TURIN, 20TH—21ST NOVEMBER 2008

GREAT INNOVATIONS IN CARDIOLOGY

4TH JOINT MEETING WITH MAYO CLINIC

4TH TURIN CARDIOVASCALAR NURSING CONVENTION

SESSION V:

NEW APPROACH TO CARDIOVASCULAR DISEASES

M. Carminati (San Donato Milanese—MI)

Interventional treatment in adults with congenital heart disease

CONGENITAL HEART DEFECTS IN ADULTS

THE ROLE OF CATHETER INTERVENTIONS

Mario Carminati
Policlinico San Donato IRCCS

CONGENITAL HEART DEFECTS IN ADULTS

- *CHD in natural history*
- *CHD with post-surgical sequelae*

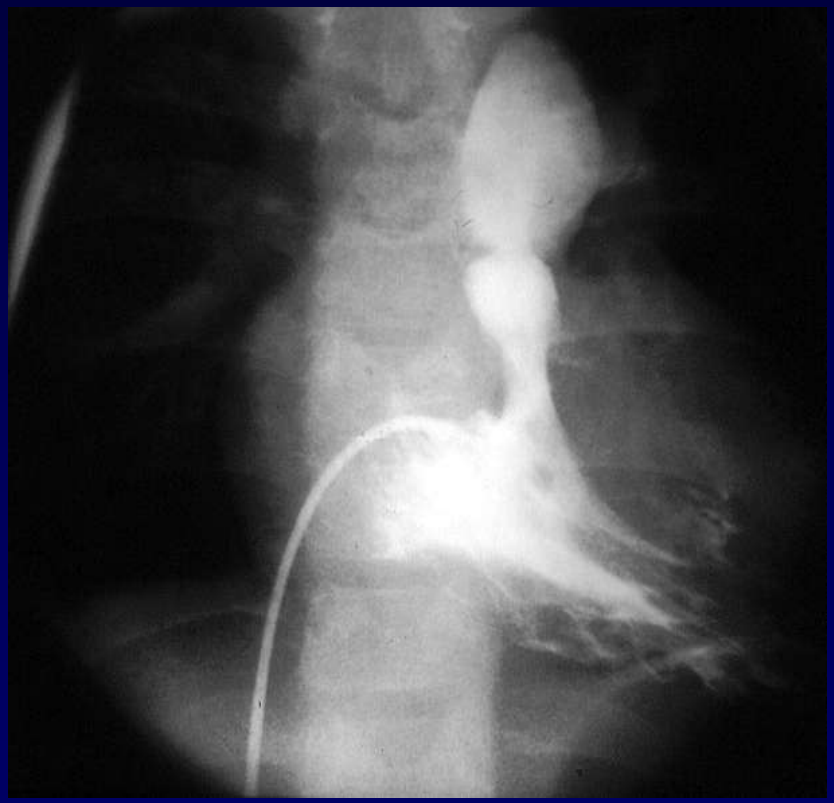
PULMONARY VALVE STENOSIS

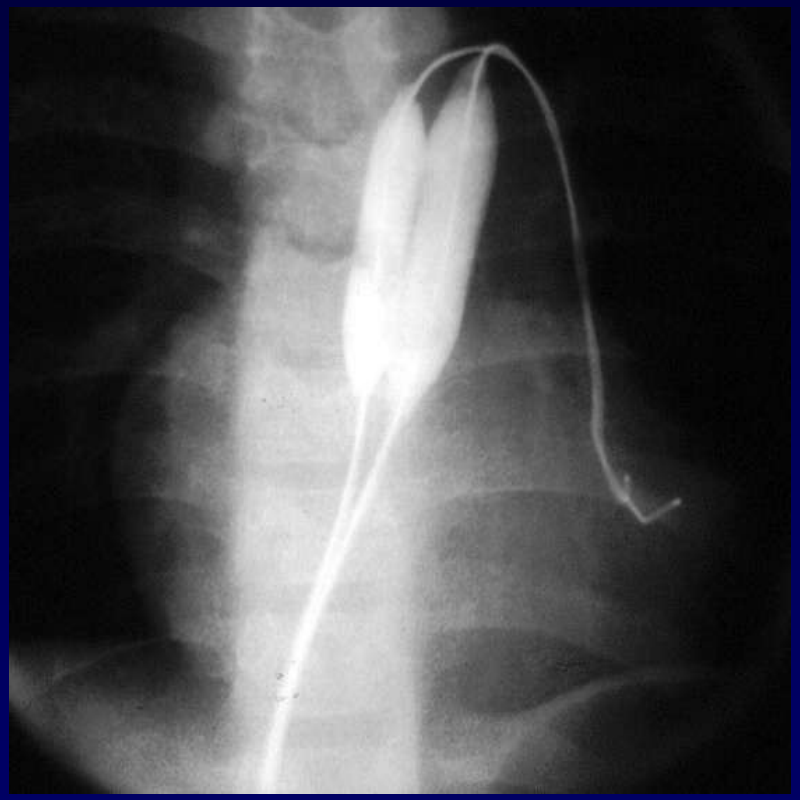
First choice procedure:
Balloon valvuloplasty

- ***Indications and results comparable with pediatric population***

Pulmonary valvuloplasty in adults

"Double balloon technique"





VALVULAR AORTIC STENOSIS

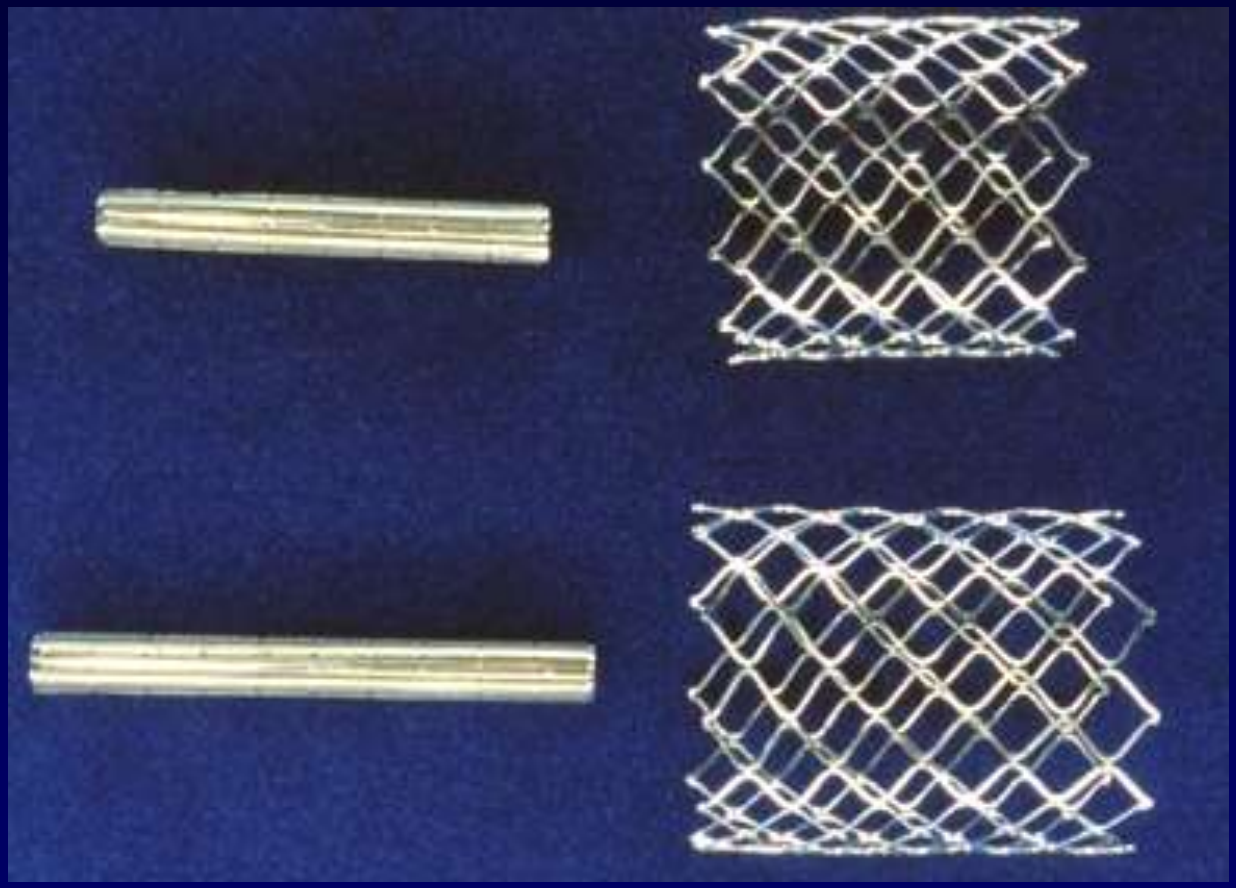
Balloon valvuloplasty

- ***Rare indications in adolescents and adults***

PULMONARY BRANCHES STENOSIS
(usually post-surgery)

First choice procedure:
Stent implantation

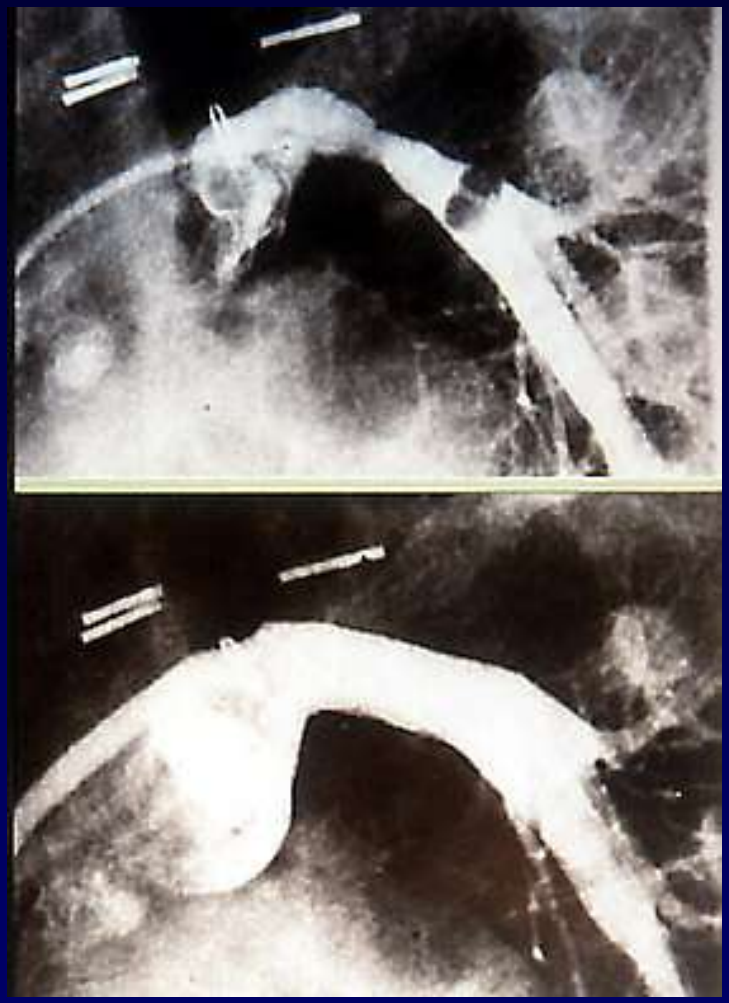
Palmaz stents

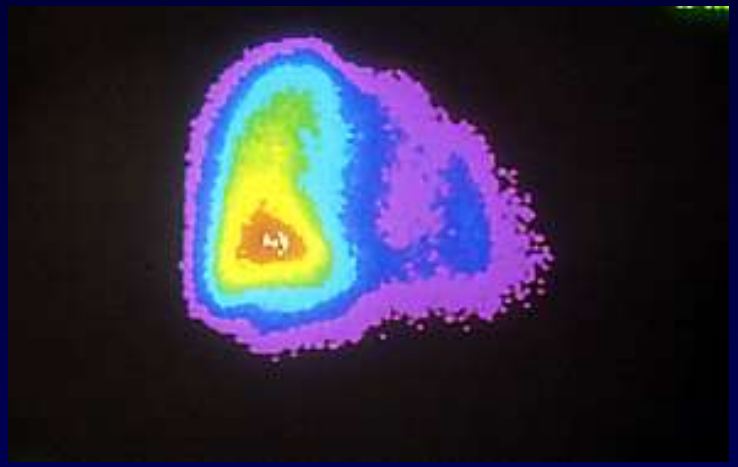


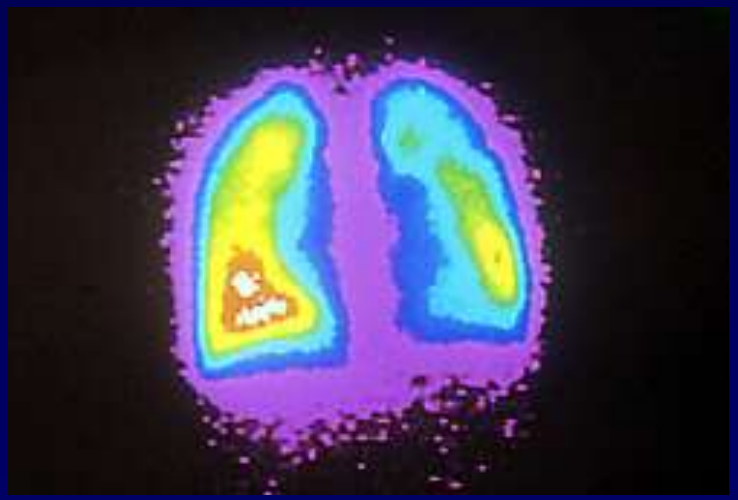
LPA stenosis (post Tetralogy repair)

Pre-

Post-

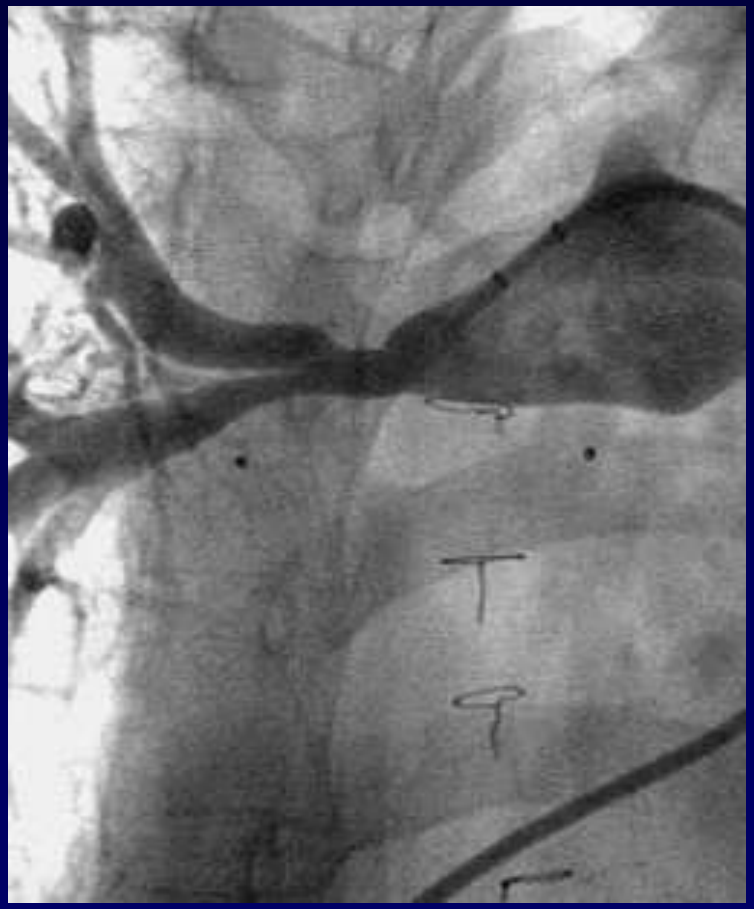






Multiple RPA stenosis

Pre-



Post-

COARCTATION AND RECOARCTATION

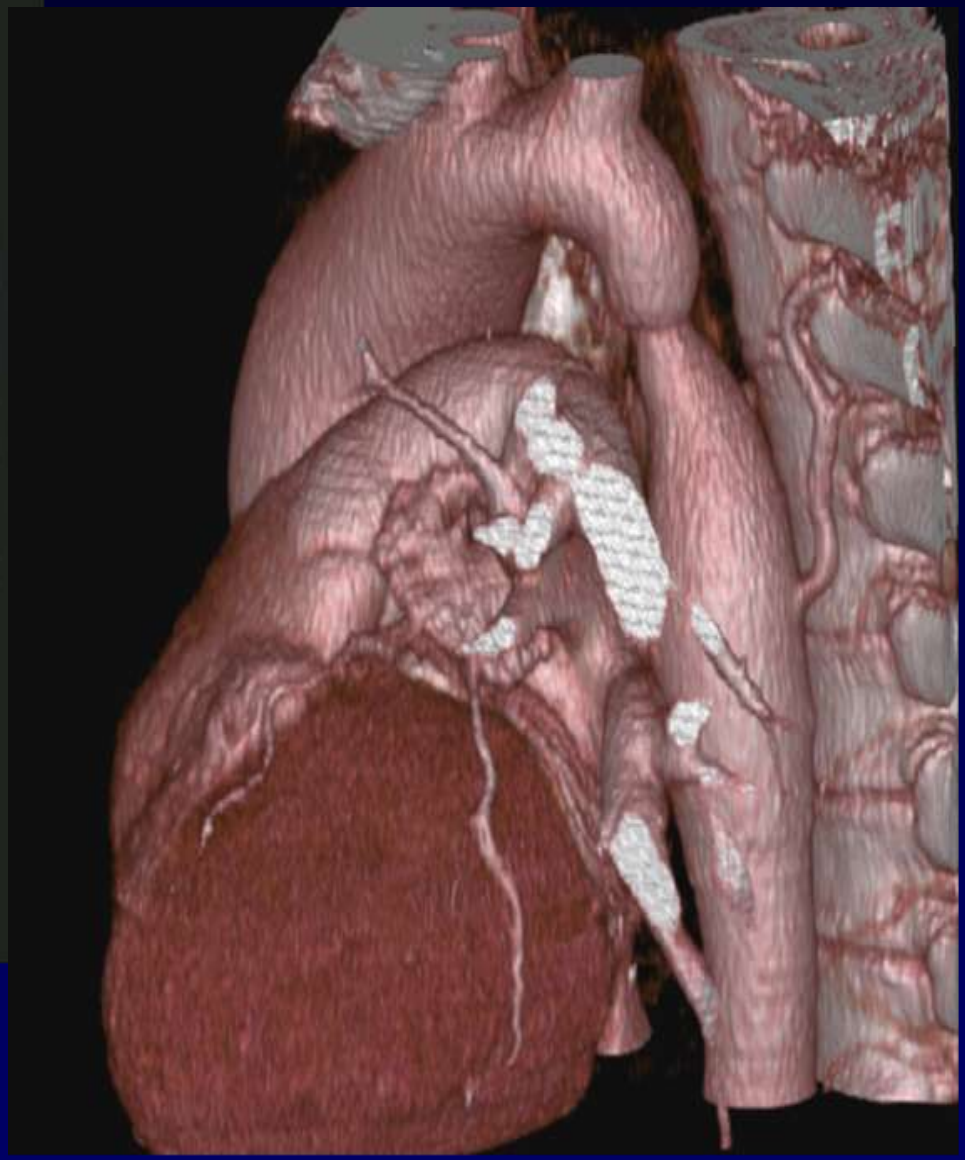
First choice procedure:
Stent implantation

