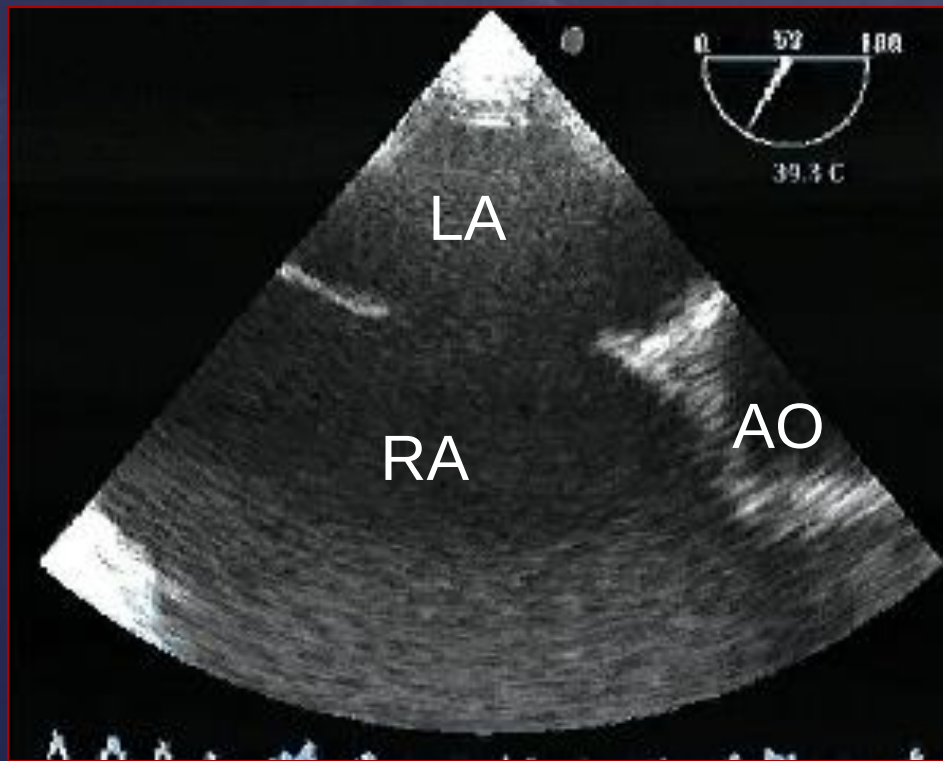


DIFFERENT TYPES OF ASD



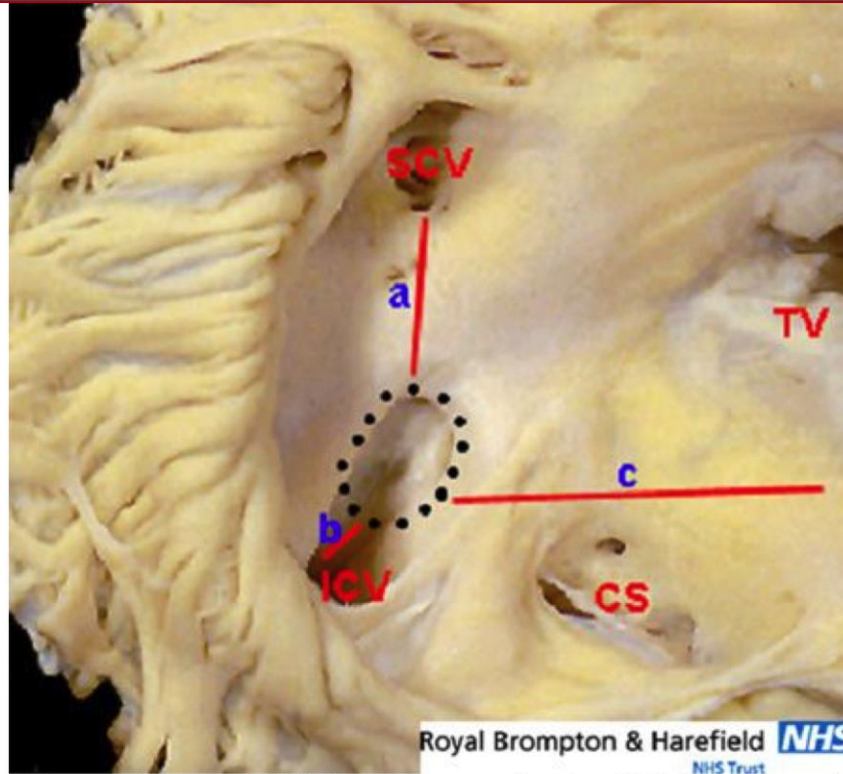
Ostium secundum ASD or fossa ovalis defect

DIFFERENT TYPES OF ASD



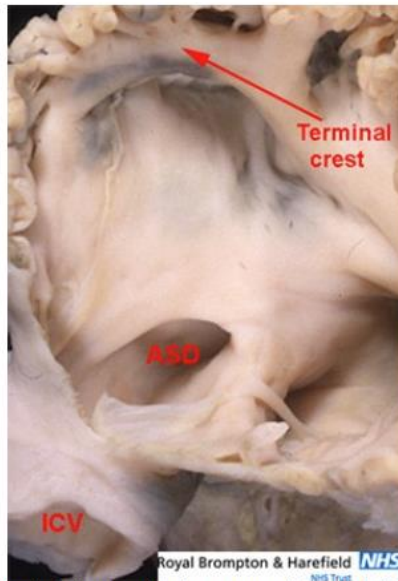
Ostium secundum ASD

DIFFERENT TYPES OF ASD



a: superior rim. b: postero-inferior rim. c: anterior rim. ICV, inferior caval vein.
SCV, superior caval vein. CS, coronary sinus. TV, tricuspid valve

DIFFERENT TYPES OF ASD

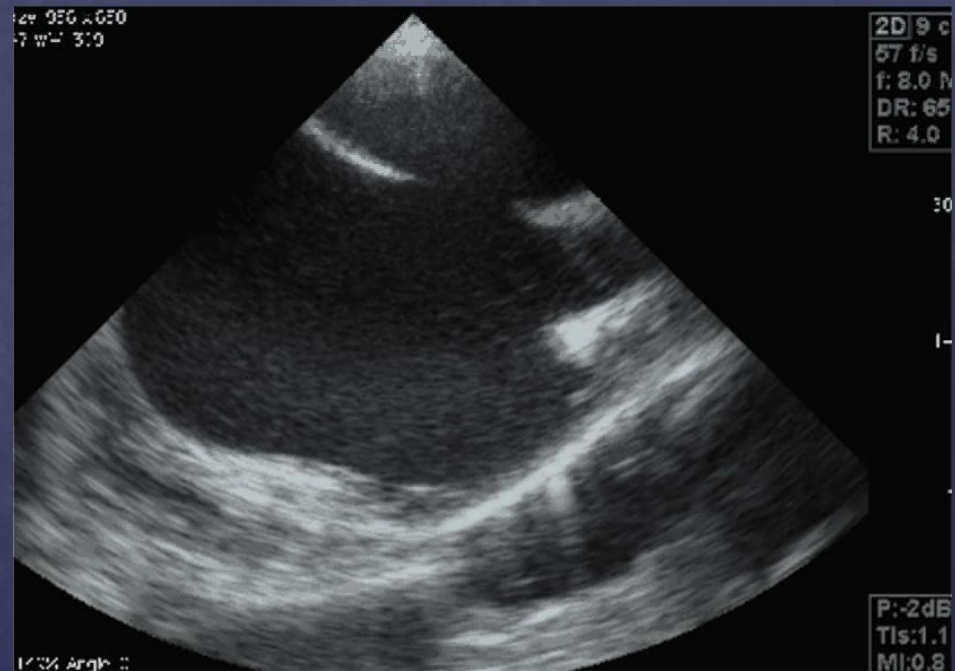
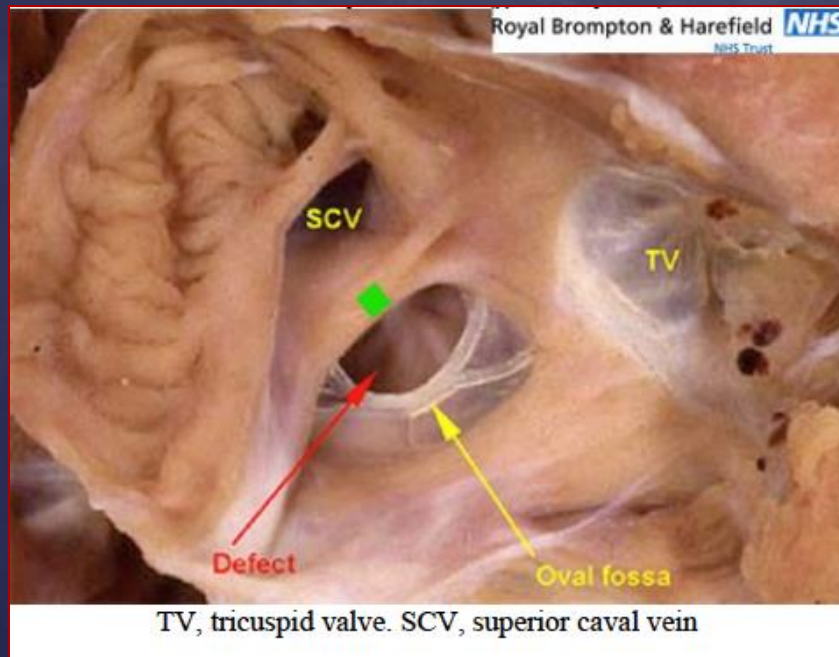


ICV, inferior caval vein. ASD, atrial septal defect



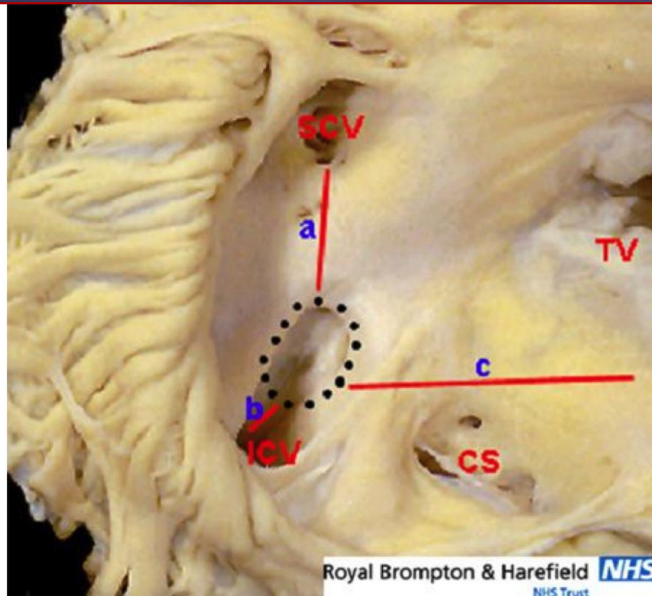
Short postero-inferior rim

DIFFERENT TYPES OF ASD



Short superior rim

DIFFERENT TYPES OF ASD

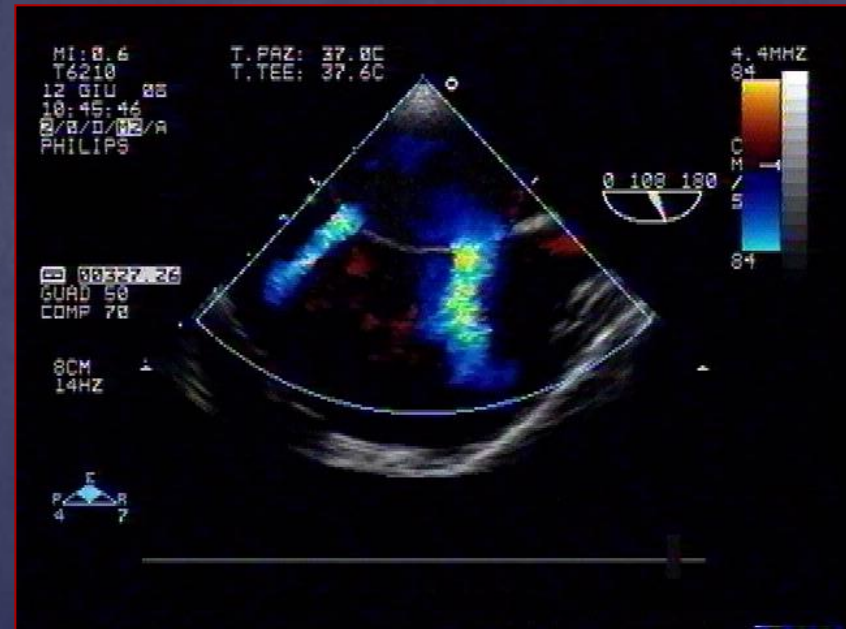
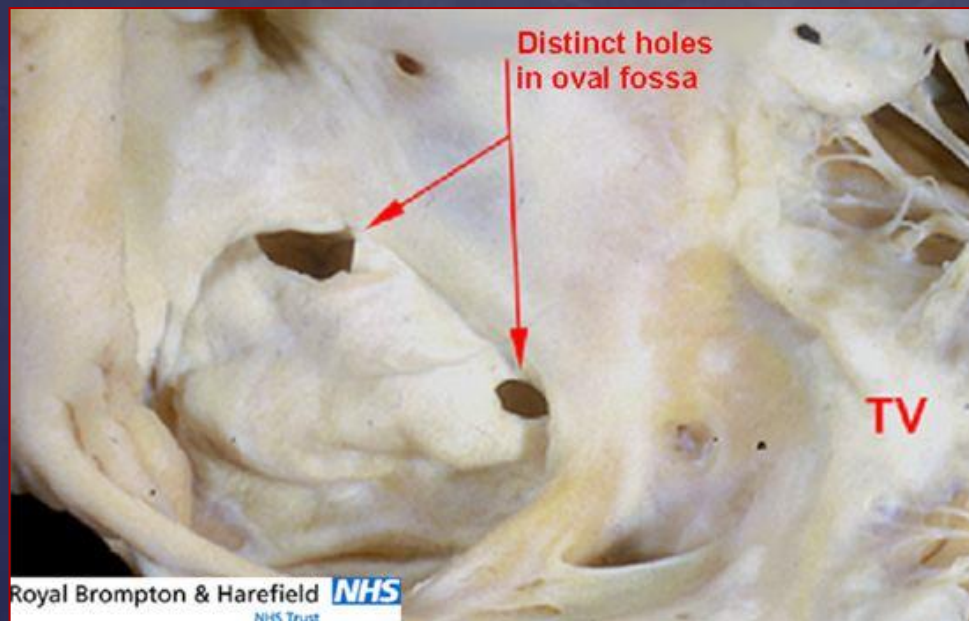


a: superior rim. b: postero-inferior rim. c: anterior rim. ICV, inferior caval vein.
SCV, superior caval vein. CS, coronary sinus. TV, tricuspid valve



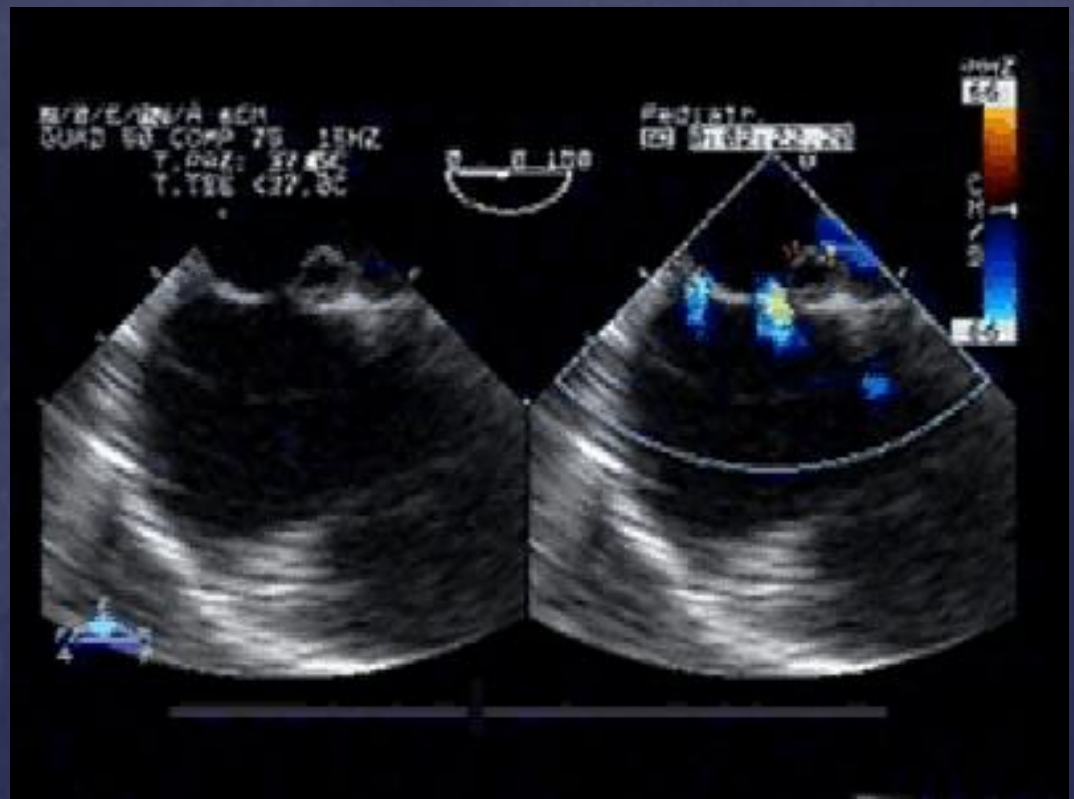
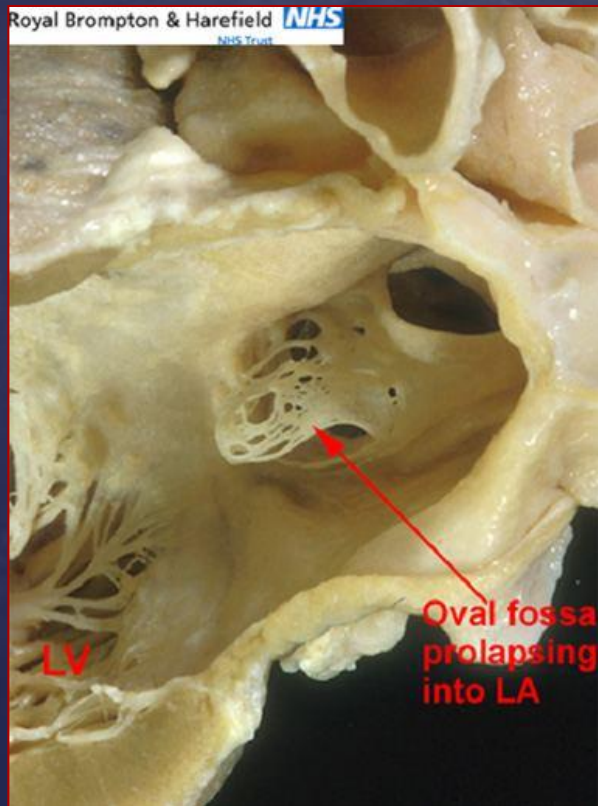
Short aortic rim

