

An intraoperative photograph showing a surgical field during aortic valve surgery. A white circular retractor is used to hold back muscle and soft tissue, providing a clear view of the aortic valve. The valve's leaflets are visible, and surgical instruments are present in the field. The overall scene is illuminated with bright surgical lights, highlighting the reddish-pink color of the heart tissue.

# AORTIC VALVE SPARING OPERATIONS IN MARFAN SYNDROME

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[www.cirugiacardiaca.org](http://www.cirugiacardiaca.org)

# Aortic valve sparing operations

## ■ BENTALL

Durability

Excellent results

But... Chronic anticoagulation

## ■ VALVE SPARING

Durability ?

Learning curve

But... No anticoagulation



Is the change acceptable ?

In what patients?

# Marfan syndrome

Conective tissue disorder

Mutation in the fibrilin 1 gen on cromosome 15

Incidence 1 in 5000-10000

**Cardiovascular system**

**Eyes**

**Skeleton**

# Marfan syndrome. Life expectation

Mean age at death

**32 y** (1972)



**45 y** (1998)

*Gray et al. Life expectancy in British Marfan syndrome population. Clin Genet 1998;54:124-8*



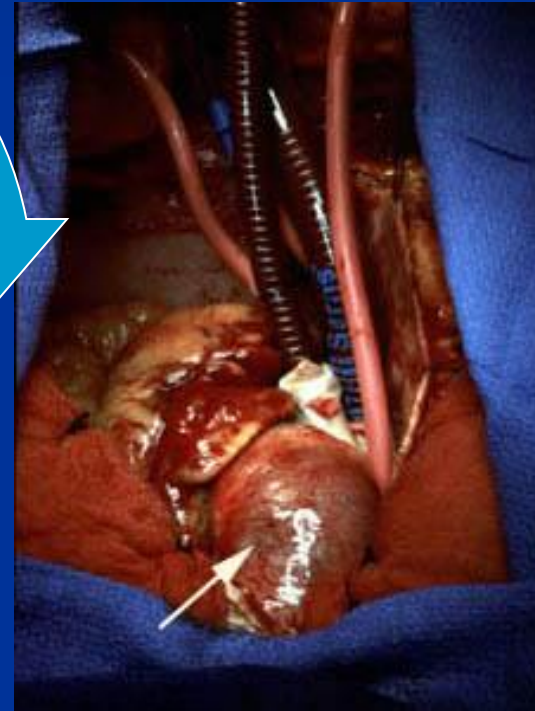
# How much time should we wait ?