“Large Stents”

Results and mid–long-term follow-up of stent implantation for native and recurrent coarctation of the aorta

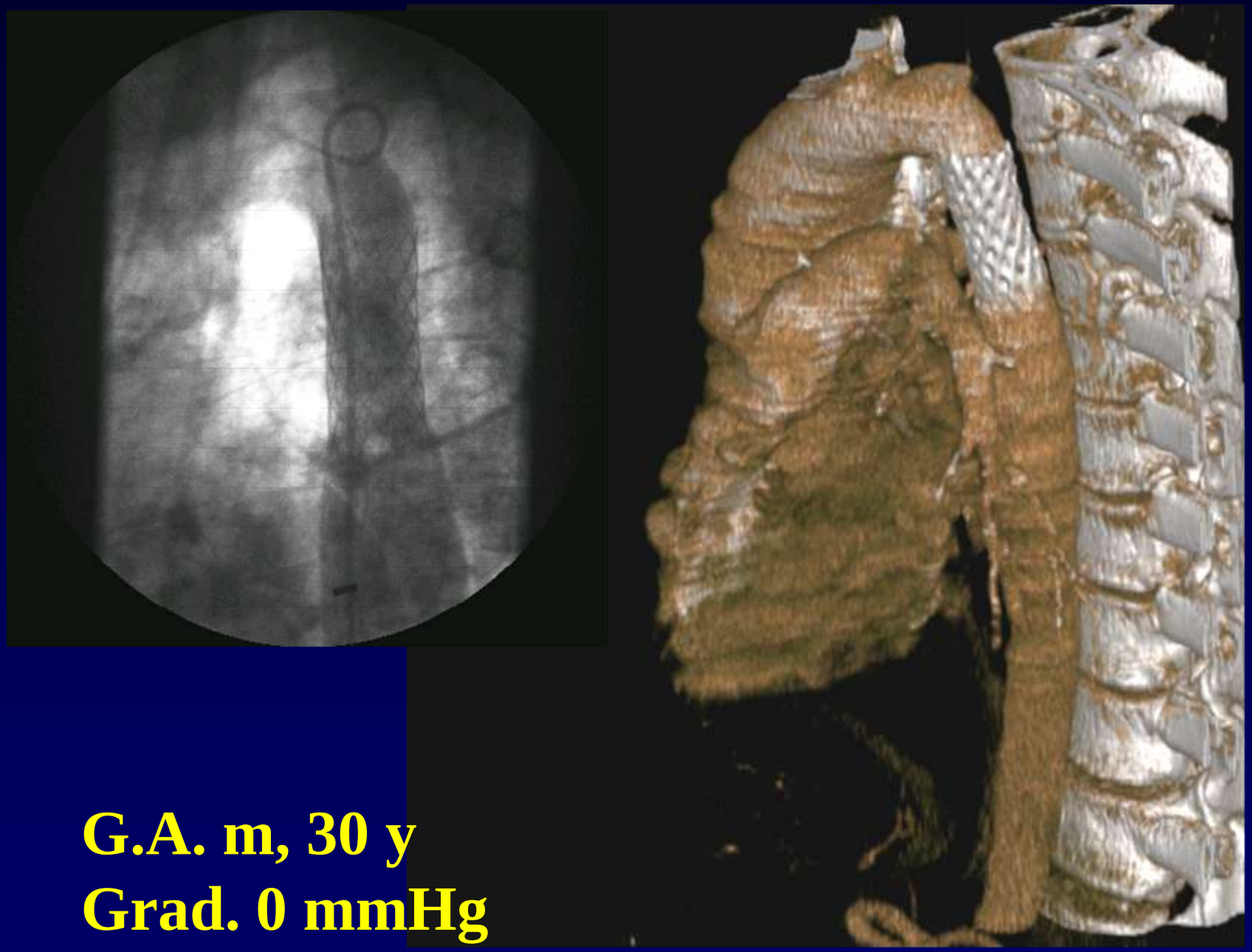
Massimo Chessa[1*], Marianna Carrozza[1], Gianfranco Butera[1], Luciane Piazza[1], Diana Gabriela Negura[1], Claudio Bussadori[2], Edoardo Bossone[3], Alessandro Giamberti[1], and Mario Carminati[1]

Eur Heart J Sept 2005

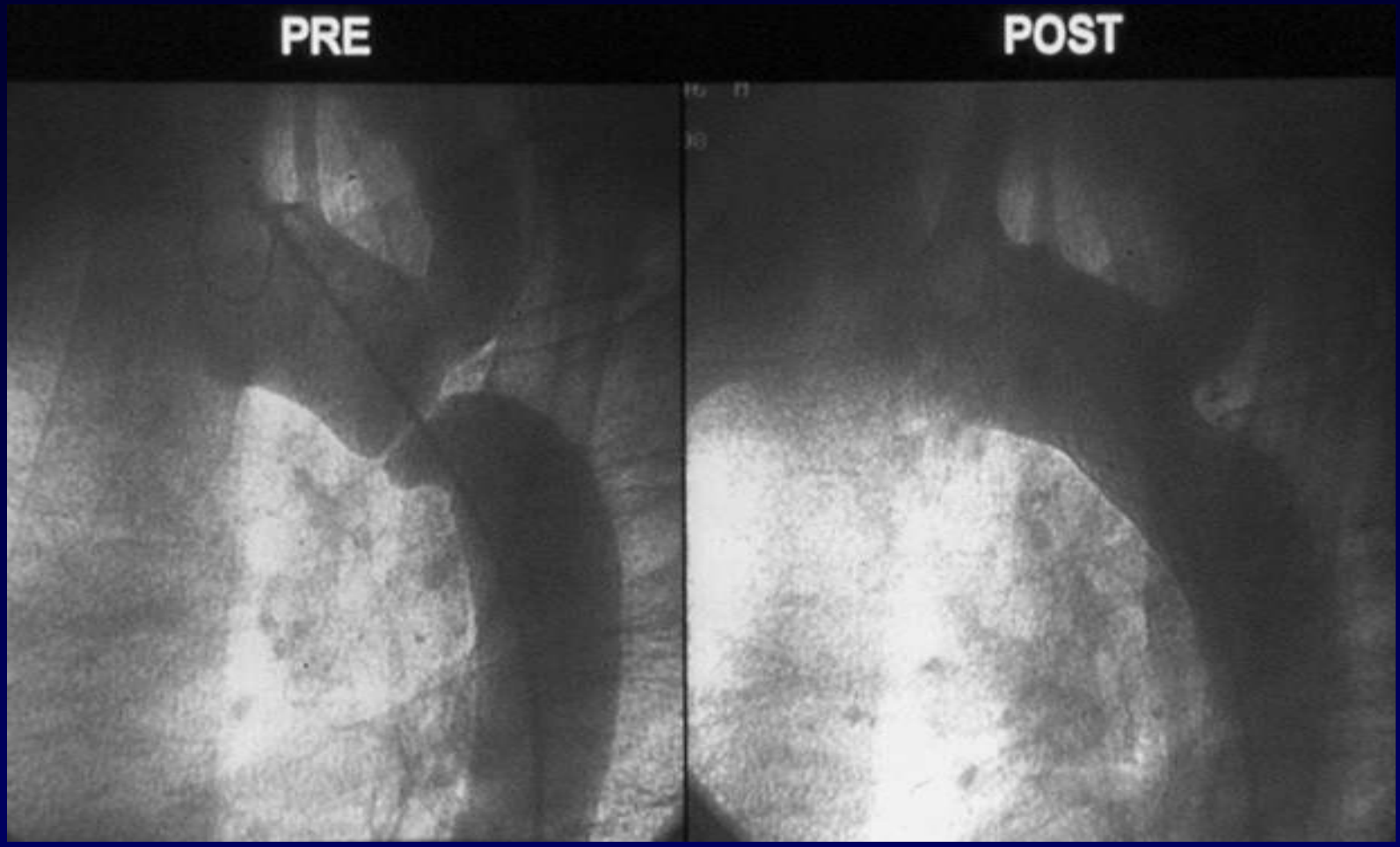


G.A. m, 30 y
Grad. 45 mmHg

Stent implantation

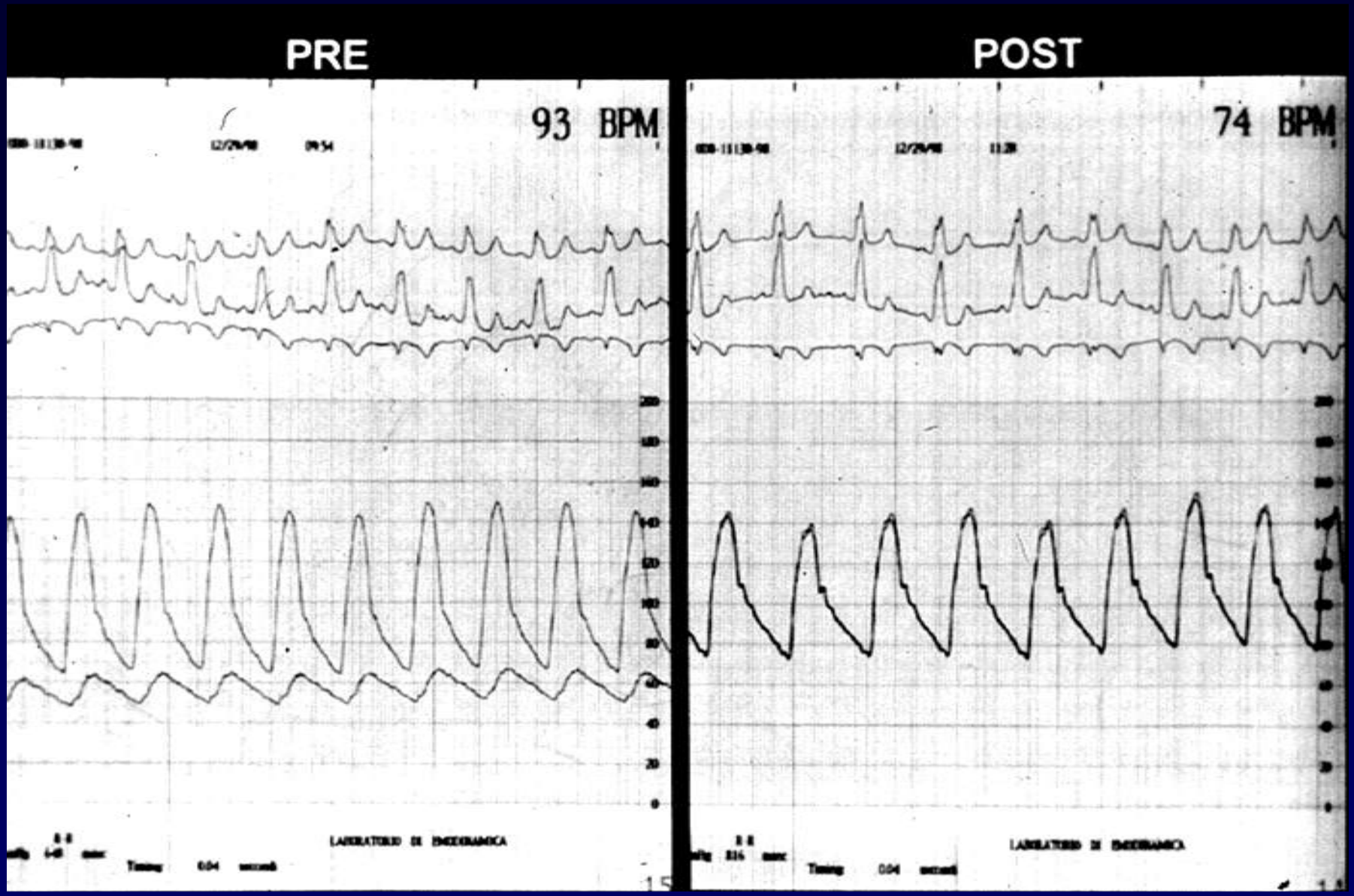


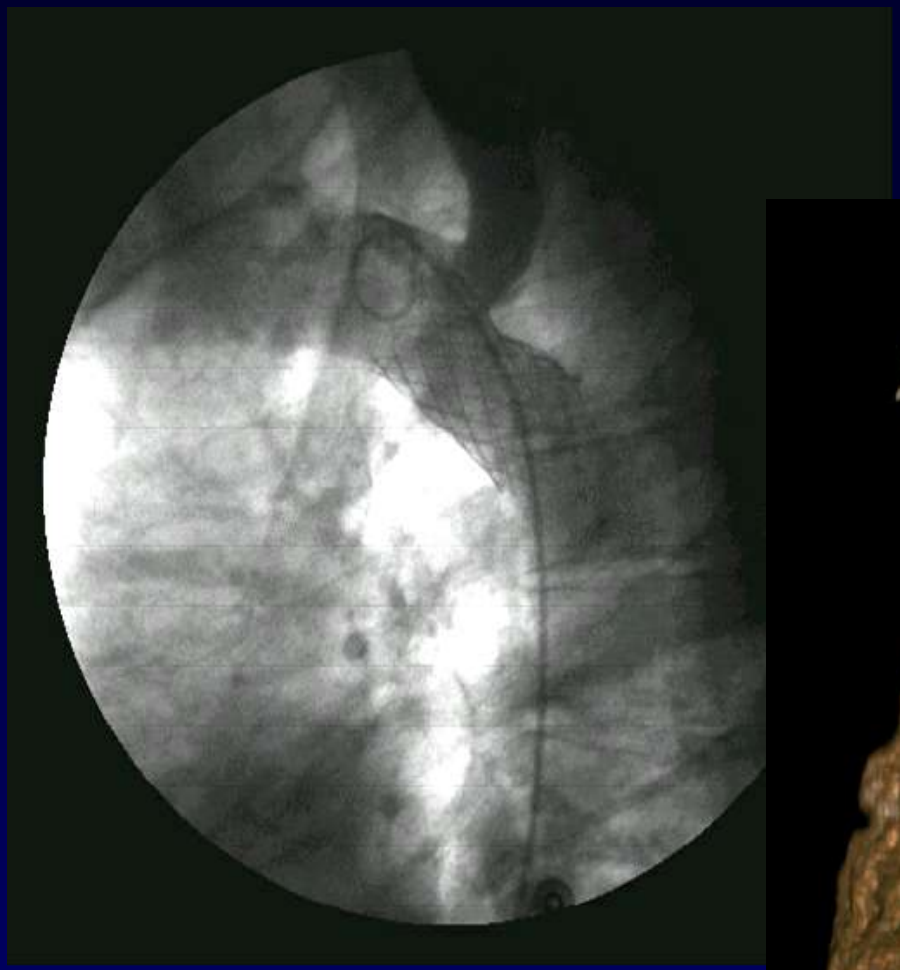
G.A. m, 30 y
Grad. 0 mmHg



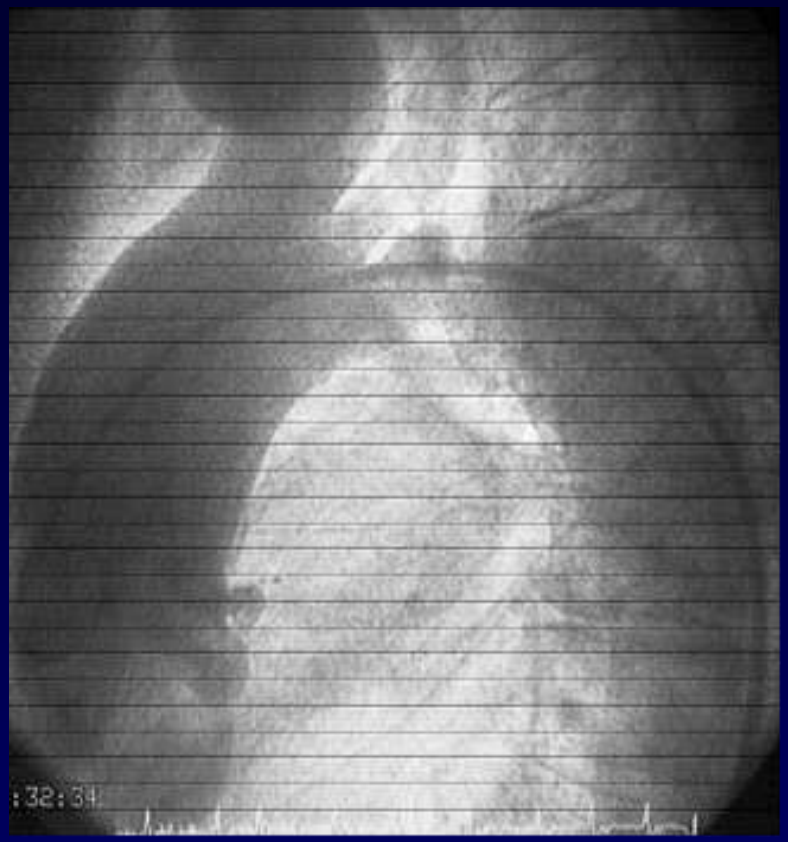
L.M. m 52y
Native Coarctation
Grad. 83 mmHg