DIFFERENT TYPES OF ASD



Multiple ASDs

DIFFERENT TYPES OF ASD

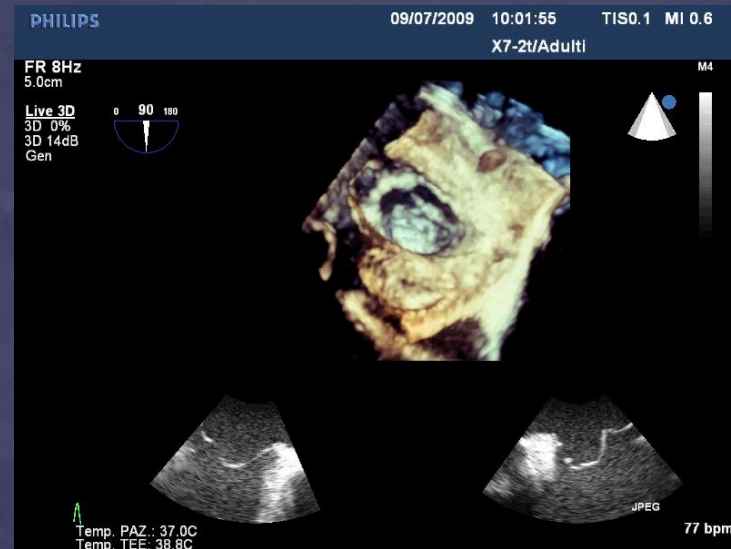


Multifenestrated aneurysm

DIFFERENT TYPES OF ASD



Multifenestrated aneurysm



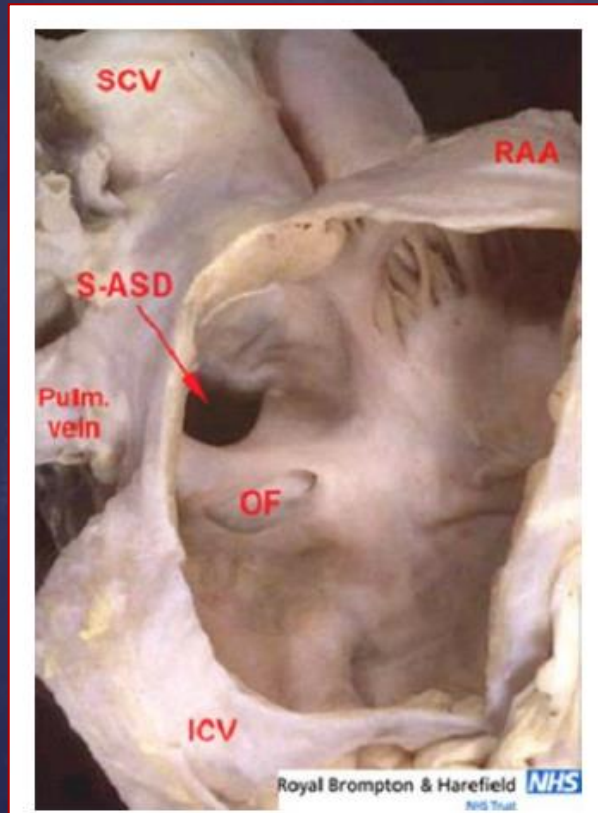
DIFFERENT TYPES OF ASD



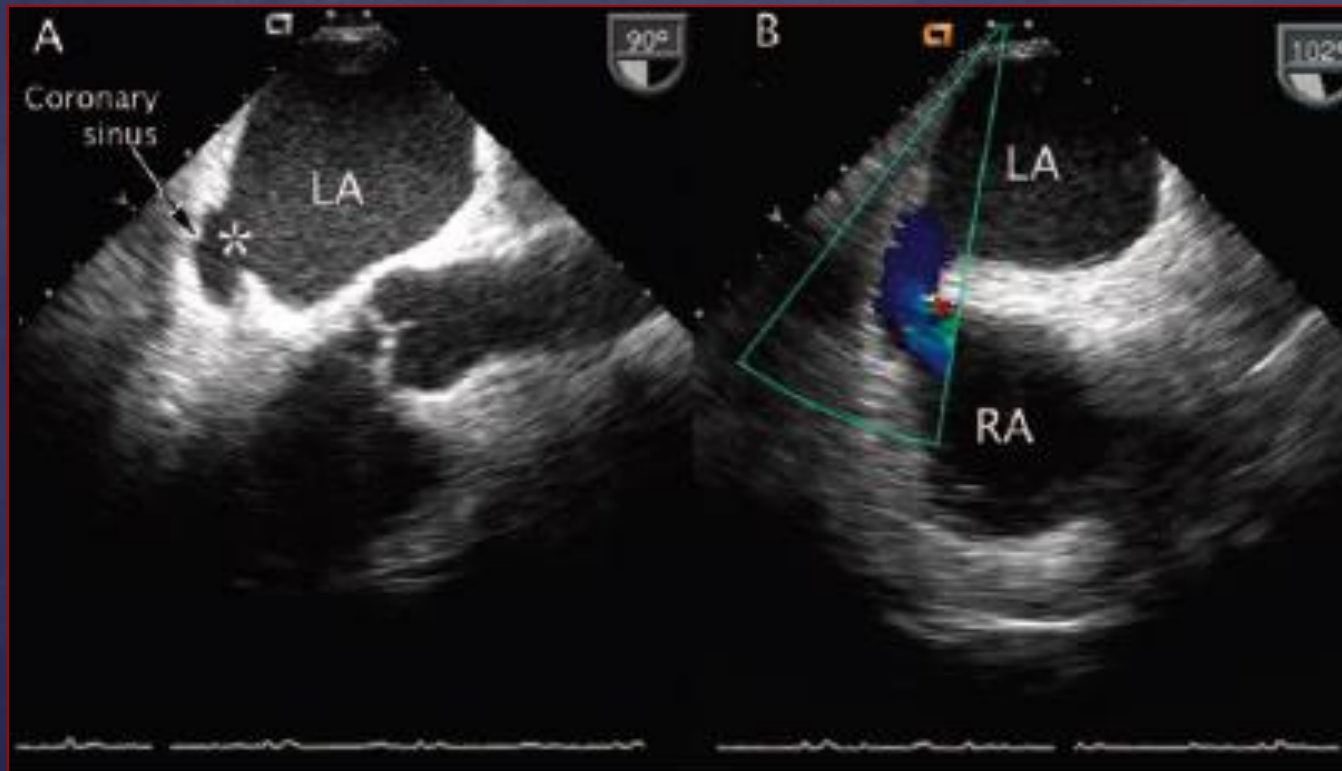
Ostium primum



DIFFERENT TYPES OF ASD

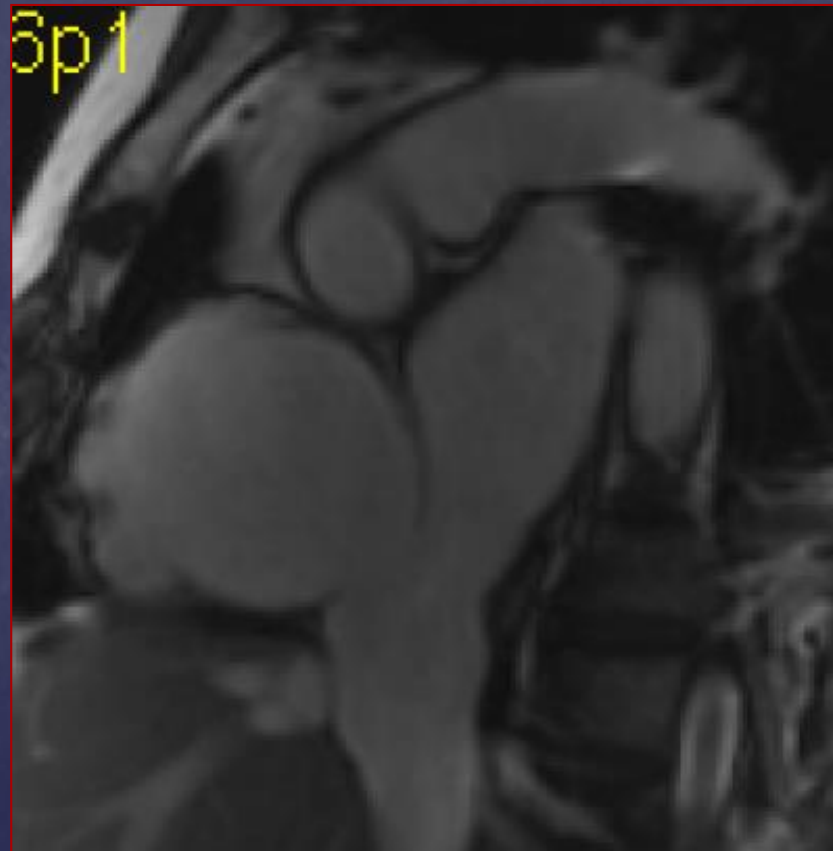
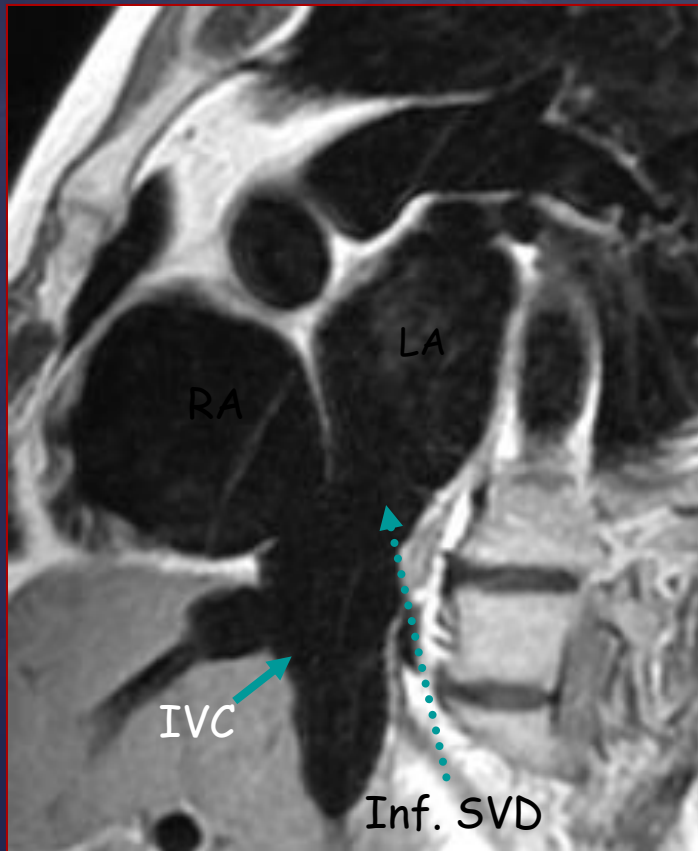


Superior Sinus Venosus Defect



Coronary sinus defect

DIFFERENT TYPES OF ASD



Inferior Sinus Venosus Defect

Difetti settali atriali

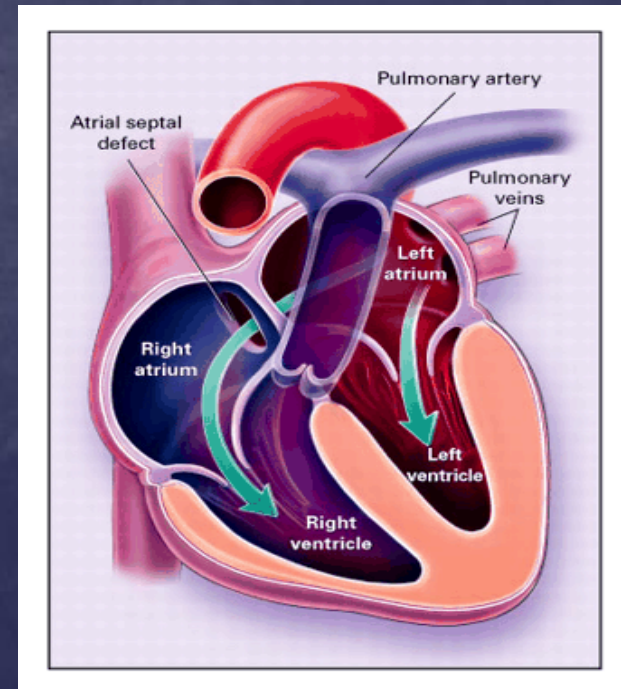
- ✓ DIA secundum 6-10% di tutte le anomalie cardiache
- ✓ F/M 2:1
- ✓ 1 per 1500 nati vivi
- ✓ Soprattutto sporadico, ma anche familiare per mutazione genetica.

Fisiopatologia

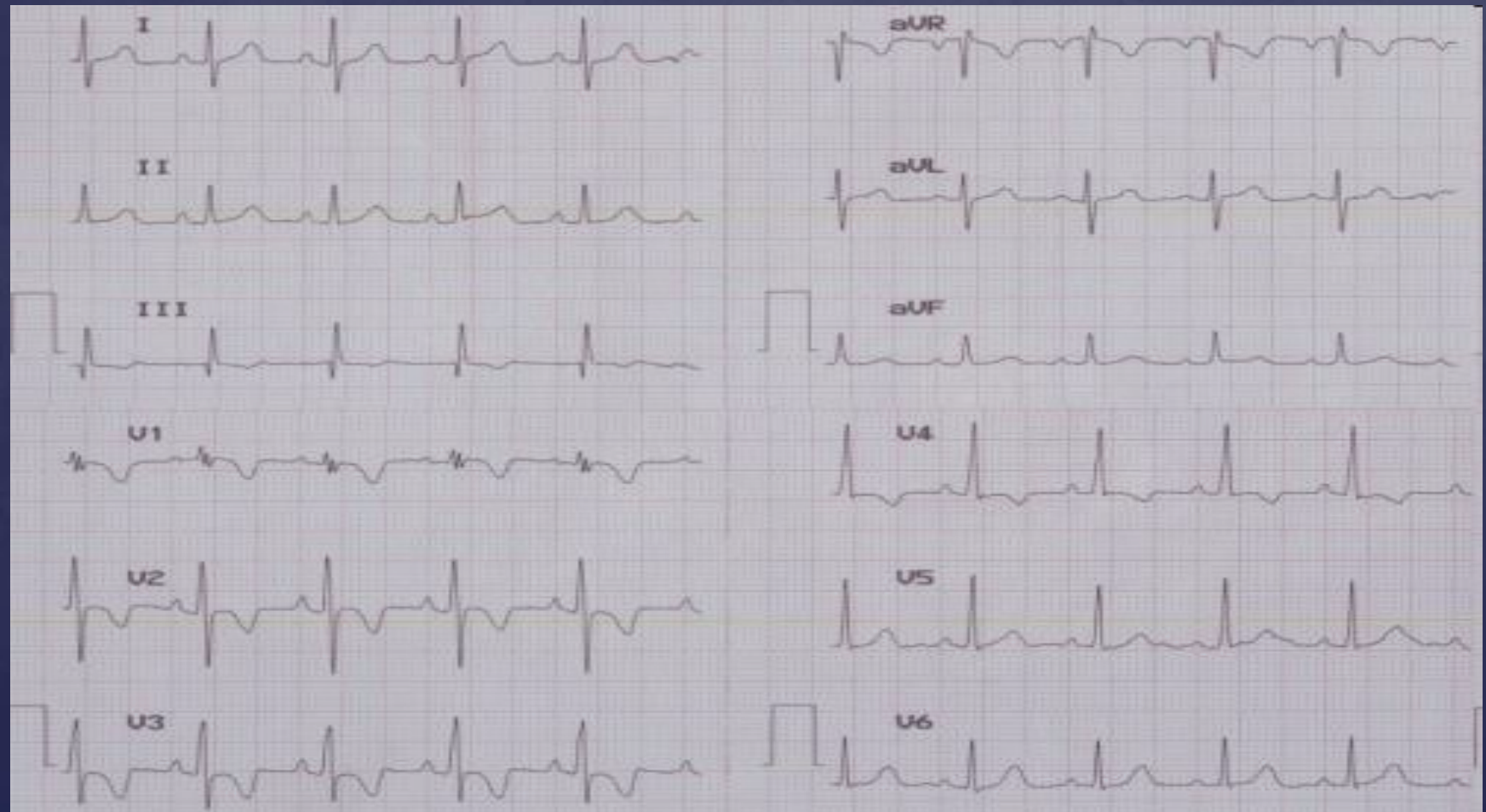


DIA secundum

- ✓ Fisiopatologia e quadro clinico:
- ✓ Sovraccarico dx con dilatazione AD e VD
- ✓ Iperafflusso polmonare
- ✓ Soffio da eiezione polmonare
- ✓ Sdoppiamento fisso II tono
- ✓ *Ipertensione polmonare*



