



Milano
28-29 ottobre 2010

ECOCARDIOCHIRURGIA

LE PROTESI AORTICHE PER VIA PERCUTANEA O TRANSAPICALE

***Monitoraggio ecocardiografico tridimensionale
della sostituzione percutanea della valvola aortica.
(Il ruolo del cardiologo esperto in imaging non invasivo come guida
alla procedura corretta)***

Gloria Tamborini
Centro Cardiologico Monzino



Centro Cardiologico
Monzino

***Il ruolo del cardiologo esperto in
imaging come guida alla
procedura corretta***

- ✓ ***Valutazione preoperatoria***
- ✓ ***Monitoraggio intraoperatorio***
- ✓ ***Valutazione del risultato***
- ✓ ***Follow up del paziente***

***Il ruolo del cardiologo esperto in
imaging come guida alla
procedura corretta***

✓ ***Valutazione preoperatoria***

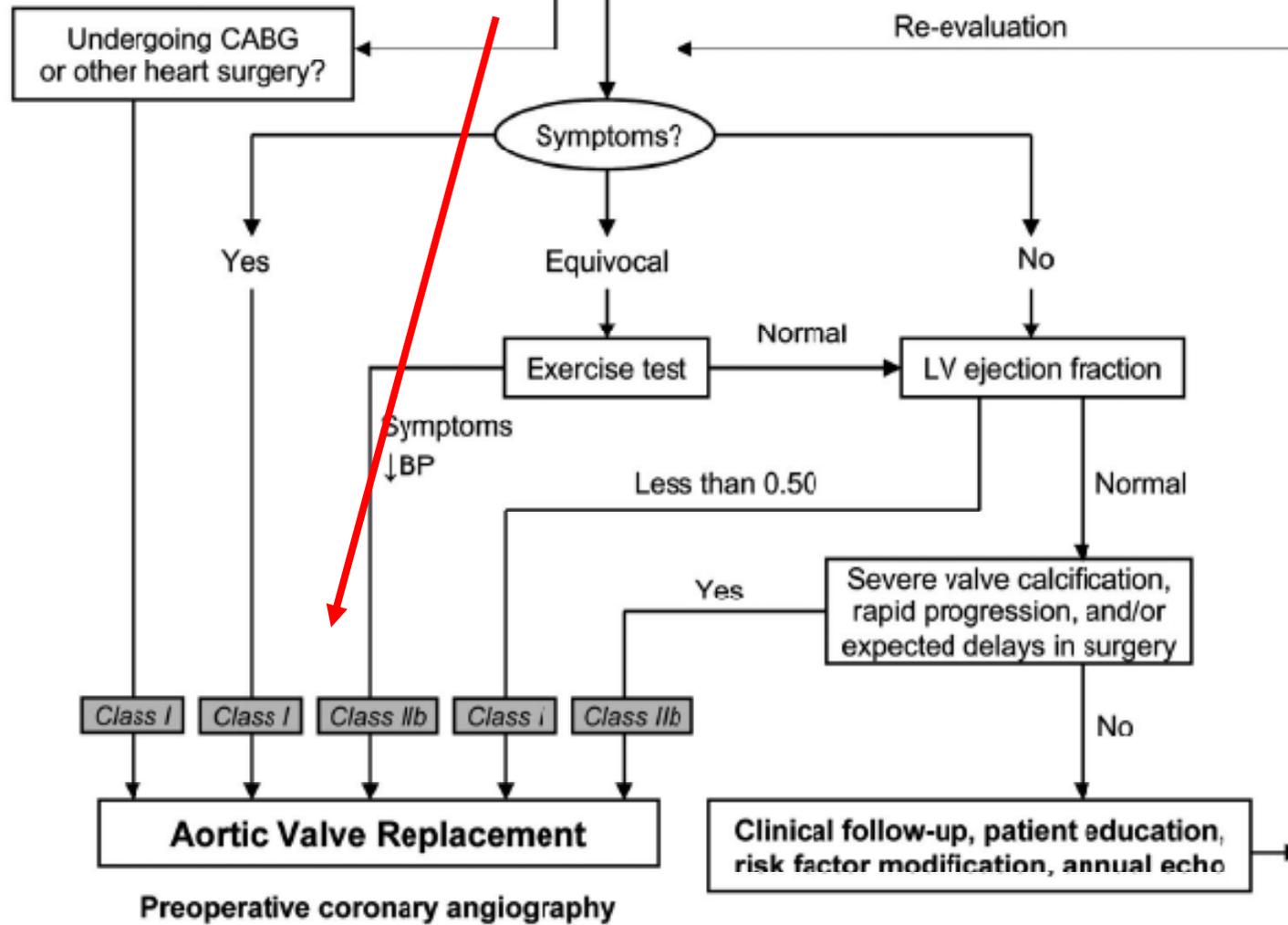
✓ ***Monitoraggio intraoperatorio***

✓ ***Valutazione del risultato***

✓ ***Follow up del paziente***

Severe Aortic Stenosis

Vmax greater than 4 m/s
AVA less than 1.0 cm²
Mean gradient > 40 mm Hg

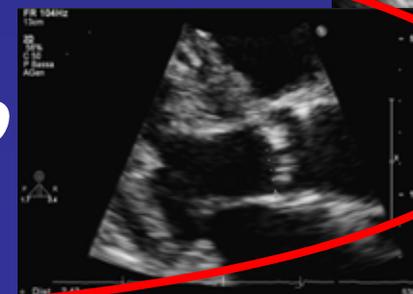


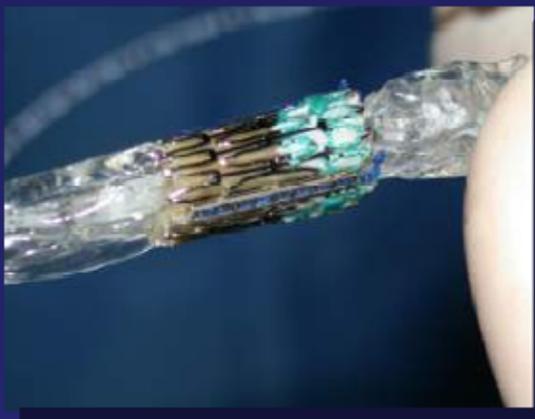
ECO TTE PREOPERATORIO PER STABILIRE L'ANATOMIA VALVOLARE AORTICA:

- ***ENTITA' E DISTRIBUZIONE
DELLE CALCIFICAZIONI A
LIVELLO DELLE CUSPIDI***
- ***CALCIFICAZIONE
DELL'ANELLO MITRALICO E
DEL LEMBO ANTERIORE***
- ***PRESENZA DI BICUSPIDIA
AORTICA***
- ***ENTITA' DEL RIGURGITO
ASSOCIATO***

MA SOPRATTUTTO:

- ***DIMENSIONI DELL'ANELLO
VALVOLARE AORTICO***





La protesi Edwards– Sapien:



*calibro **23 mm** richiede :*

- *anello nativo 18–21 mm*
- *distanza anello/TC >10 mm.*

*Una **protesi più piccola dell'anello valvolare** del paziente può determinarne lo spostamento, l'embolizzazione della protesi o un eccessivo rigurgito paraprotetico*