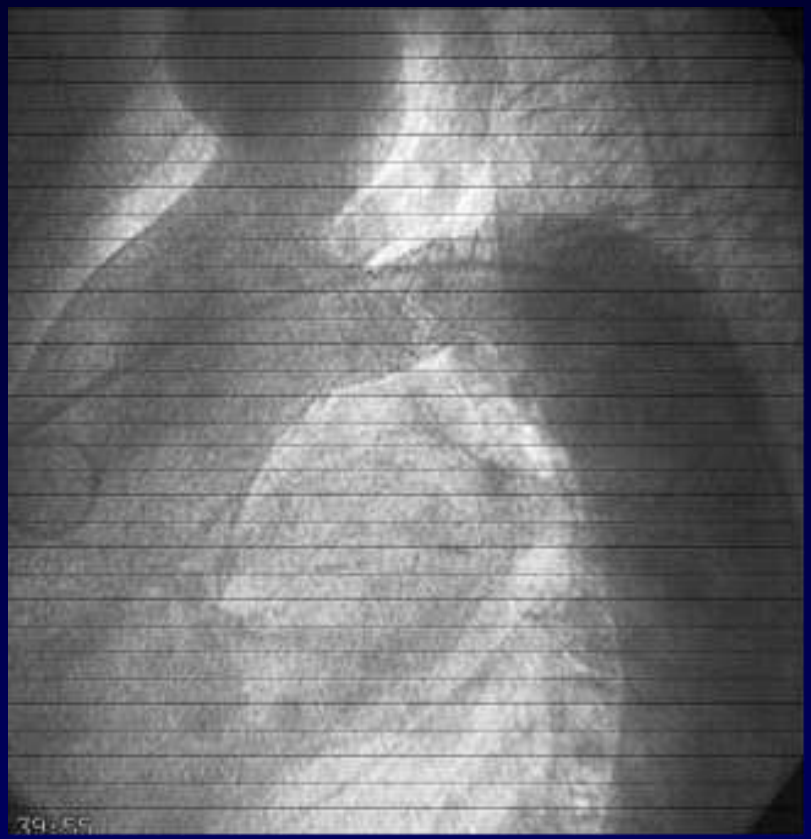
P 4014 - 20 mm.
Grad. 0 mmHg


PRE
93 BPM
POST
74 BPM



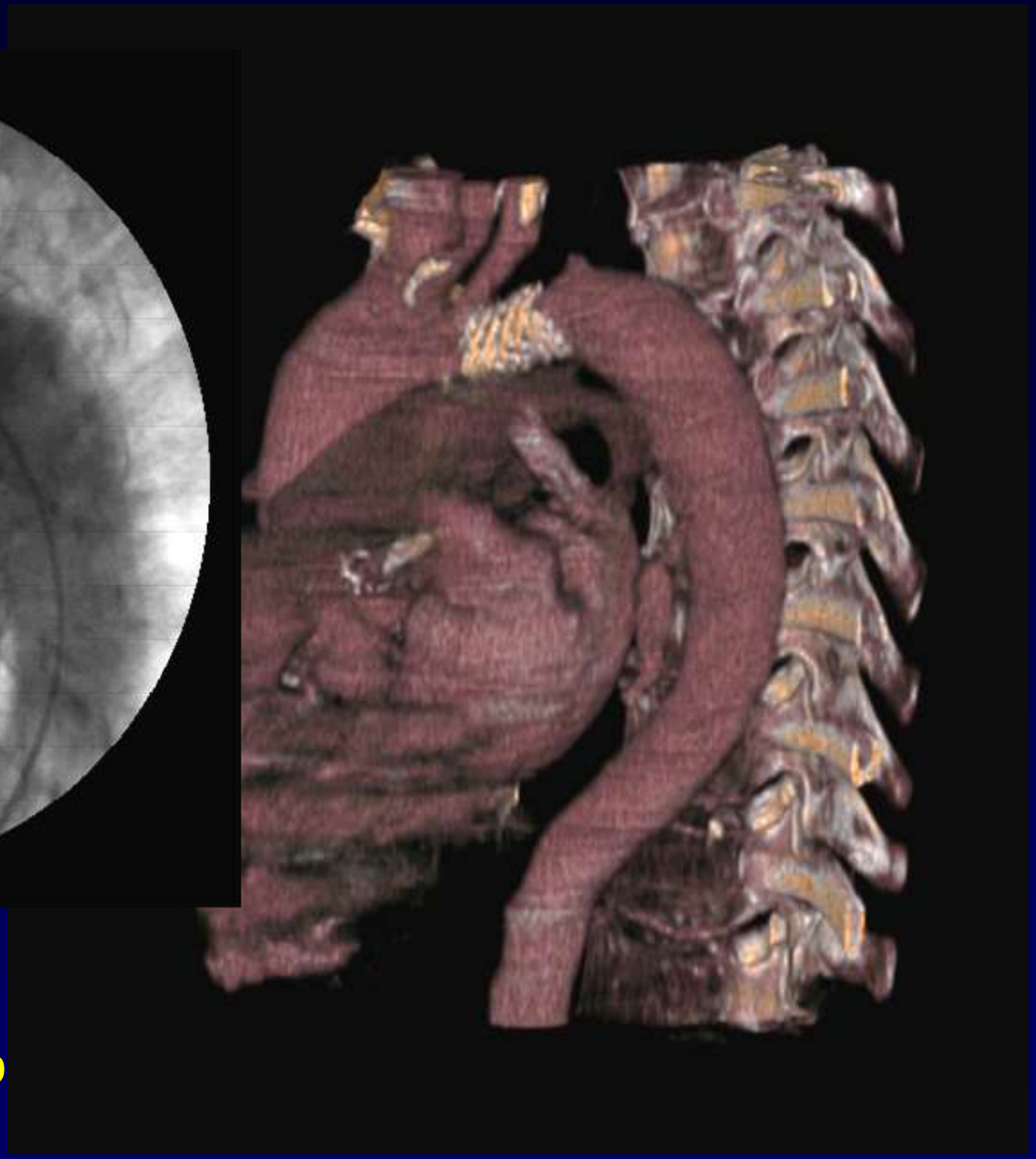
L.M. m 52y
4 years follow-up





F.L. f 65y
Transverse Arch stenosis
Grad. 100 mmHg

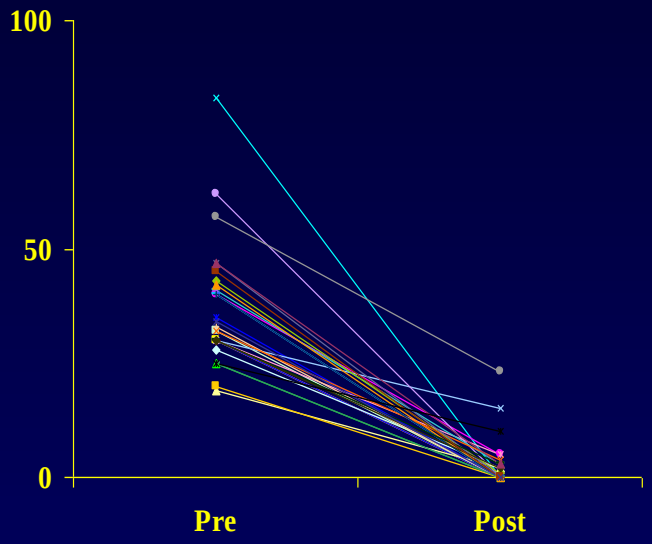
P 308 - 18 mm
Grad. 0 mmHg



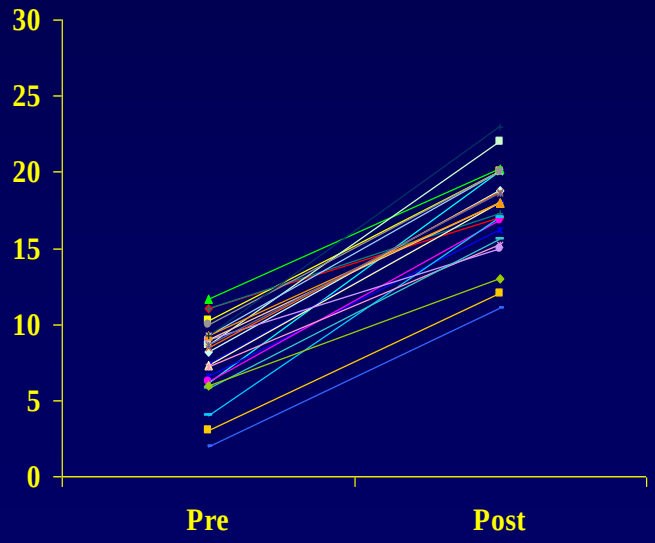
F.L. f 65y
3 years follow-up
Grad. 0 mmHg

STENTING NATIVE COARCTATION

Pressure Gradient (mmHg)

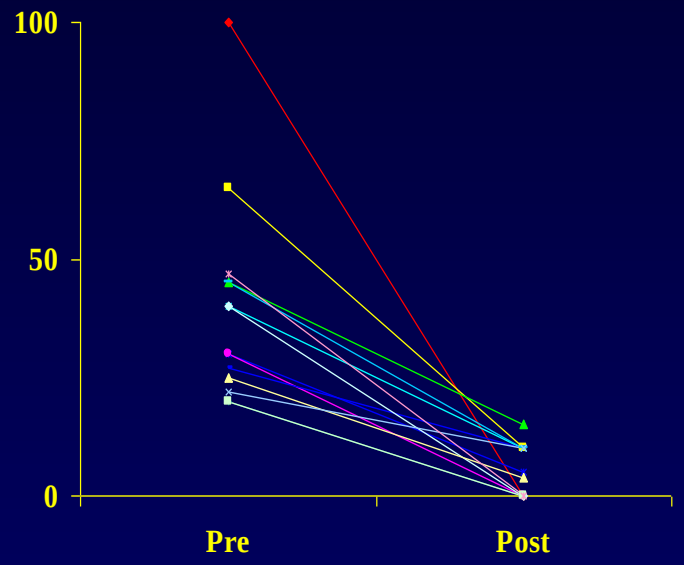


Vessel Diameter (mm)

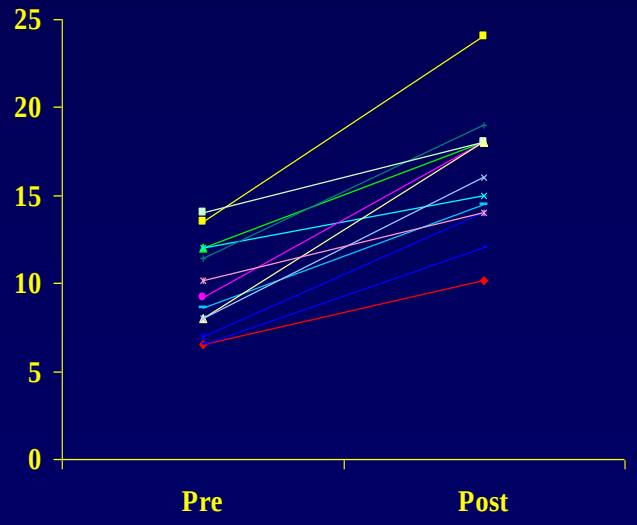


STENTING RECOARCTATION

Pressure Gradient (mm Hg)



Vessel Diameter (mm)



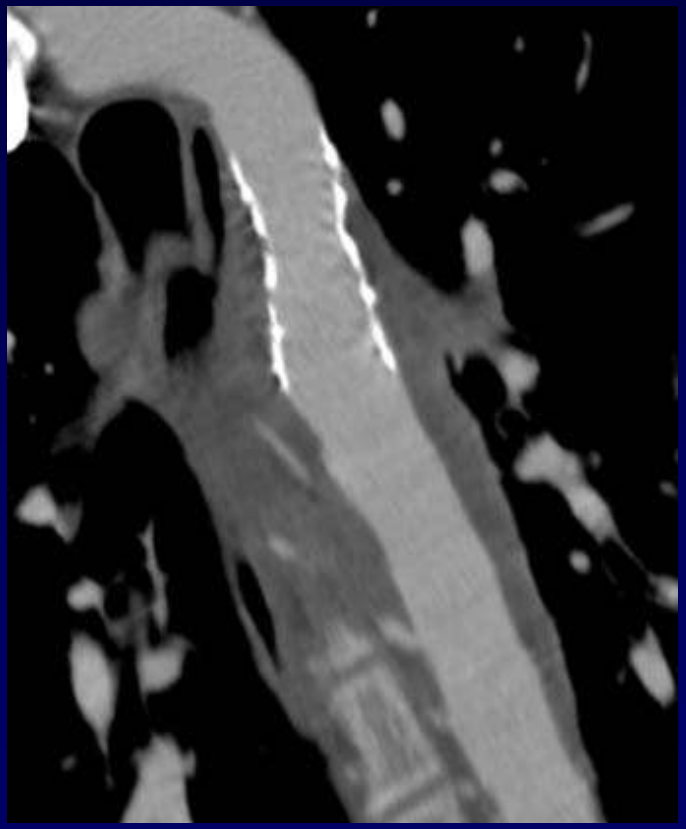
Early Major Complications

** wall rupture: 25 yrs, aortic recoarctation+aneurysm (Palmaz 5014)*

** periaortic-hematoma: 32 yrs, severe coarctation (Palmaz 5014)*

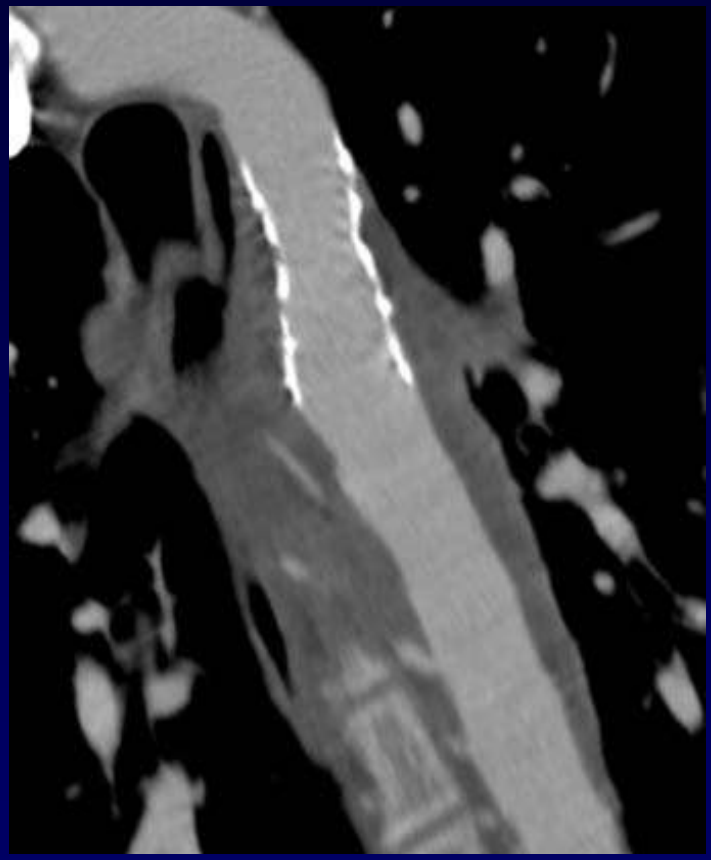
P.M., 32 y. Early Complication with BS

- **Periaortic-hematoma**



Early Complication with BS

- **Periaortic-hematoma**

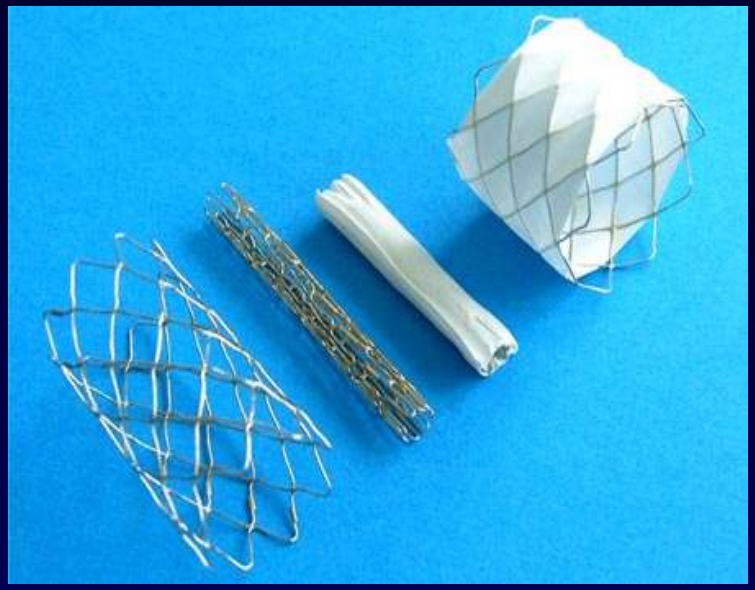


Spontaneous resolution

Background

- Stents implantation has gained increased popularity for the treatment of aortic arch obstructions in adolescents/adults
- Some problems/complications cannot be avoided completely (aneurysms, dissections, wall rupture….)
- Can covered stents improve the results/avoid complications?

CP covered stent

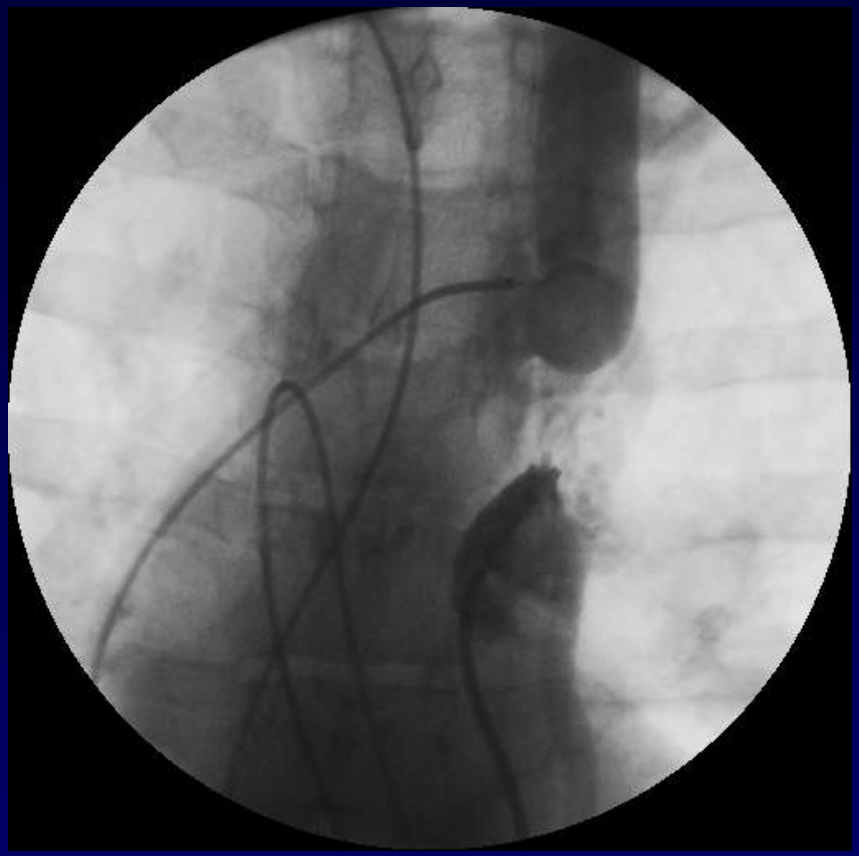


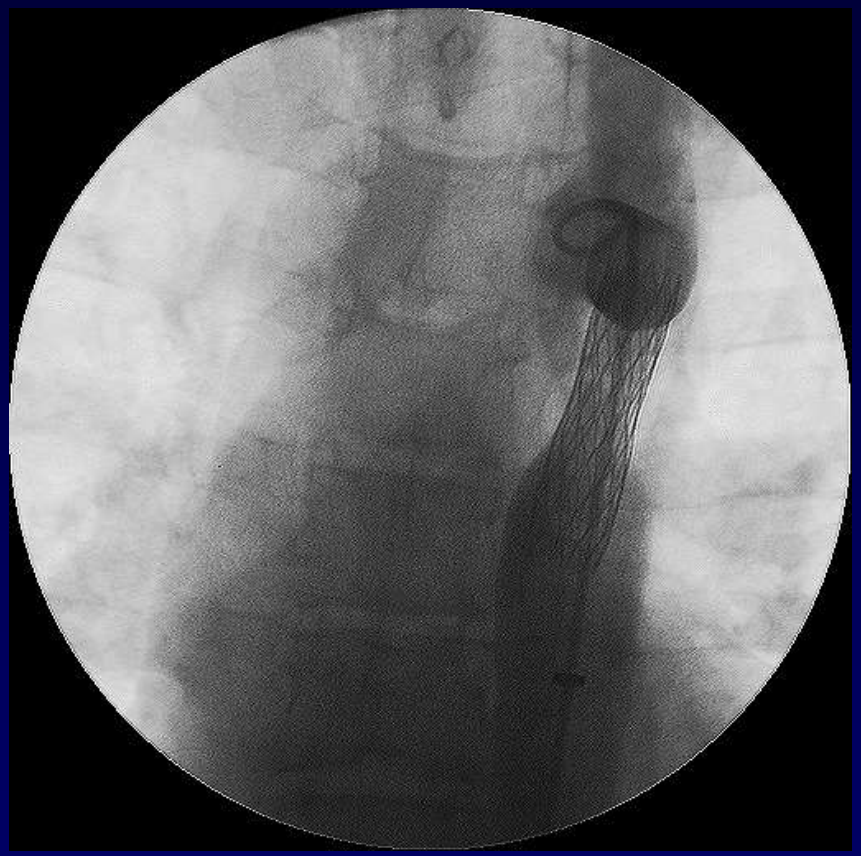
Covered stents in patients with complex aortic coarctations

Gianfranco Butera, MD, PhD,[a] Luciane Piazza, MD,[a] Massimo Chessa, MD, PhD,[a] Diana Gabriella Negura, MD,[a] Luca Rosti, MD,[a] Raul Abella, MD,[a] Angelica Delogu, MD,[b] Claudia Condoluci, MD,[c] Andrea Magherini, MD,[d] and Mario Carminati, MD[a] *San Donato Milanese, and Roma, Italy*

(Am Heart J 2007;0:1-6.)