ECG



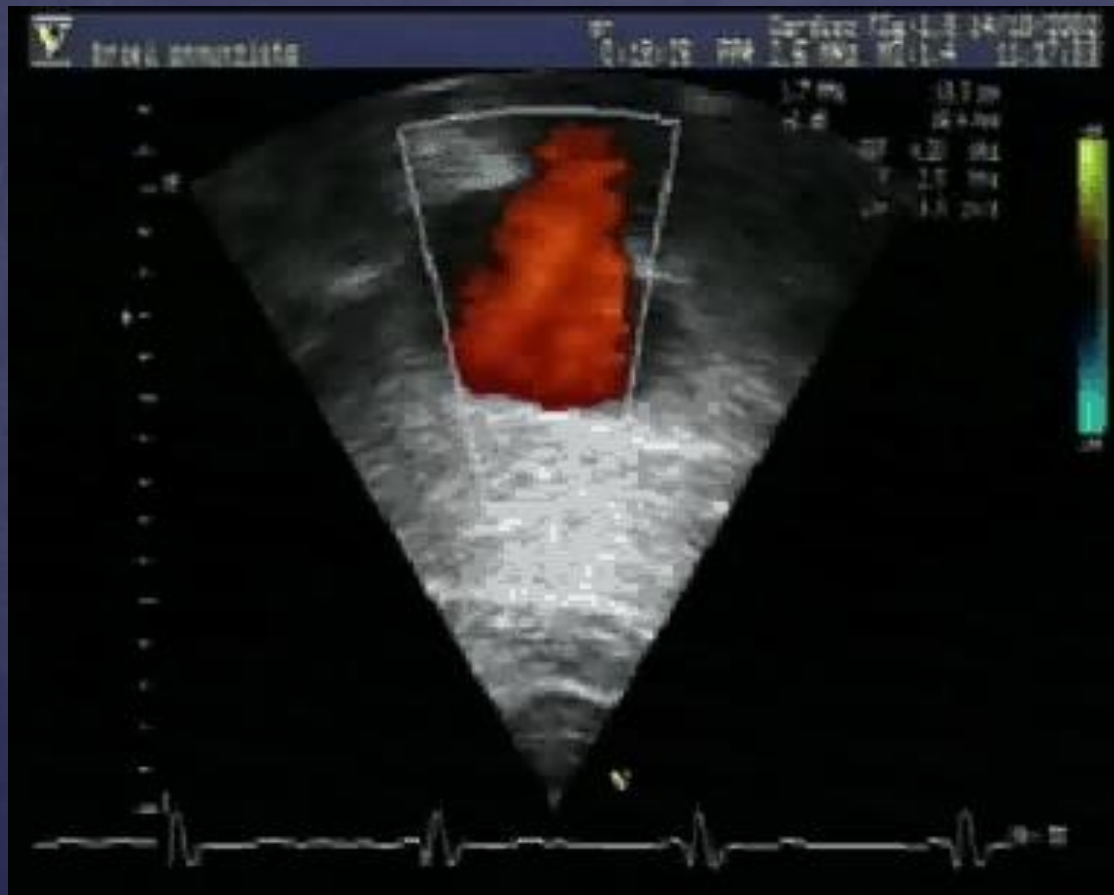
RX torace



Ecografia



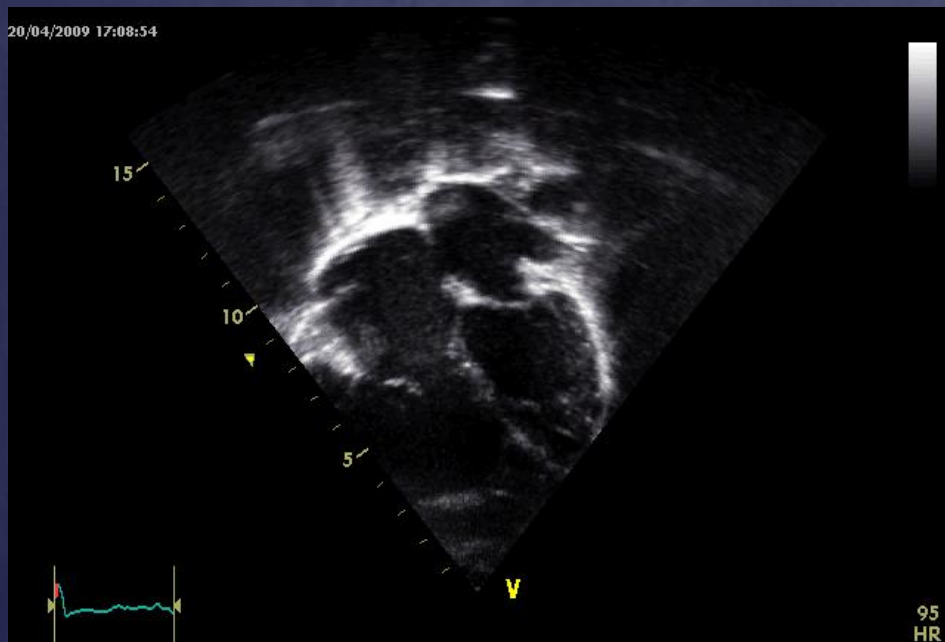
Ecografia



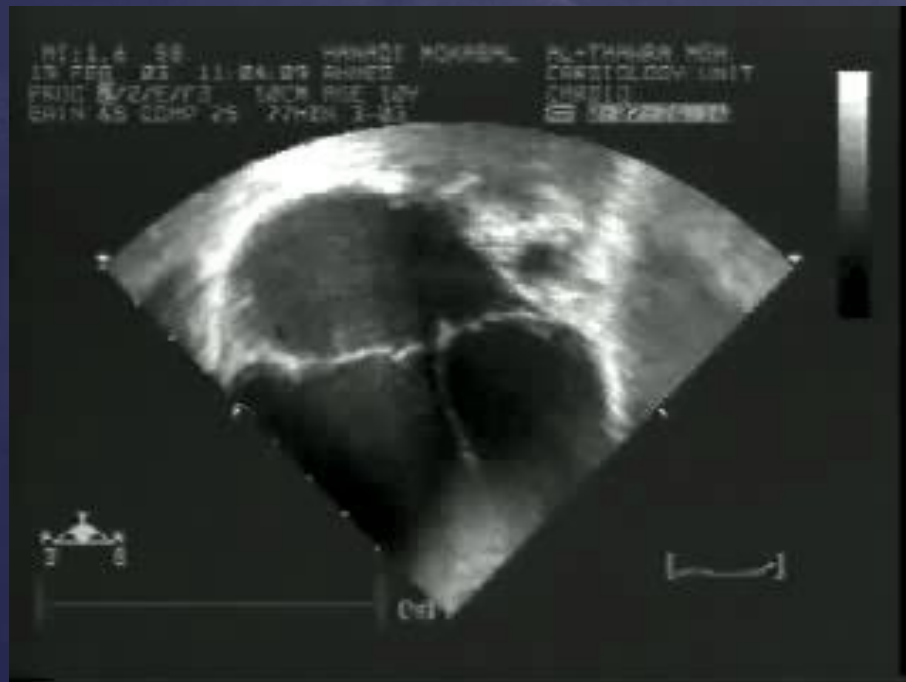
Ecografia



Ecografia



Ecografia

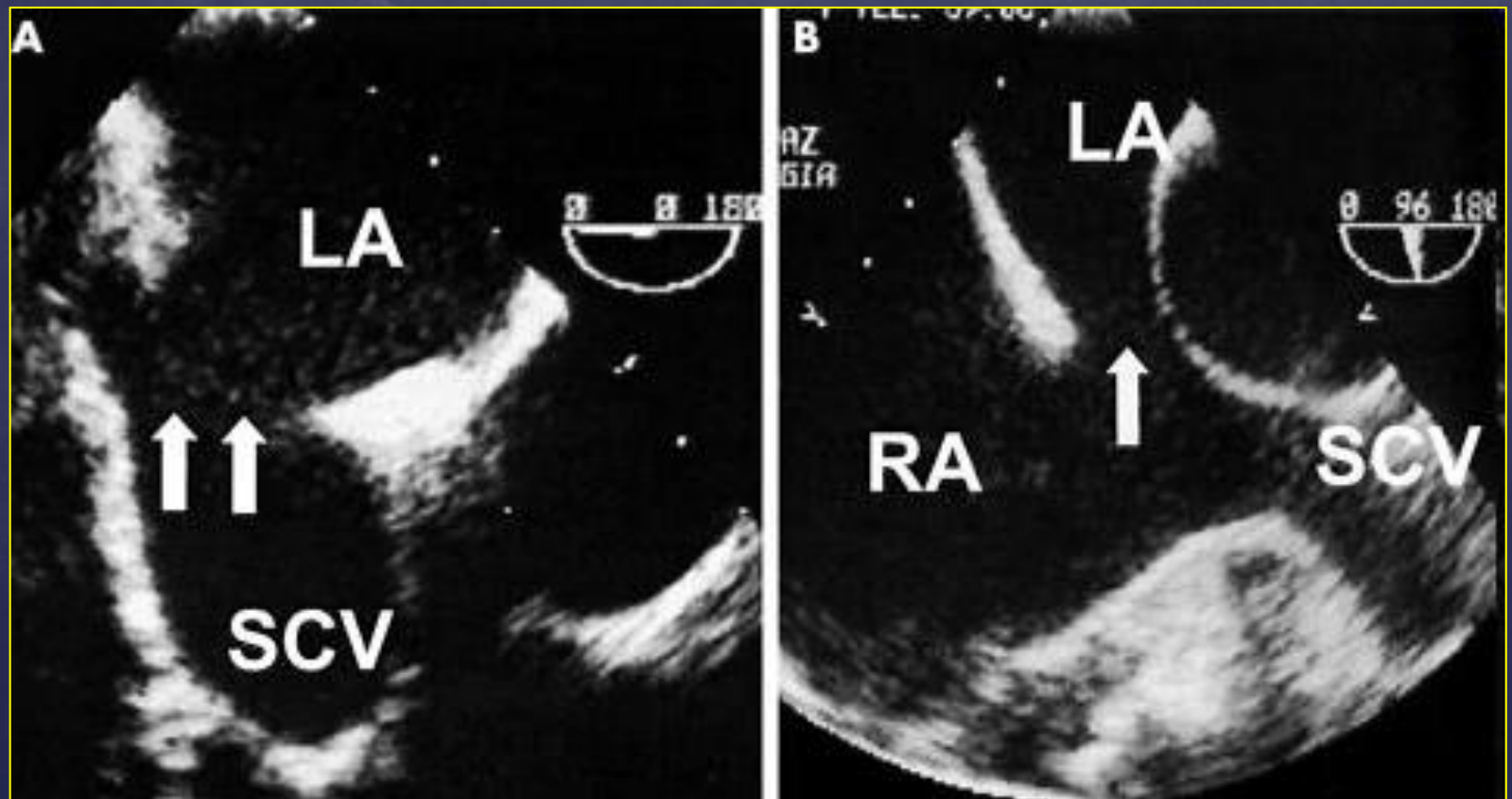


DIA seno venoso

- ✓ Cavale superiore
- ✓ Cavale inferiore o seno coronarico

DIA seno venoso

- ✓ Eco TEE cavale superiore



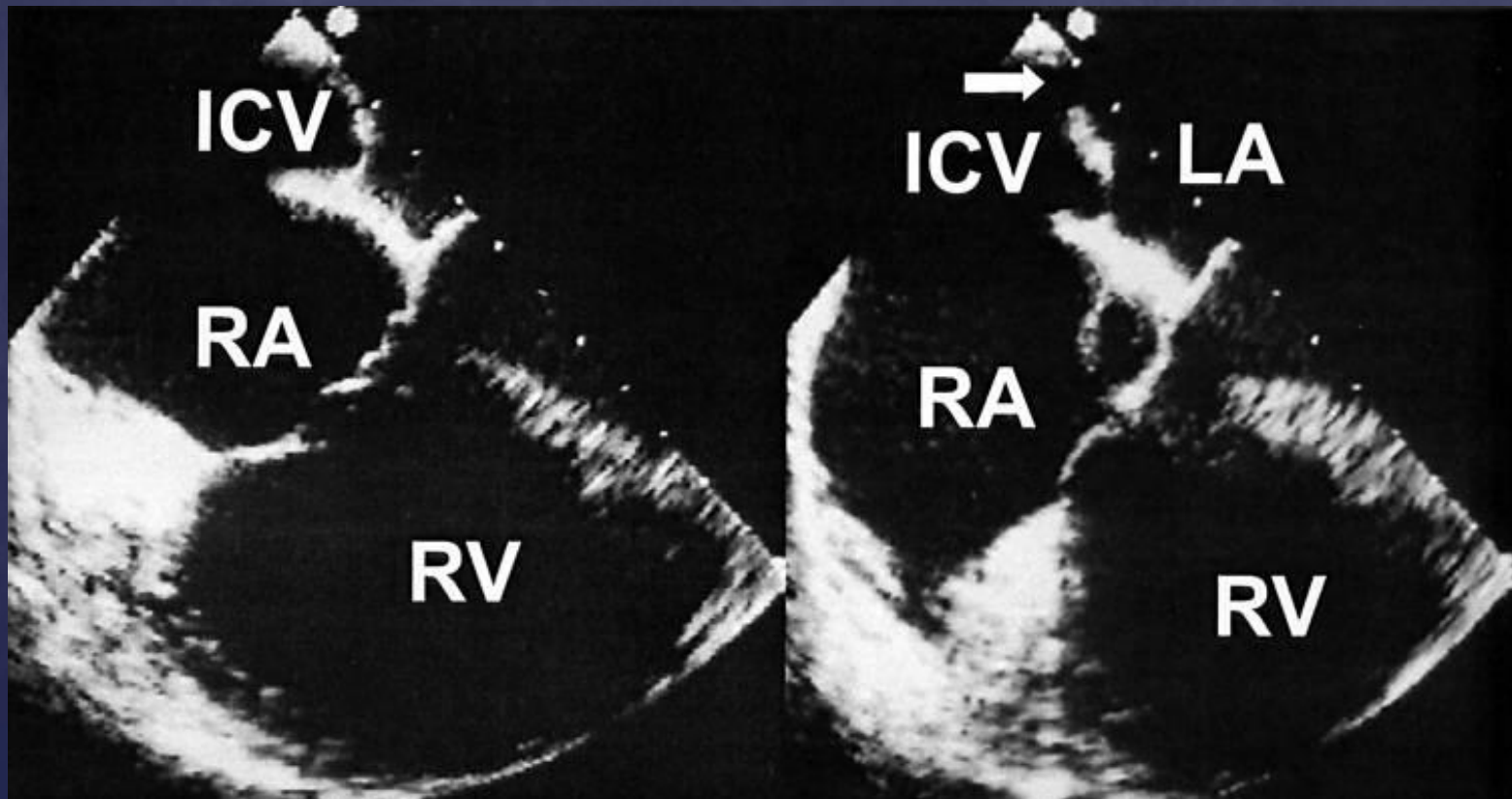
DIA seno venoso

✓ eco



DIA seno venoso

- ✓ Eco TEE cavale inferiore



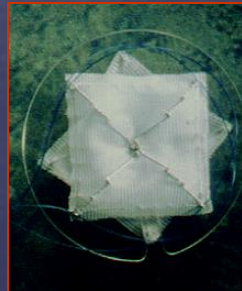
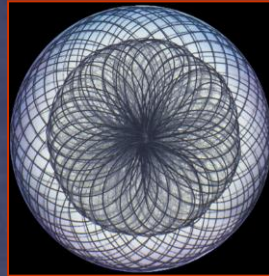
DIA ostium primum

✓ eco

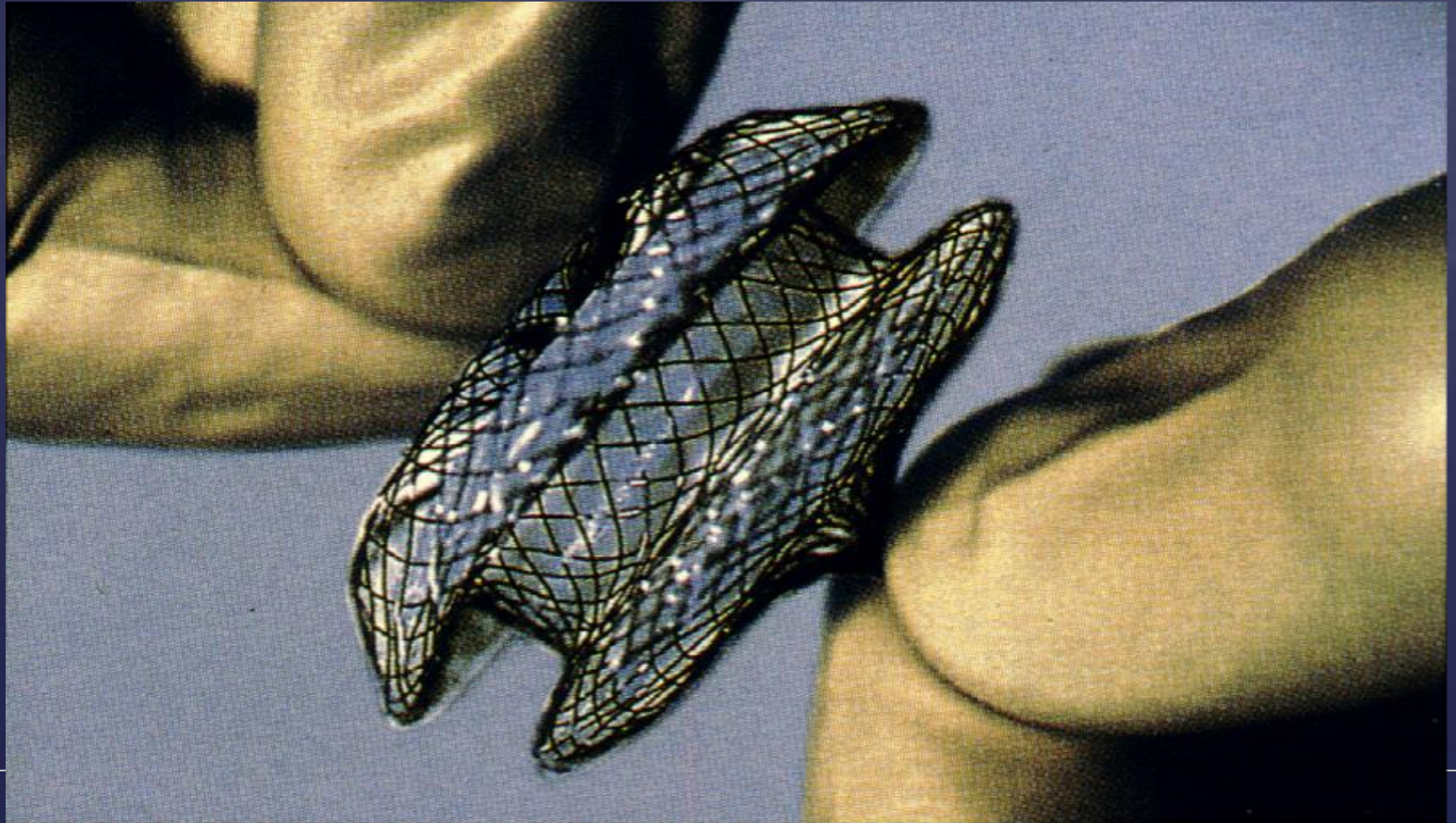


Trattamento interventistico del difetto settale atriale

Occlusion



Amplatzer septal occluder device



ASD occlusion

- ✓ ASD ostium secundum type
- ✓ ASD diameter larger than 10 mm
- ✓ Left to right shunt $> 1,5$
- ✓ No pulmonary hypertension
- ✓ Paradoxical embolism

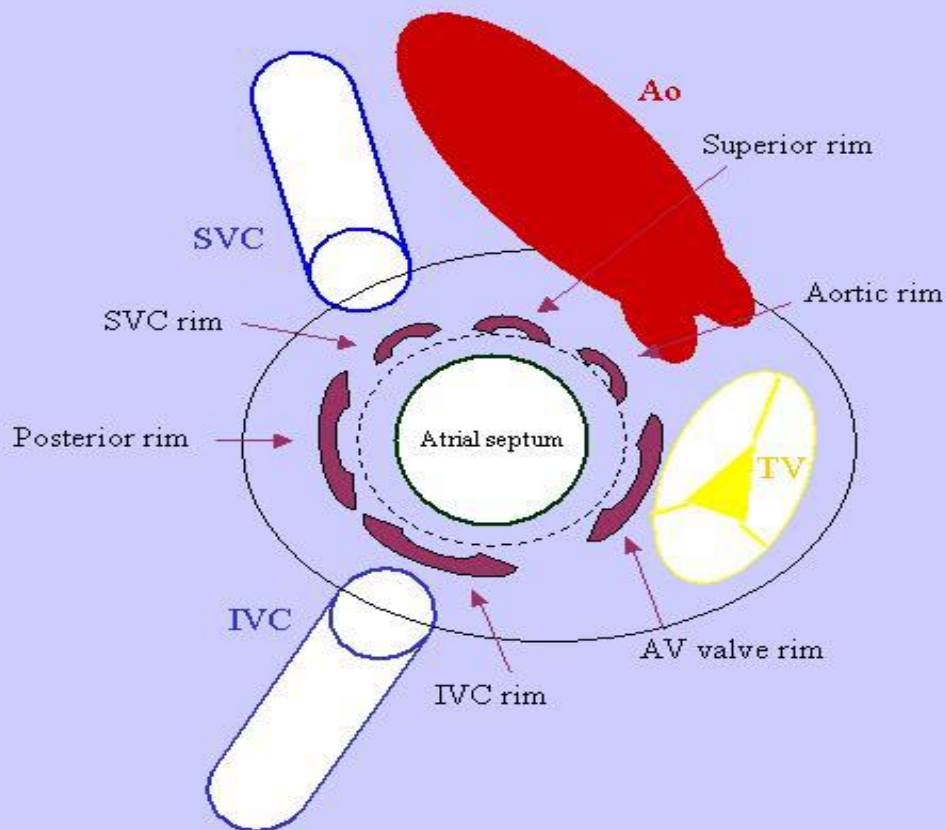
Tecnica della procedura

- Anestesia generale, ventilazione assistita
- Ecografia transesofagea
- Approccio venoso femorale
- Angiografia in vena polmonare superiore dx nel DIA, atrio destro nel FOP
- Misurazione del difetto
- Impianto device, controllo angio - TEE

Ecocardiografia

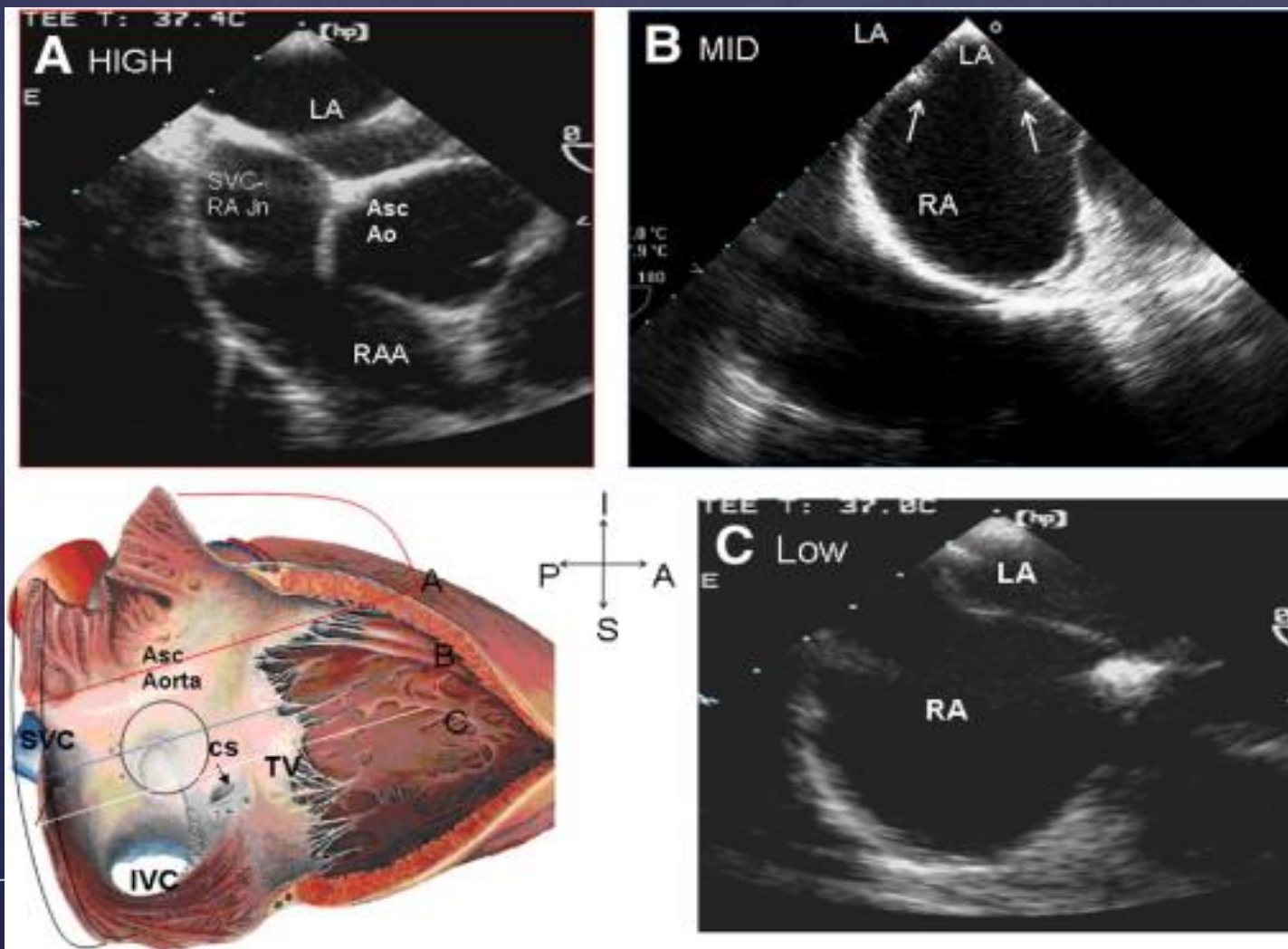
Transtoracica/transesofagea

Margini del difetto interatriale



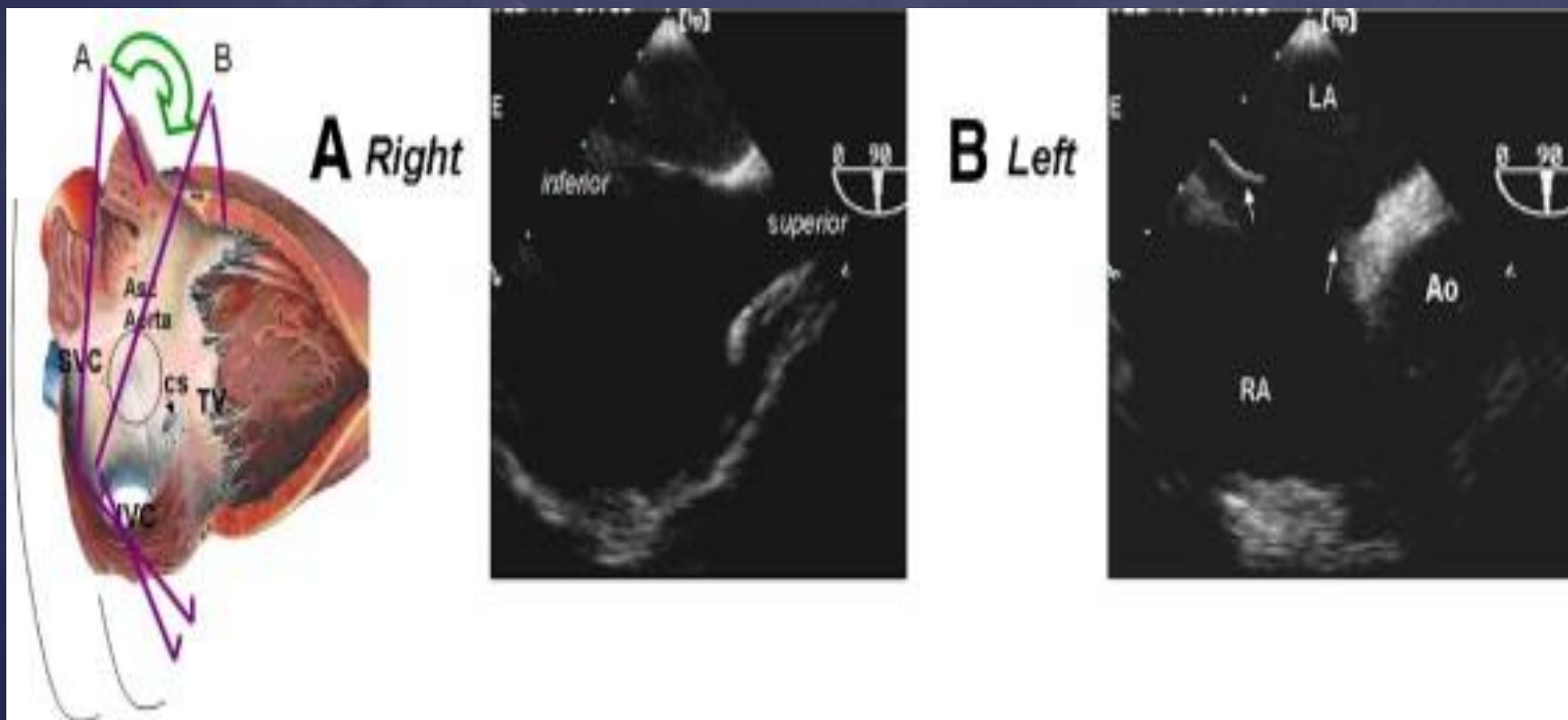
Ecocardiografia transesofagea

0° Rim anteriore e posteriore



Ecocardiografia transesofagea

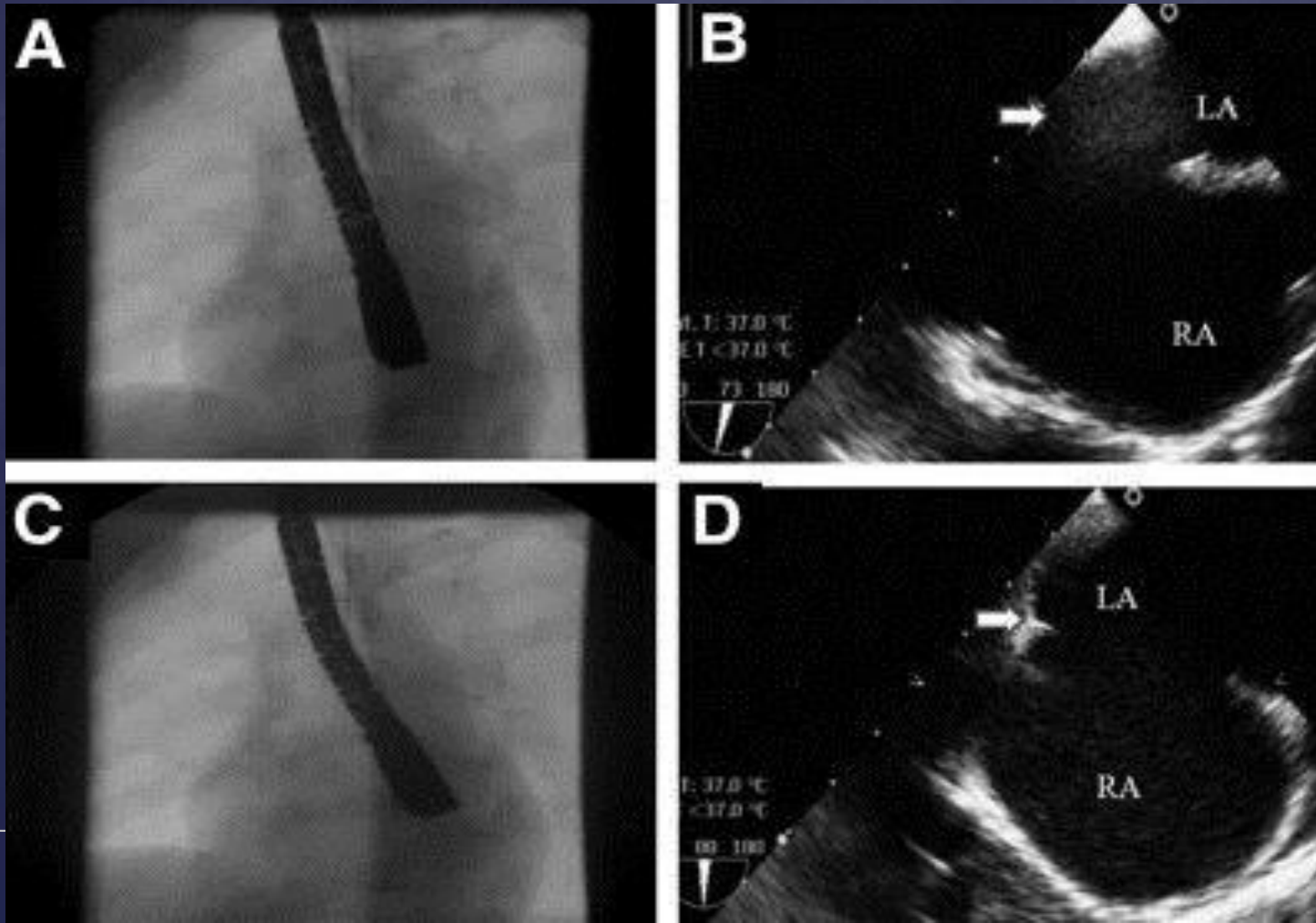
90° Rim cavale superiore e inferiore



Ecocardiografia transesofagea

Rim posteroinferiore

Long axis 70-90°

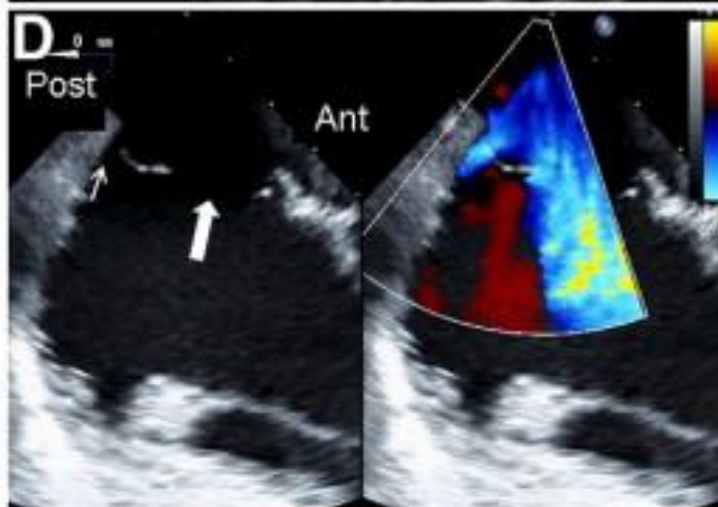
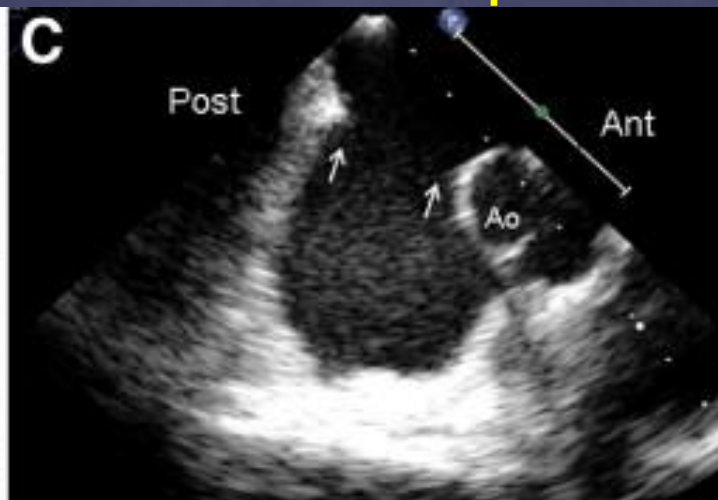