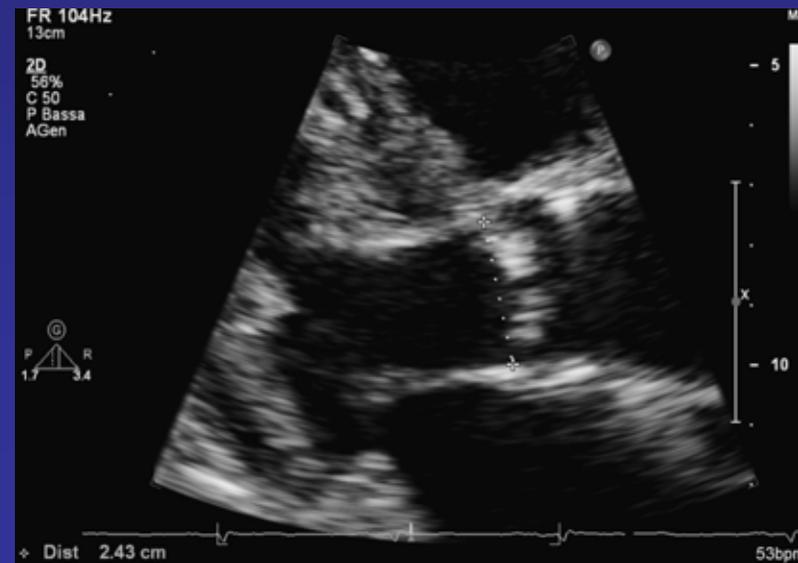
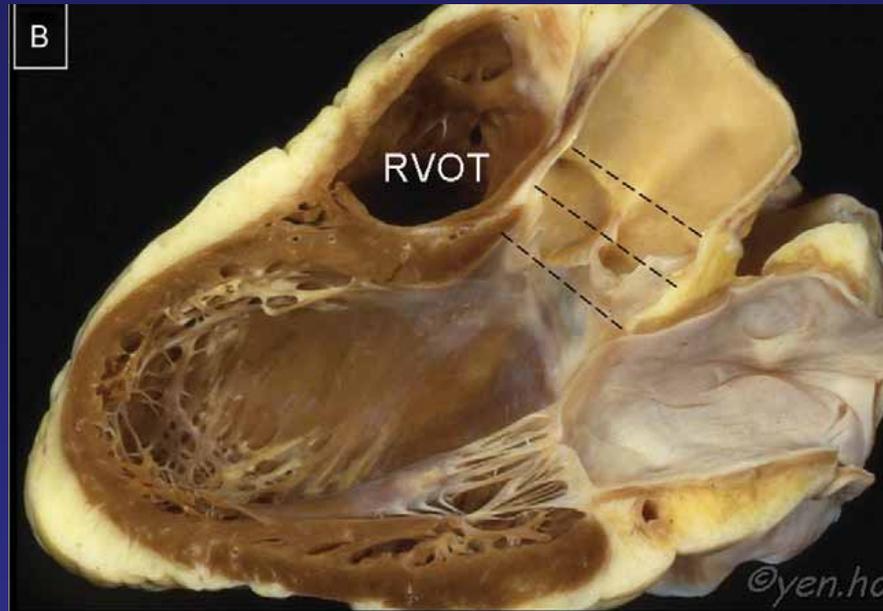
- *L'impianto di una **protesi troppo grande** può causare trauma dell'anulus, ostruzione dell'ostio coronarico, espansione subottimale dello stent e pertanto distorsione delle cuspidi valvolari e severa insufficienza intraprotetica o interferire con la funzione dell valvola mitrale*

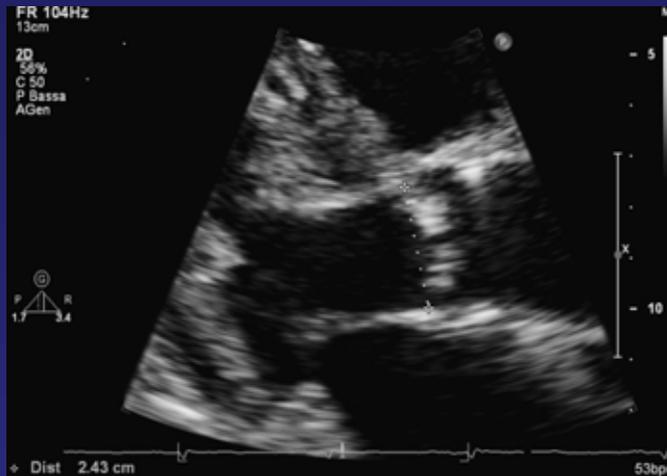
*calibro **26 mm** richiede:*

- *anello nativo 22–24.5 mm*
- *distanza anello/TC >11 mm.*

Valutazione dell'anello aortico

TTE

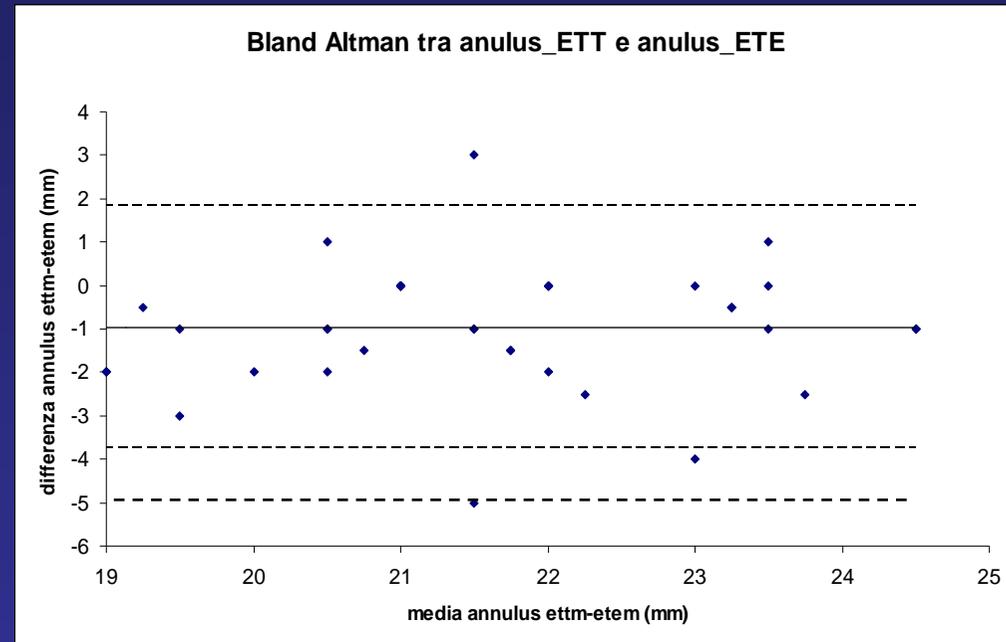




TTE



TEE



*Dati preliminari annulus
TTE e TEE nei primi 80 pz da noi studiati:
differenza media – 1mm*

TTE vs TEE

JACC: CARDIOVASCULAR IMAGING
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VOL. 1, NO. 3, 2008
 ISSN 1534-878X/08/1324-00
 DOI:10.1016/j.jcmg.2007.09.004



Role of Echocardiography in Percutaneous Aortic Valve Implantation

Robert R. Moss, MB, BS,*† Emma Ivens, MB, BS,*† Sanjeevan Pasupati, MB, ChB,*†
 Karin Humphries, PhD,*†† Christopher R. Thompson, MD, CM,*†† Brad Munt, MD,*††
 Ajay Sinhal, MD,*†† John G. Webb, MD,*†

Vancouver, British Columbia, Canada

TEE vs TAC

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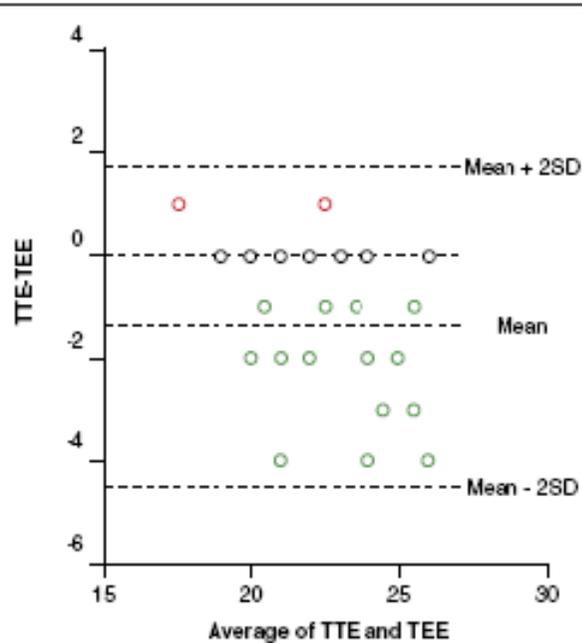


Noninvasive Evaluation of the Aortic Root With Multislice Computed Tomography

Implications for Transcatheter Aortic Valve Replacement

Laurens F. Tops, MD,* David A. Wood, MD,† Victoria Delgado, MD,*
 Joanne D. Schalij, MSc,* John R. Mayo, MD,† Sanjeevan Pasupati, MD,†
 Frosko P. L. Lamers, MD,* Ernst E. van der Wall, MD, PhD,*
 Martin J. Schalij, MD, PhD,* John G. Webb, MD,† Jeroen J. Bax, MD, PhD, FACC*

Leiden, the Netherlands, and Vancouver, Canada



The mean difference (TTE-TEE) is -1.36 mm (2 SD -4.48 to +1.75 mm).