Stenting of subatretic coarctation

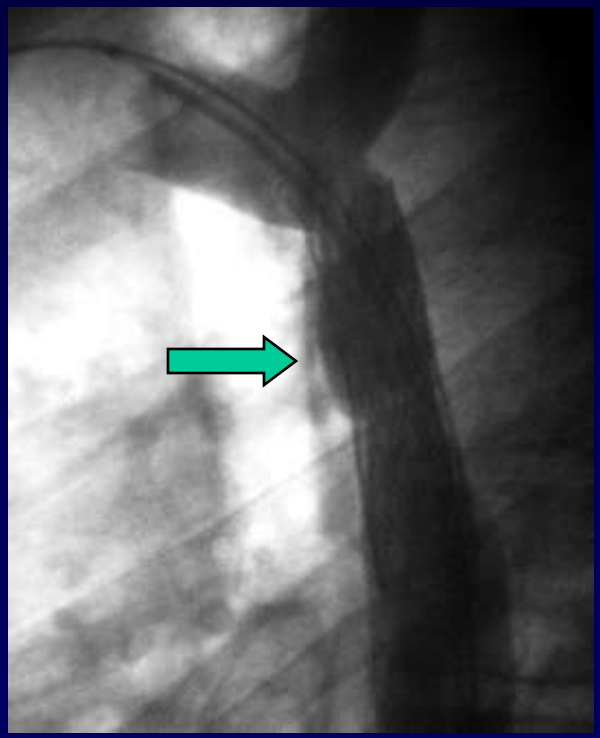


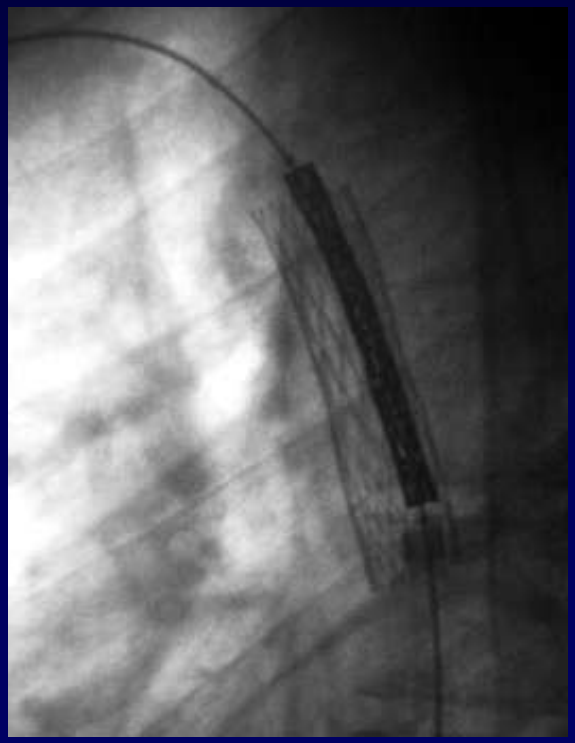


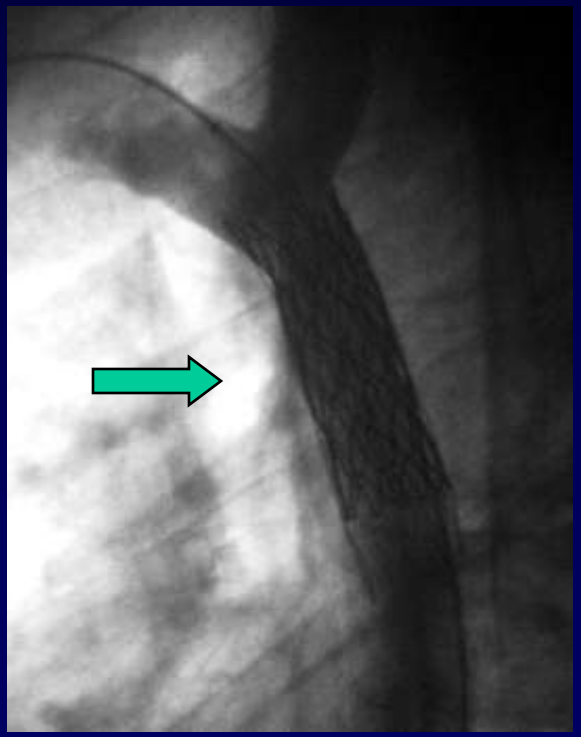
Aneurysm

CP covered stent

Covered stent







Stenting Aortic Arch Obstructions

San Donato Experience (Jan 2000 – Jul 2007)

123 pts age: 15 years (6-66)

- Native Coarctation 85
- Recoarctation 38

Stents Used

- **Bare Stents (BS)** **77**
  - *Palmaz* *42*
  - *Genesis* *24*
  - *CP* *11*

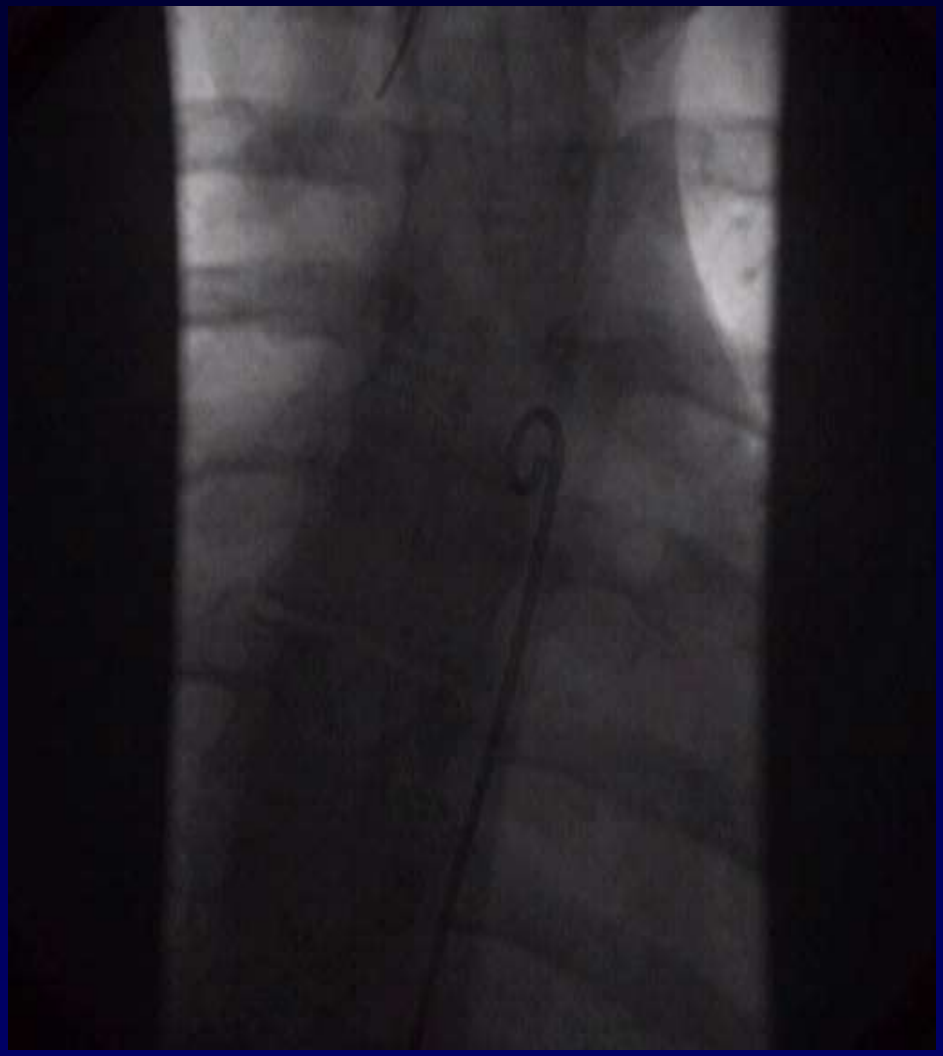
- **Covered Stents (CS)** **46**
  - *CP* *46*

Results

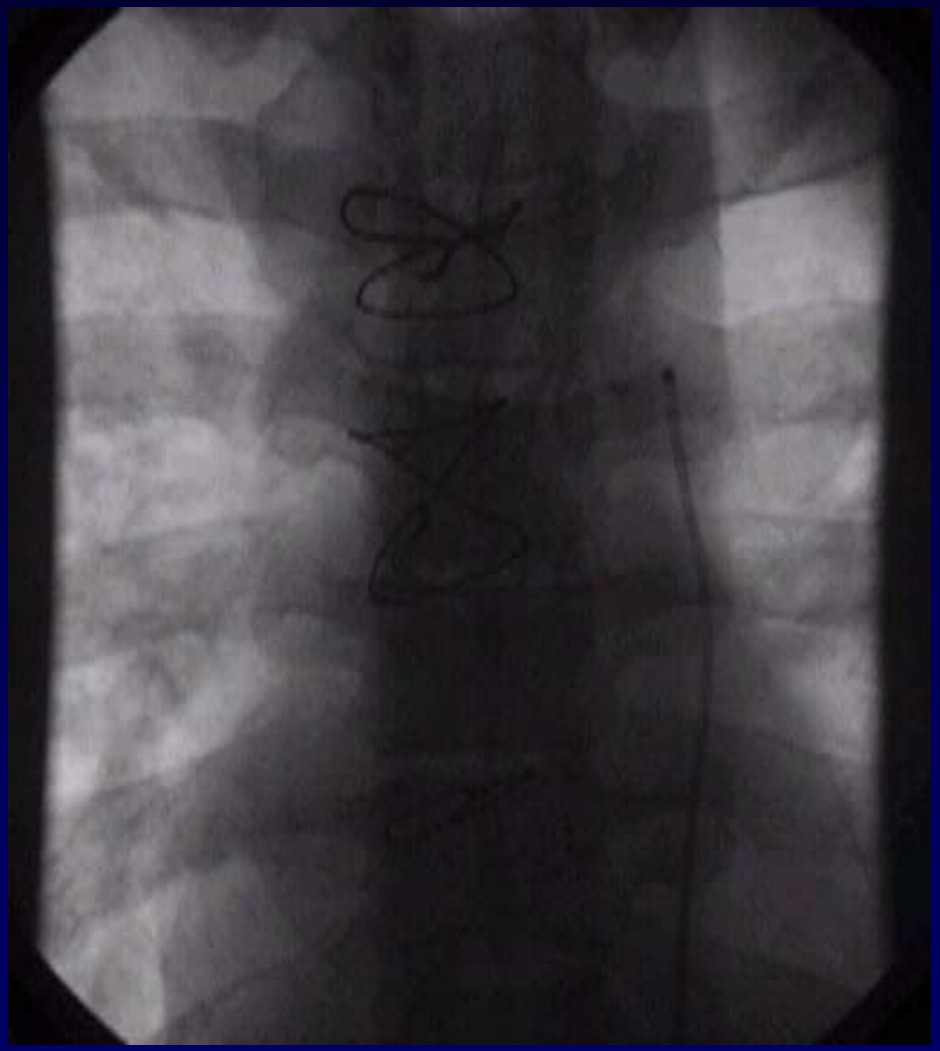
- **Successful implantation in all pts in both groups**

- **No differences for age, weight, gender, type of coarctation (native/recoarctation), procedure and fluoroscopy time**

Subatretic aortic isthmus



Interruption of Aortic isthmus



Follow-up Complications

- **BS: aneurysm formation 2**

(10 and 12 months after stent implant)

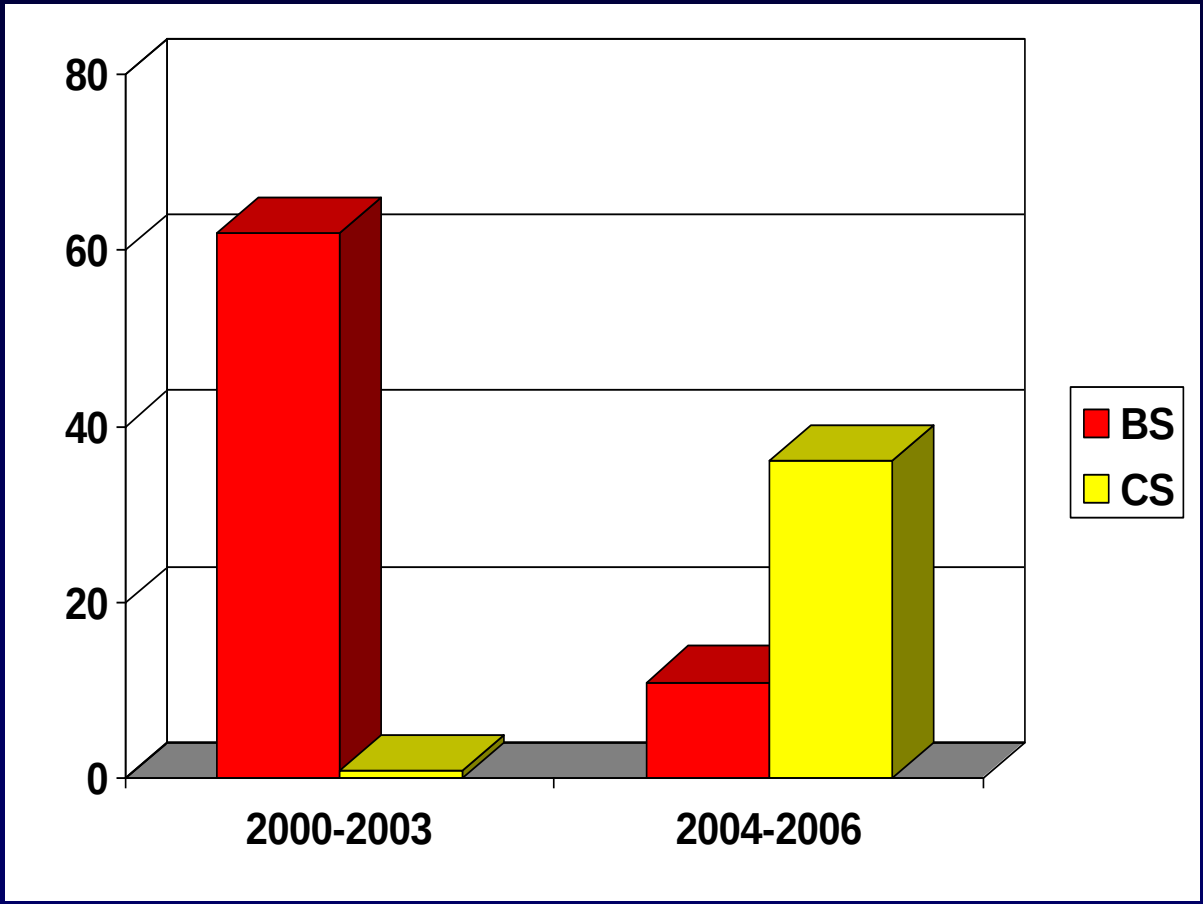
- **CS: none**

Major Advantages of CS vs BS

- **Less risk of unwanted damage of the aortic wall**

Results

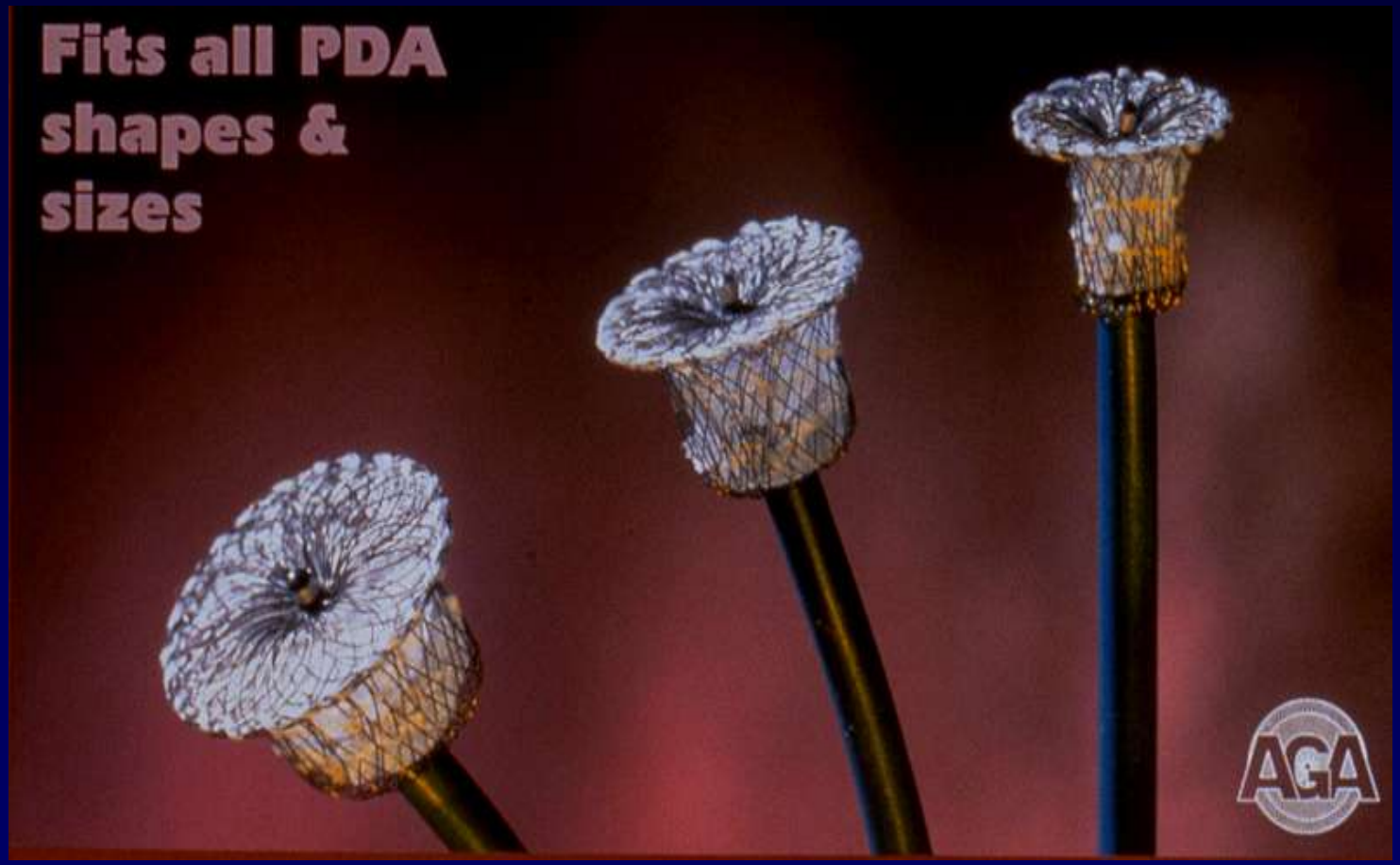
Distribution of stent used during the period of study