Root aneurysm



Mortality 1 -5 %

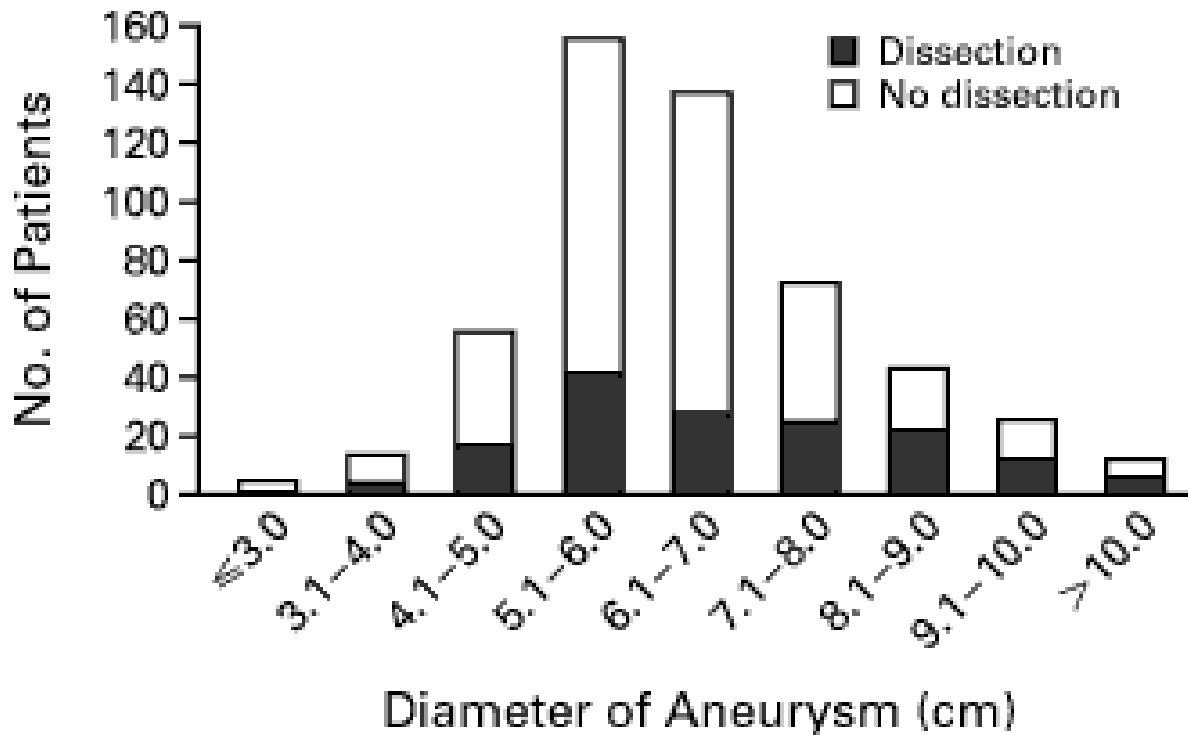
Aortic dissection



Mortality 11 – 30%

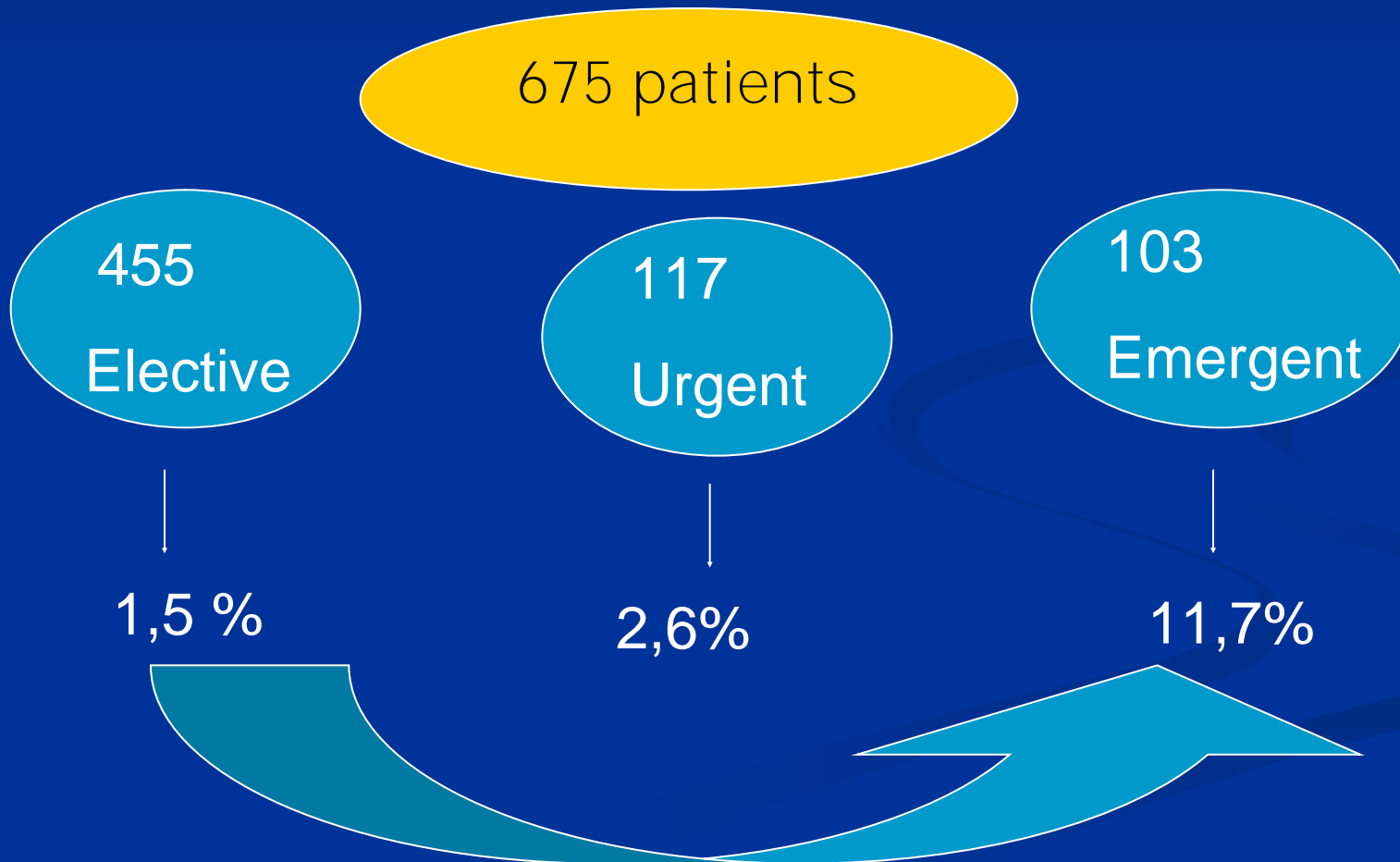
# Diameter of Aneurysm - Dissection

*V.Gott. NEJM 1999*



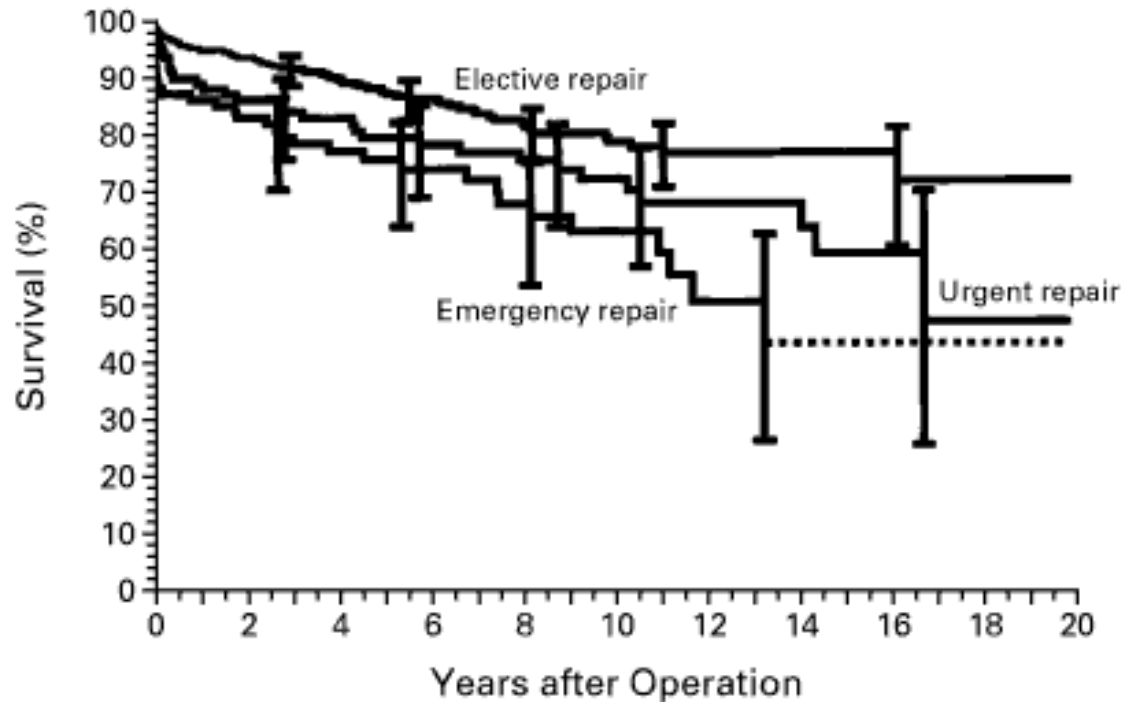
# Hospital mortality in aortic root surgery

V.Gott et al. Replacement of the aortic root in patients with Marfan's syndrome ( N Engl J Med 1999; 340: 1307-13)



# Actuarial Survival after aortic root surgery

V.Gott et al. Replacement of the aortic root in patients with Marfan's syndrome ( N Engl J Med 1999; 340: 1307-13)



No. AT RISK

Elective repair	455	381	294	204	141	97	64	42	17	4	1
Urgent repair	117	88	74	62	53	41	23	16	8	4	3
Emergency repair	103	73	57	41	31	21	10	4	3	2	0

# Timing of Surgery

	AoI 0,I,II	AoI III,IV
1985	6,5	6
1995	5,5	5
2005	<b>5 cm</b>	<b>4,5 cm</b>
2010	?	?