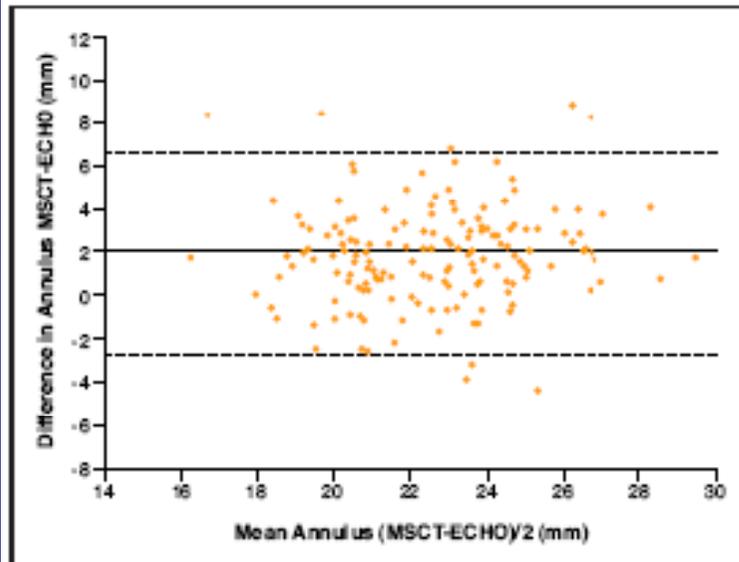


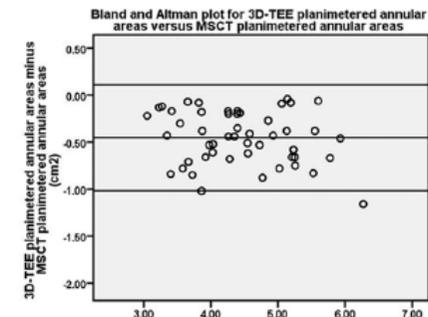
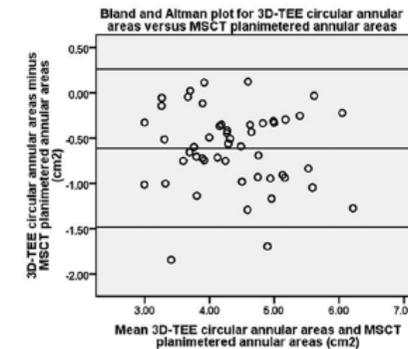
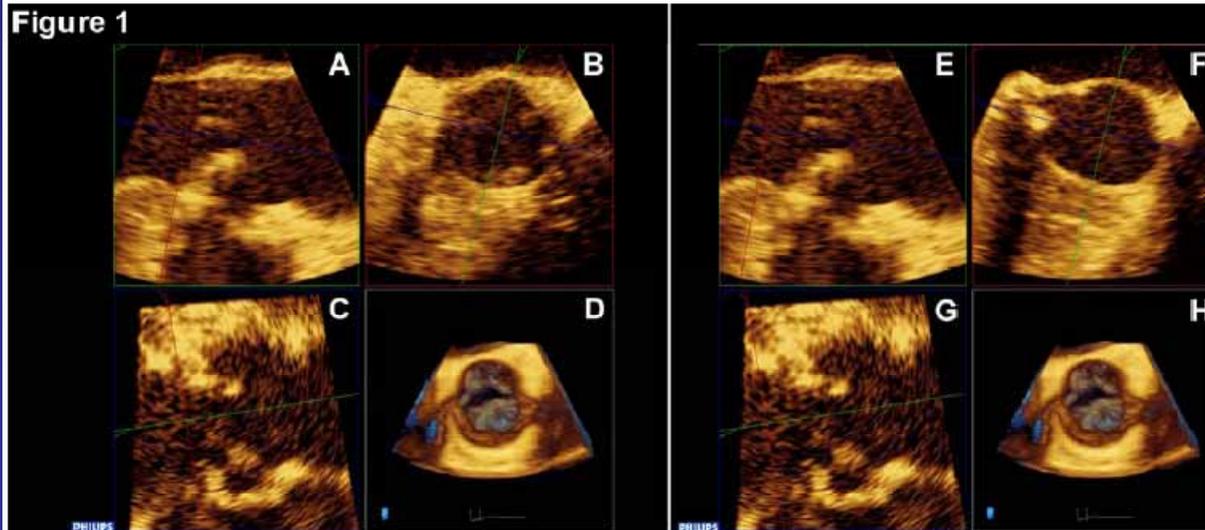
Figure 7. Agreement Between MSCT and Echocardiography

TAC vs 3DTEE

Comparison of Aortic Root Dimensions and Geometries Pre- and Post-Transcatheter Aortic Valve Implantation by 2- and 3-Dimensional Transesophageal Echocardiography and Multi-slice Computed Tomography

Arnold C.T. Ng, Victoria Delgado, Frank van der Kley, Miriam Shanks, Nico R.L. van de Veire, Matteo Bertini, Gaetano Nucifora, Rutger J. van Bommel, Laurens F. Tops, Arend de Weger, Giuseppe Tavilla, Dominic Y. Leung, Joanne Schuijf, Martin J. Schalij, and Jeroen J. Bax
CIRCULATIONAHA/2009/885152

Figure 1



CLINICAL RESEARCH

Interventional Cardiology

Multimodal Assessment of the Aortic Annulus Diameter

Implications for Transcatheter Aortic Valve Implantation

David Messika-Zeitoun, MD, PhD,*†; Jean-Michel Serfaty, MD, PhD,†; Eric Brochet, MD,‡

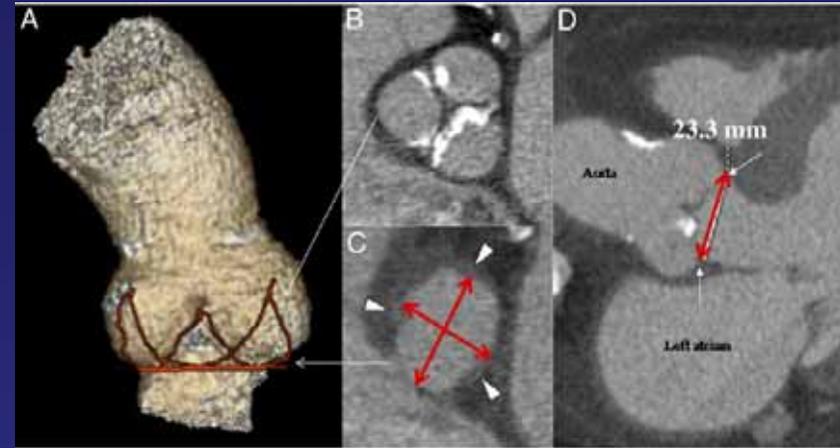


Table 2 Impact of the Method of Aortic Annulus Measurement on TAVI Strategy

	TAVI Strategy			Agreement With TTE		Agreement With TEE	
	23-mm Prosthesis	26-mm Prosthesis	No Implantation	n (%)	Kappa	n (%)	Kappa
Echocardiographic measurements							
TTE	5	29	11	—	—	37 (83)	0.68
TEE	6	25	14	37 (83)	0.68	—	—
MSCT measurements							
Virtual basal ring							
Long-axis	0	10	35	16 (36)	0.03	19 (42)	0.07
Short-axis	16	21	8	21 (47)	0.13	19 (42)	0.09
Mean	4	24	17	28 (62)	0.32	28 (62)	0.34
3-chamber view	7	25	13	27 (60)	0.28	26 (58)	0.27

EDITORIAL COMMENT

Multimodality Quantitative Imaging of Aortic Root for Transcatheter Aortic Valve Implantation

More Complex Than It Appears*

E. Murat Tuzci, MD, Samir R. Kapadia, MD,
Paul Schoenhagen, MD

Cleveland, Ohio

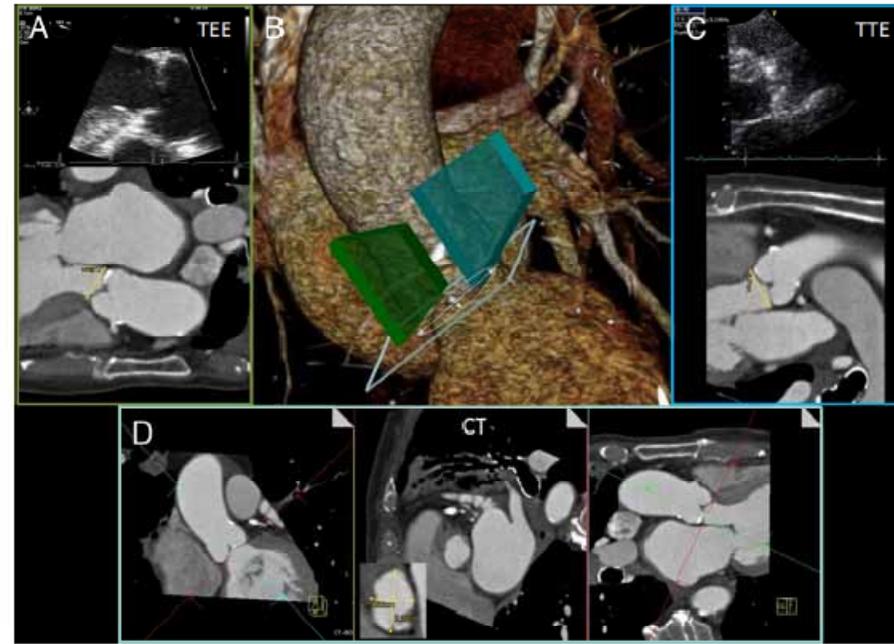


Figure 1. Multimodality Imaging of the Aortic Root

Transesophageal echocardiography (TEE), transthoracic echocardiography (TTE), and multidetector computed tomography (MDCT) images of the aortic root in a single patient. In the 3-dimensional reconstruction in B, the green, blue, and white planes demonstrate the imaging planes of the TTE, TEE, and computed tomography scans. In A, the TEE image and corresponding MDCT reconstruction in the exact same angle with measurement are shown. In C, the TTE image and the corresponding MDCT reconstruction are shown. In D, the cross-sectional MDCT image of the annulus is shown, demonstrating the elliptical shape. The fact that each method measures a different part of the annulus explains the discrepancy between the imaging modalities.