Ecocardiografia transesofagea

Centrale



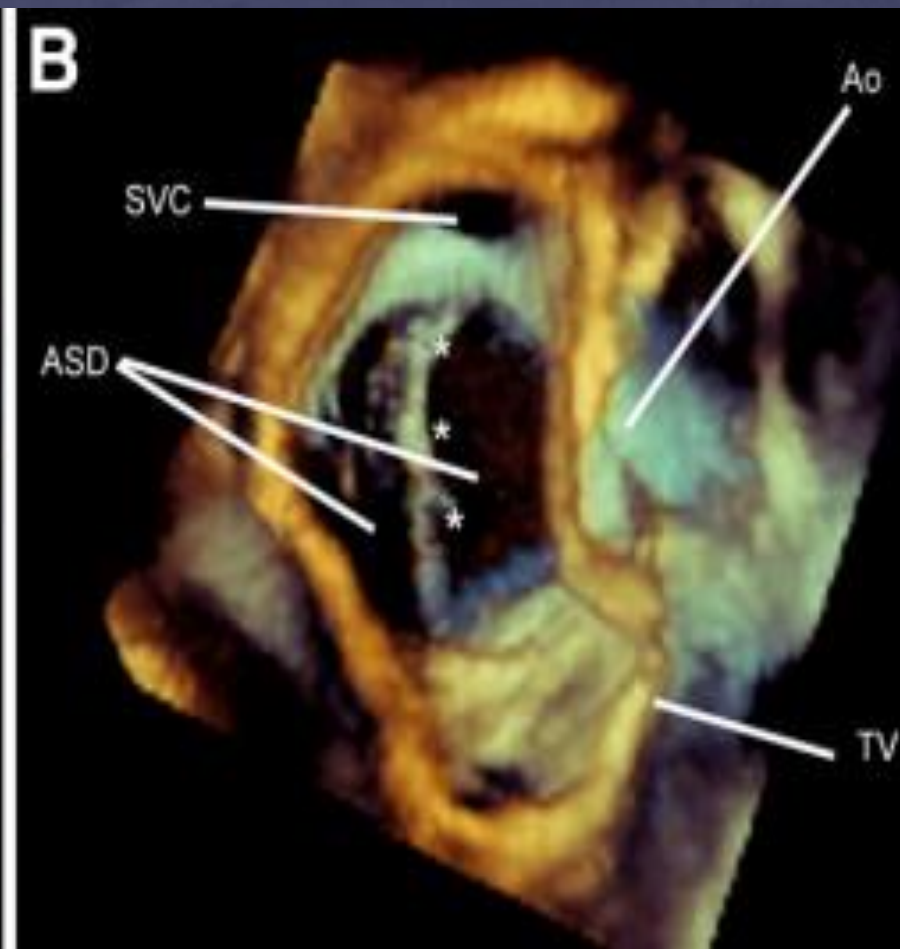
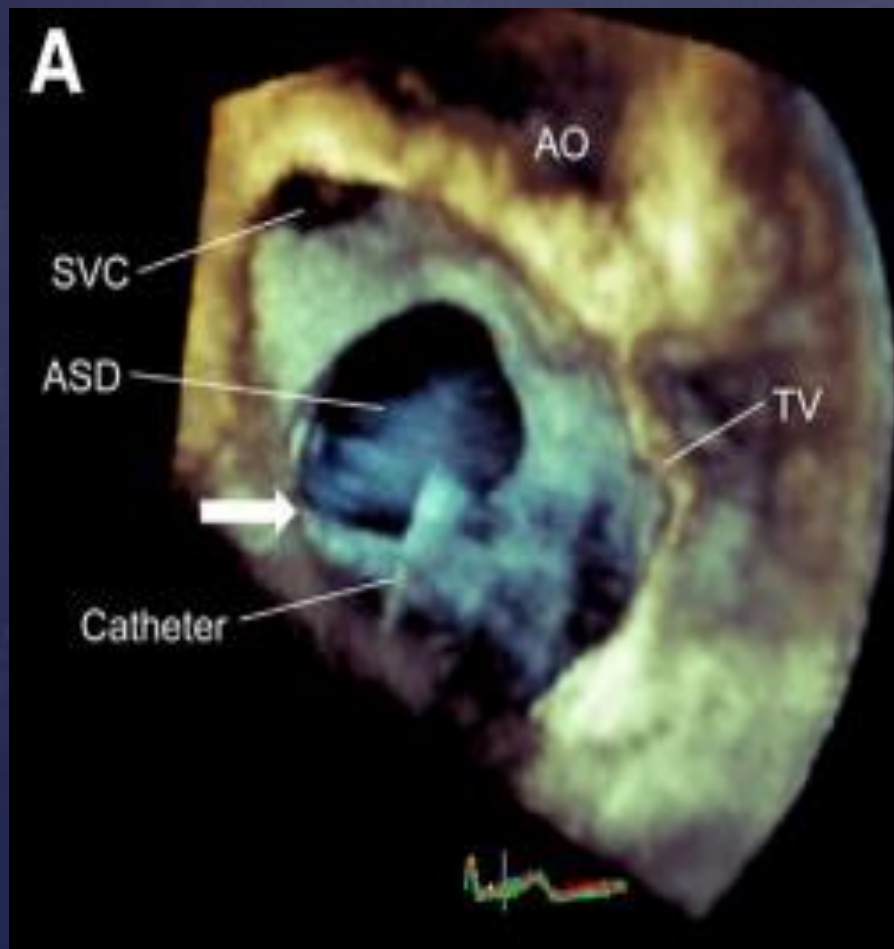
Deficit rim aortico e posteriore



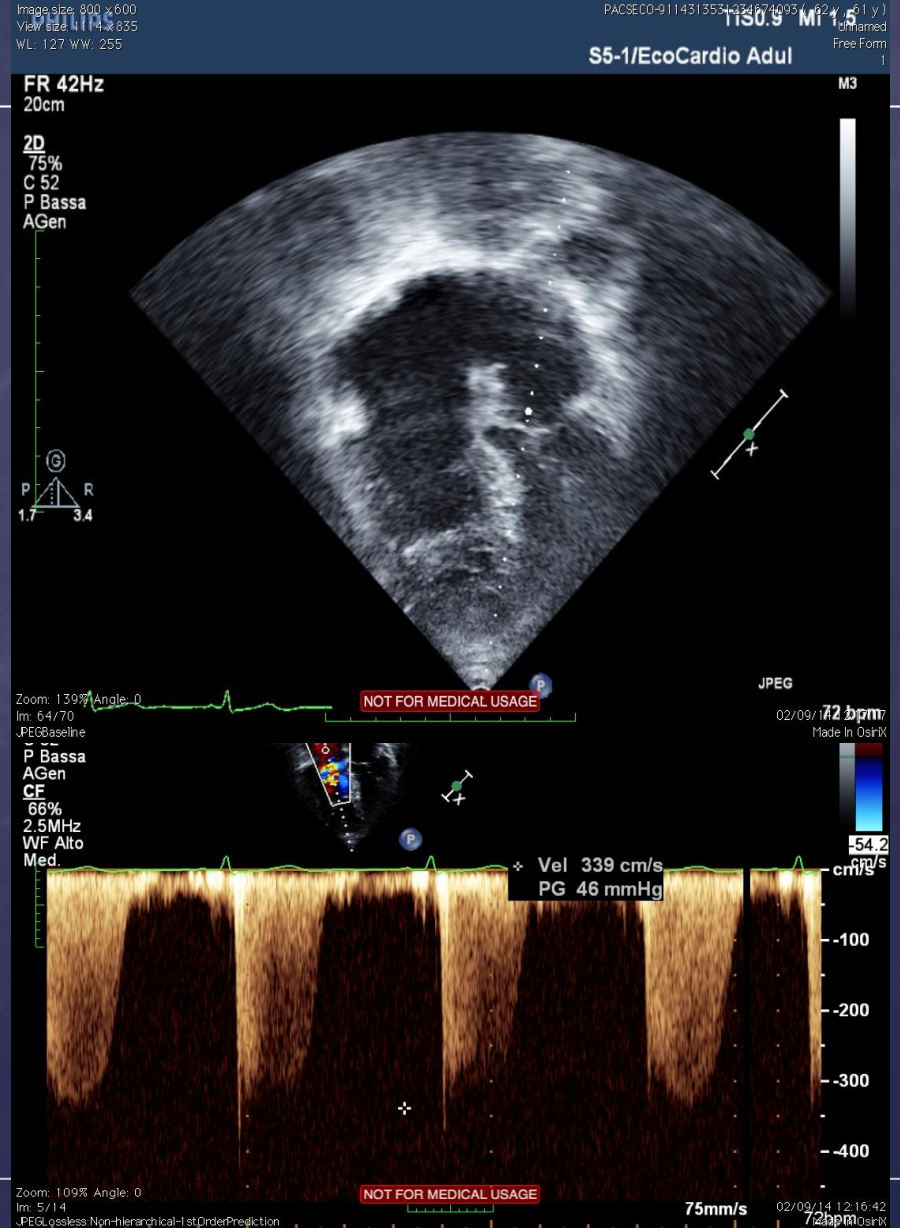
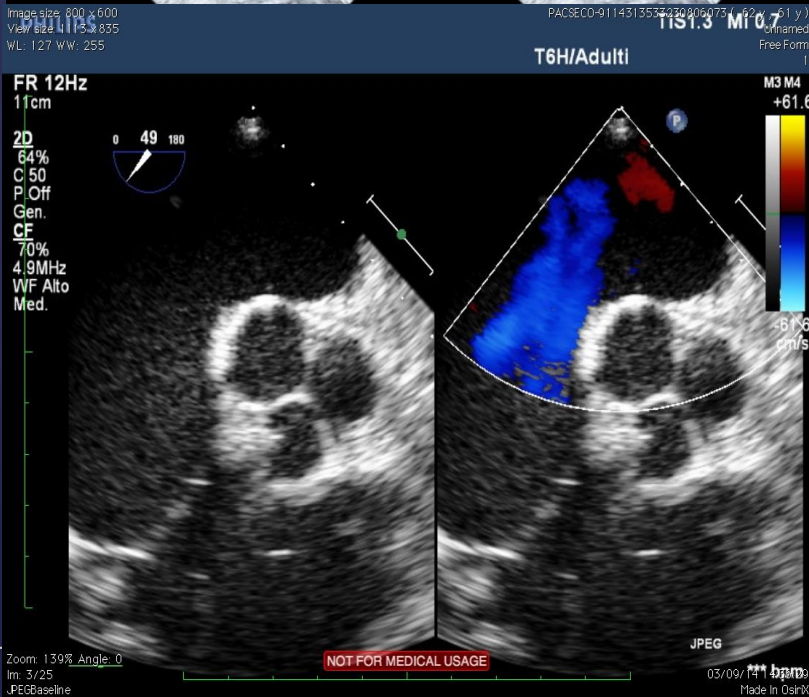
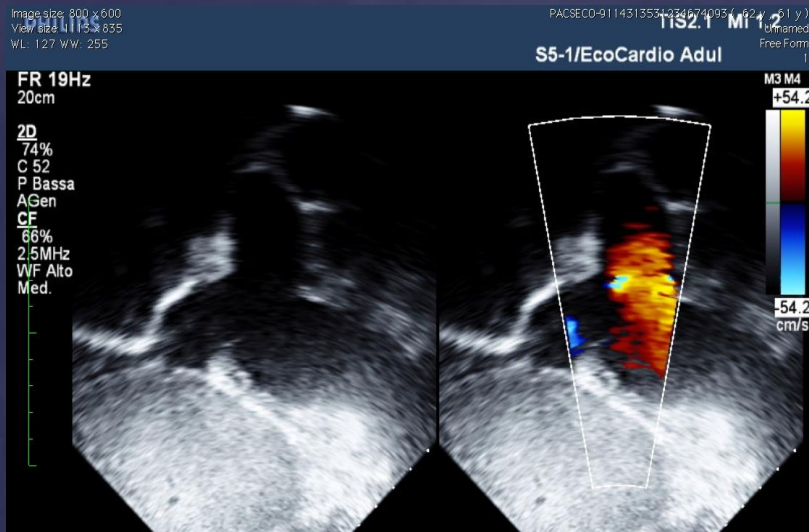
Deficit rim aortico

Difetti multipli :anteriore e posteriore

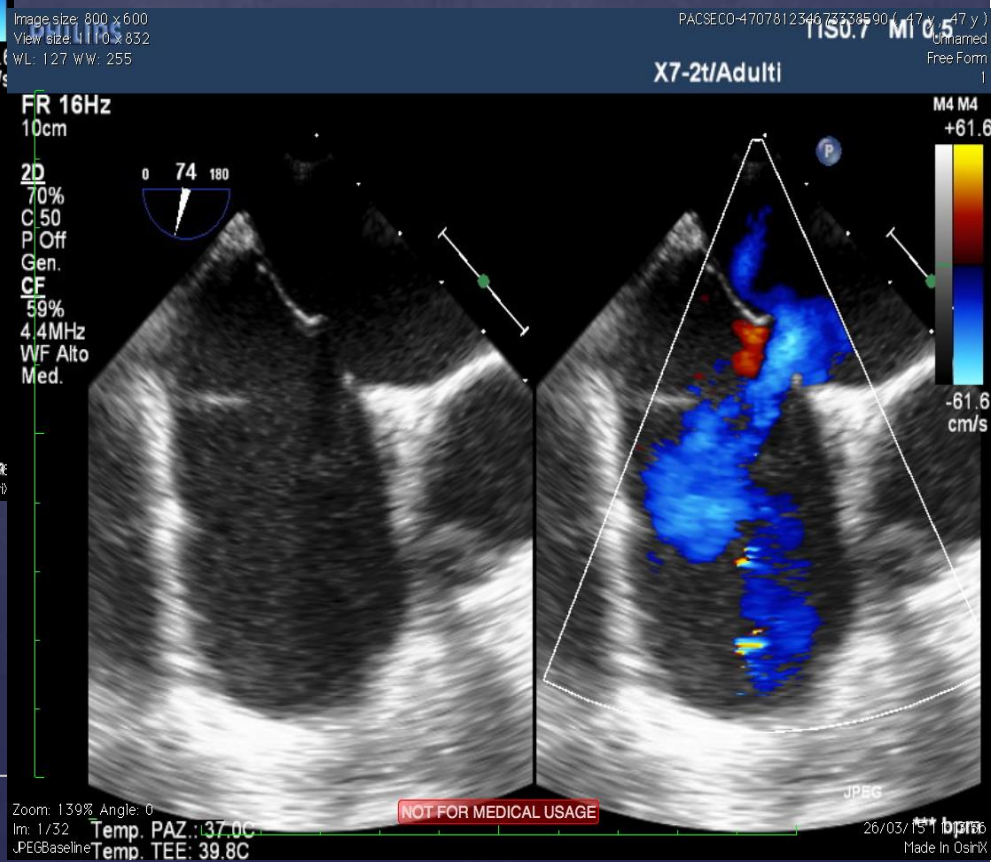
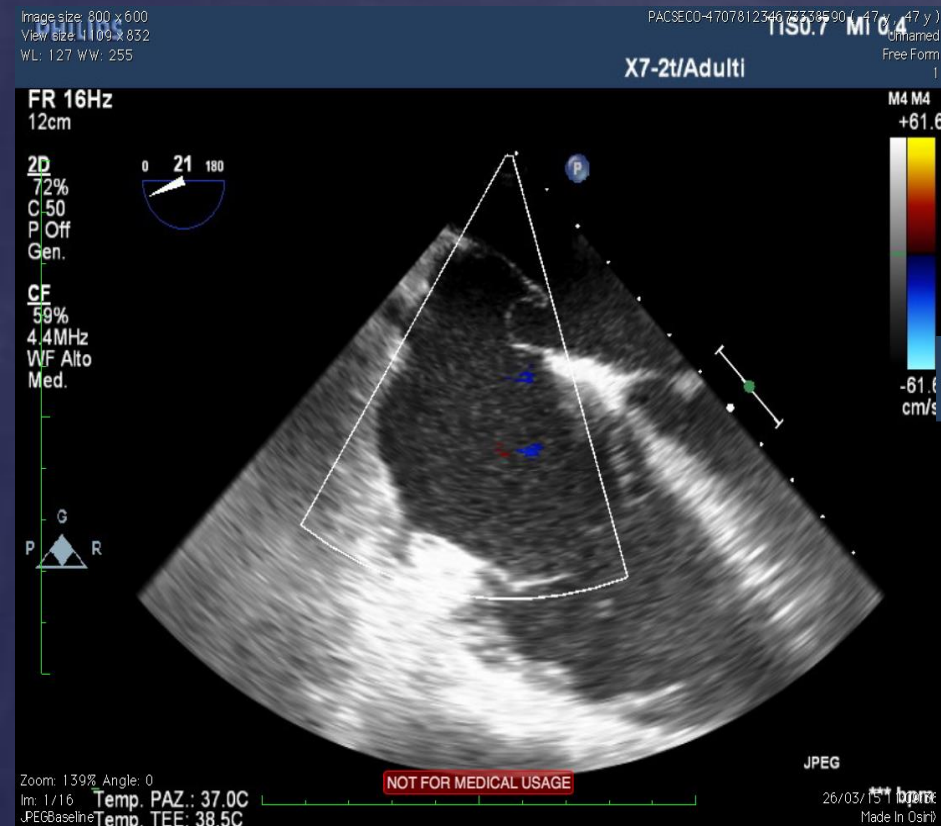
Ecocardiografia transesofagea



Difetto interatriale



DIA multipli e aneurisma del setto



Difetto interatriale

Image size: 800 x 600
View size: 1112 x 834
WL: 127 WW: 255

PACSECO-47078123467338590 (-47 y, 47 y)
Unamed
Free Form
1

X7-2t/Adult

FR 18Hz
8.1cm

2D

67%
C 50
P Off
Gen.

CF

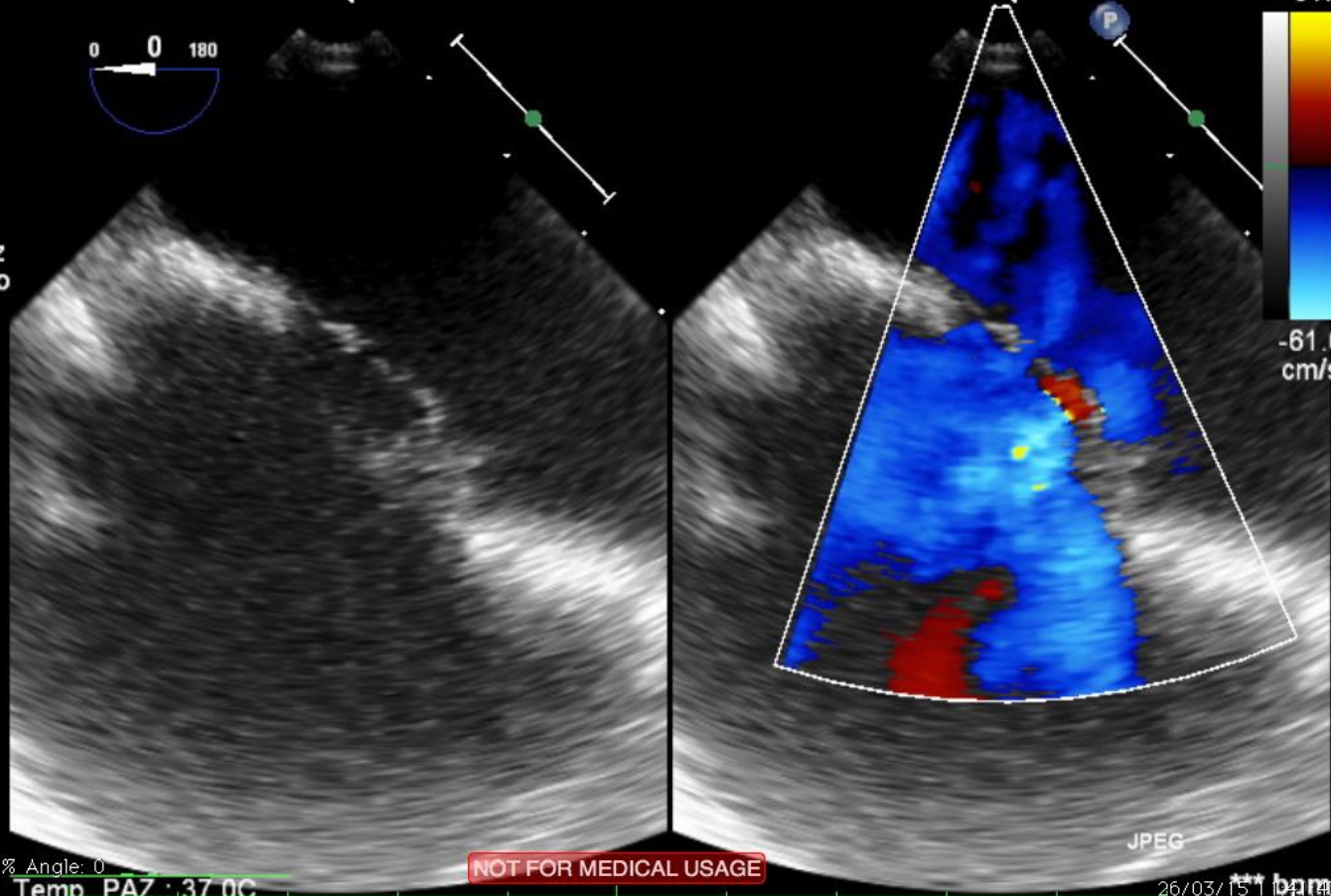
59%
4.4MHz
WF Alto
Med.