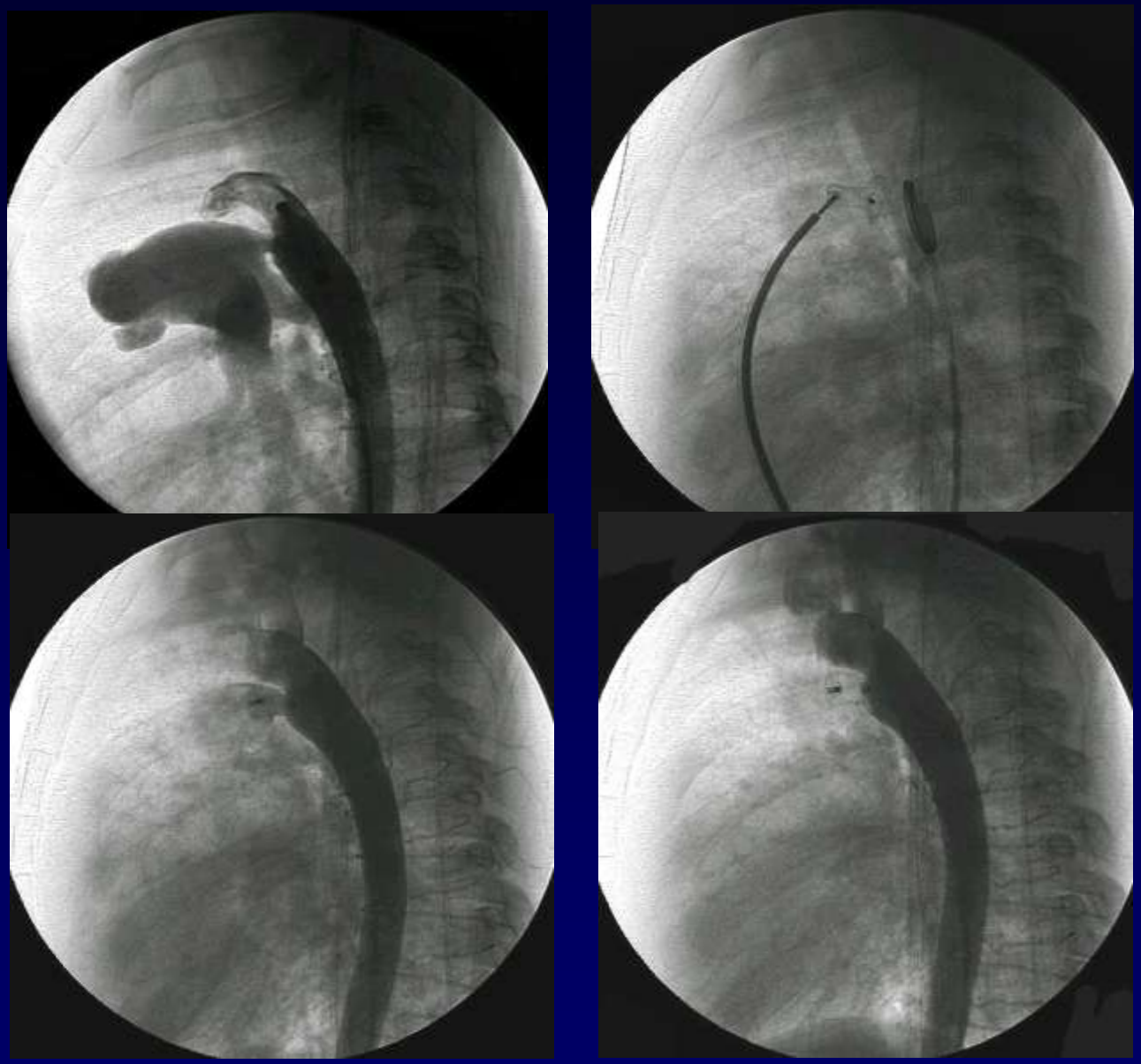
PDA

First choice procedure: device closure

PDA Amplatzer device



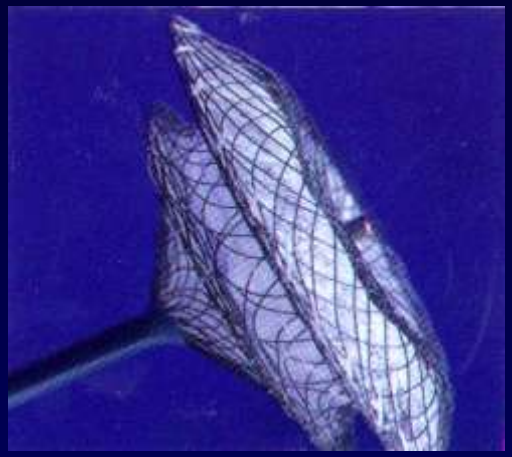
PDA Amplatzer device

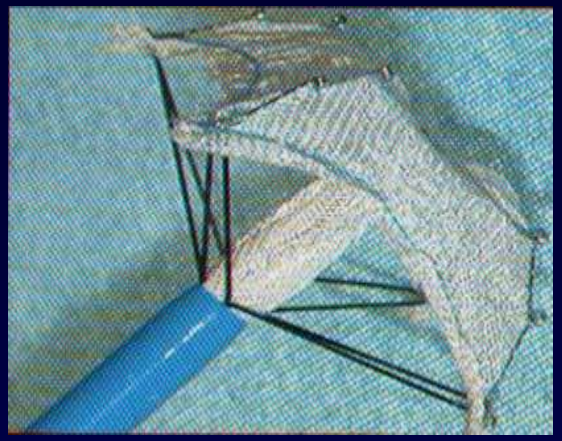


SECUNDUM ASD

First choice procedure: device closure

Amplatzer
92%





Starflex
4%

Intrasept-Cardia
2%

Helex
2%

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Early and Late Complications Associated With Transcatheter Occlusion of Secundum Atrial Septal Defect

Massimo Chessa, MD, PHD, Mario Carminati, MD, Gianfranco Butera, MD, PHD, Roberta Margherita Bini, MD, Manuela Drago, MD, Luca Rosti, MD, Alessandro Giamberti, MD, Giuseppe Pomè, MD, Eduardo Bossone, MD, PHD, Alessandro Frigiola, MD

San Donato Milanese, Italy

Early Complications:34 pts (3,8%)

- Complete AVB : 1 (0.1 %)
- Transient SV Arrhythmias: 8 (0.9 %)
- A.F. needing ECV: 6 (0.7%)
- Thrombus formation on the device: 1 (0.1 %)
- Groin hematoma: 6 (0.7 %)
- Retropharingela hematoma: 1 (0.1 %)

Medical treatment

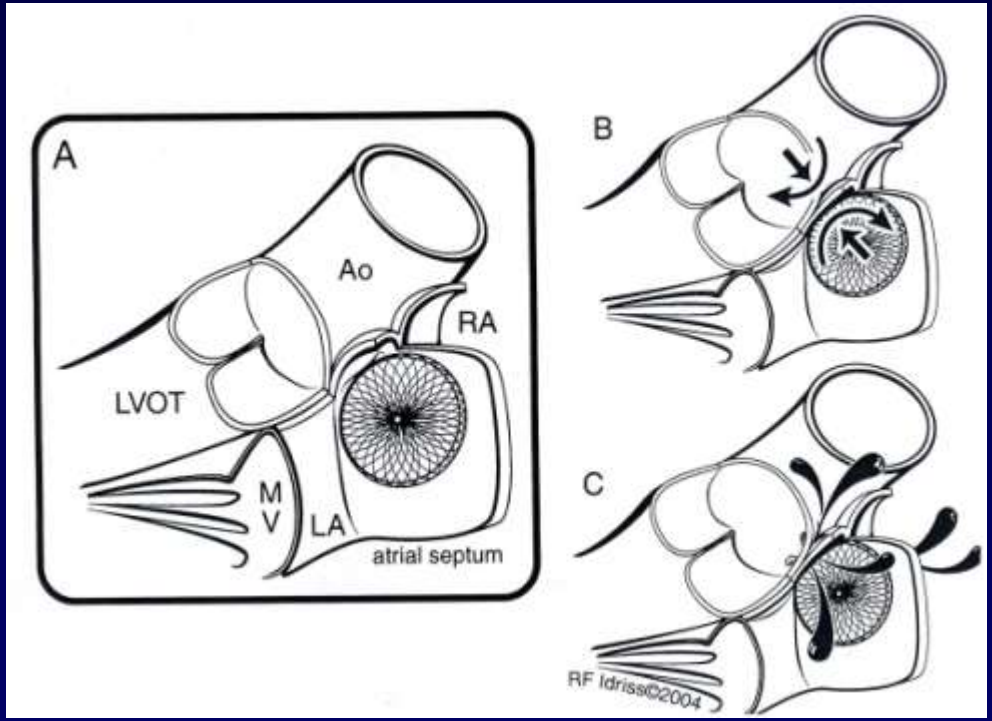
- Device malposition/embolization: 7 (0,8%)
- Erosion of atrial wall: 2 (0,2%)
- Pericardial effusion: 1 (0,1%)

Need for Surgery

Catheterization and Cardiovascular Interventions 63:496–502 (2004)

Erosion of Amplatzer Septal Occluder Device After Closure of Secundum Atrial Septal Defects: Review of Registry of Complications and Recommendations to Minimize Future Risk

Zahid Amin,[1*†] MD, Ziyad M. Hijazi,[2†] MD, John L. Bass,[3†] MD, John P. Cheatham,[4†] MD, William E. Hellenbrand,[5] MD, and Charles S. Kleinman,[5†] MD

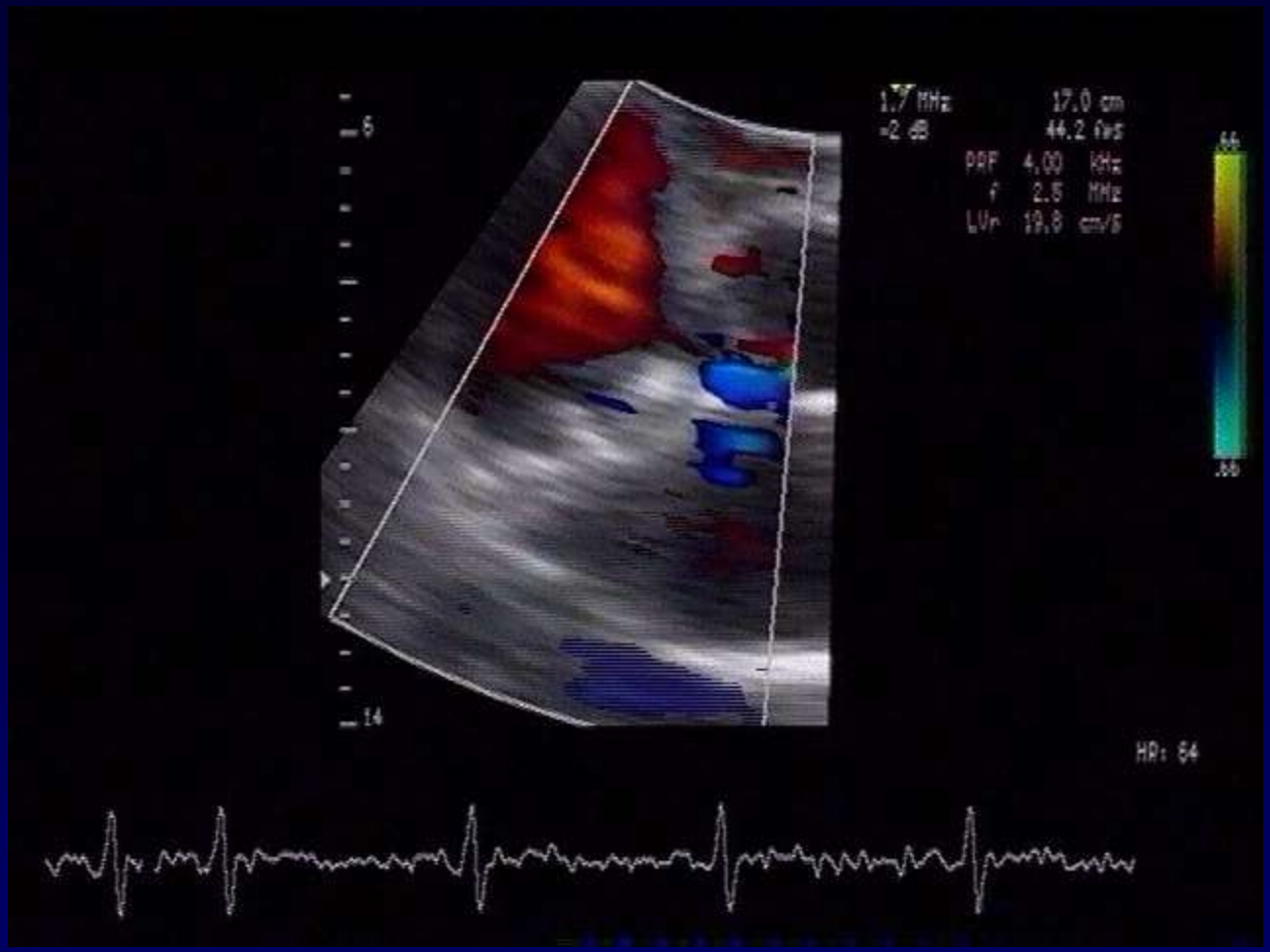


Follow-up

32±15 months (range 1-68)

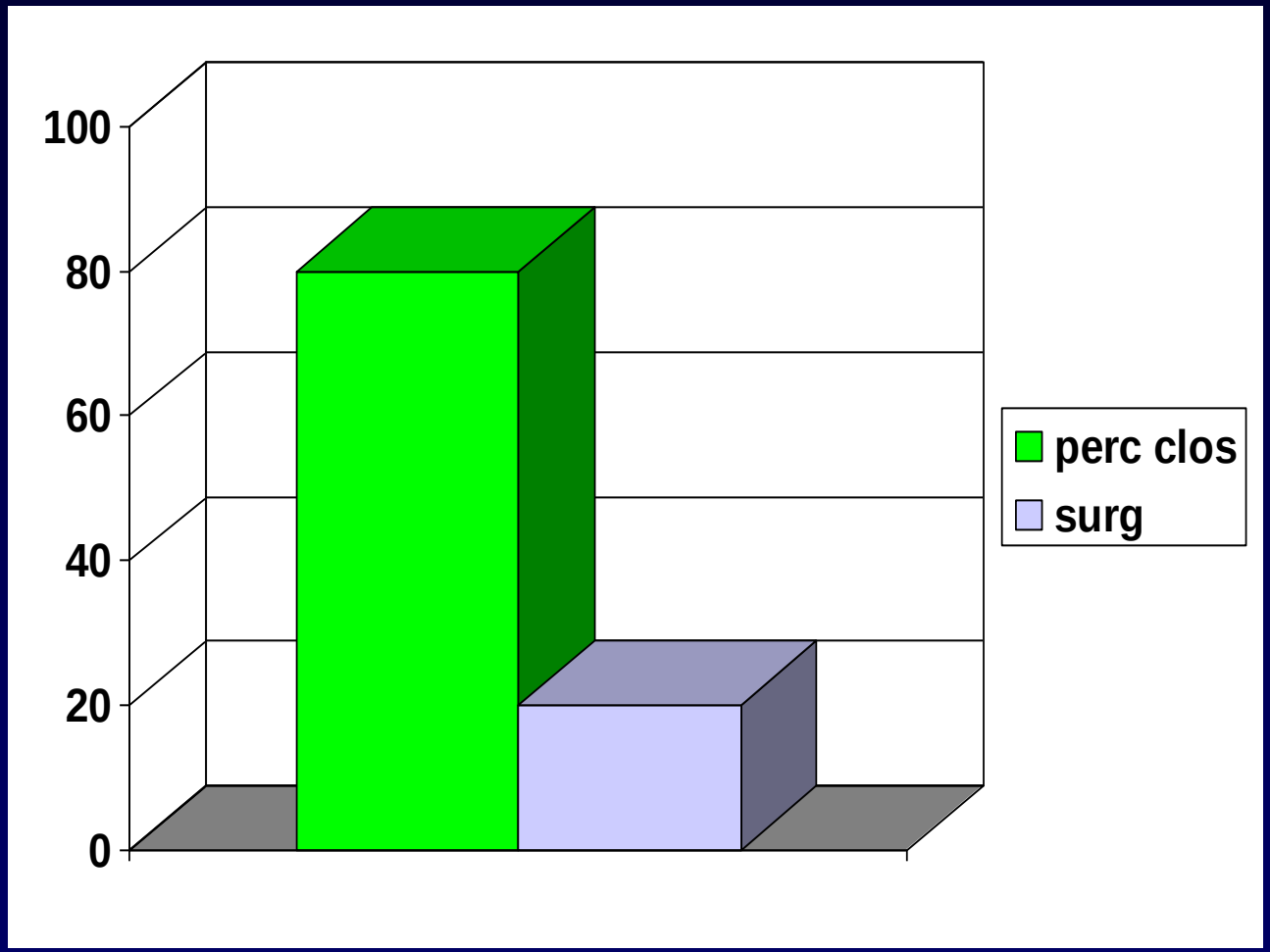
- **Long -term complications (> 4 months post procedure) (0.3 %)**
  - **Thrombus formation (medical therapy): 1 pt**
  - **Device malposition (elective surgery): 1 pt**
  - **Ao -RA fistula (elective surgery): 1 pt**