...
a
h
depending on annulus measurements, we are far from
calling this art a science!
...
fruit when more sizes
available. Although we
1) for device selection

TEE INTRA/PRE OPERATORIA



AO VALVE ANATOMY



AORTIC ANNULUS

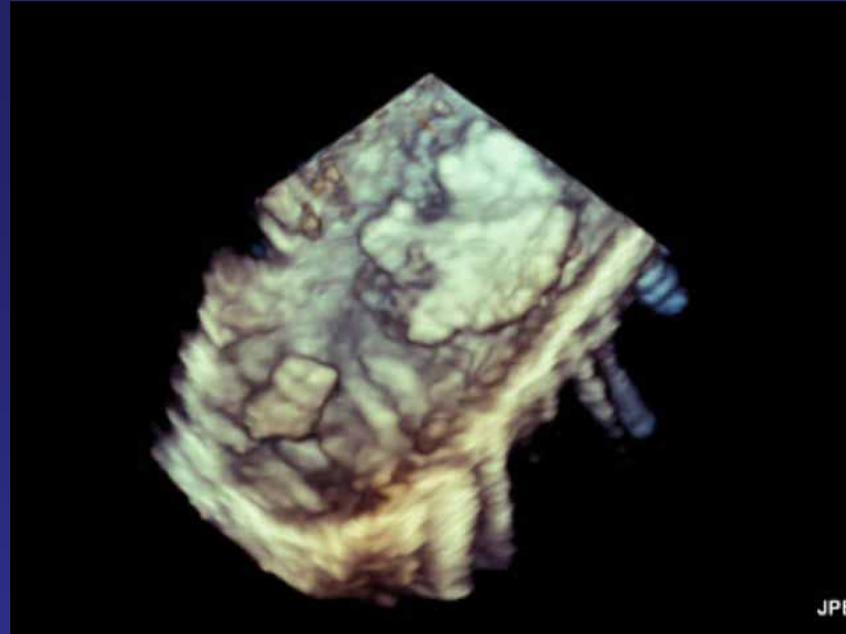


***AO VALVE
REGURGITATION***

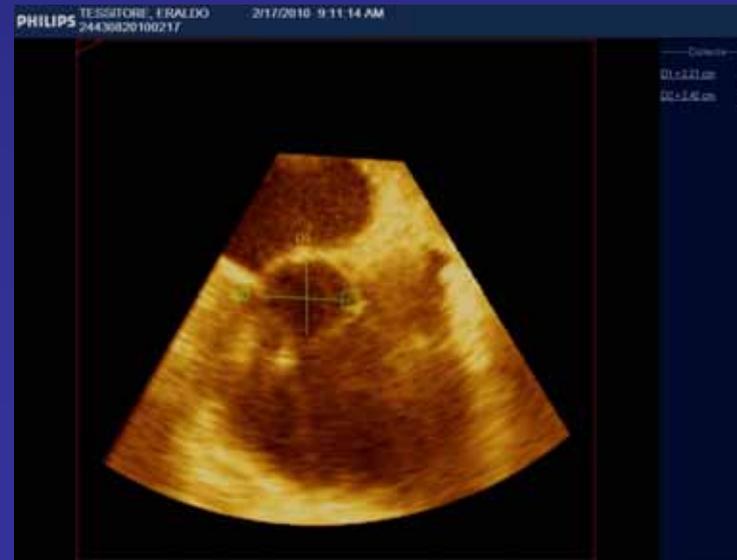
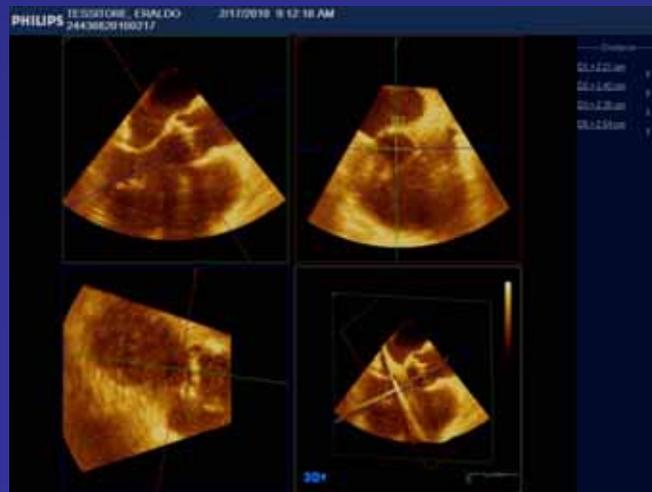


LV FUNCTION

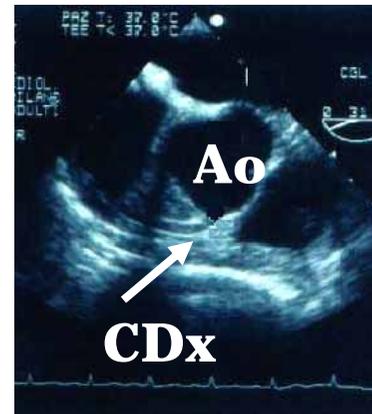
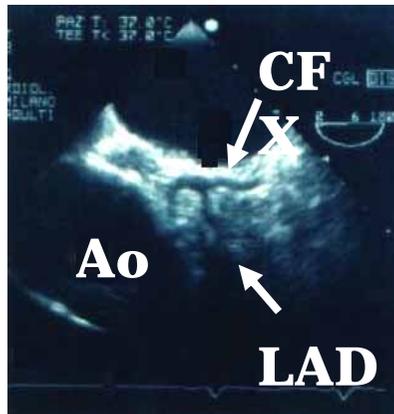
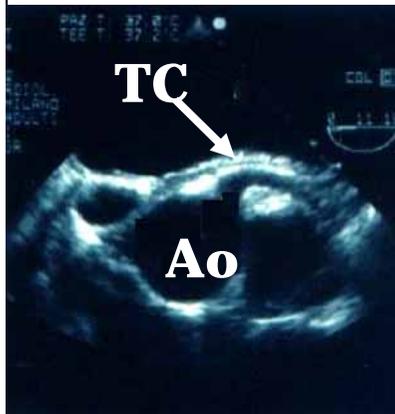
3D TEE *Aterosclerosi aorta discendente* *Area valvolare*



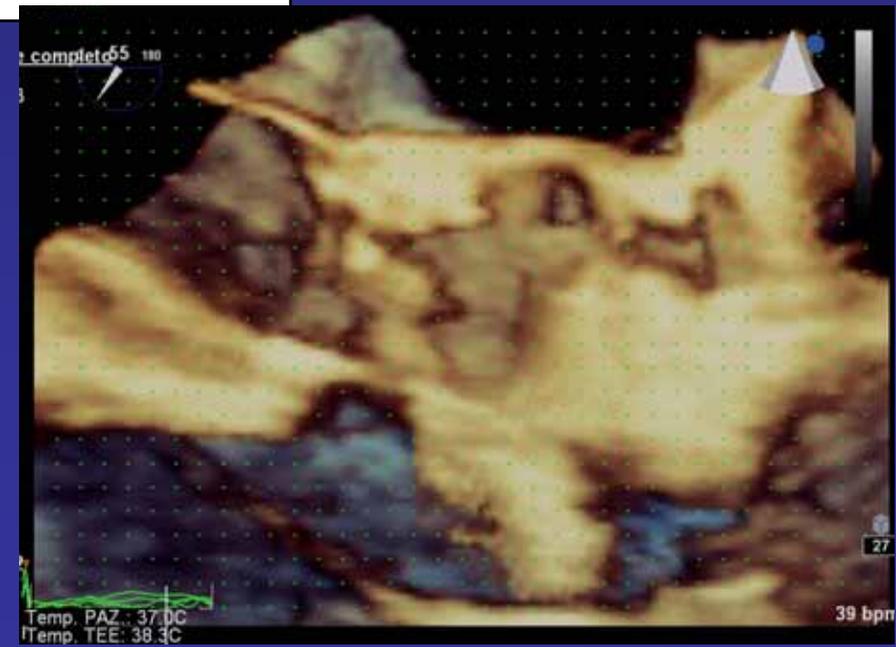
Anello valvolare



Distanza anello aortico/coronarie



Pepi et al Chest 1995.