M4 M4
+61.6



-61.6
cm/s



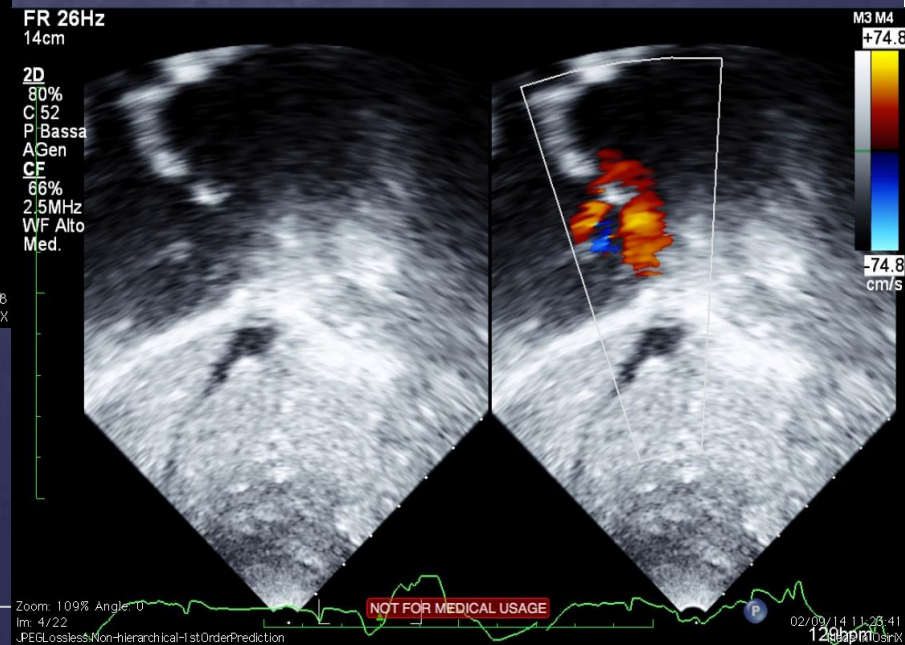
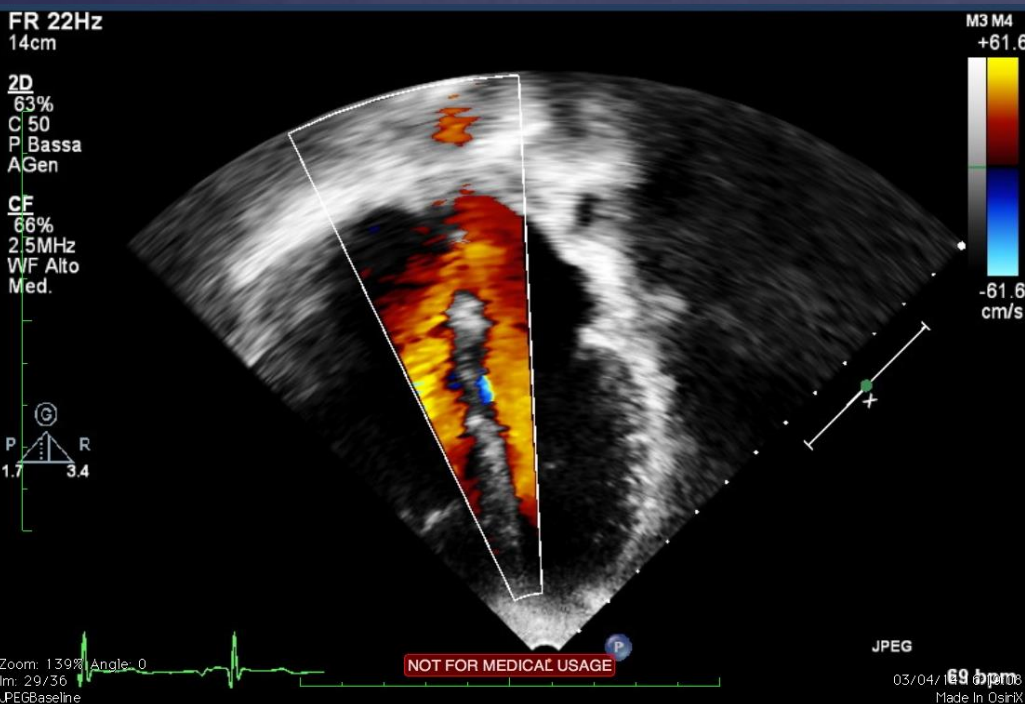
JPEG

Zoom: 139% Angle: 0
Im: 19/72 Temp. PAZ : 37.0C
Temp. TEE: 39.1C

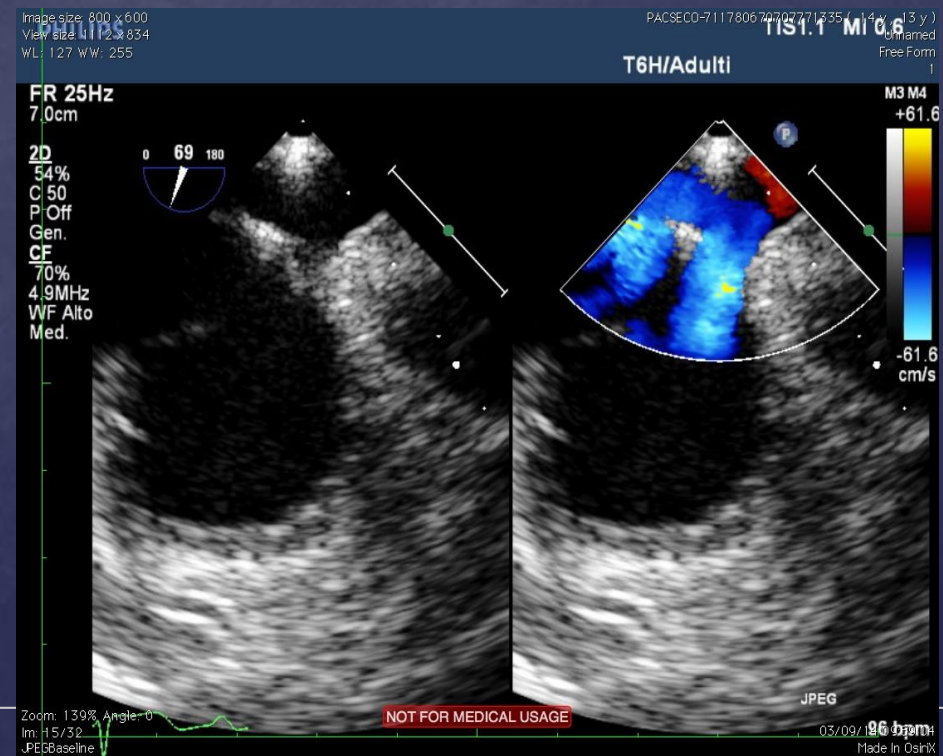
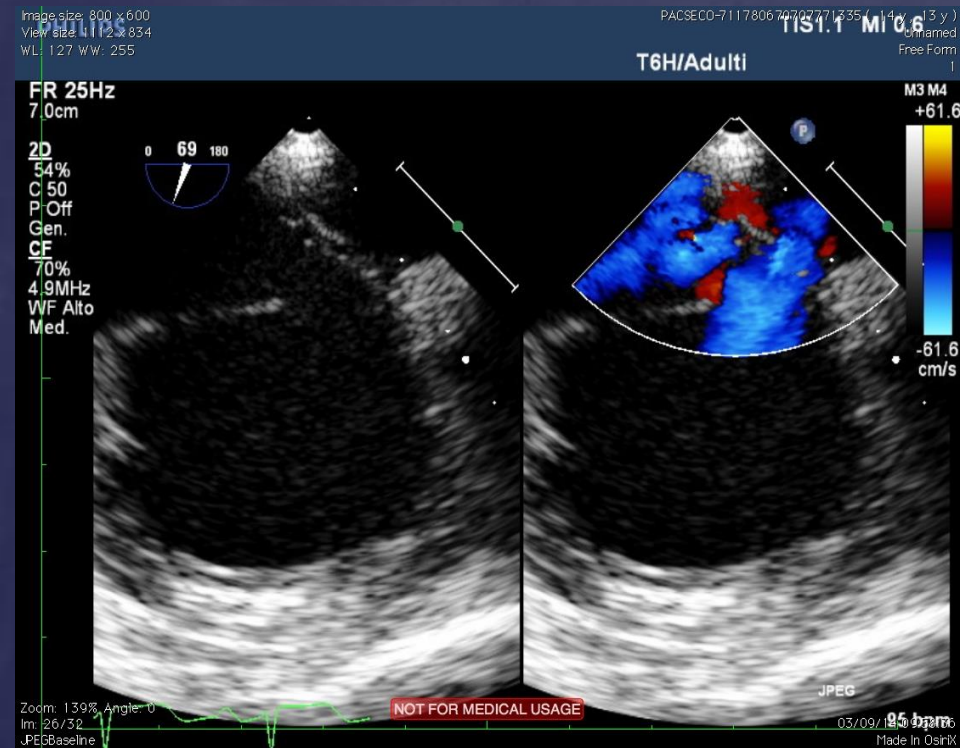
NOT FOR MEDICAL USAGE

26/03/15 11:03
*** bpm
Made In OsiriX

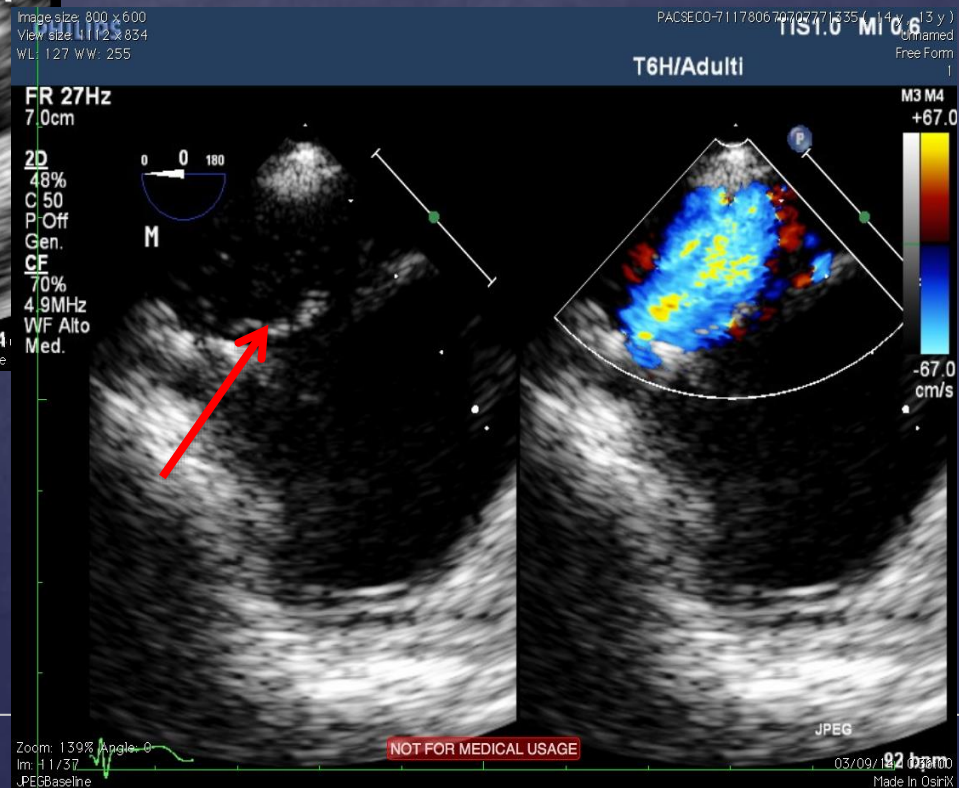
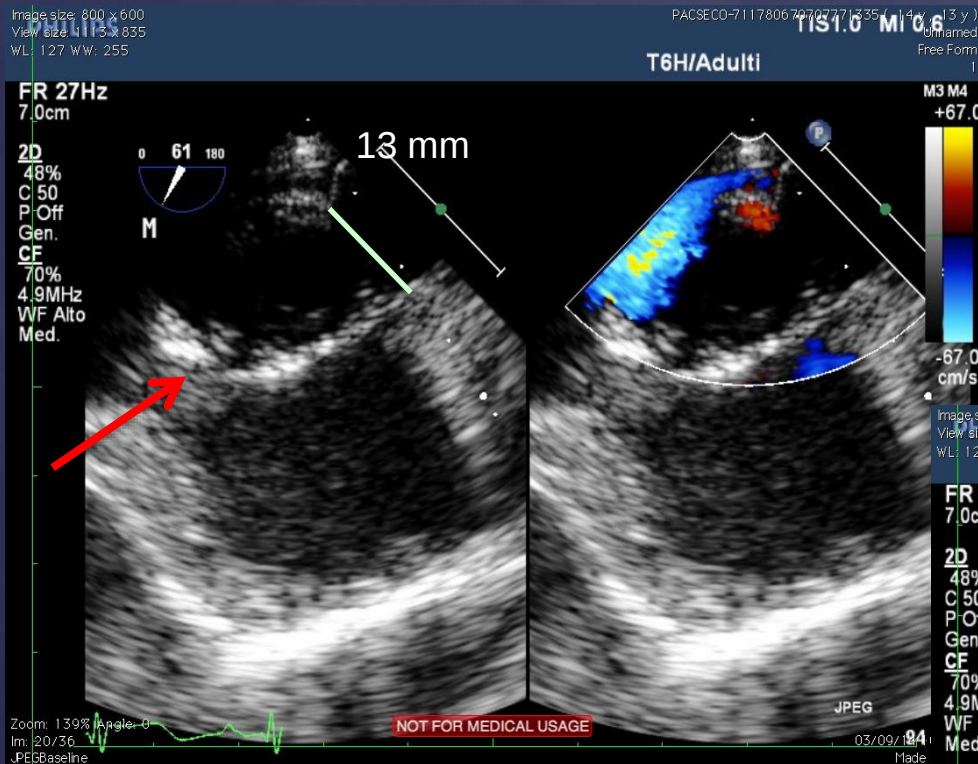
Difetti interatriali multipli



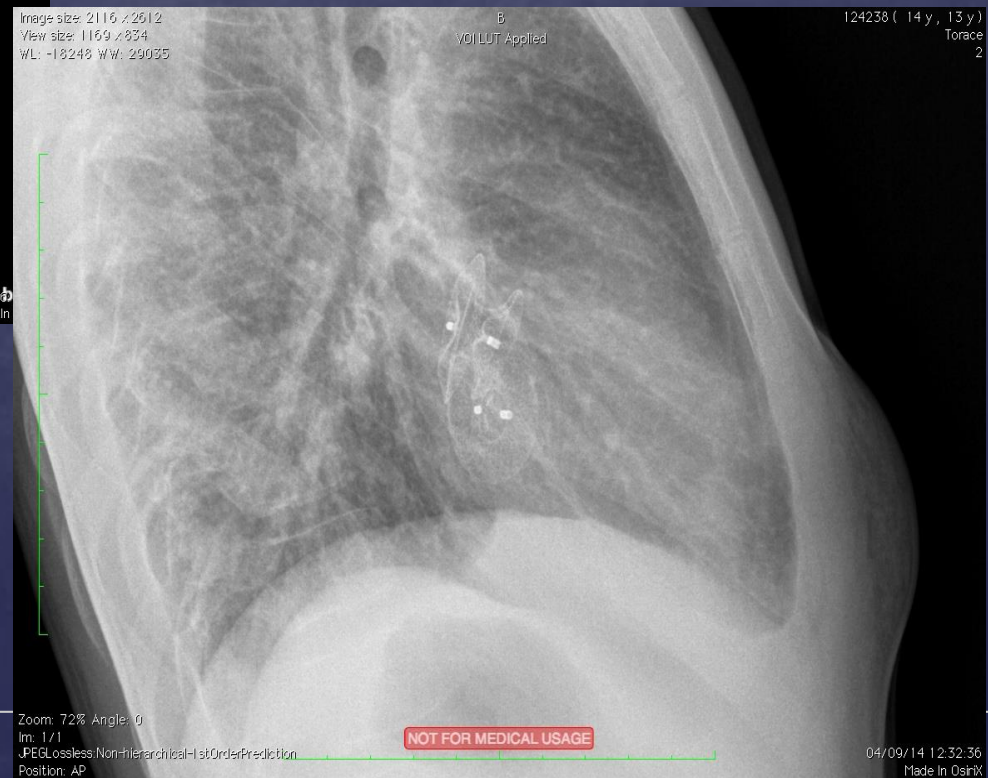
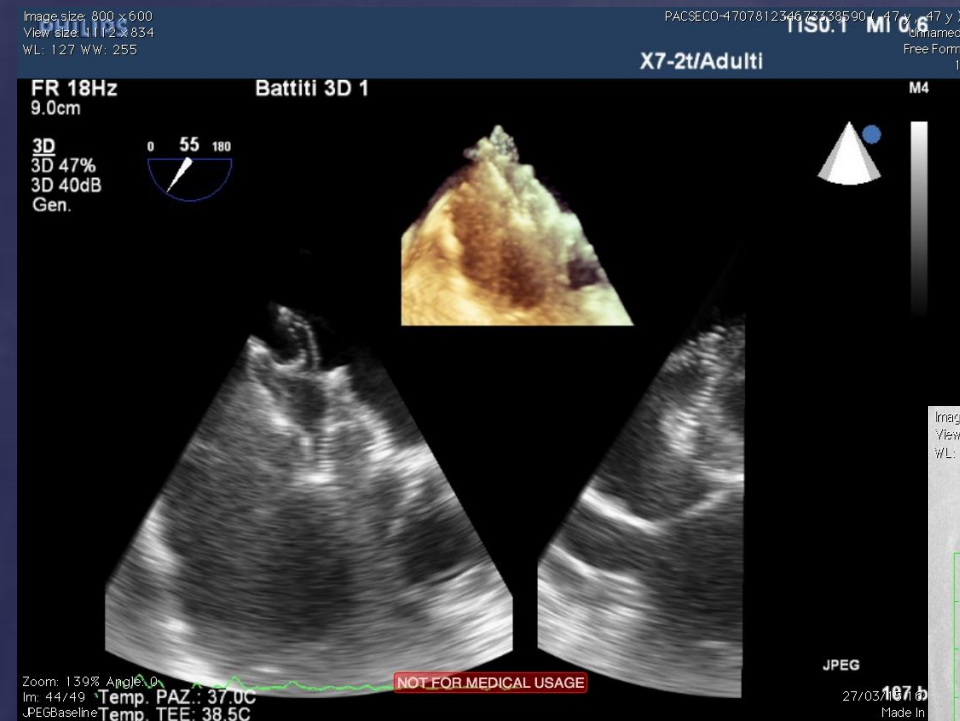
Difetti interatriali multipli



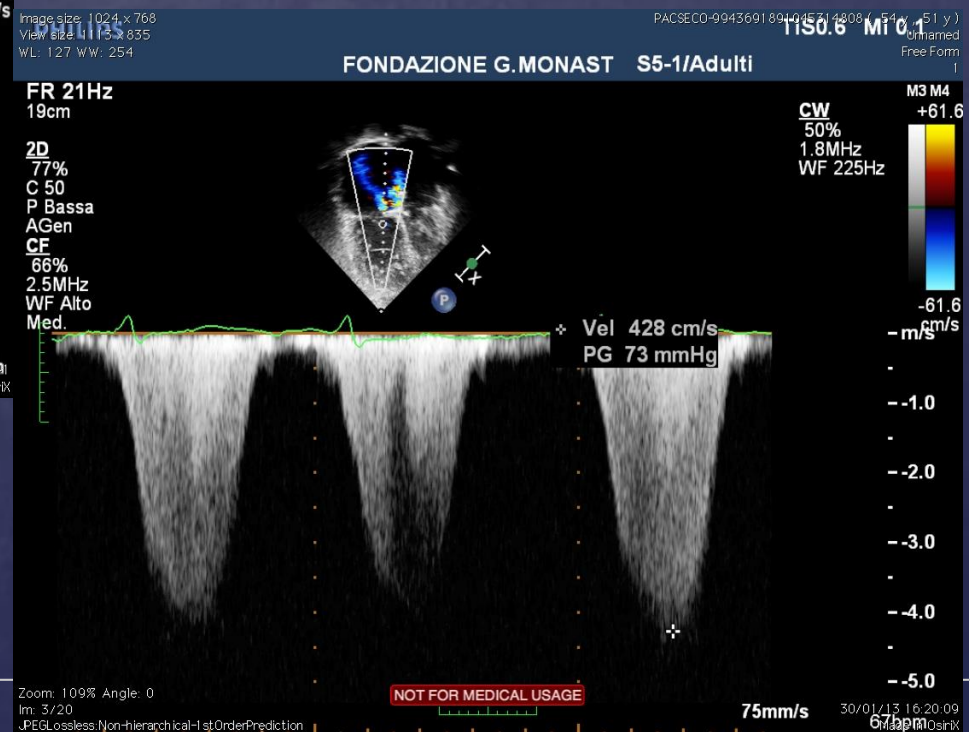
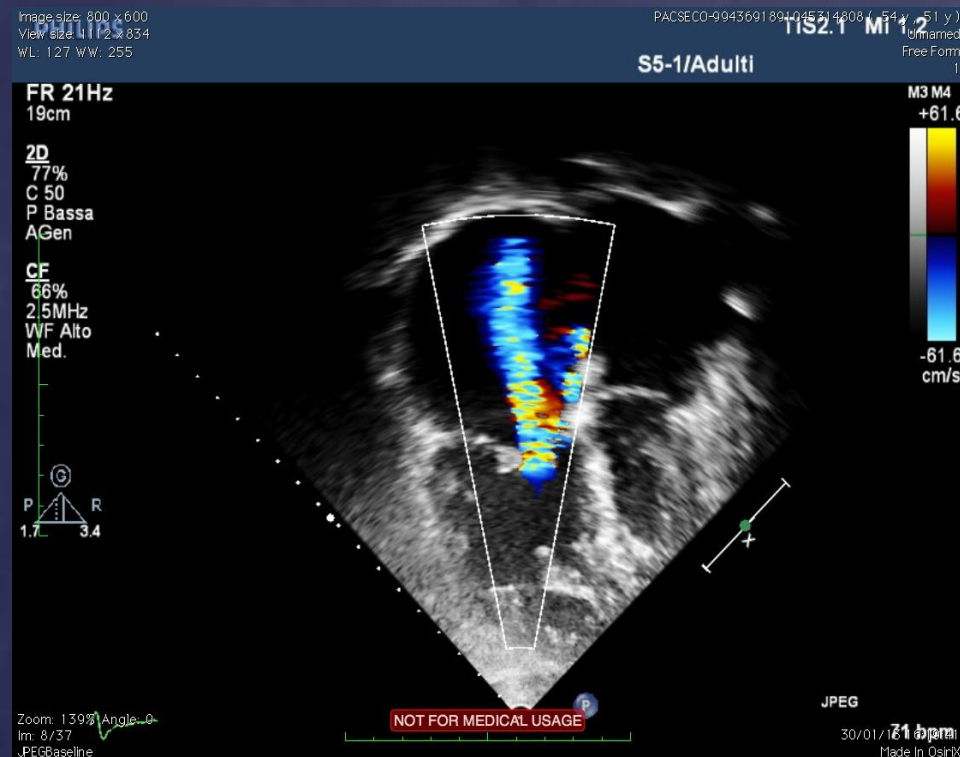
Difetti interatriali multipli