Aorta-RA fistula



Total ASD's: 1387

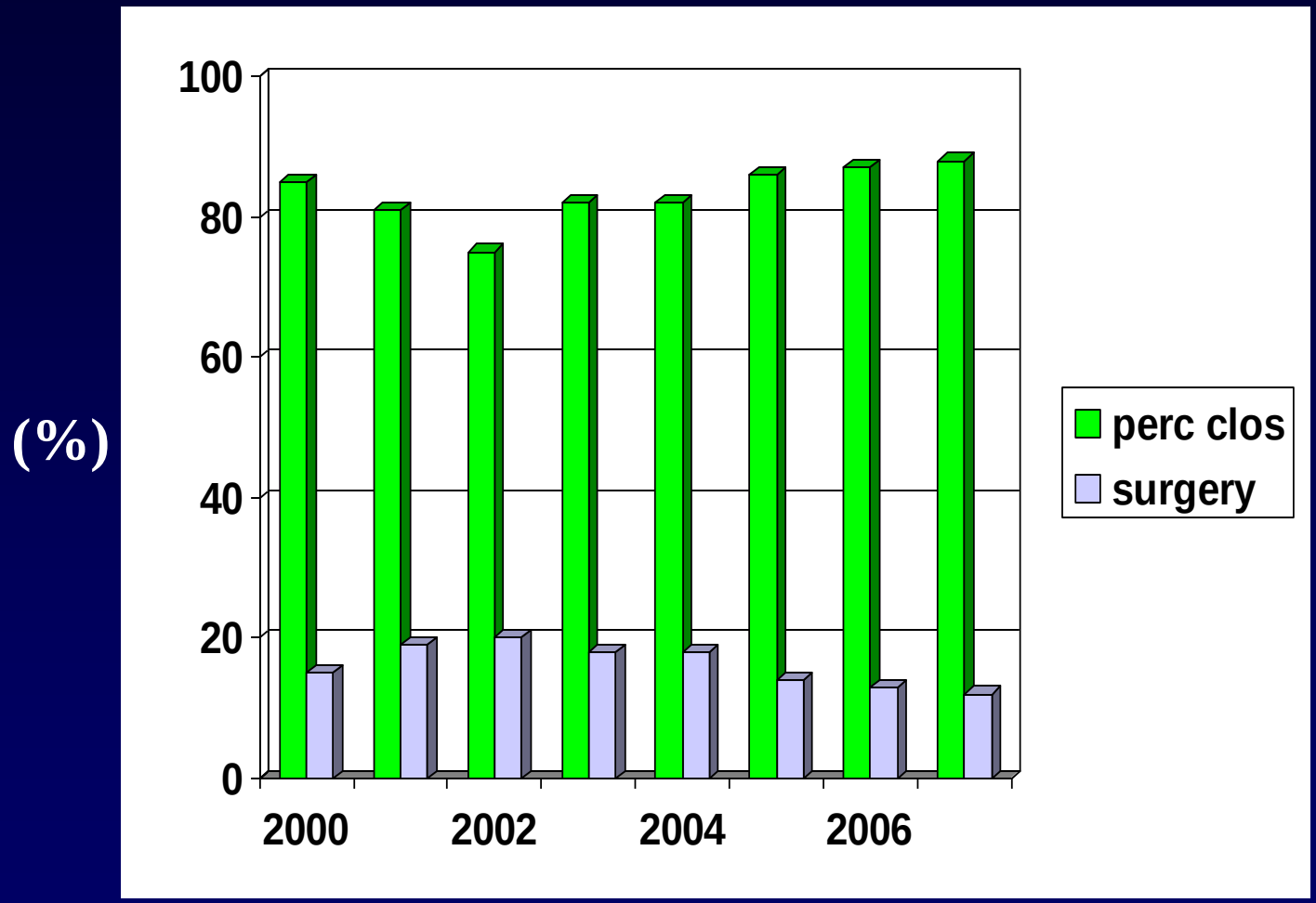
(%)



1115 (80%)

272 (20%)

ASD closure



VENTRICULAR SEPTAL DEFECTS

- *VSD's in natural history much less common than in pediatric age*
- *Residual post-surgery VSD's*

VSD's percutaneous closure (up to May 2006)