Ruolo dell'ecocardiografia

✓ *Valutazione preoperatoria*

✓ *Monitoraggio intraoperatorio*

✓ *Valutazione del risultato*

✓ *Follow up del paziente*

2004 → 2009

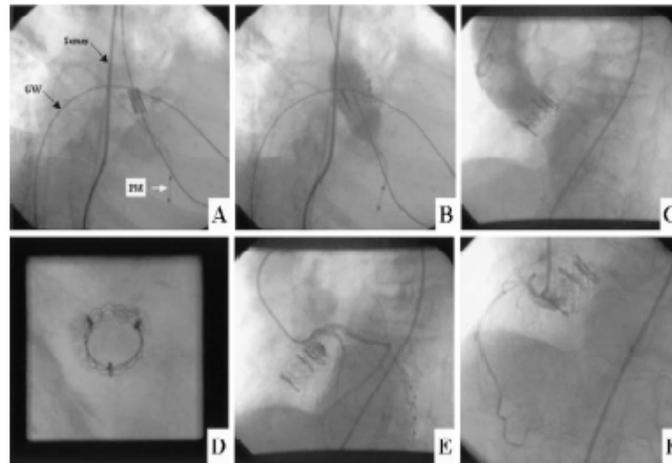
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ISSN 0735-1097/04/\$30.00
doi:10.1016/j.jacc.2003.11.026

EXPEDITED REVIEW

Early Experience With Percutaneous Transcatheter Implantation of Heart Valve Prosthesis for the Treatment of End-Stage Inoperable Patients With Calcific Aortic Stenosis

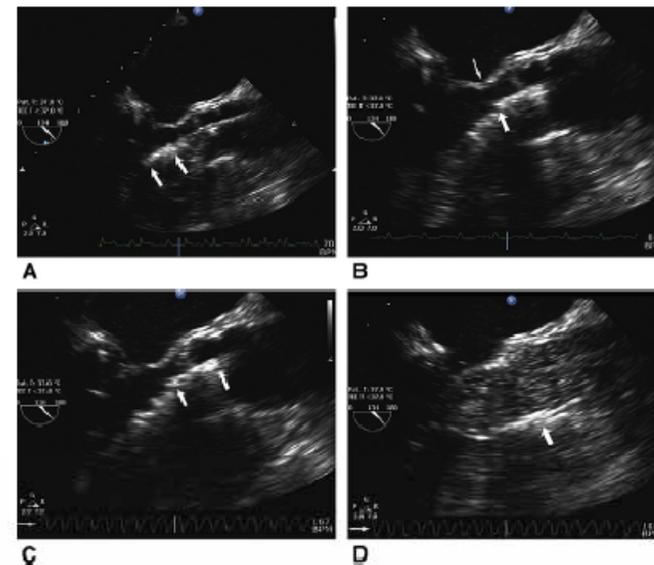
Alain Cribier, MD, FACC,* Hélène Eltchaninoff, MD,* Christophe Tron, MD,* Fabrice Bauer, MD, Carla Agatiello, MD,* Laurent Sebah, MD,* Assaf Bash, PhD,§ Danielle Nuzimovici, MD,§ P.-Y. Litzler, MD† Jean-Paul Besseau, MD ‡ Martin B. Leon, MD, FACC‡



Feasibility of transapical aortic valve implantation fully guided by transesophageal echocardiography

Eric Dumont, MD, Jérôme Lemieux, MD, Daniel Doyle, MD, and Joseph Rodés-Cabau, MD, FESC, Québec, Canada

The Journal of Thoracic and Cardiovascular Surgery • October 2009



Use of Real Time Three-Dimensional Transesophageal Echocardiography in Intracardiac Catheter Based Interventions

Gila Perk, MD, Roberto M. Lang, MD, Miguel Angel Garcia-Fernandez, MD, Joe Lodato, MD,

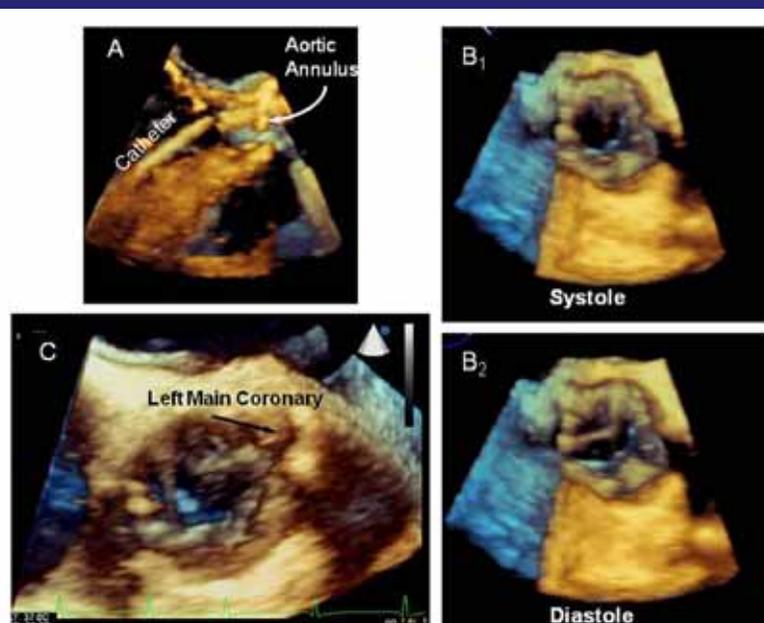


Figure 15 Percutaneous aortic valve replacement. (A) Guiding catheter seen passing through the aortic valve (3D zoom mode acquisition). (B₁) Systolic and (B₂) diastolic frames of a percutaneously implanted aortic valve as seen from the left ventricular perspective (3D zoom mode acquisition). (C) The proximal left main coronary artery, as seen from the left ventricular perspective. Patency of ostium of the left main coronary artery is confirmed after valve implantation (3D zoom mode acquisition).

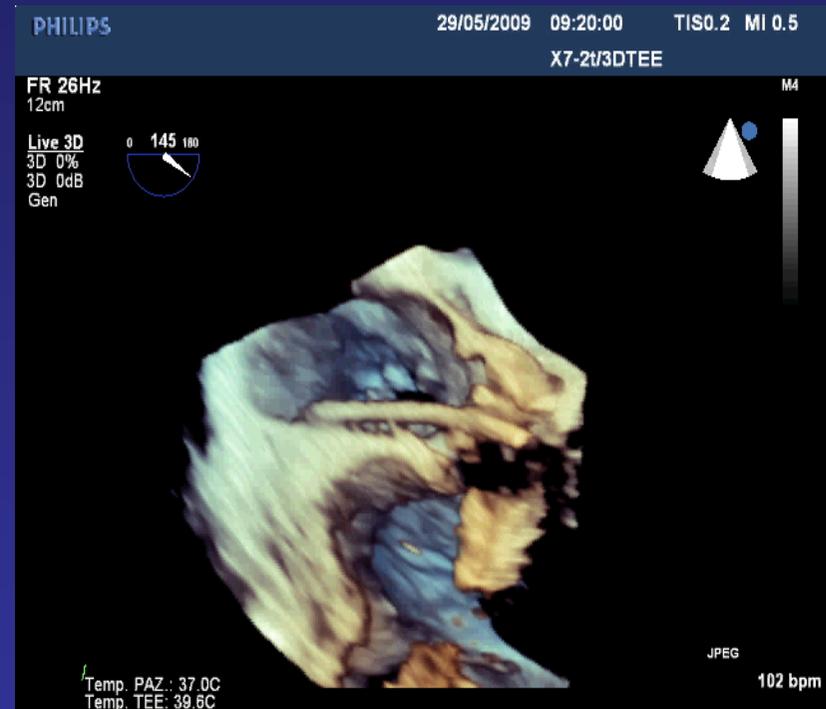
VANTAGGI:

- ✓ **Migliore visualizzazione del catetere (in particolare della punta) e dei device**
- ✓ **Migliore visualizzazione dei rapporti con le strutture anatomiche**
- ✓ **Ridotta necessità di manipolazione della sonda per la ricerca di proiezioni multiple**
- ✓ **Possibilità di ottenere visioni anatomiche “en face”**

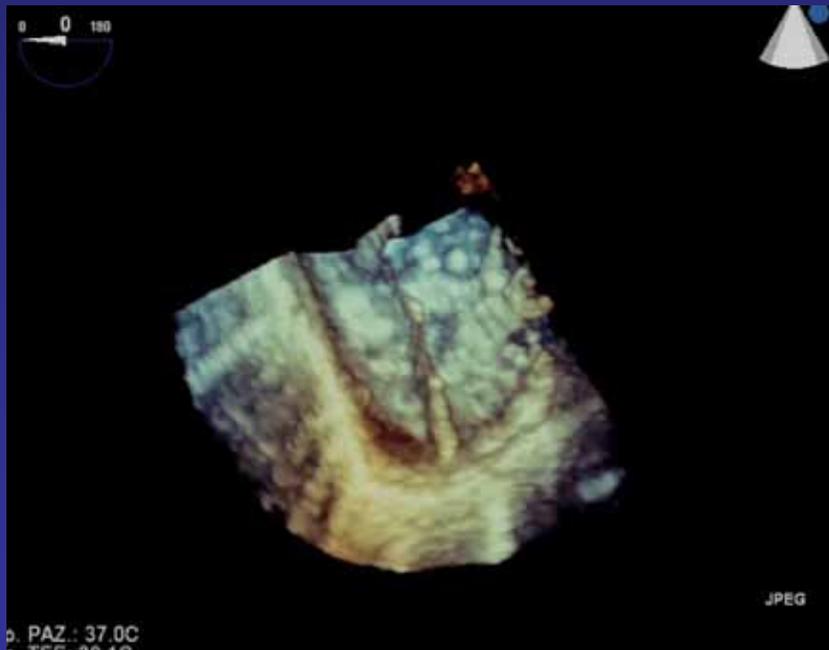
LIMITAZIONI:

- ✓ **Necessità di curva d'apprendimento**
- ✓ **Ridotto frame rate con l'utilizzo dello zoom**

Monitoraggio procedurale: Posizionamento del catetere PM



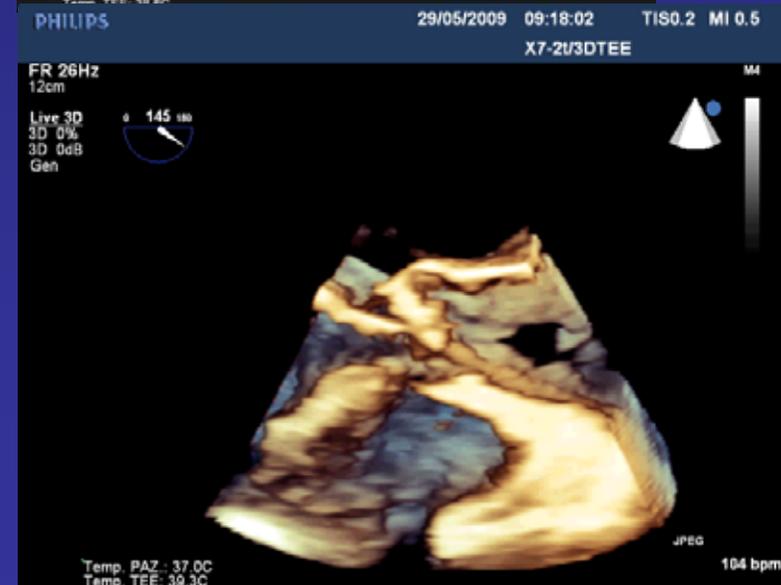
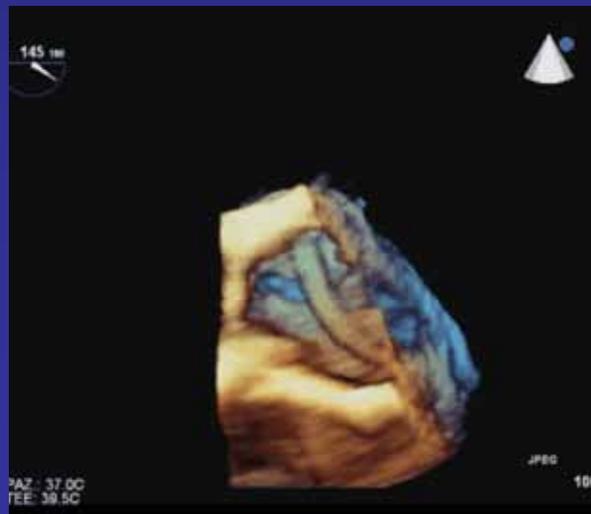
*Monitoraggio :
passaggio
in aorta discendente*



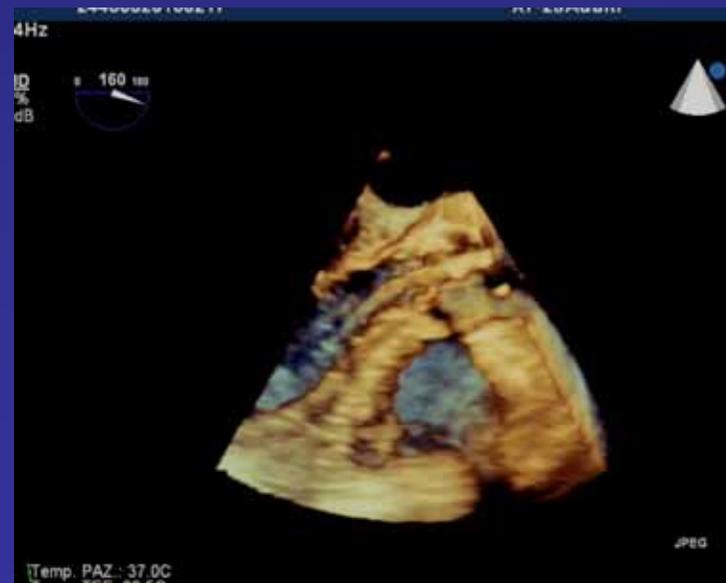
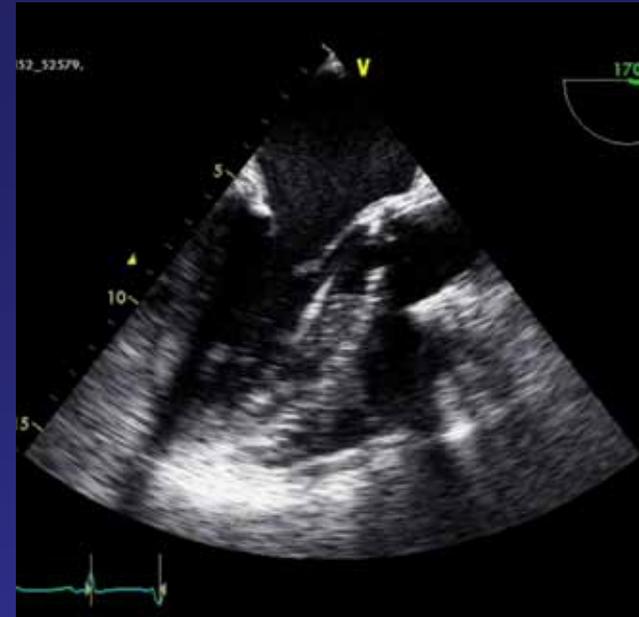
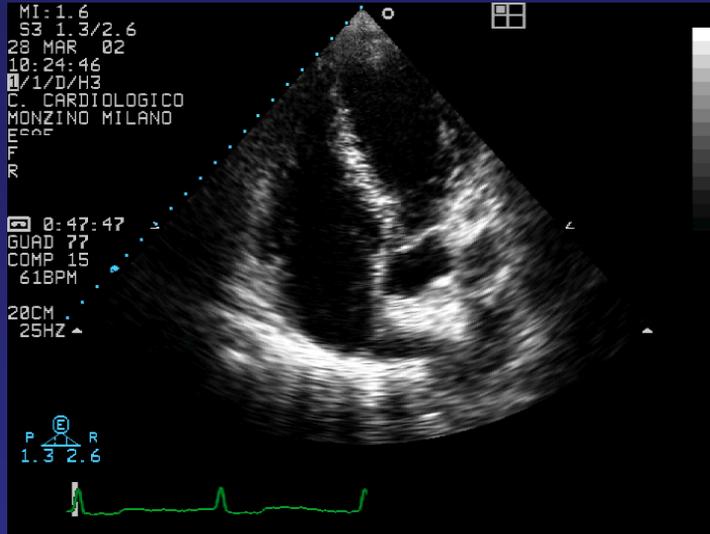
APPROCCIO TRANSFEMORALE

1) Arrivo del pig tail

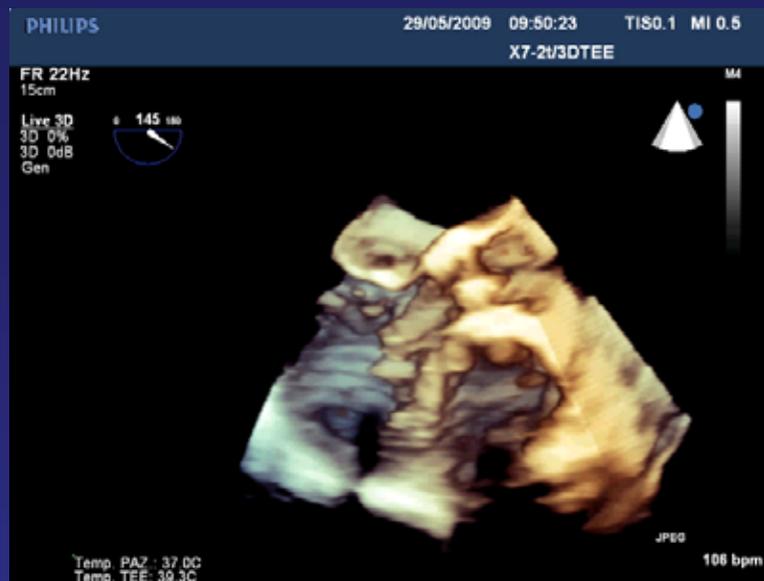
2) Passaggio attraverso la valvola aortica