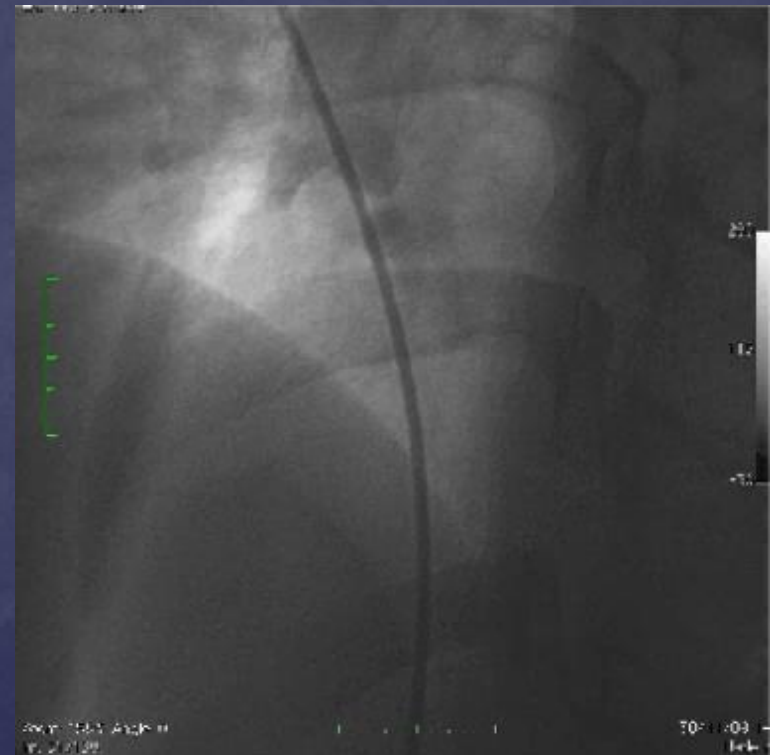
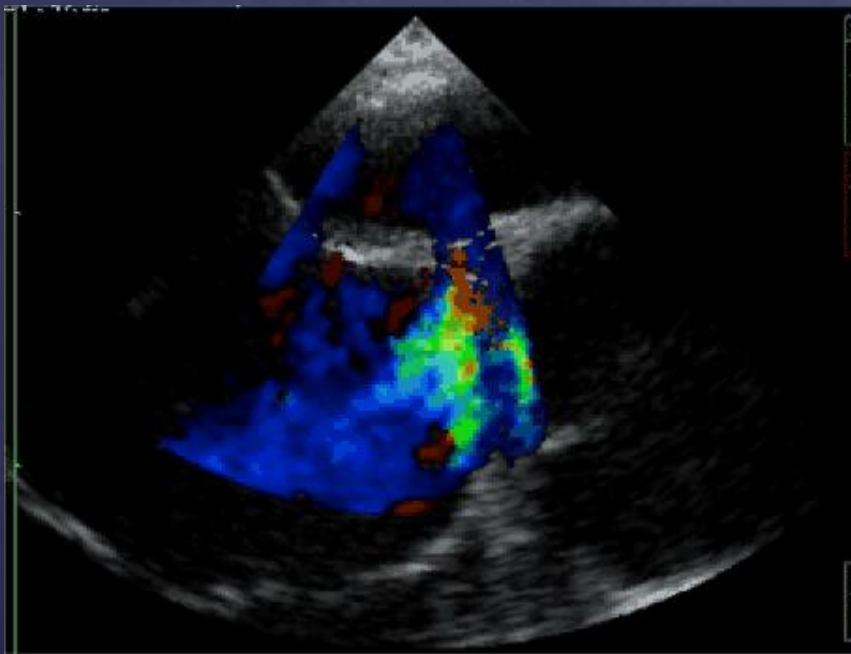
Difetti interatriali multipli



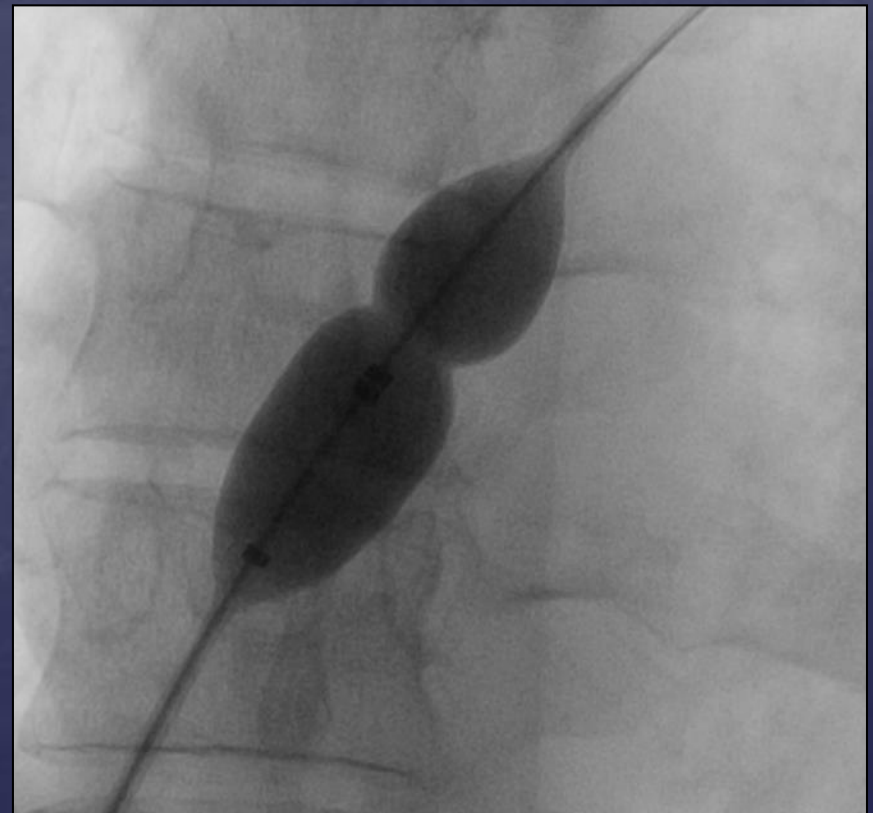
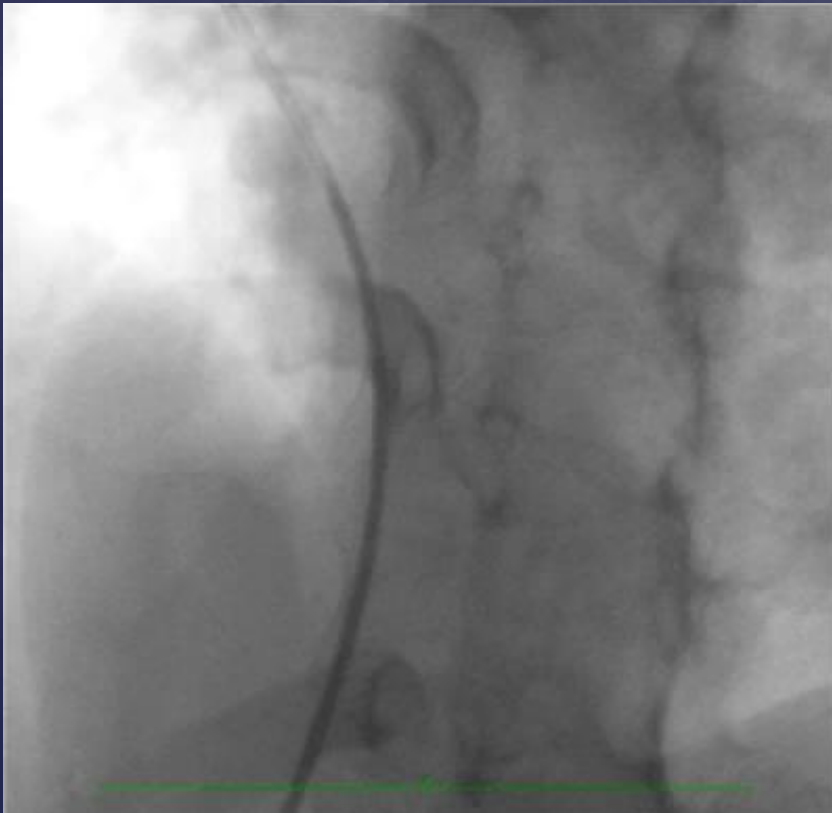
Difetto interatriale Ipertensione polmonare



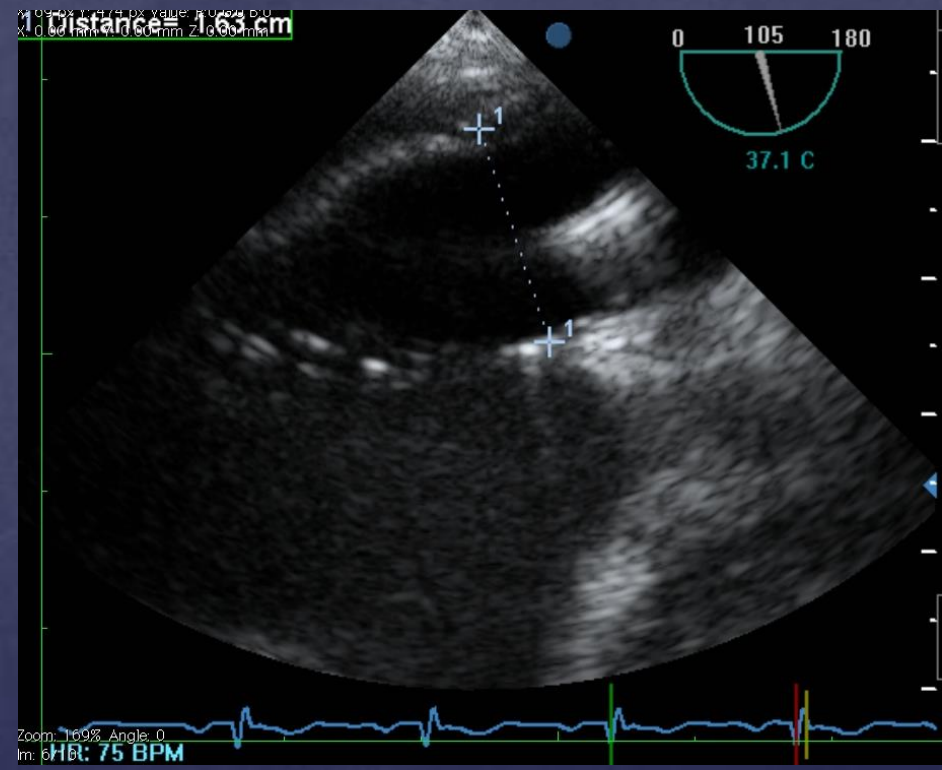
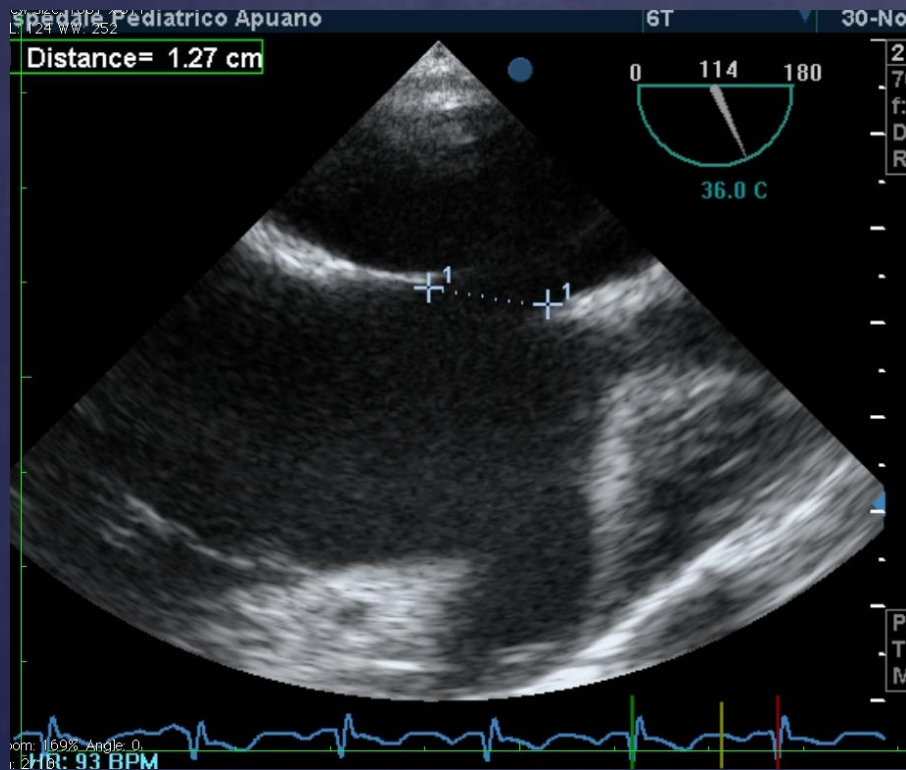
ASD occlusion



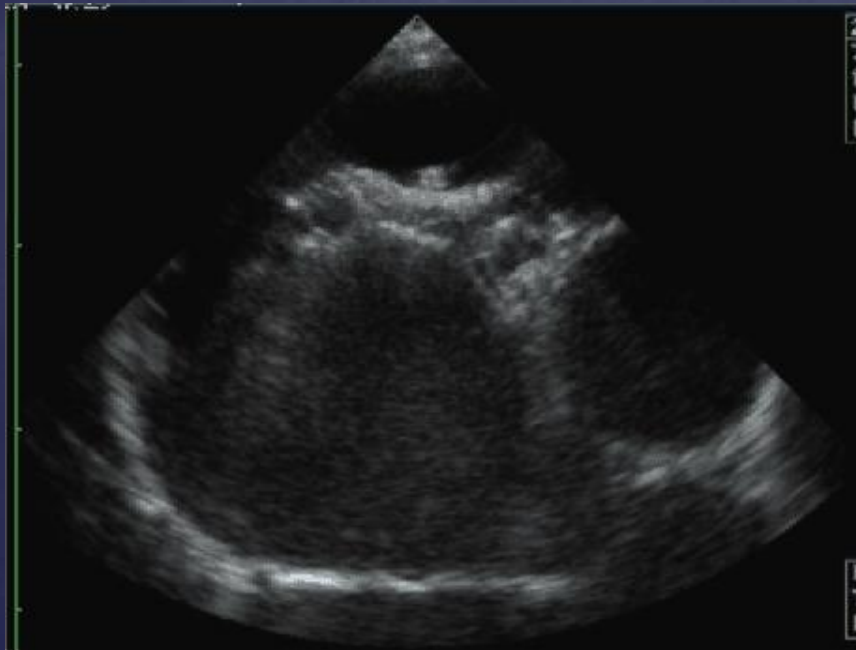
ASD occlusion



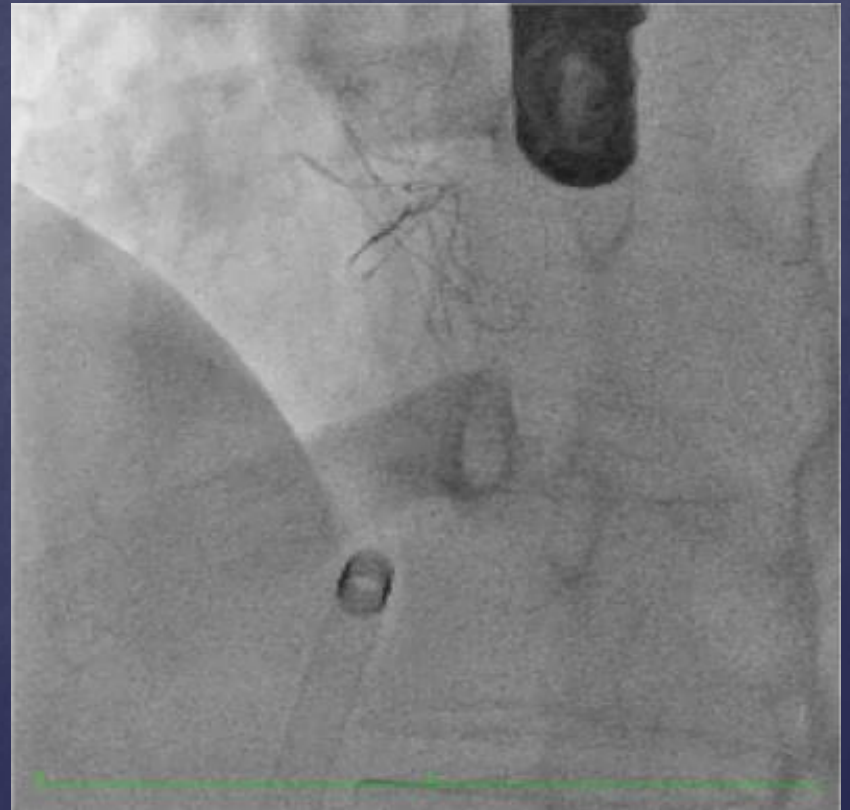
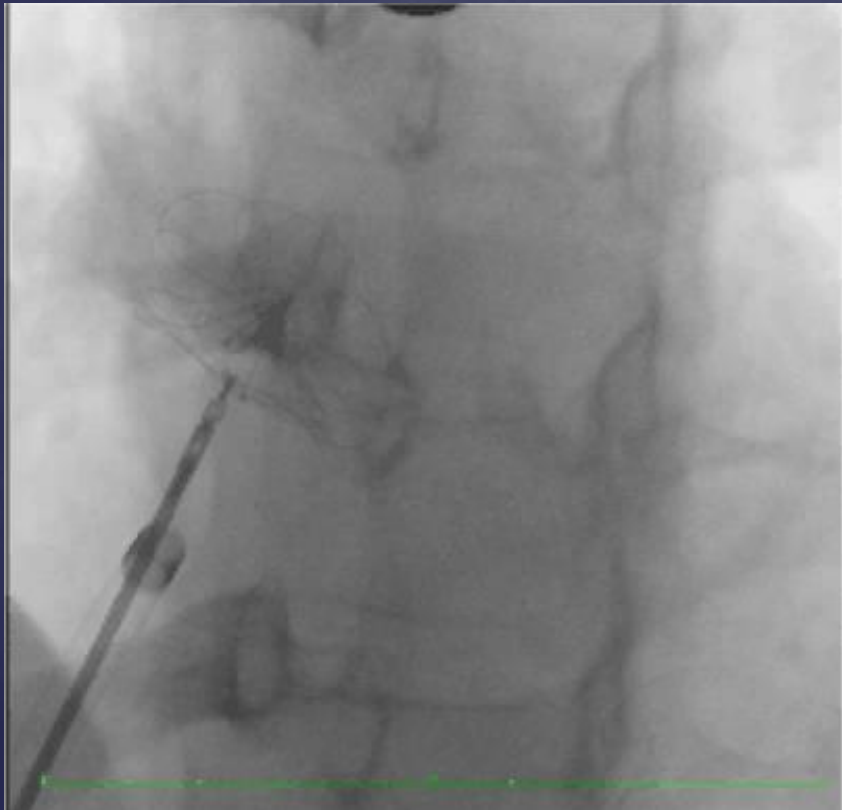
ASD occlusion



ASD occlusion



ASD occlusion



✓ Major complications 2%

- Perforation
- Thrombosis
- Arrhythmias
- Malpositioning/Embolization
- Erosion
- Infective endocarditis