N° Total ***145***

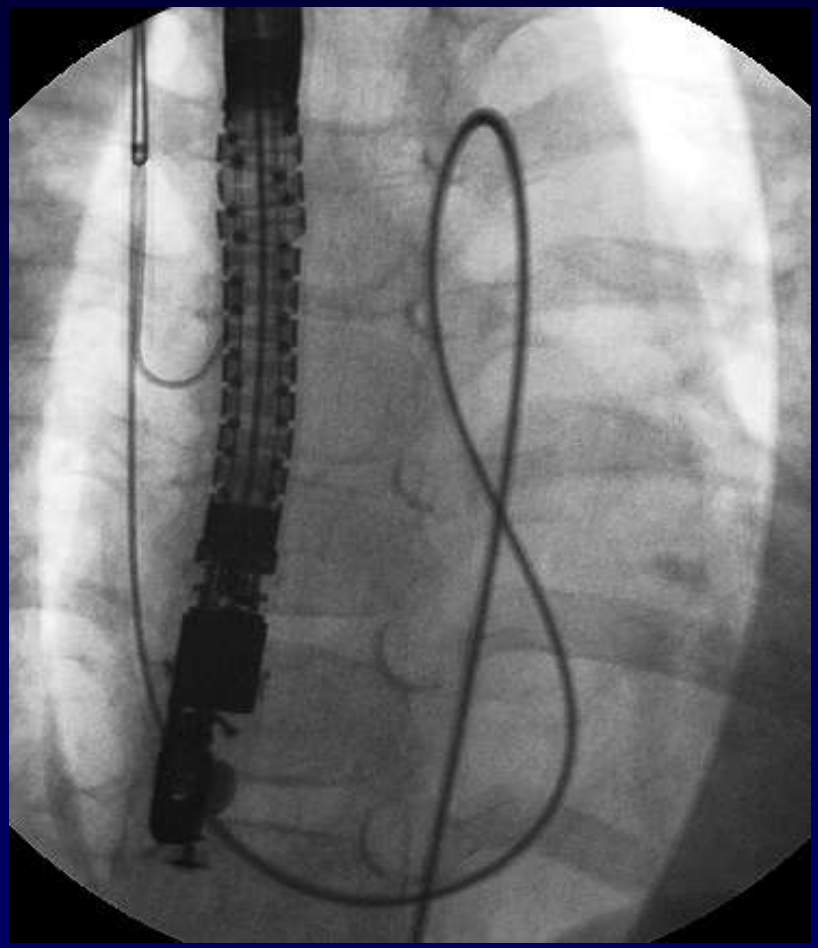
< 18 y ***104 (72%)***

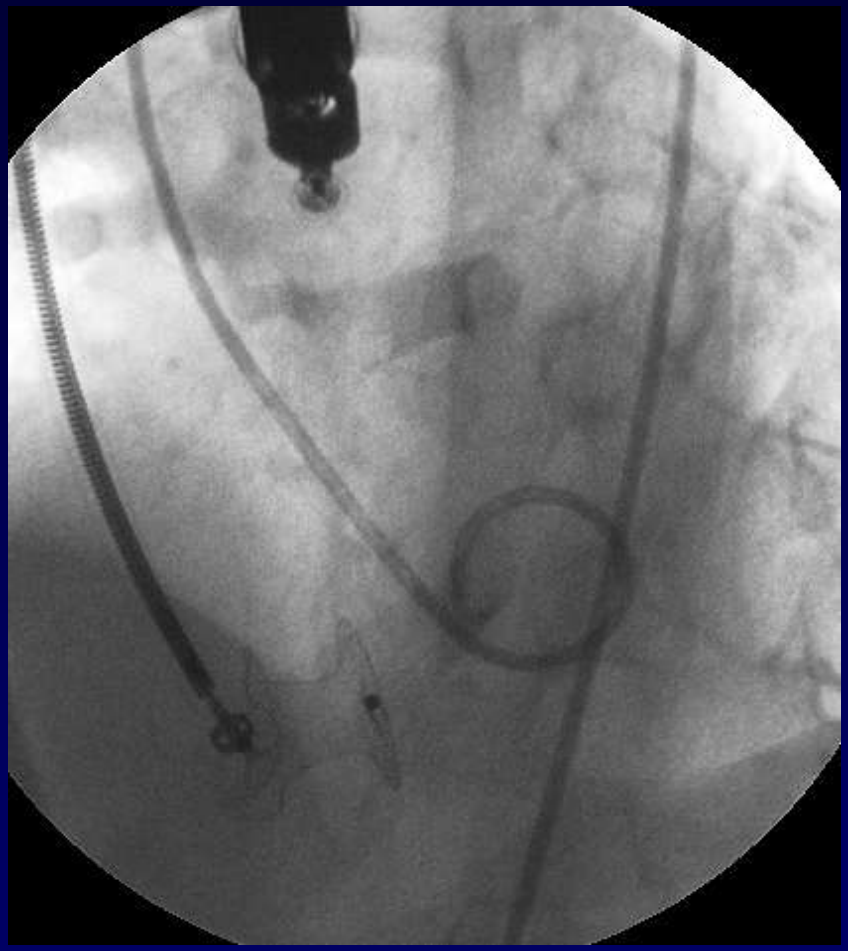
> 18 y ***41 (28%)***

Perimembranous	*27*
Muscular	*7*
Residual post-surg.	*7*

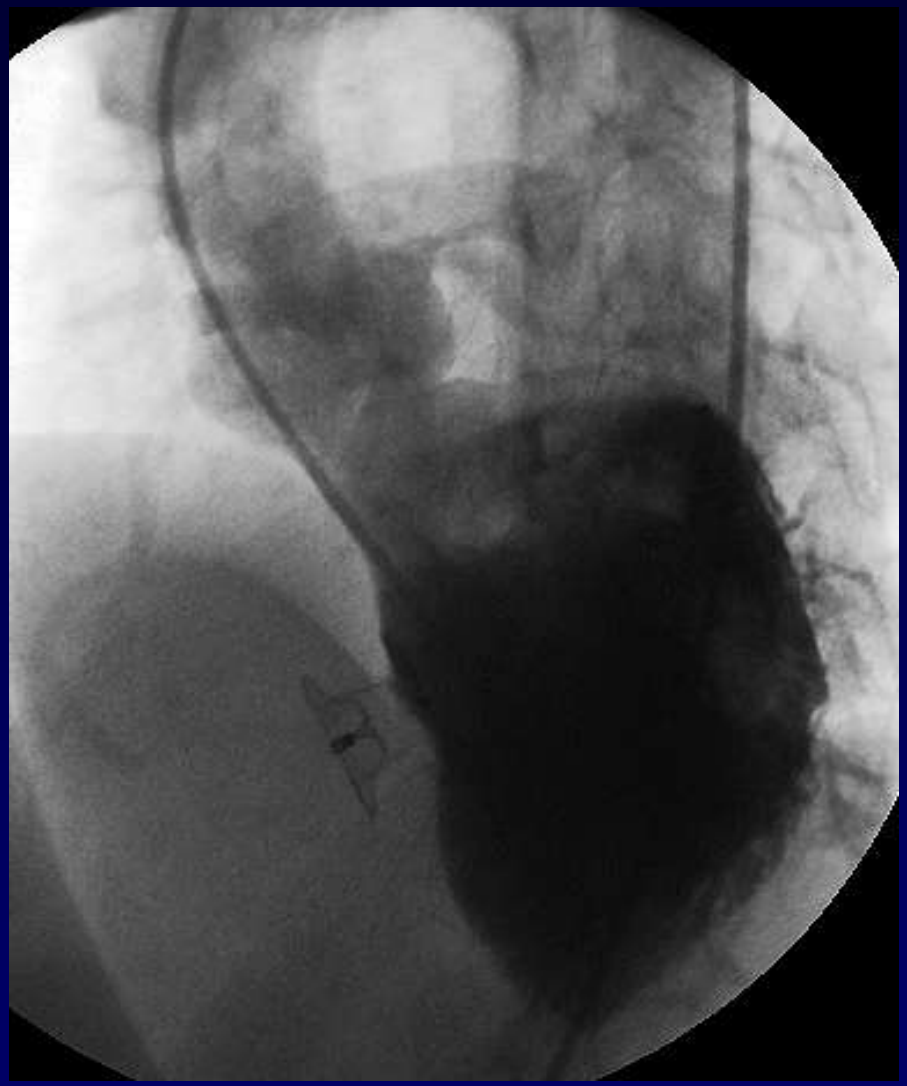
Muscular VSD

Amplatzer muscular VSD occluder



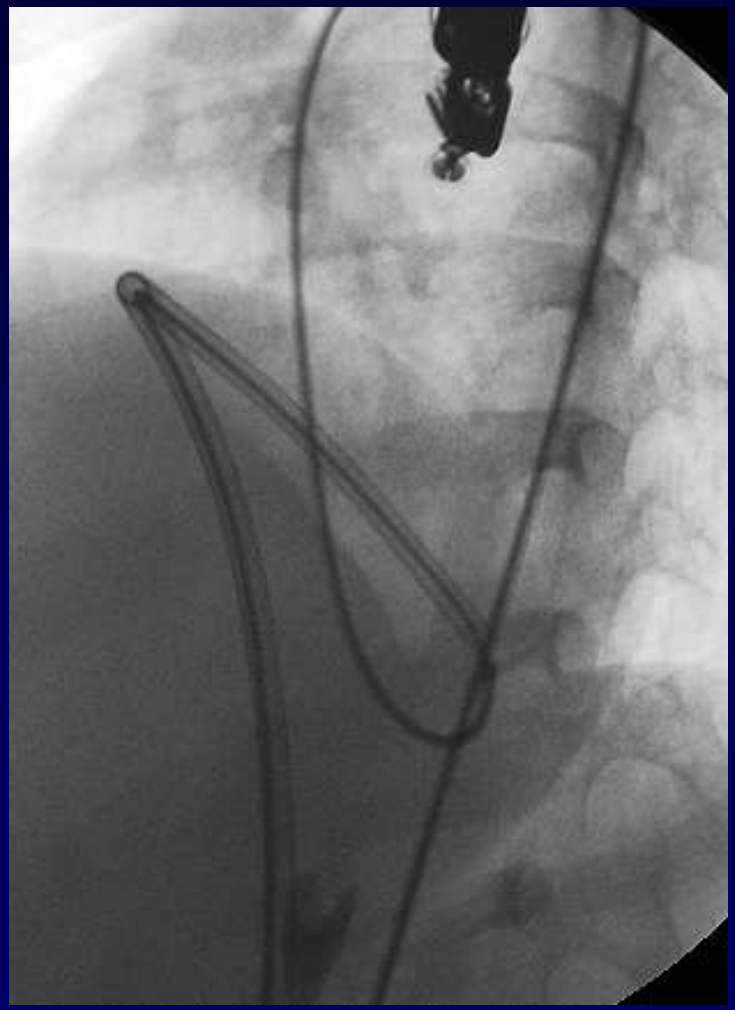


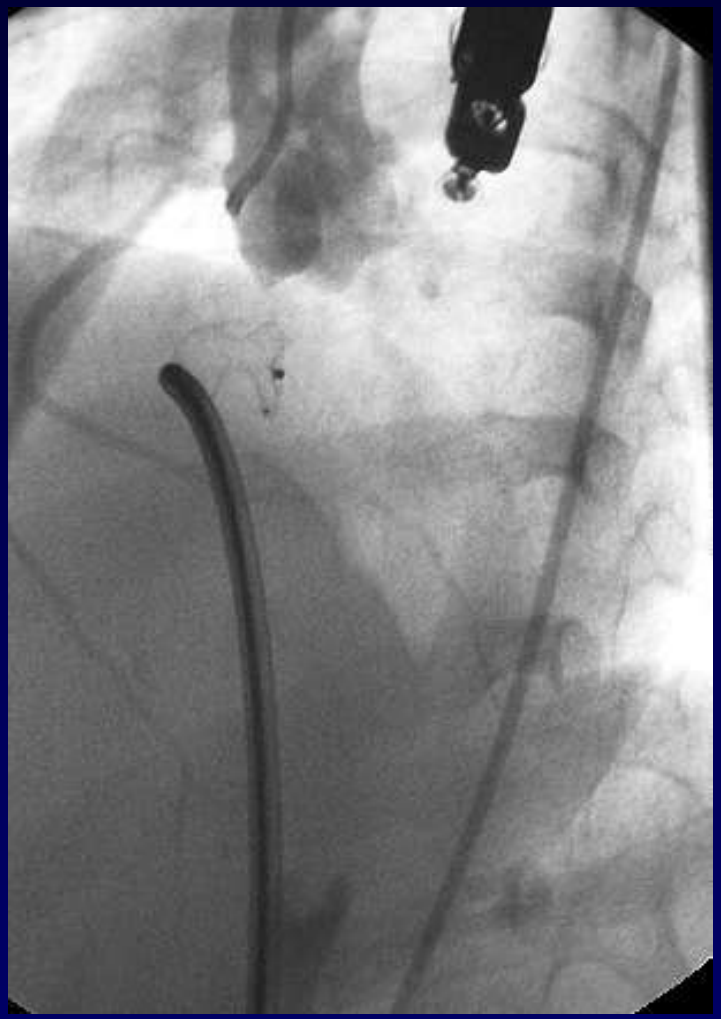
Amplatzer muscular VSD occluder



Perimembranous VSD

Amplatzer membranous VSD occluder



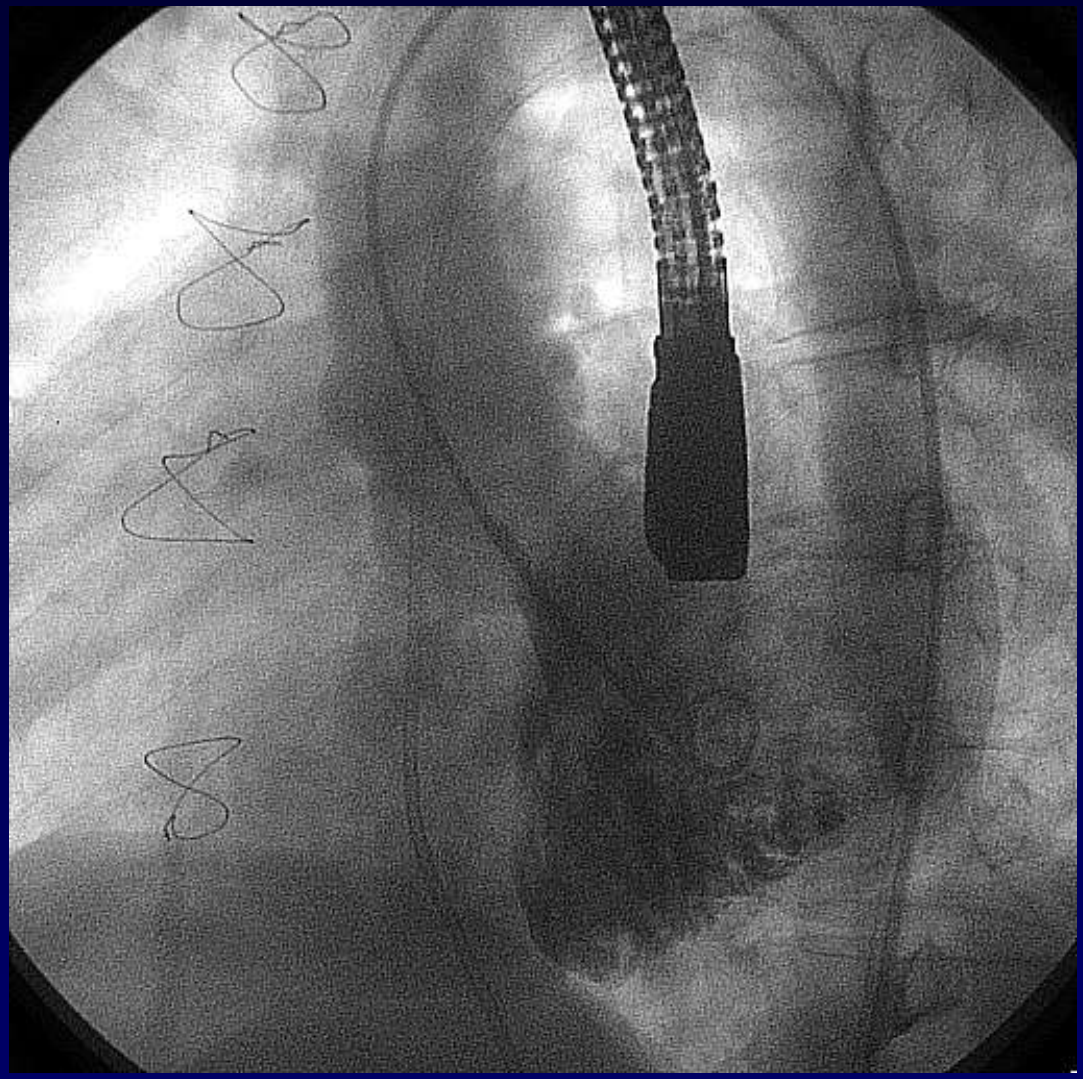


Amplatzer membranous VSD occluder

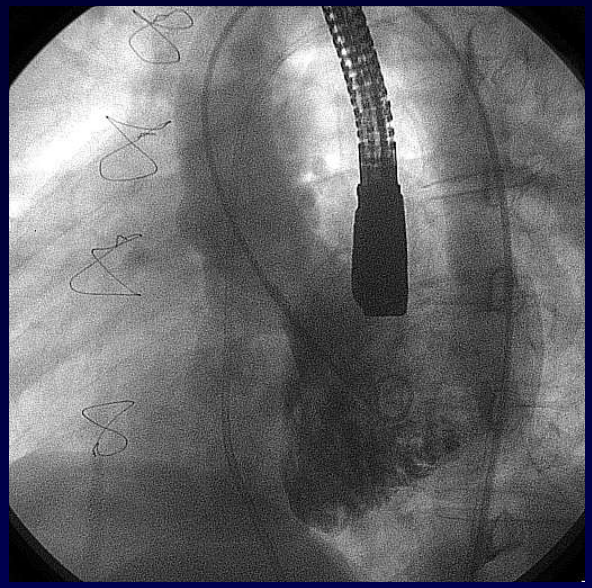
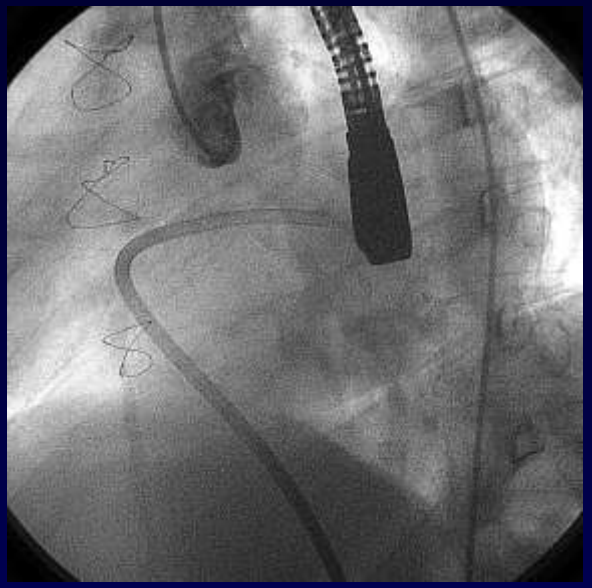
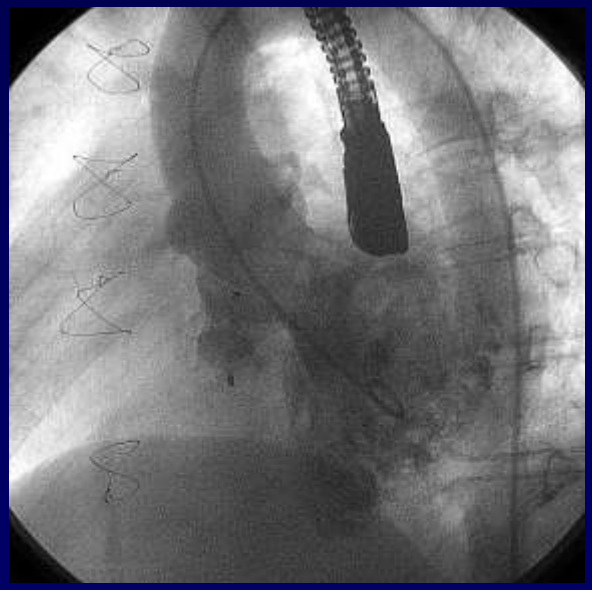
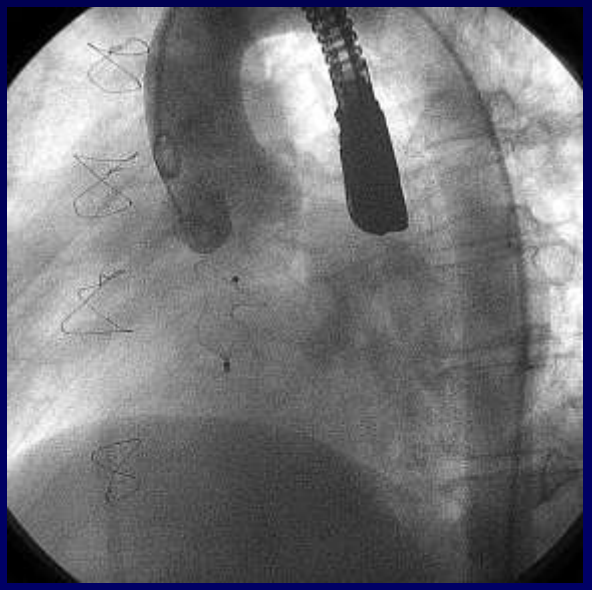
Perimembranous VSD with “aneurysm”

Muscular VSD device implantation

Residual VSD after DORV surgical repair



Device closure

Complete VSD Closure

Immediate → **40 %**

Discharge → **65 %**

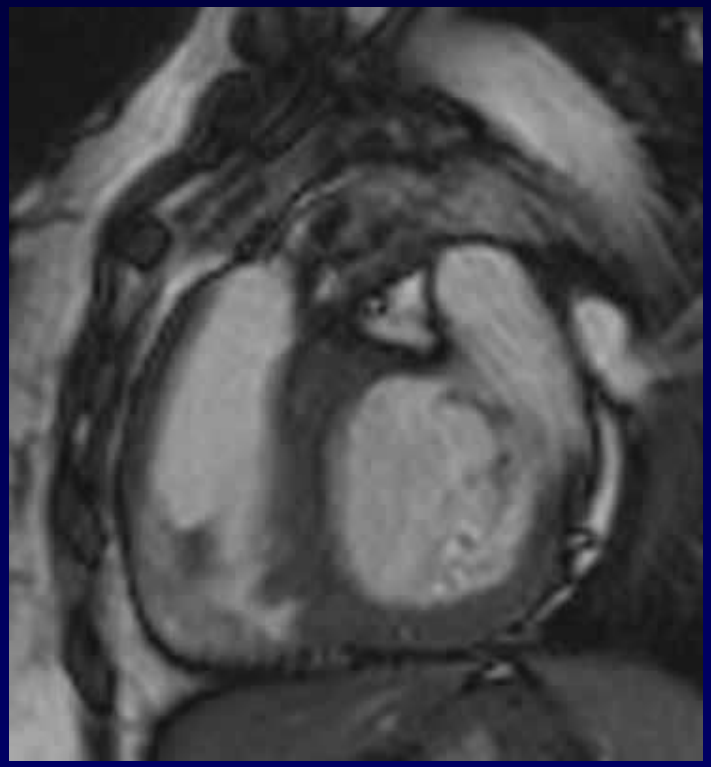
Follow-up → **93 %**

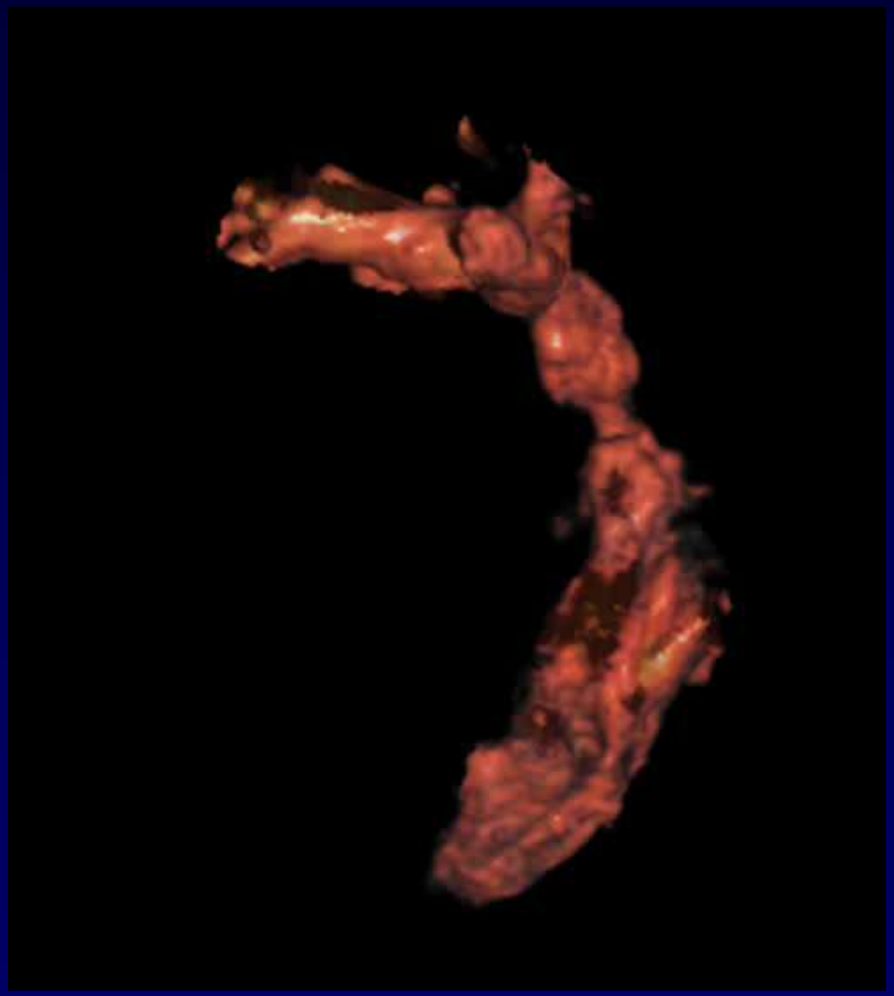
7% trivial residual shunt

Complications

Aortic regurgitation *(trivial)*	**6 (4%)**
Tricuspid regurgitation *(trivial)*	**12 (8%)**
Complete Heart Block: *(requiring PM implantation)* *Only perimembranous VSD's*	**6 (4%)**
Device embolization *(cath retrieval in all)*	**3 (2%)**

Post-surgical RVOT disfunction





Transcatheter pulmonary valve implantation

Melody

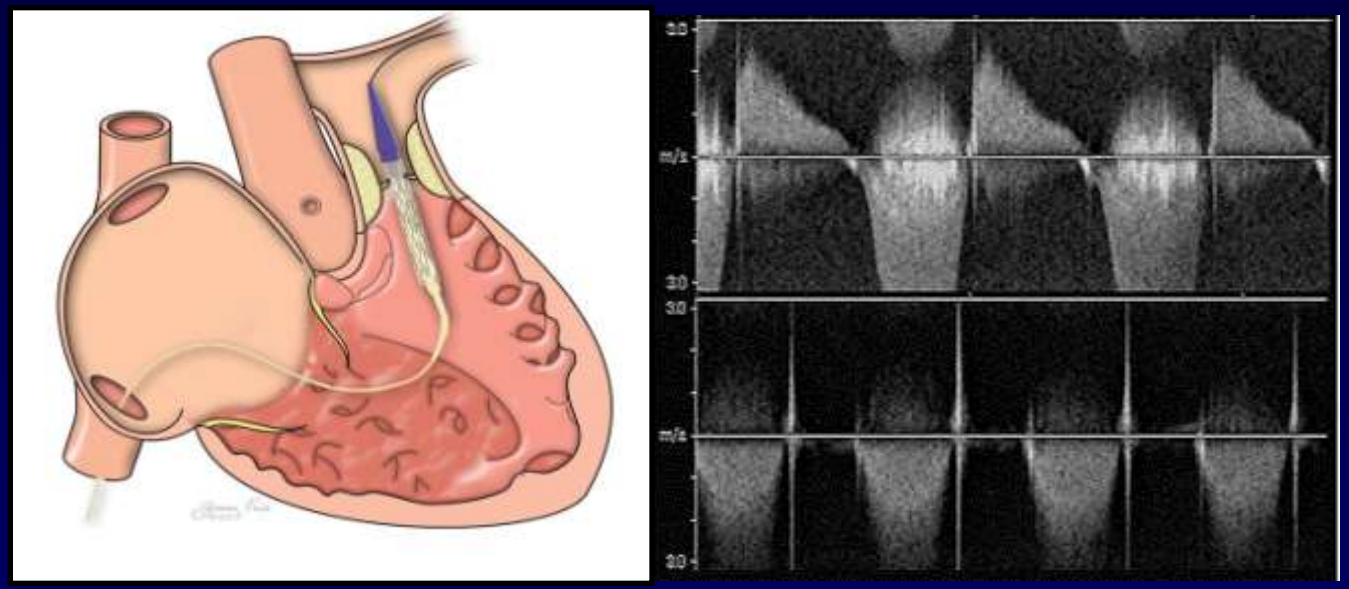
Early report

September 2000

Percutaneous replacement of pulmonary valve in a right-ventricle to pulmonary-artery prosthetic conduit with valve dysfunction

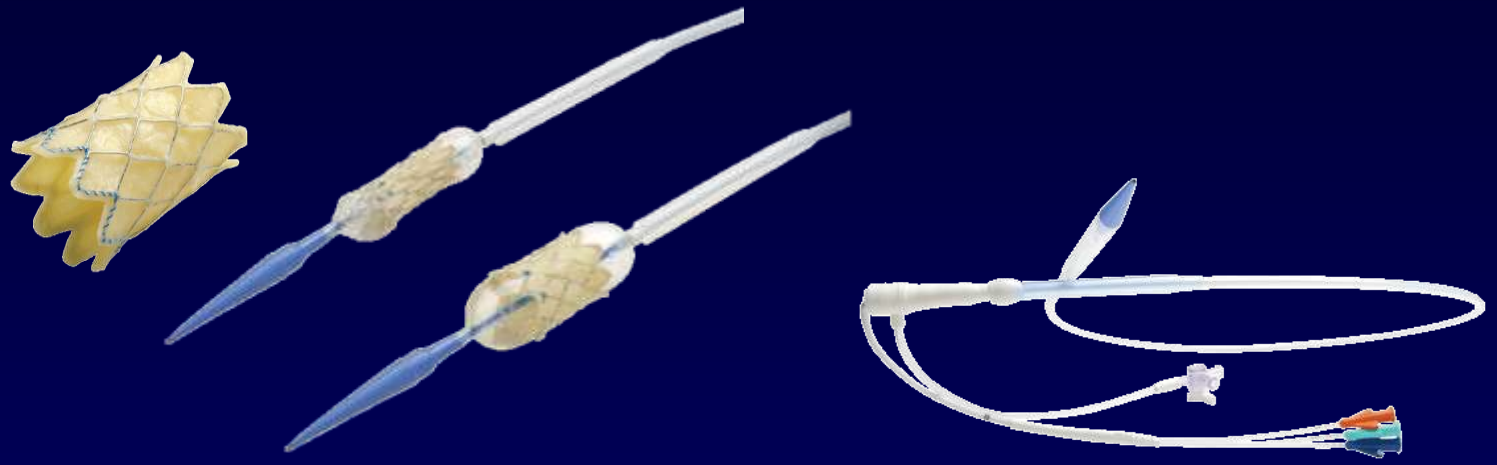
THE LANCET

Philipp Bonhoeffer, Younes Boudjemline, Zakhia Saliba, Jacques Merckx, Yacine Aggoun, Damien Bonnet, Philippe Acar, Jérôme Le Bidois, Daniel Sidi, Jean Kachaner



Bonhoeffer P, et al. Lancet 2000

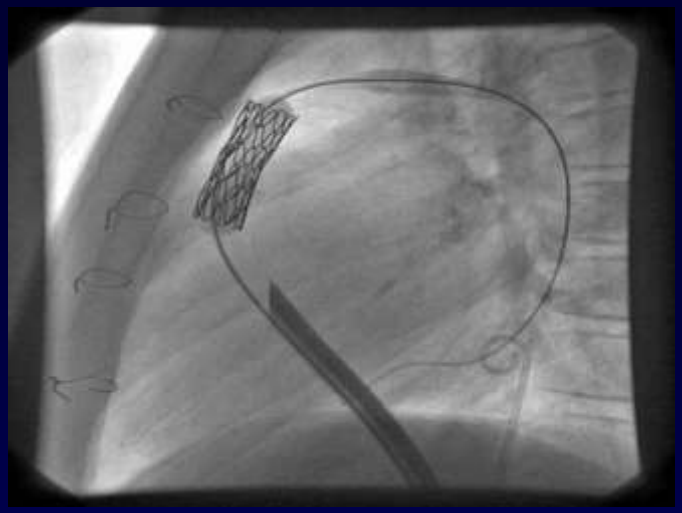
Melody® Valve and delivery system

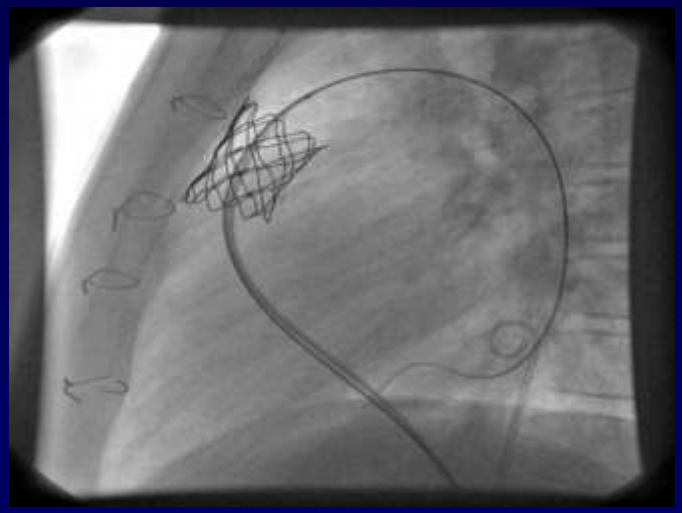


Bovine jugular venous valve in Platinum-Iridium (CP) stent

- Balloon-In-Balloon (BIB) delivery system
- Three balloon sizes: 18, 20, 22 mm
- 22Fr size


University of Minnesota/© Medtronic, Inc.