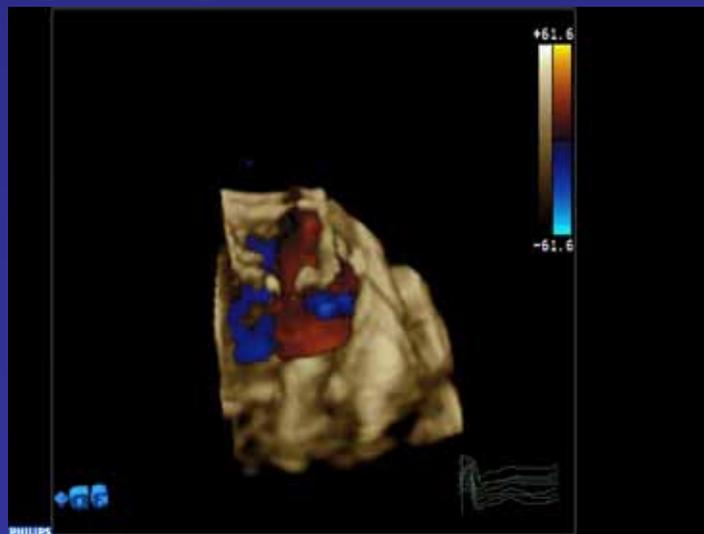
APPROCCIO TRANSAPICALE



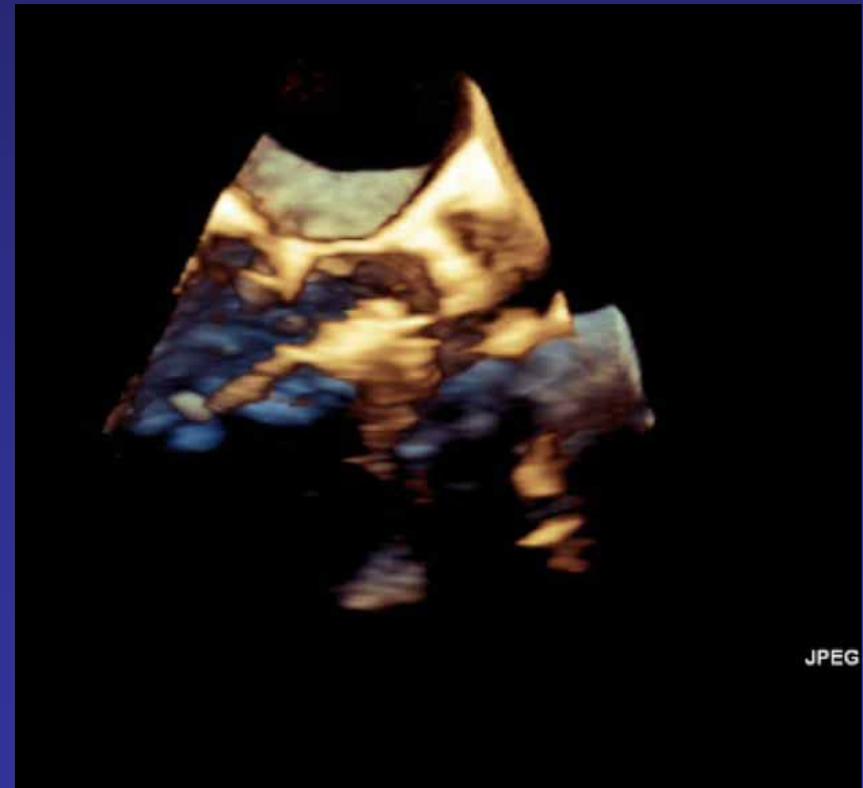
Piccoli trombi sul catetere

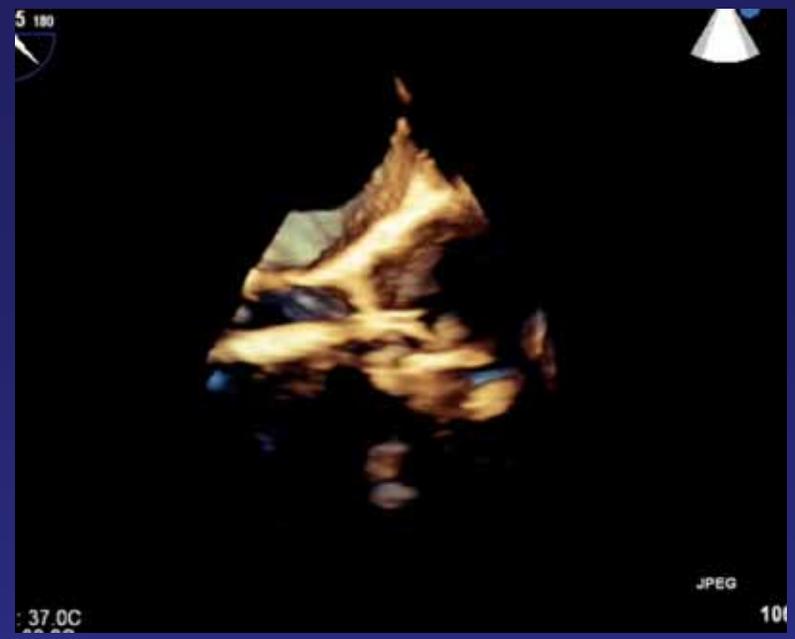
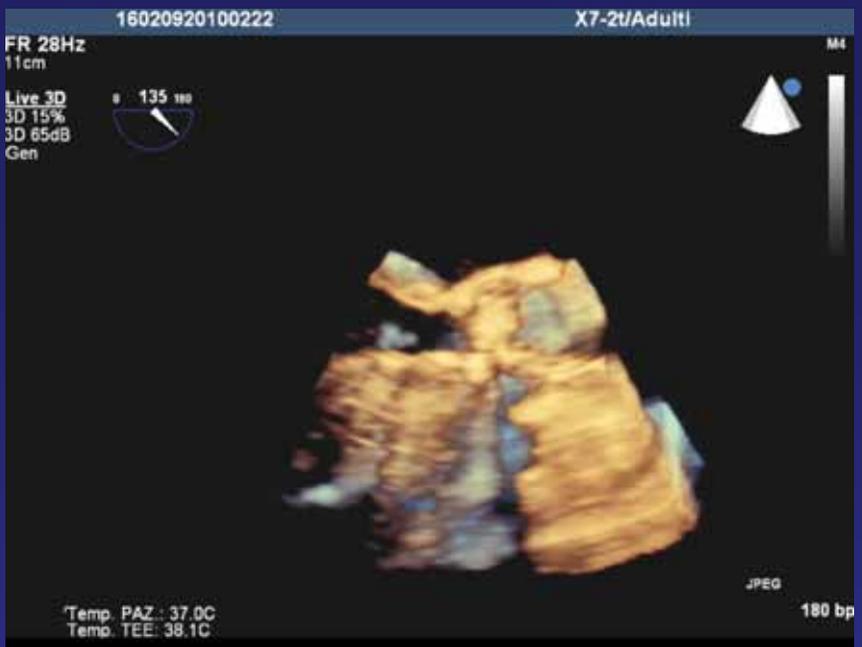


Rigurgito mitralico funzionale



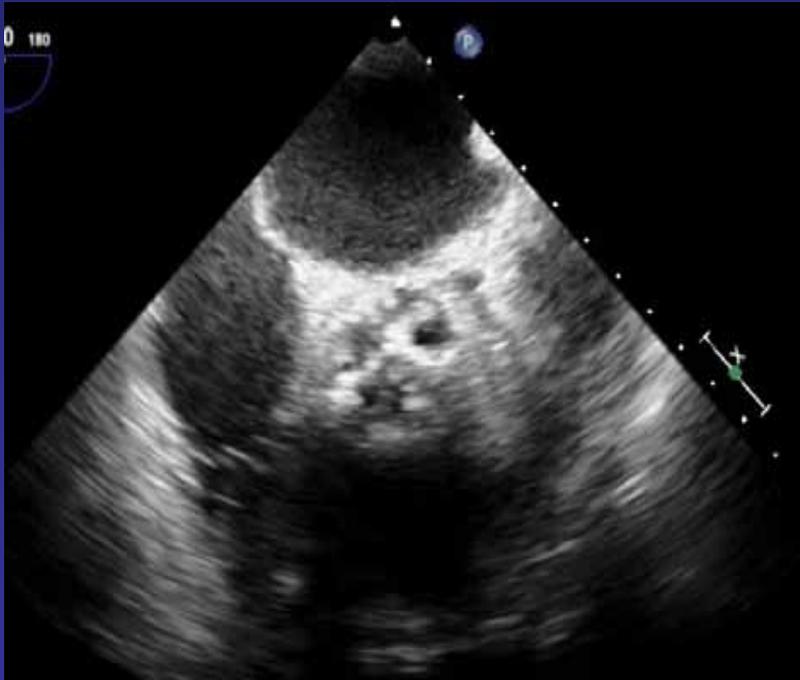
Ballooning della valvola





TEE in Aortic Stenosis

Role and clinical implications for transcatheter aortic valve replacement
replacement