✓ Minor complications 5%

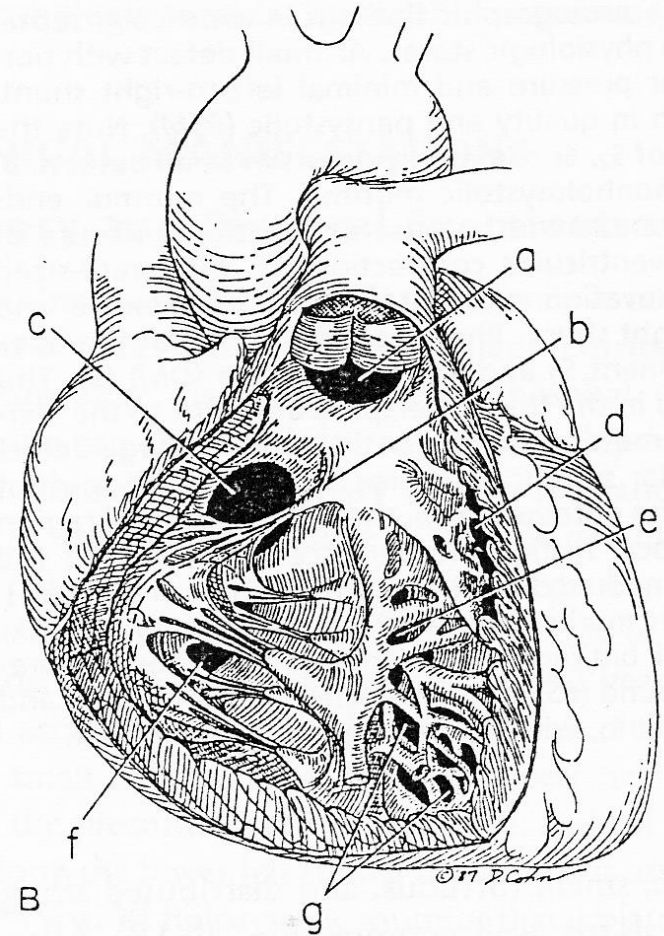
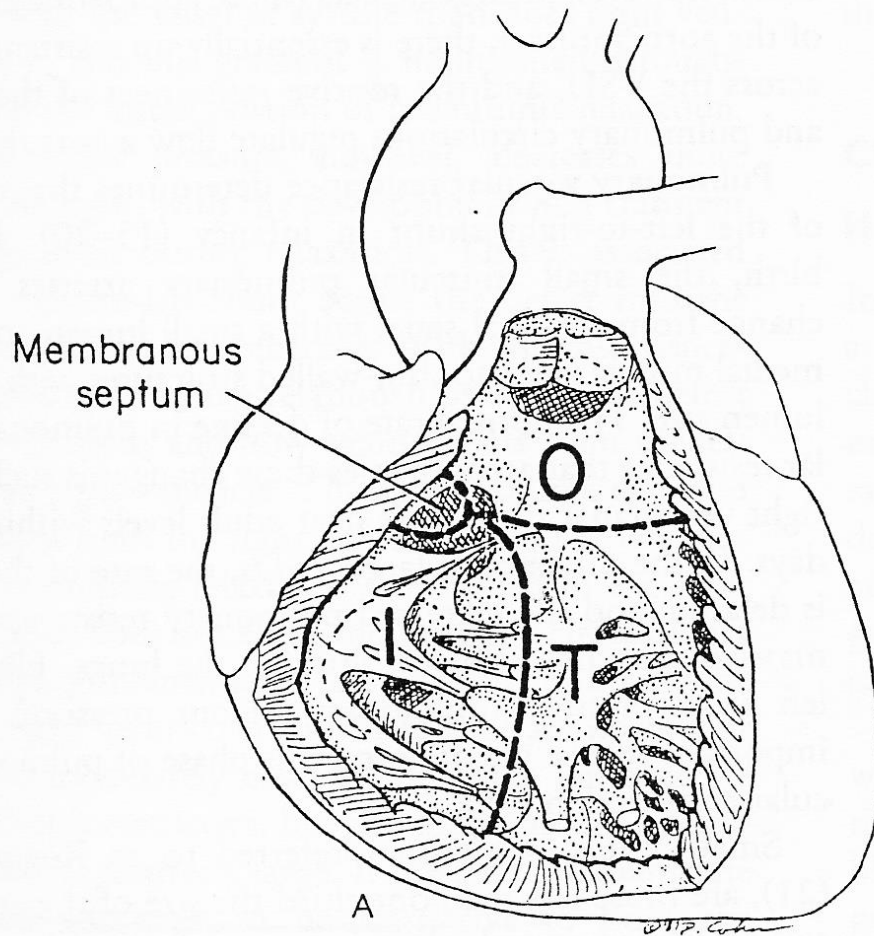
ASD occlusion

- ✓ Success rate 80-96%
- ✓ Late occlusion rate 98-100%

Difetti settali ventricolari

- ✓ 20% dei pazienti con cardiopatia congenita
- ✓ 5-50 per mille neonati
- ✓ Alta incidenza di chiusura spontanea

Difetti settali ventricolari



Difetti settali ventricolari

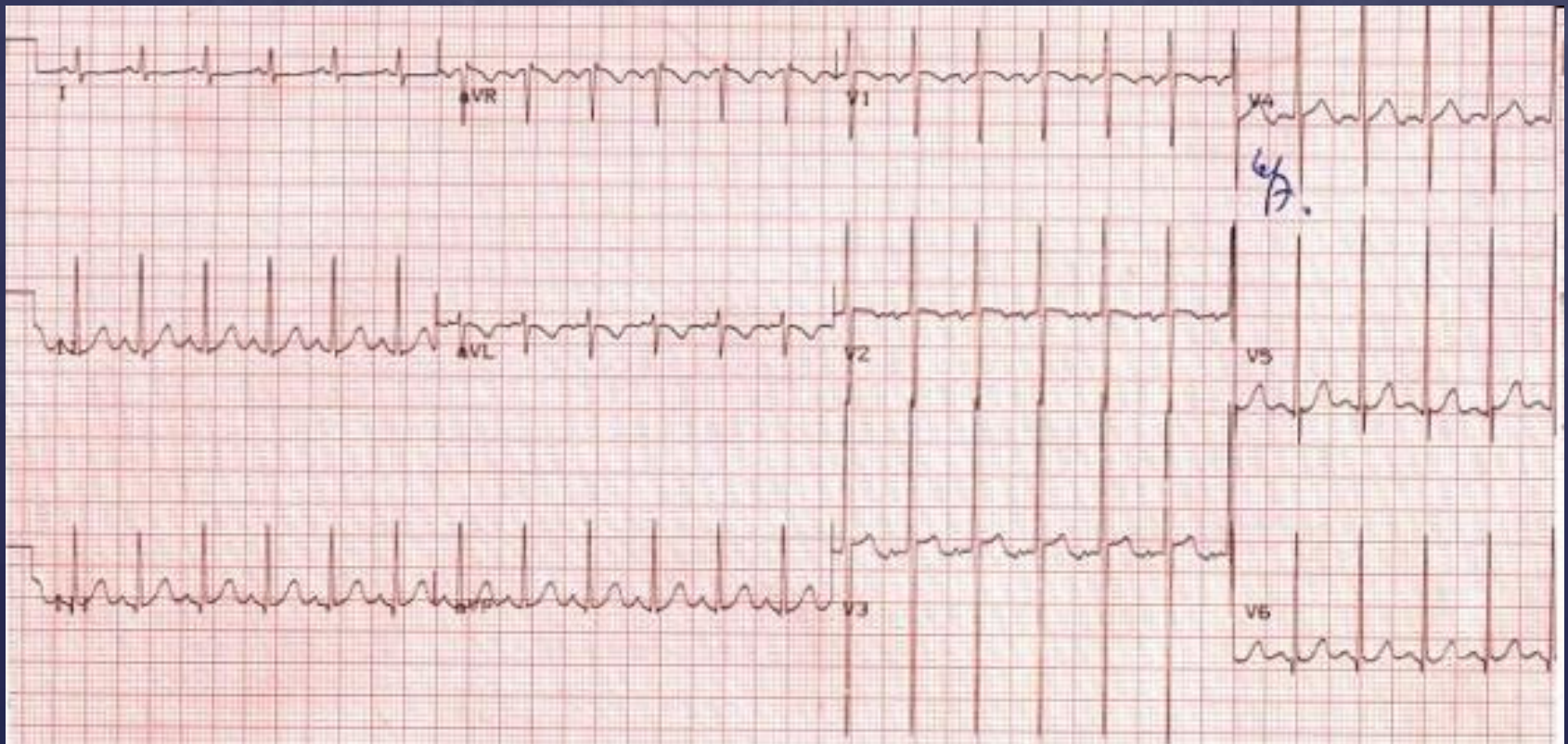
- ✓ Fisiopatologia e quadro clinico:
- ✓ Iperafflusso polmonare
- ✓ Sovraccarico atriale e ventricolare sinistro
- ✓ Ipertensione polmonare
- ✓ Soffio sistolico

Difetti settali ventricolari



Difetti settali ventricolari

✓ ECG



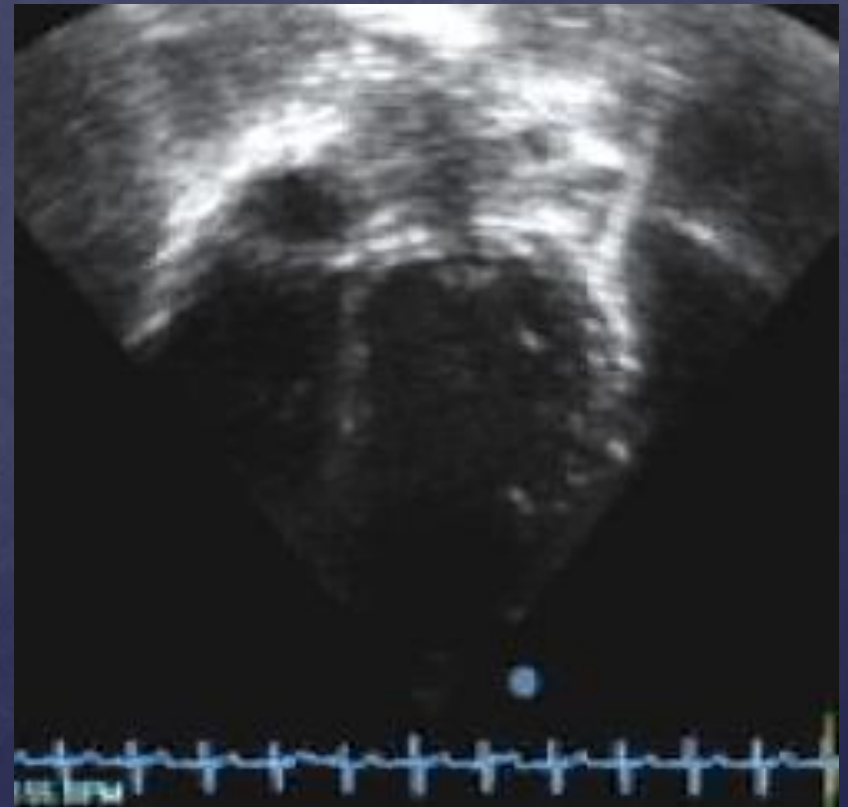
Difetti settali ventricolari

✓ RxTorace



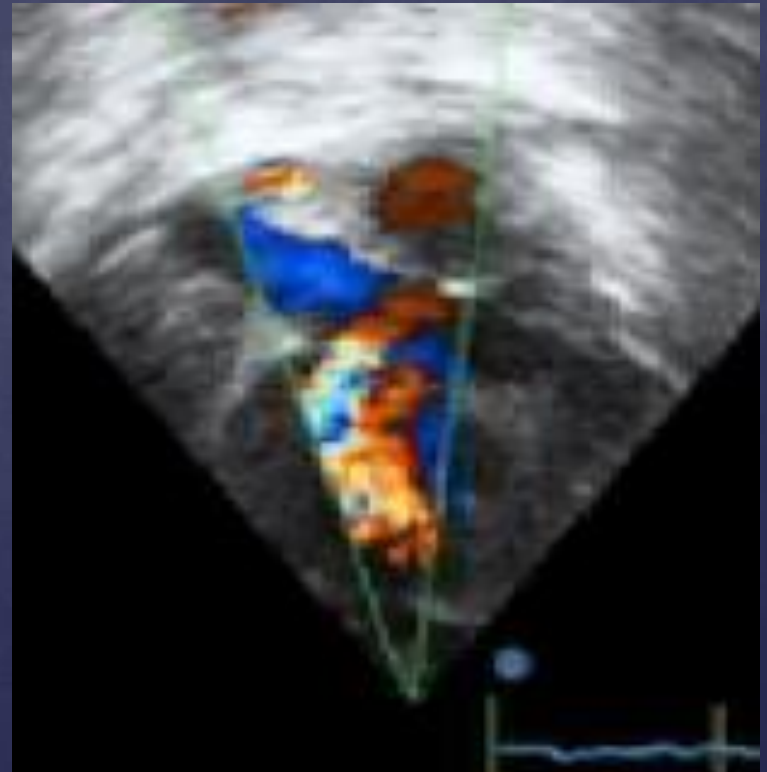
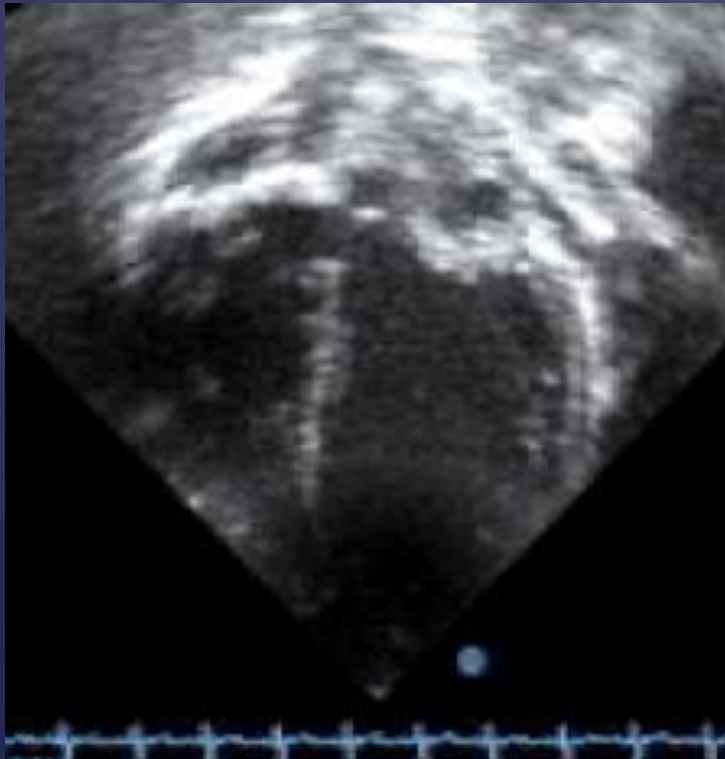
Difetti settali ventricolari

ECO: dilatazione sezioni sinistre



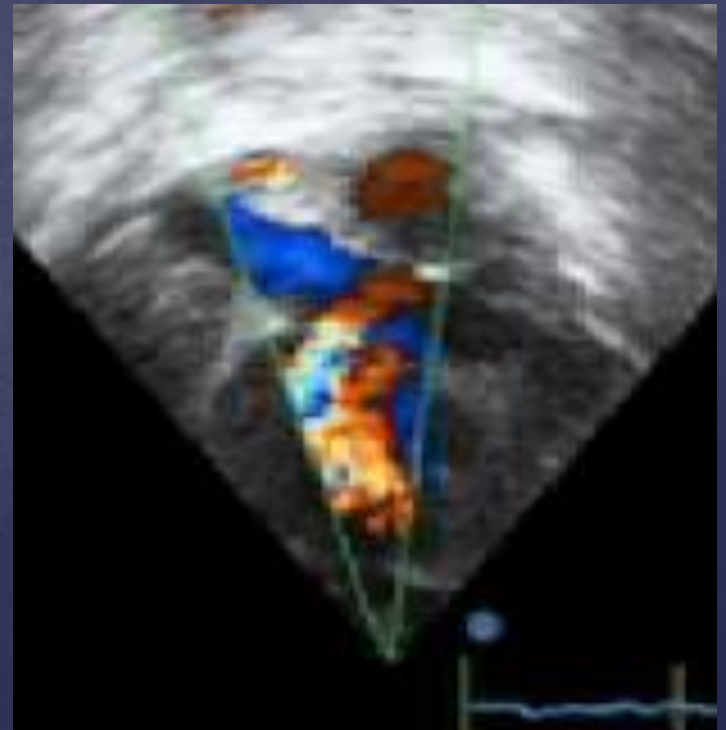
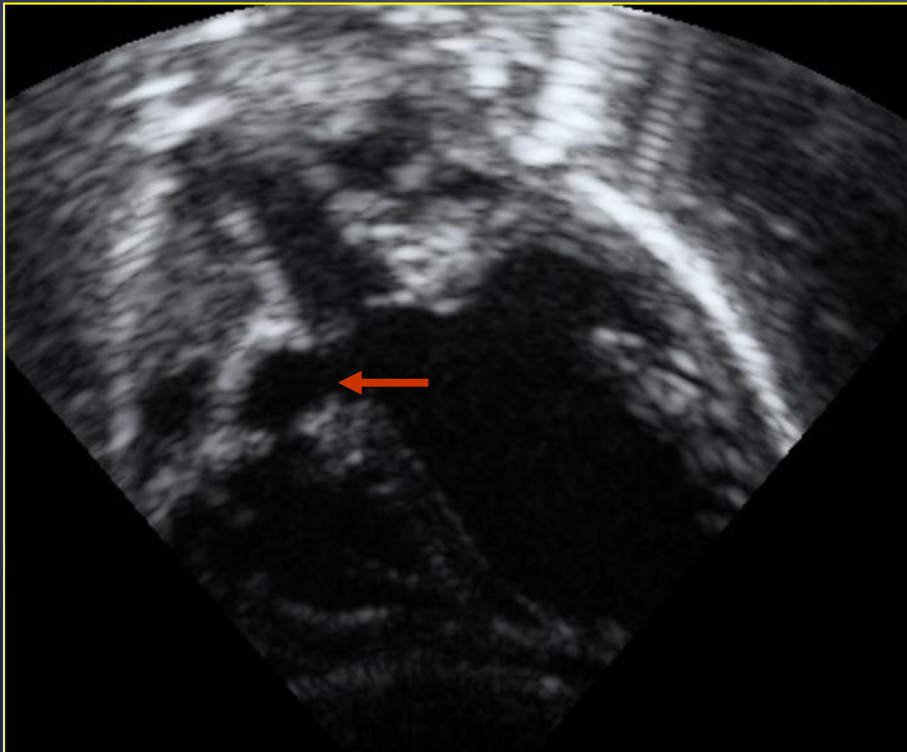
Difetti settali ventricolari

ECO: DIV PM



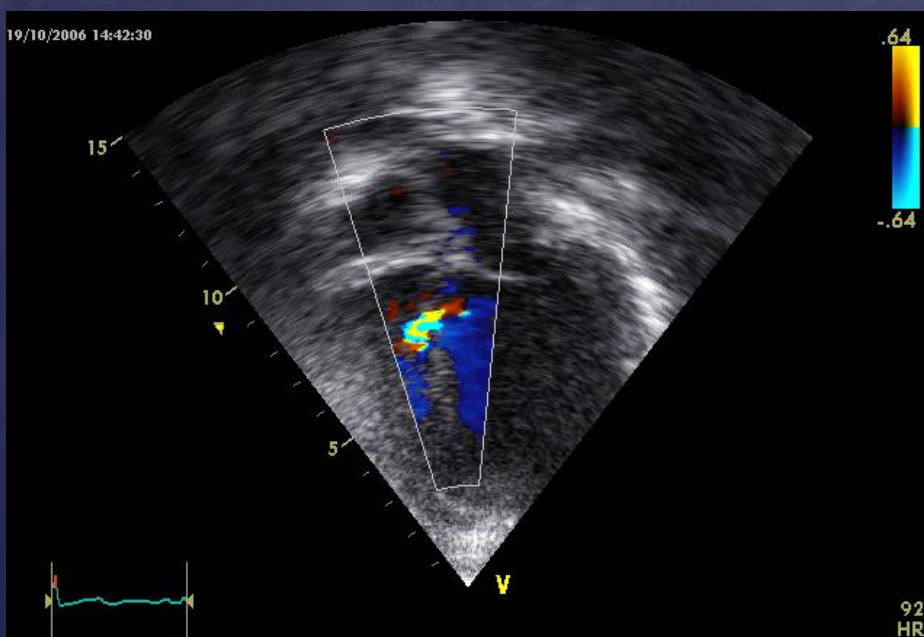
Difetti settali ventricolari

ECO: DIV PM



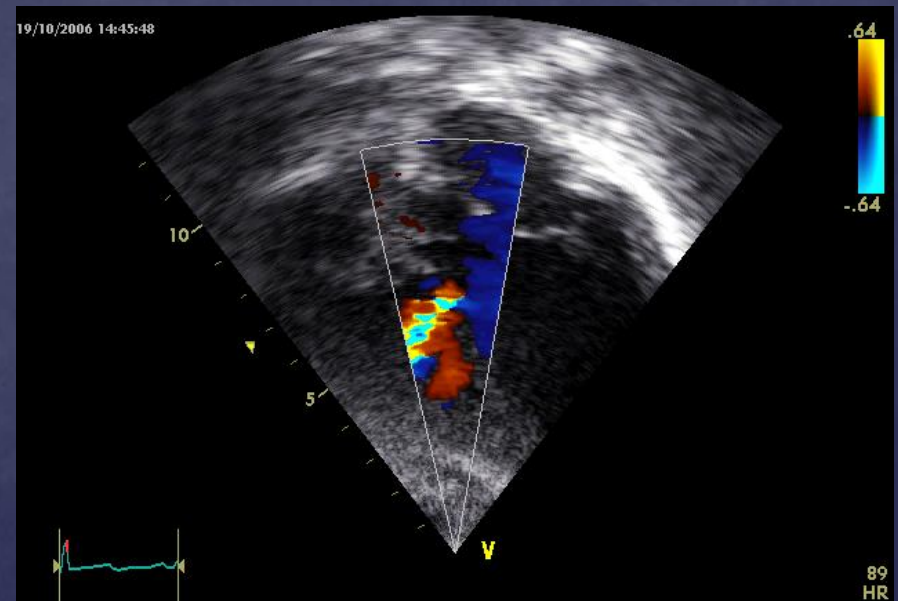
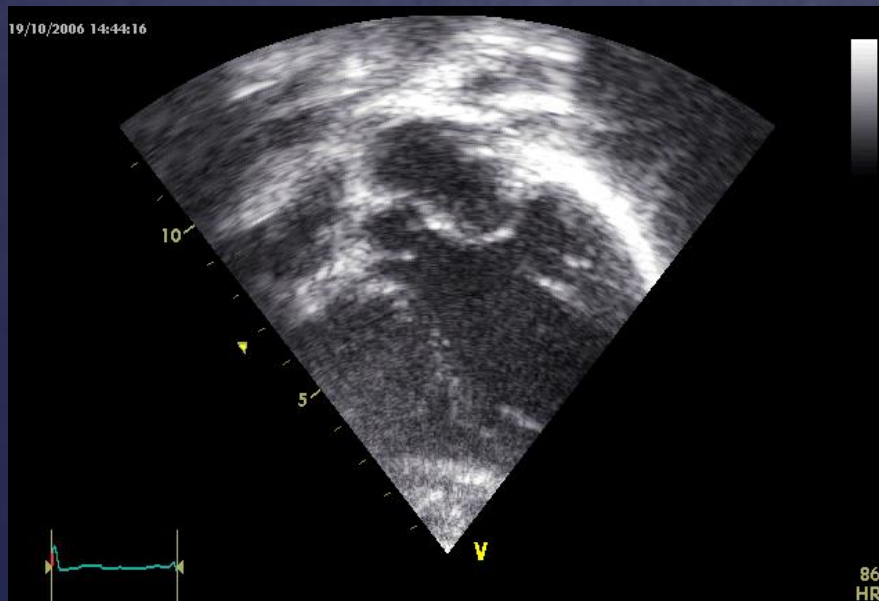
Difetti settali ventricolari