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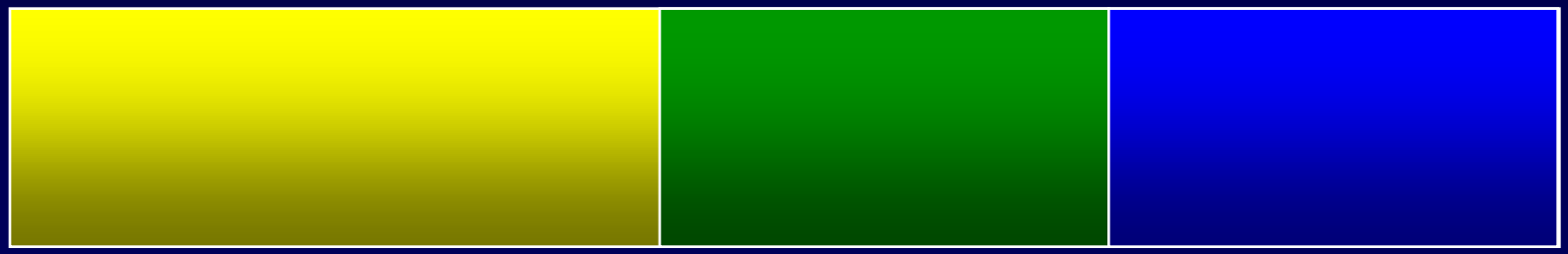
Predominant RVOT lesion

RVOT obstruction ⟺ Pulmonary Regurgitation



40% 30% 30%

Clinical Criteria

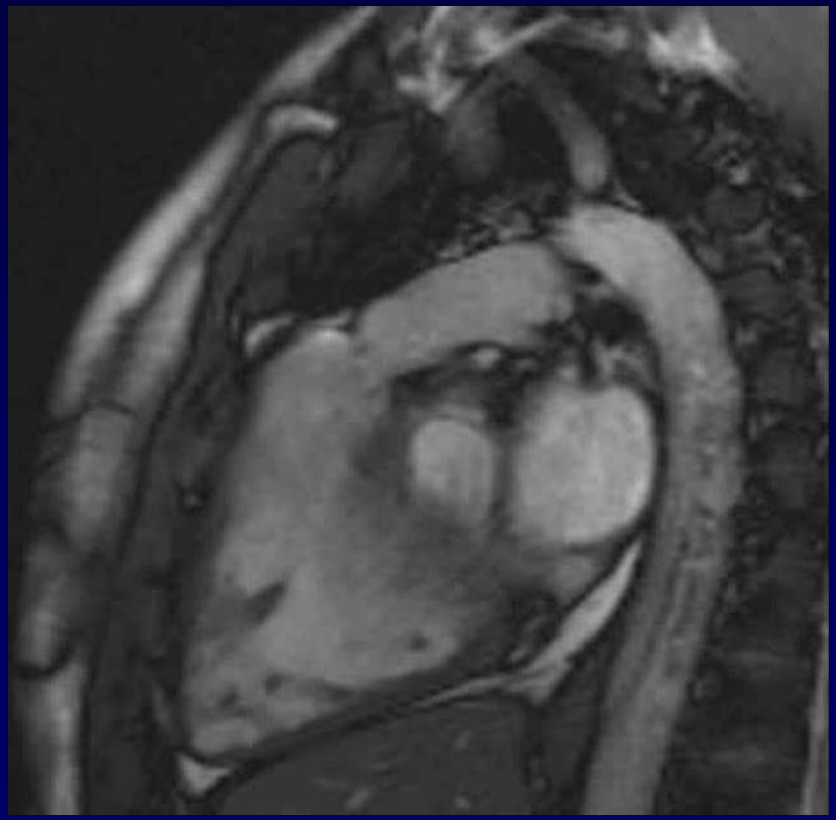
- RV outflow tract obstruction (RVOTO)
  - RV systolic pressure ≥ 2/3 of systemic

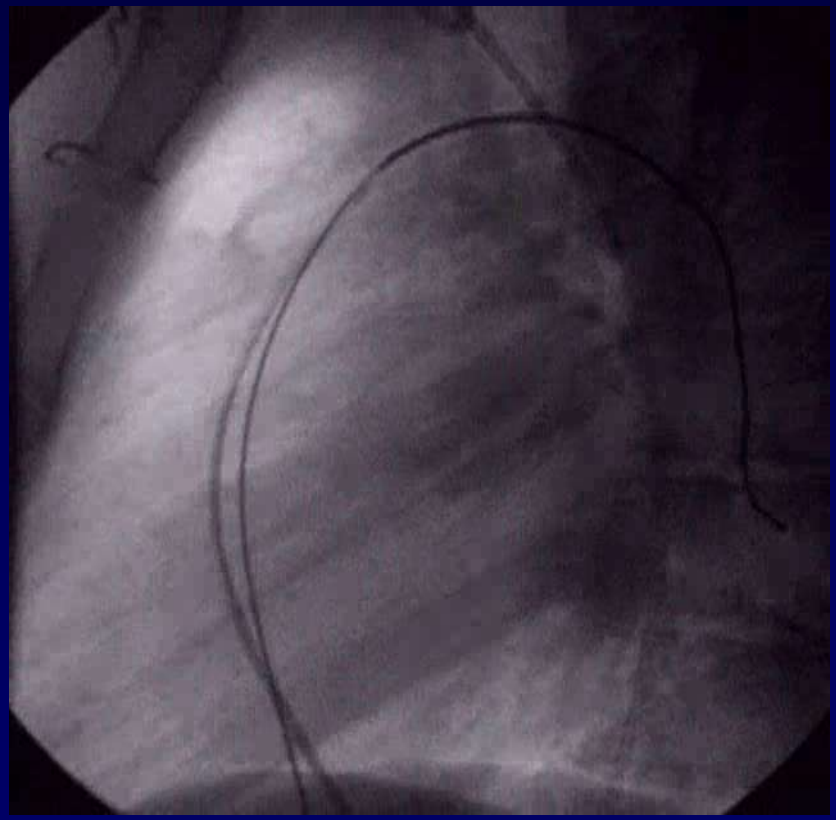
- Moderate to severe regurgitation (PR)
  - Impaired exercise capacity (<65% of predicted)
  - Significant RV dilatation / dysfunction

Lurz P, et al. *Circulation* 2008

Morphological Criteria

RVOT dimensions > 16 mm and < 22 mm

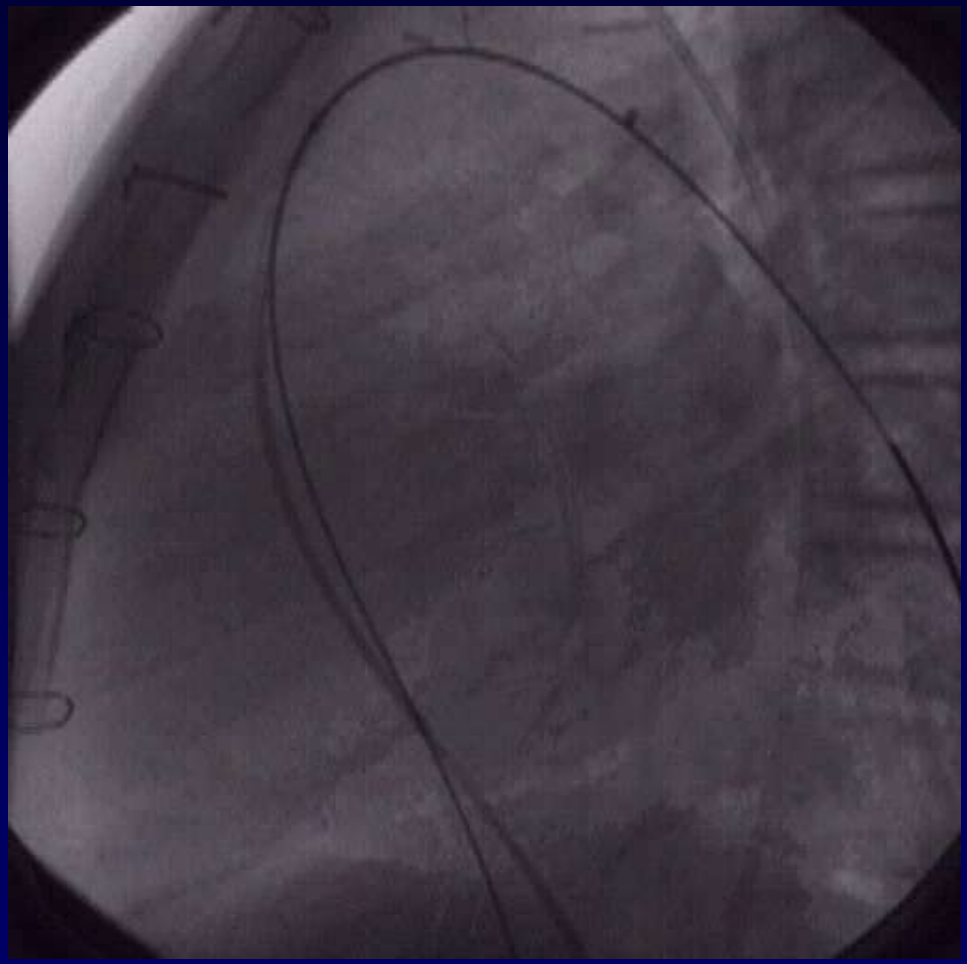




Procedure

Pre-dilatation 30%

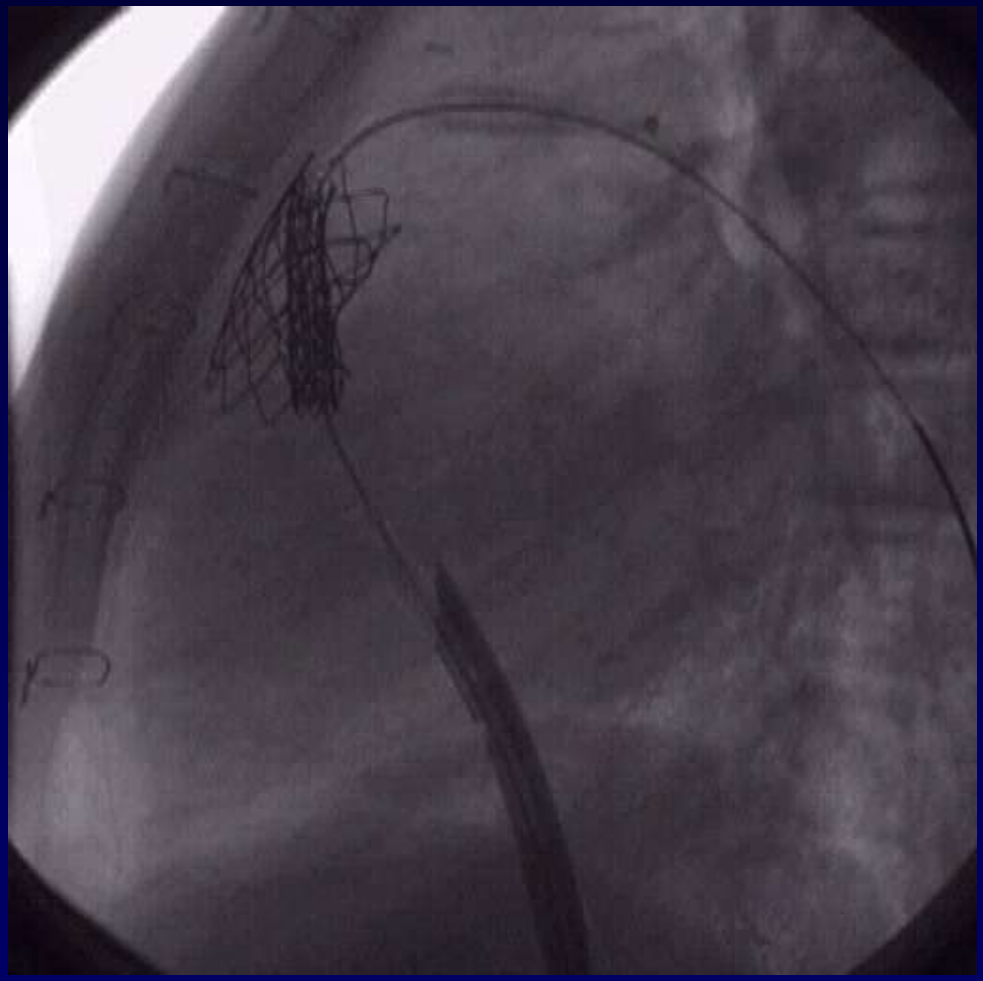
Pre-stenting 50%



Procedure

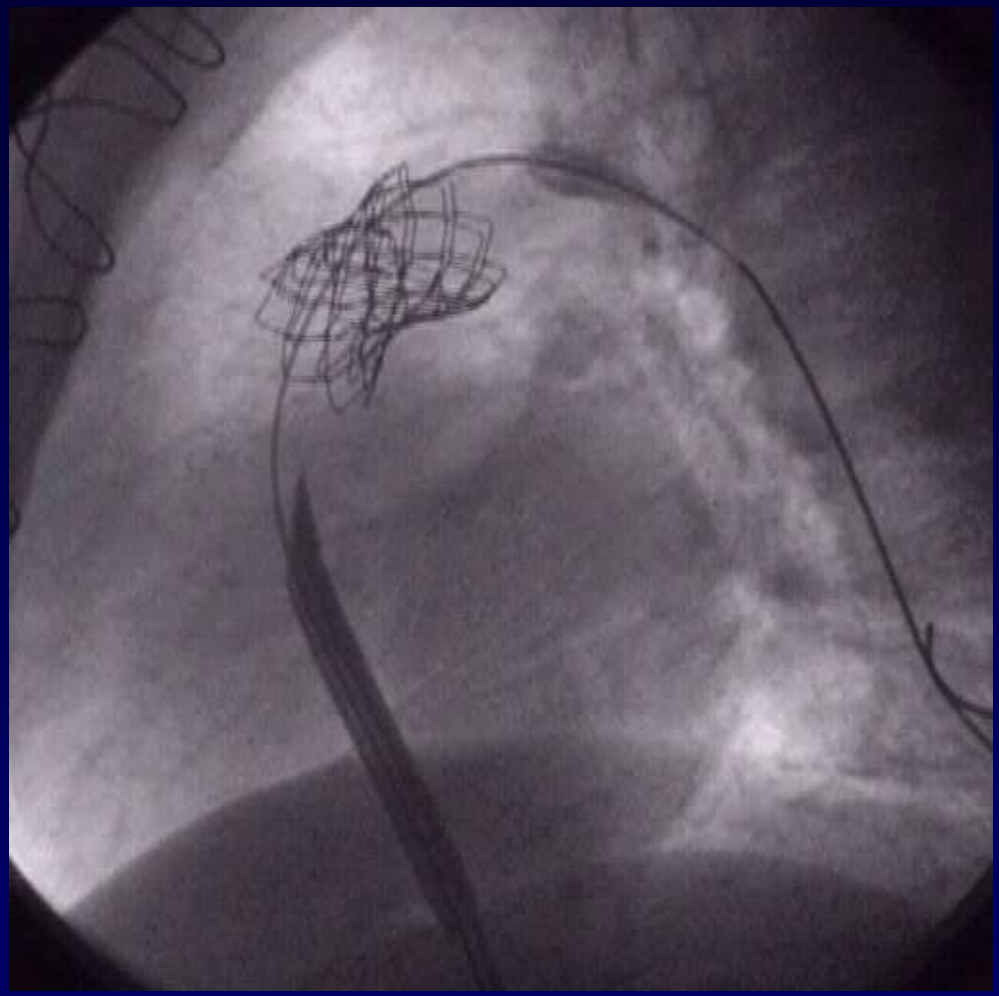
Melody implanted

- 18mm: 23%
- 20mm: 28%
- 22mm: 45%



Procedure

Post-dilatation 70%



Global experience with Melody up to May 2008

• Implantations worldwide	550
• Europe	399
• Canada	68
• U.S.	57
• Saudi Arabia	26

M Carminati Euro PCR 2008

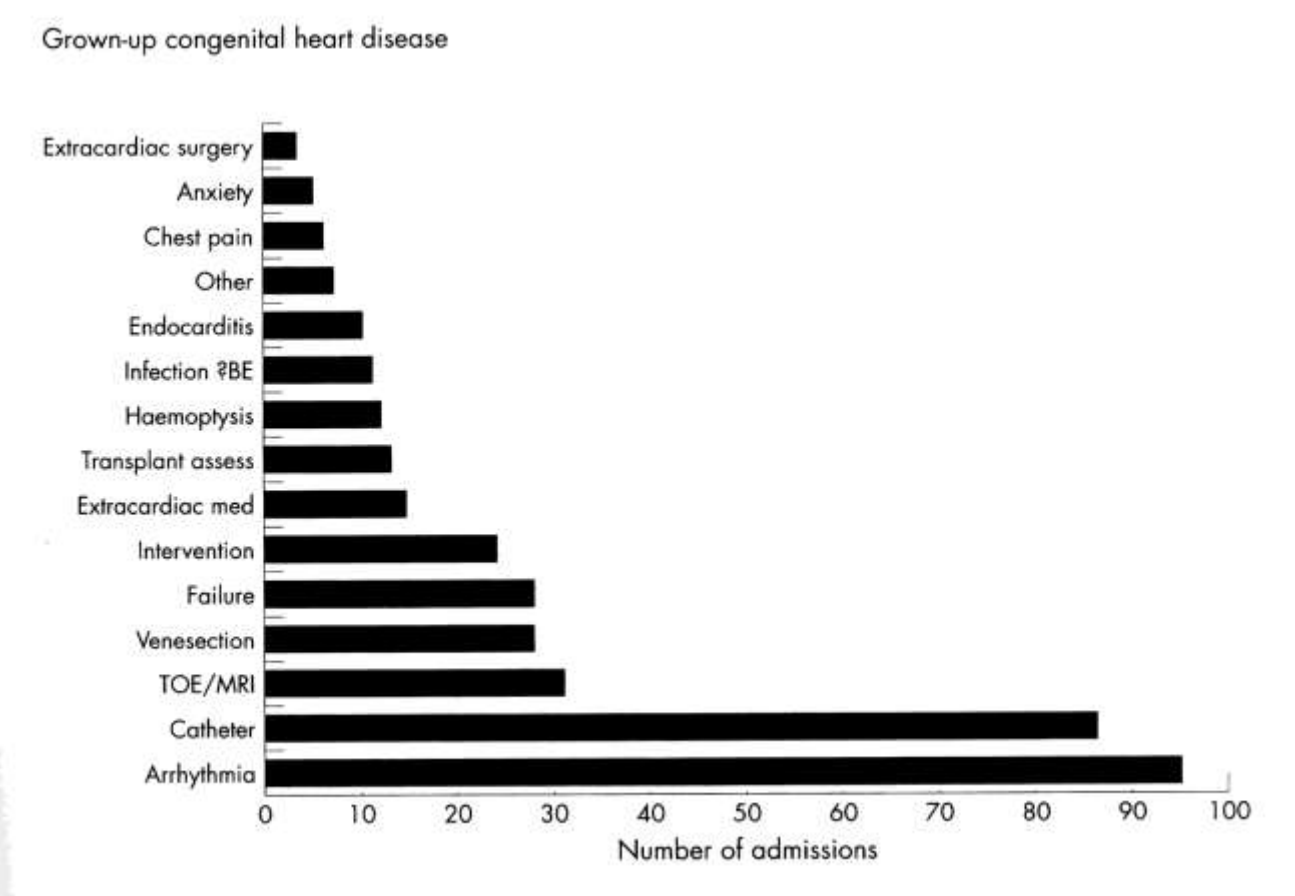
Acute results

Melody successfully implanted:

294/305 (96,4%)

- *Residual gradient < 25mmHg:* *88%*
- *Absent / trivial pulmonary regurgitation:* *99%*

Reasons for hospitalisation *Fron Jane Sommerville Database*



Catheterization and Cardiovascular Interventions 67:258–264 (2006)

PEDIATRIC AND CONGENITAL HEART DISEASE

Congenital Heart Disease

The Impact of Interventional Cardiology for the Management of Adults with Congenital Heart Defects

Massimo Chessa,[1*] MD, PHD, FSCAI, Marianna Carrozza,[1] MD, Gianfranco Butera,[1] MD, PHD, Diana Negura,[1] MD, Luciane Piazza,[1] MD, Alessandro Giamberti,[1] MD, Vasta Feslova,[1] MD, Edoardo Bossone,[1] MD, FACC, Carlo Vigna,[2] MD, and Mario Carminati,[1] MD

Thank you for your attention!

Mario Carminati