# Timing of Surgery

Management of Aortic Disease in Marfan Syndrome ( Arch Intern Med.2005;165:749-755)

Markov decision analysis

CONCLUSION

> 3 cm



PROPHYLACTIC  
AORTIC SURGERY

# Timing of Surgery

*7 th International research symposium on the Marfan Syndrome ( Ghent september 2005)*

> 5 cm

> 4 cm + moderate aortic insufficiency

**4,5 – 5 cm            surgery if valve could be preserved**

> 2mm / year

# History

Dr. Hugh Bentall ( 1966, London)



This operation has saved lives  
in thousand of patients

Gold standard

# History

Professor Sir Magdic Yacoub



Remodeling technique



1983 : first described *Circulation* 1983; 68:III-321

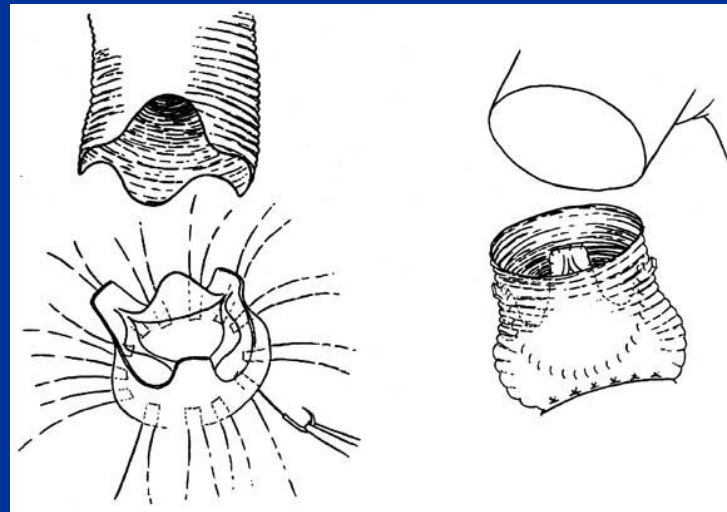
1993: *Remodeling of the aortic annulus. JTCS* 1993;105:435-8

# History

Dr. Tirone David



Reimplantation technique



*An aortic valve-sparing operation for patients with aortic incompetence and aneurysm of the ascending aorta. JTCS 1992;103:617-22*

# Confusion

What should I  
choose in this  
patient ?



Bentall  
Remodeling  
David I  
David II  
David III  
David IV  
David V  
David VI  
Valsalva graft



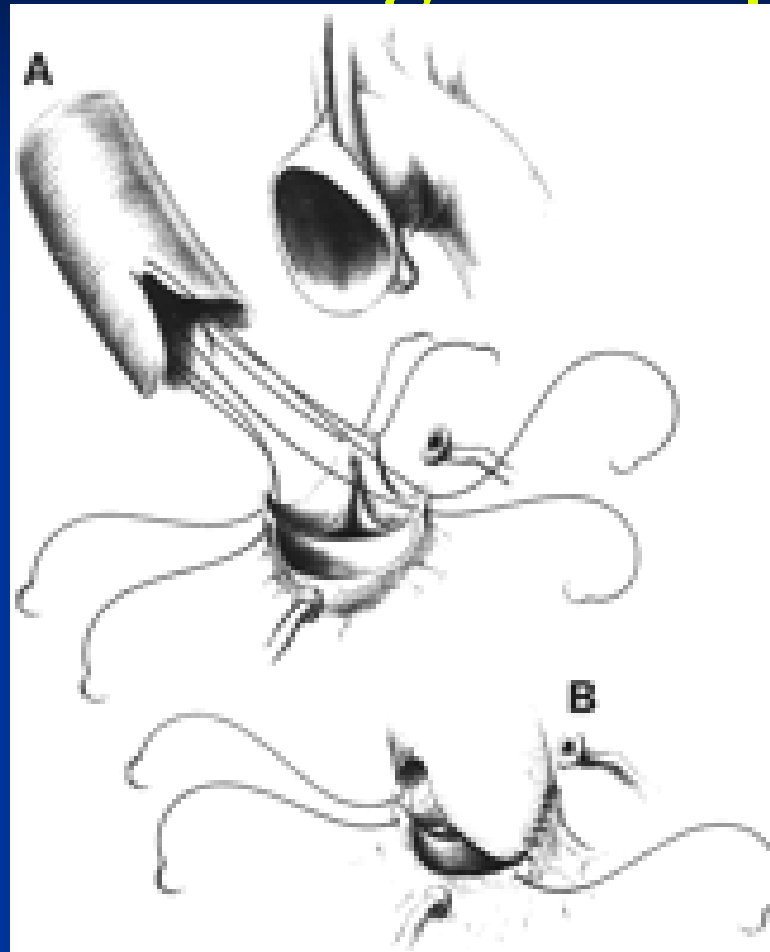
...maybe the best for this patient is to call other surgeon...