ECO DIV muscolare



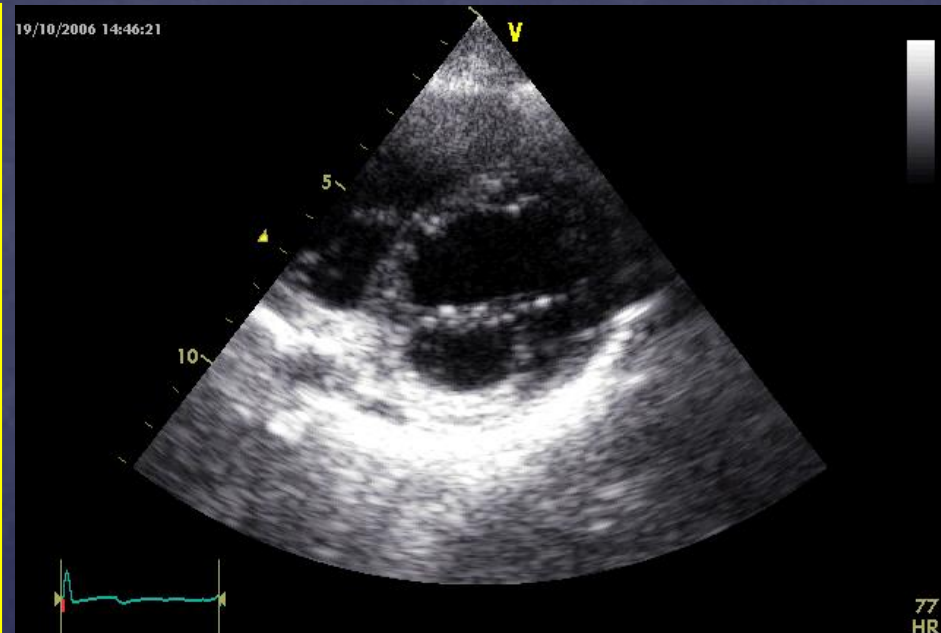
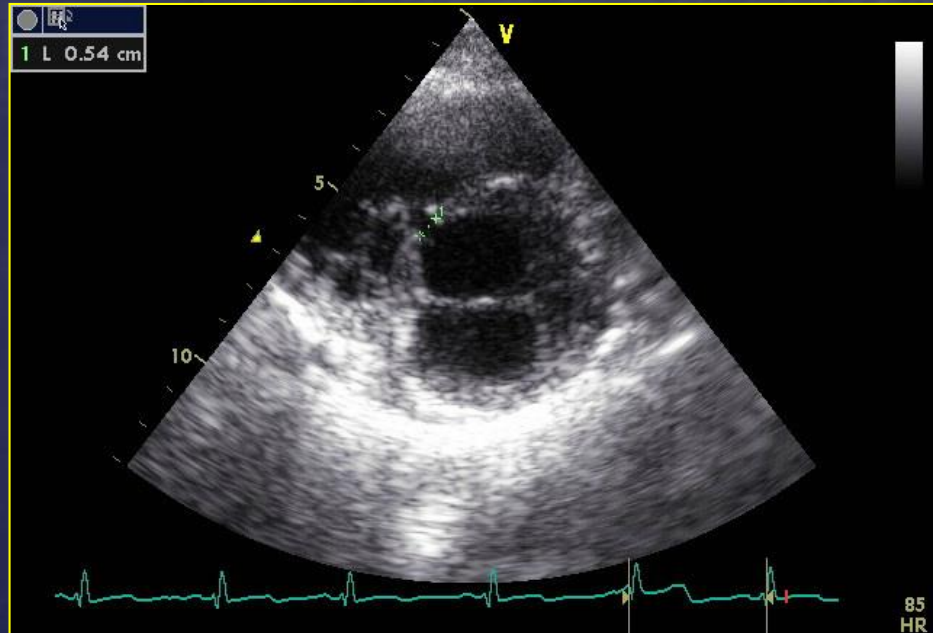
Difetti settali ventricolari

ECO DIV muscolare



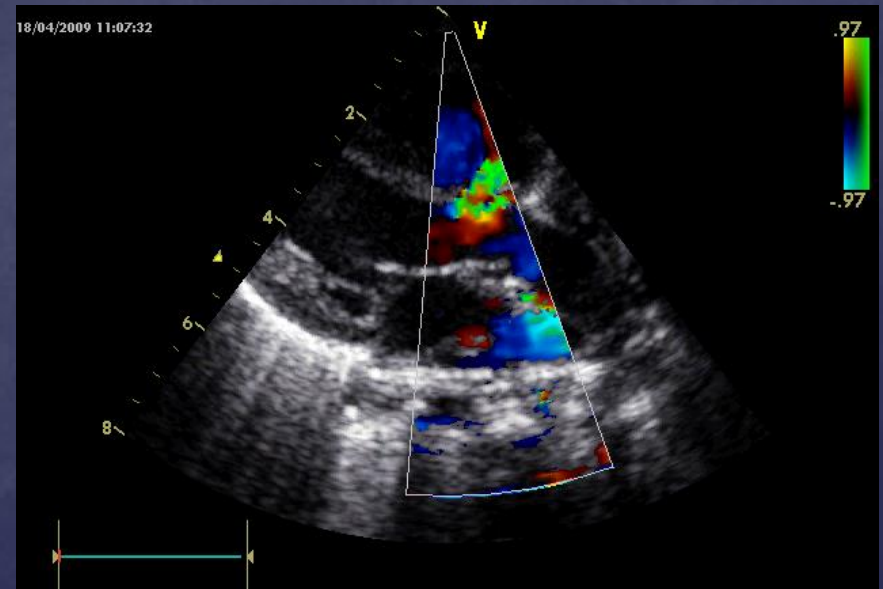
Difetti settali ventricolari

ECO DIV muscolare



Difetti settali ventricolari

ECO DIV infundibulare

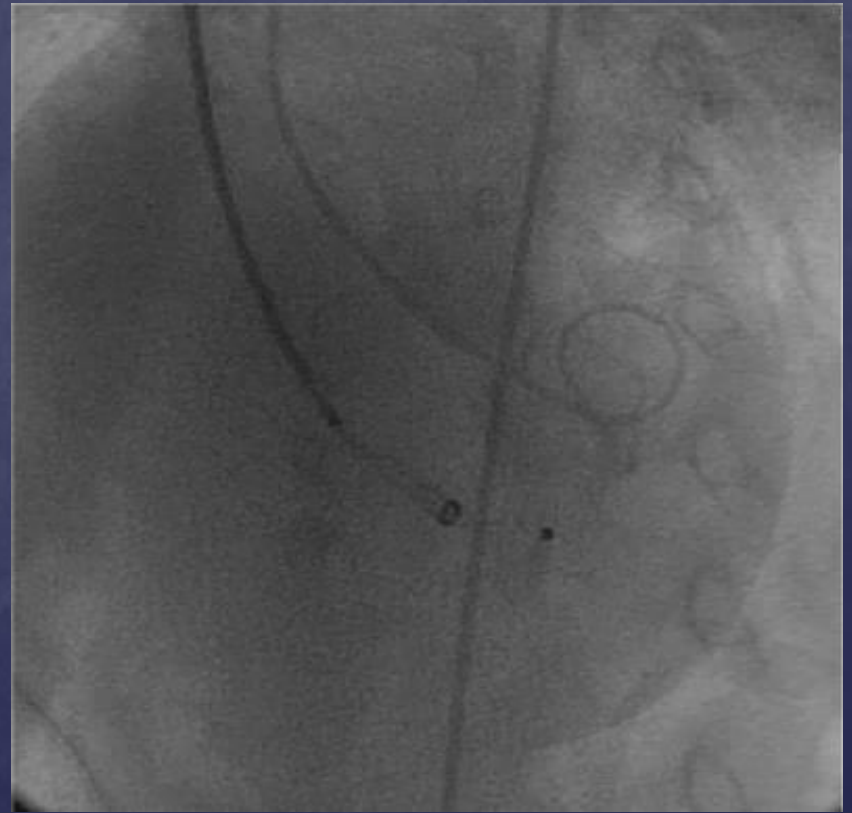


Trattamento interventistico del difetto settale ventricolare

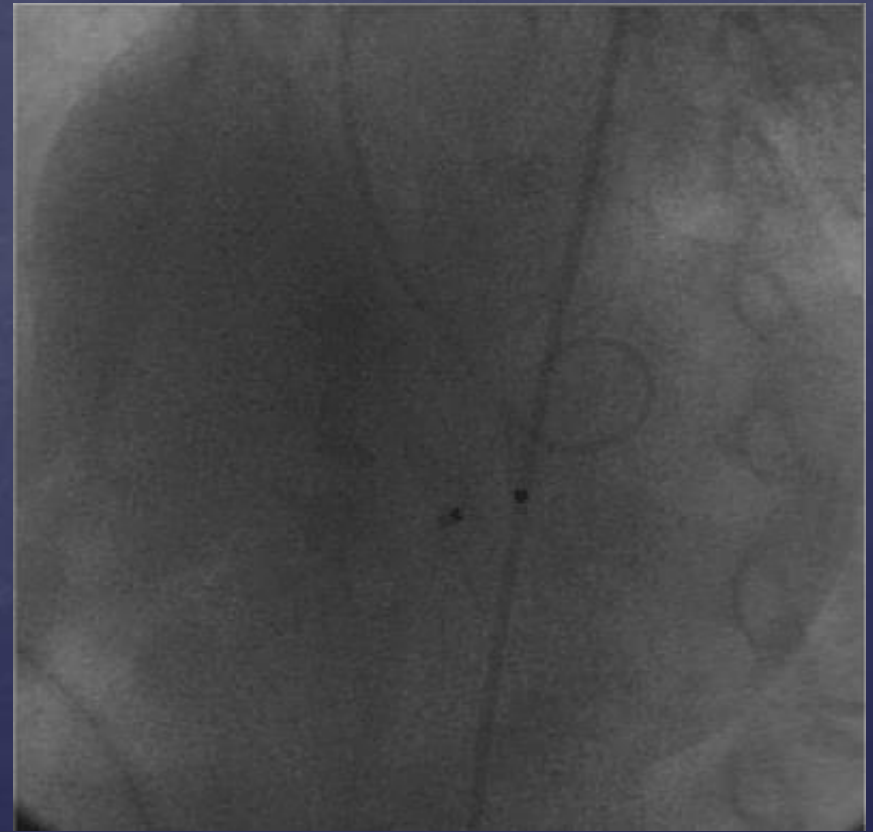
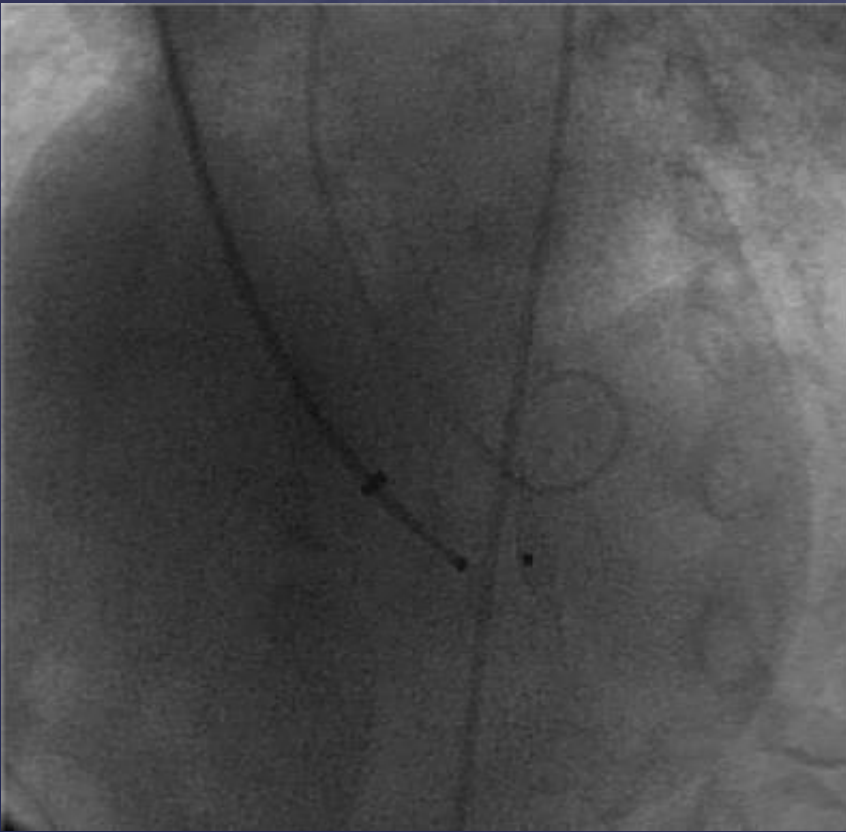
VSD occlusion

- ✓ VSD with significant shunt
- ✓ Reversible pulmonary hypertension

VSD occlusion



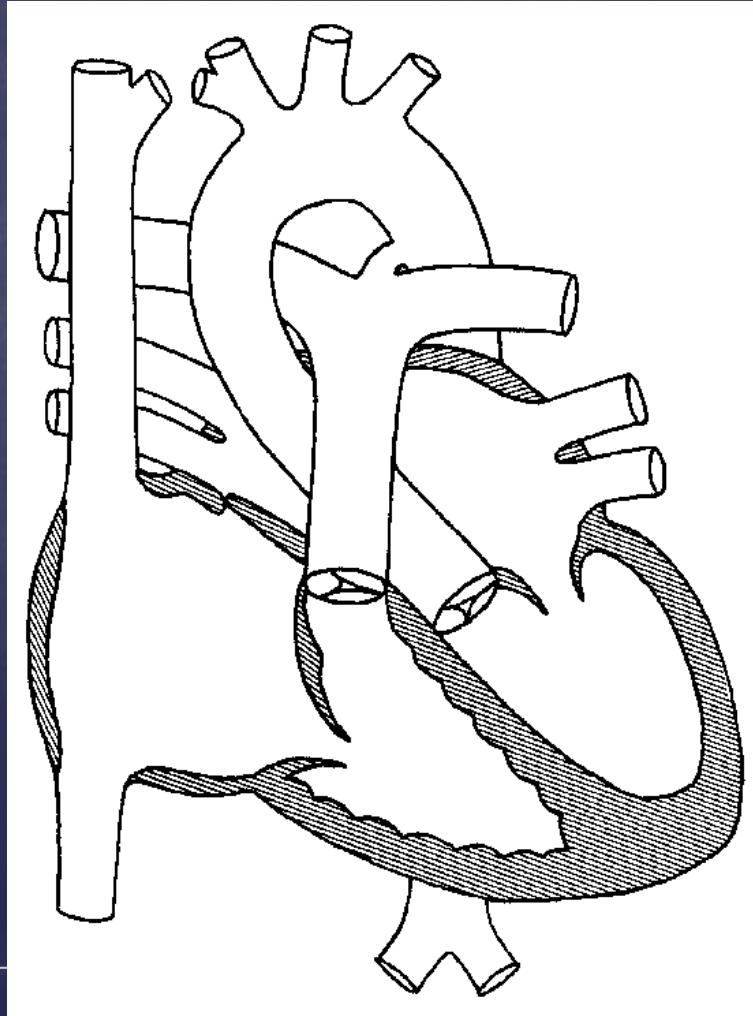
VSD occlusion



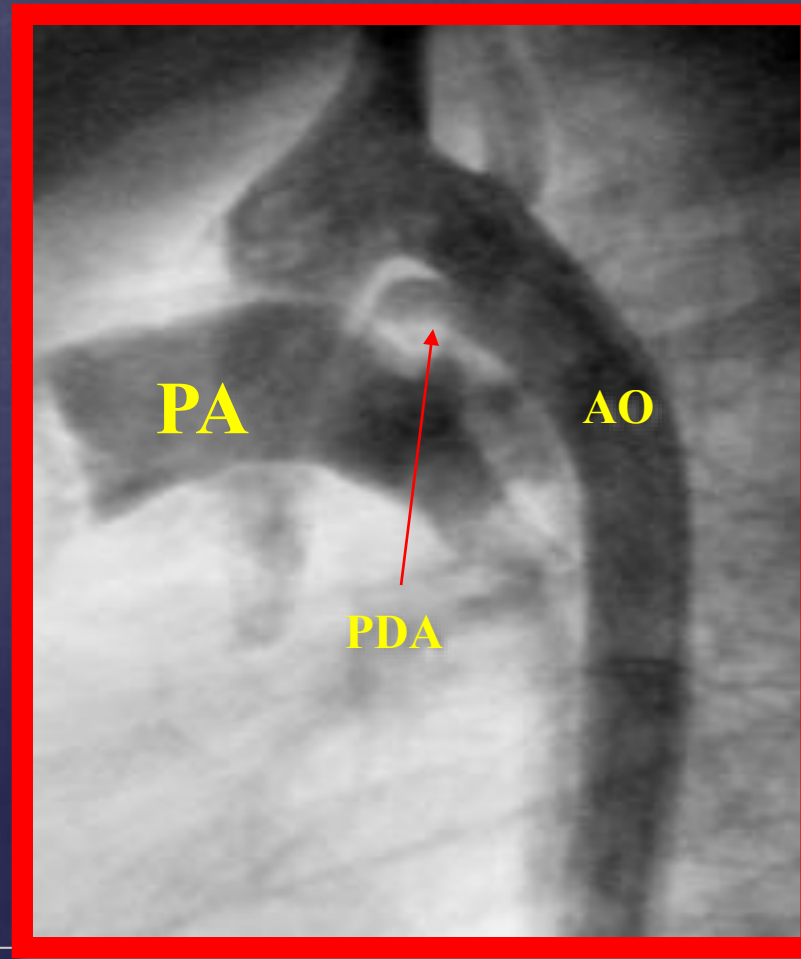
- Success: 86-100%
- Mortality: 0.2 %
- Major complications 6.7%
 - BAV 2,6% *for PM VSD*
 - Malposition, embolization, erosion, infective endocarditis
- Minor complications 5%

Transcatheter closure of the patent arterial duct

Closure of the patent arterial duct **PDA**



Closure of the patent arterial duct **PDA**



Closure of the patent arterial duct

Angiographic classification

Toronto angiographic classification

- ✓ A type conic
- ✓ B type short, window like
- ✓ C type tubular
- ✓ D type complex
- ✓ E type elongated

Closure of the patent arterial duct **Variables**

- ✓ **Anatomy**
 - ✓ **Shunt size**
 - ✓ **PA pressure**
-
- ✓ **Age at presentation**
 - ✓ **Clinical presentation**

Closure of the patent arterial duct

Indications for intervention

Indications

- Continuous murmur,
- CTI > normal
- echo LV volume overload
- IE prophylaxis ?? – silent duct ??

Closure of the patent arterial duct

Conditions for intervention

Conditions

- Normal/moderately elevated PA pressure
- Body weight > 5 kg (ADO II???)
- Ductal anatomy (mostly type A ??)
- Narrowest diameter < 2,5 – 3 mm (coil)
- Narrowest diameter > 2,5 – 3 mm (ADO I / II)

Closure of the patent arterial duct **Technique**

- ✓ General / local anaesthesia
- ✓ Intracardiac pressures
- ✓ Oxymetry ?
- ✓ Aortic arch angiography, angulation
- ✓ Measurements of the duct
- ✓ Device implantation
- ✓ Control angiography

Technique – PDA Measurements

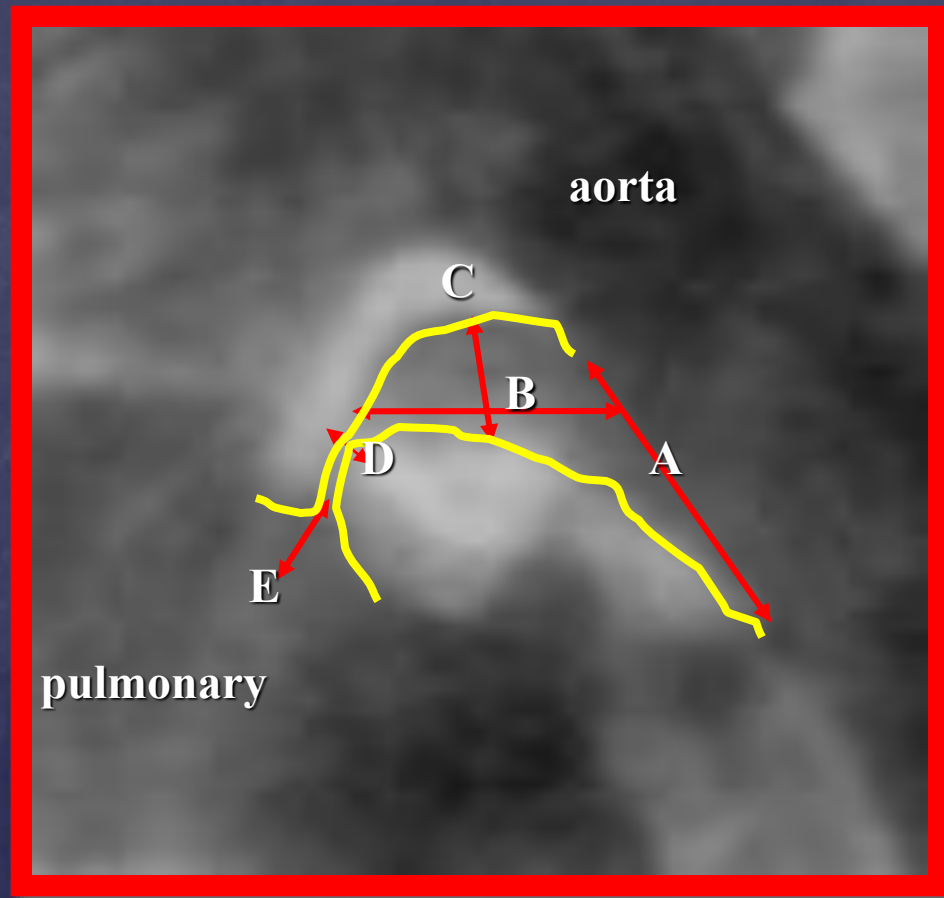
A: ao.amp.d.

B: ao.amp.length

C: ao.amp.mid.d.

D: narrowest d.

E: pulm.amp.d.



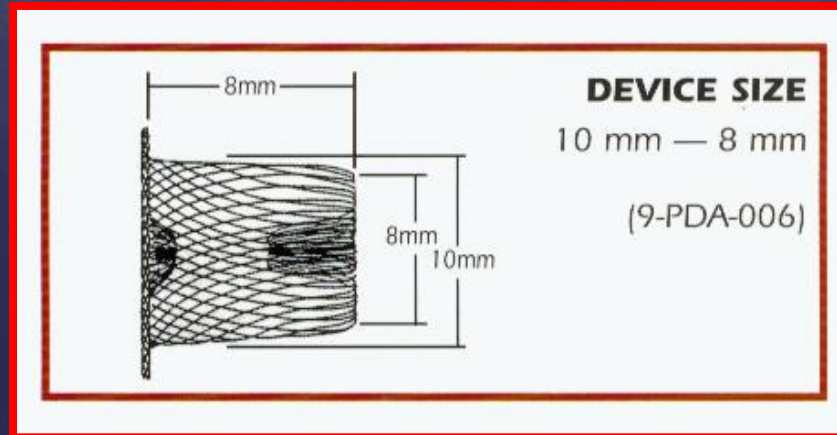
Closure of the patent arterial duct **Amplatzer ductal occluder**



Closure of the patent arterial duct

Devices and delivery systems

- ✓ Introducer: 5-8 F (Amplatzer)
- ✓ Device: 6/4, 8/6, 10/8, 12/10, 14/12
- ✓ Retention disk diameter + 4 mm



Dotto di Botallo pervio

Ecocardiografia transtoracica