# Nomenclature ????

- **David I**      cilindric graft
- **David II** = Yacoub
- **David III** = Yacoub + annuloplasty
- **David IV**      cilindric graft 2-4 mm larger
- **David V**      cilindric graft 4-6 mm larger
- **David VI**      (Stanford modification) two grafts
- **David**      De Paulis graft



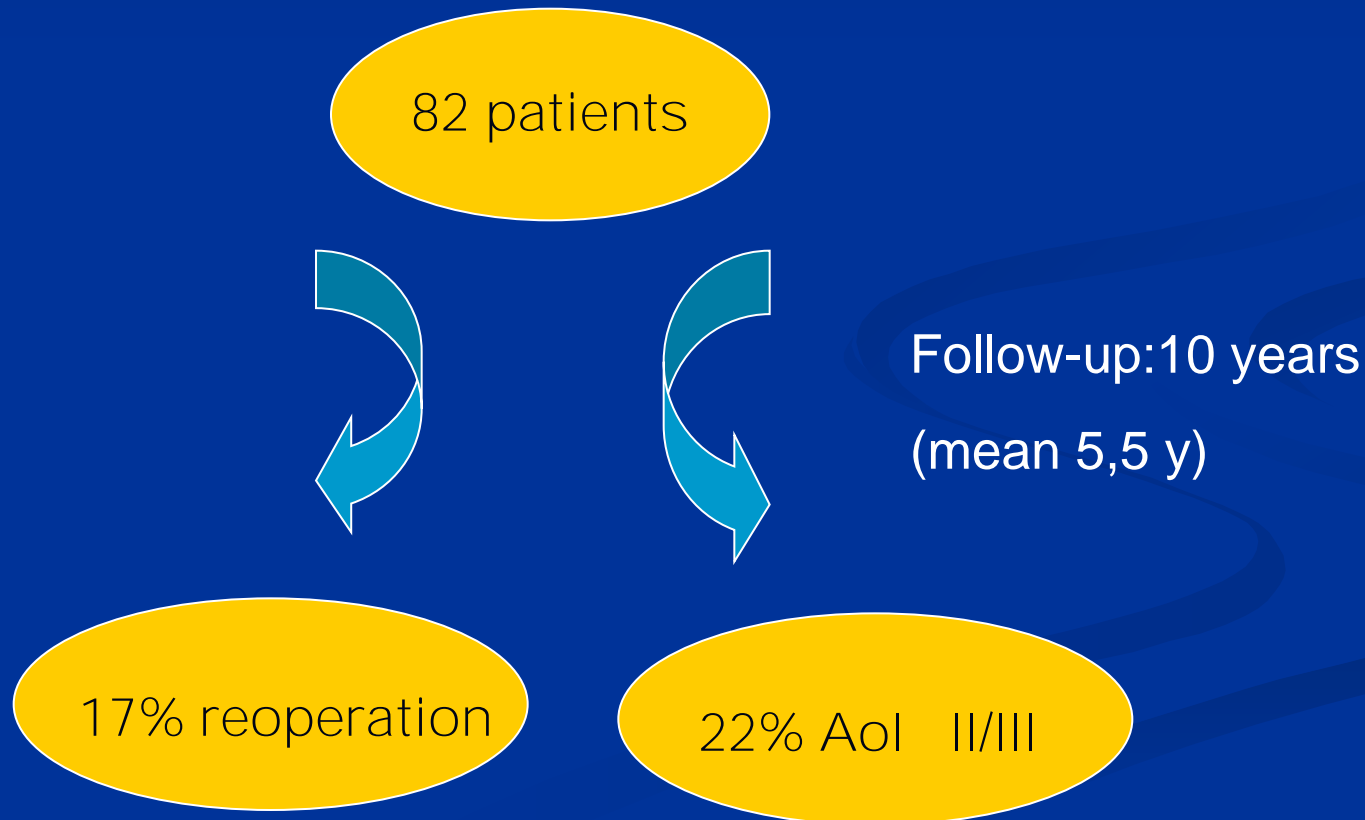
# Remodeling technique



*Yacoub et al. Early and long term results of a valve sparing operation for Marfan syndrome. Circulation. 1999; 100 II-29-35*

# Remodeling technique

*Yacoub et al. Early and long term results of a valve sparing operation for Marfan syndrome.  
Circulation.1999; 100 II-29-35*




# Reimplantation technique. David`s experience

*Aortic valve sparing operations in patients with aneurysms of the Aortic root or ascending aorta.ATS 2002; 74: 1758-61*

**230 patients** ( 151 root aneurysms )

**94 reimplantation technique**

Hospital mortality	2 patients
Survival	83%
No reoperation	97%
No Ao regurgitation	<b>90% ( reimplante)</b> 55% (remodelado)



Follow up  
8 years

# Reimplantation technique. Impact of preoperative aortic insufficiency

*Kallenbach et al ATS 02;74:S1765-8*

## 158 aortic root aneurysms

	83 AoI III/IV	vs	71 AoI I/II
Mortality	3.6%		4.2%
Reop.	3.8%		4.4%
AoI mean	0.43+/-0.58		0.42+/-0.62
<b>No AoI III/IV</b>	<b>98%</b>		<b>89%</b>
<b>( 8 years)</b>			

# Reimplantation technique. Impact of preoperative aortic root diameter

*Kallenbach et al (Circulation 2003;108II285-90)*

## 168 patients aortic root aneurysms

Aortic root	47 (>60 mm)	58 (50-60)	18 (<50)
Survival	98%	100%	100%
No reop	98%	96%	63%
No AoI >II	100%	96%	94%

mean follow up 3 years

# Management of pediatric aortic disease in Marfan syndrome

(Cameron et al. 7th International Research symposium on the Marfan Syndrome. Ghent Sept 2005)

## Timing of surgery

Sinuses > 5 cm  
> 1 cm / year

Progressive aortic regurgitation

Other valvular surgery + moderate sinuses dilatation

Aortic dissection very rare under 12 years

# Management of pediatric aortic disease in Marfan syndrome

(Cameron et al. 7th International Research symposium on the MARfan Syndrome. Ghent Sept 2005)

**n = 61** mean age 13 mean diameter 5.6 cm

72% root an. 16% mitral valve, 10% dissection, 2% aortic insuff.

**No hospital mortality**

		Late mortality	Late Results
<b>Bentall</b>	29	10%	No morbidity, 3 exitus
<b>Sparing</b>	22	0%	2 reoperations ( Yacoub)
<b>Homograft</b>	10	30%	4 reoperations

**Election procedure: David with Valsalva graft**

# Hospital 12 de Octubre experience

- From march 2004 –sept 2005: **23 patients**
- Mean age: 53 years
- **Seven patients: Marfan syndrome**
- Mean aortic root diameter: 55,4 mm
  
- **Preop.aortic insufficiency**

IV	( 11 )
III	( 6 )
I	( 6 )
  
- **Other associated surgery**

coronary revascularization	( 3 )
mitral – tricuspid – Closure IAC	( 2 )
closure IAC	( 1 )

# Hospital 12 de Octubre experience

- David I: 1
- Valsalva graft: 17
- David VI (Stanford): 5


**Reimplantation  
technique**

Mean bypass time 207'

Mean clamp time 170'

# Hospital 12 de Octubre experience

## Results

- Two patients: Ao I > II  reconversion to mechanical prosthesis
- No hospital mortality
- One AMI , one permanent pacemaker
- No other major complications
- Mean follow up 8 months 

Ao I	0	13
I	5	
II	1	
- One exitus at 9 months: abdominal aneurysm rupture

# Reflections

- Marfan patients have increased his life span since Bentall procedure developed in 1966.
- Gold standard : Bentall operation
- But... chronic anticoagulation and prostheses related complications

# Reflections

## Valve sparing operations

- Avoid chronic anticoagulations
- Decrease thromboembolic and haemorrhagic complications.
- Decrease endocarditis
- Improve quality of life in a very young population

# Reflections

Durability ?

- How many years without warfarin will the valve last before a second operation might become necessary ?
- The key question is not if the valve can be spared, but will the preserved aortic valve function well for 10 years, if no longer ?

More complicated operation  
Learning curve