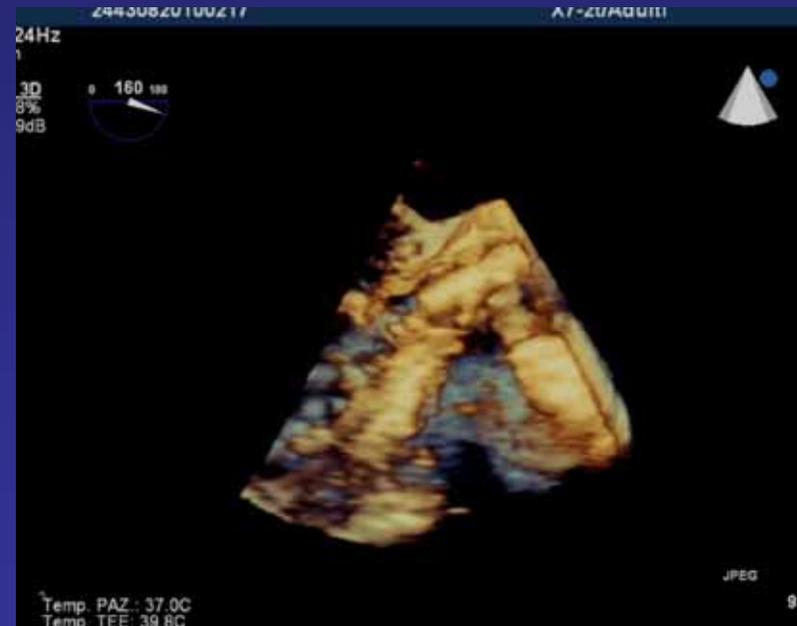


Pre-balloon

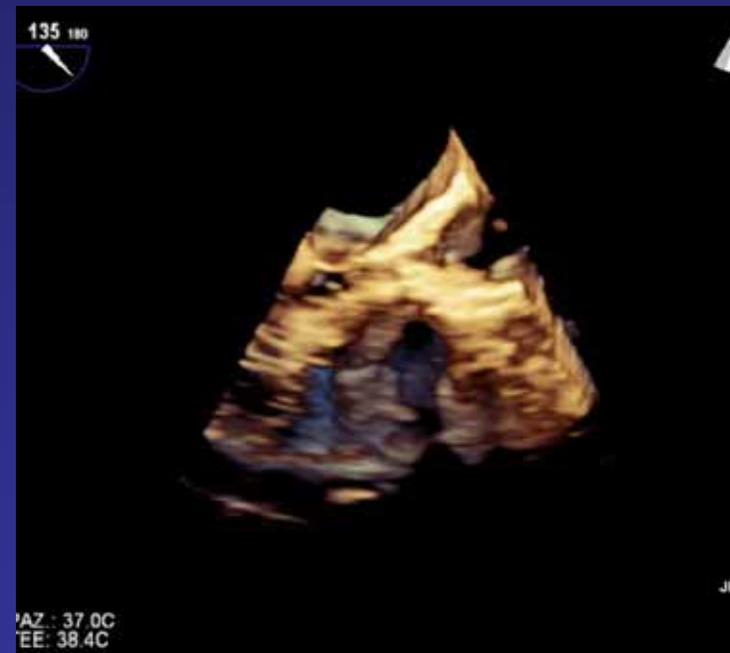


Post-balloon

Posizionamento della protesi



Impianto della protesi



***Il ruolo del cardiologo esperto in
imaging come guida alla
procedura corretta***

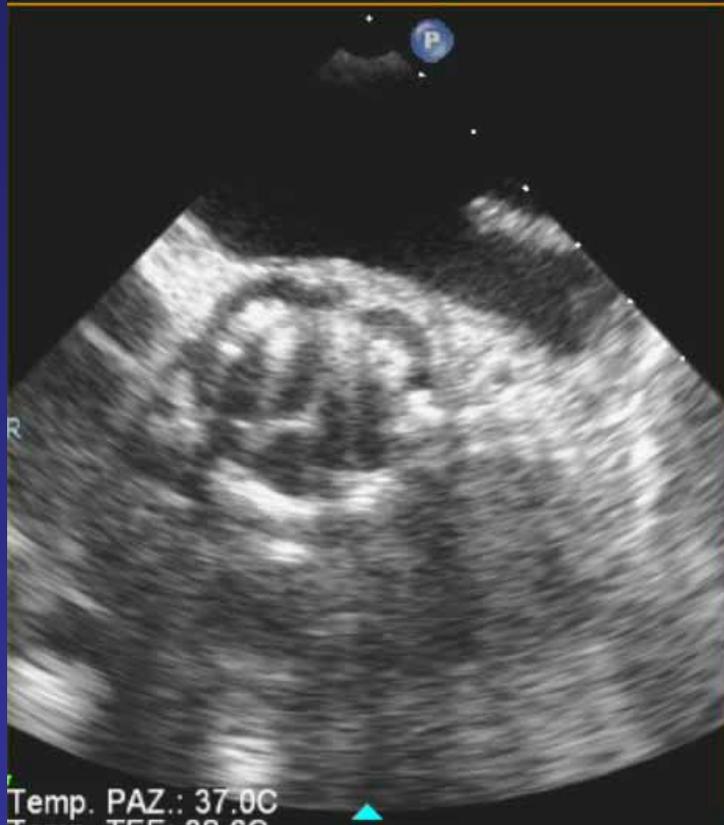
✓ ***Valutazione preoperatoria***

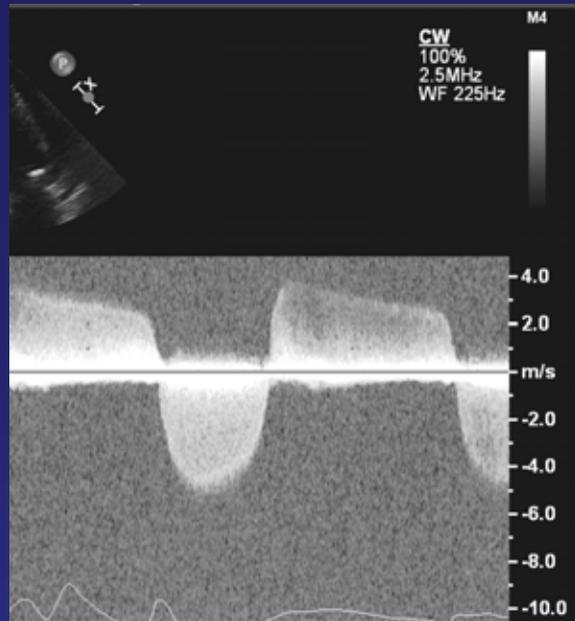
✓ ***Monitoraggio intraoperatorio***

✓ ***Valutazione del risultato***

✓ ***Follow up del paziente***

Post Implantation Prosthetic valve morphology

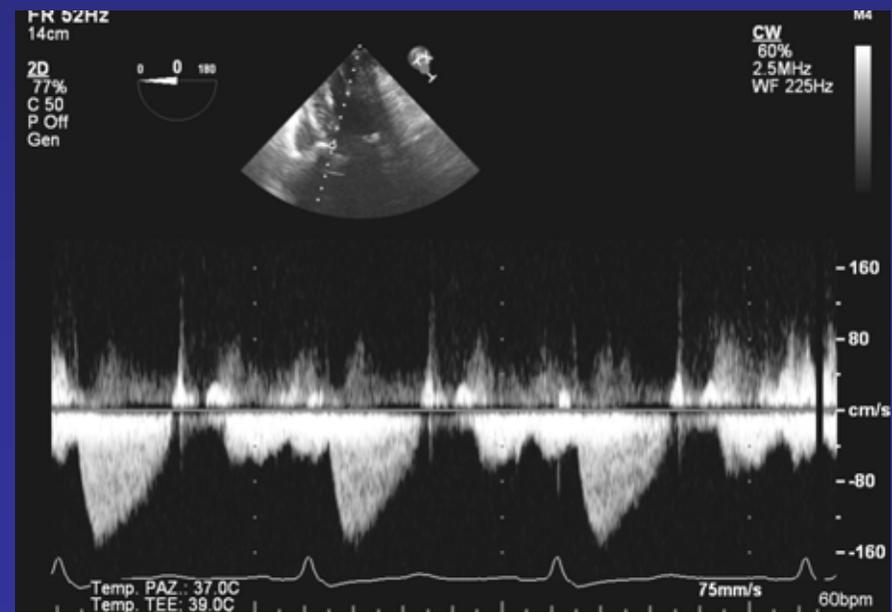




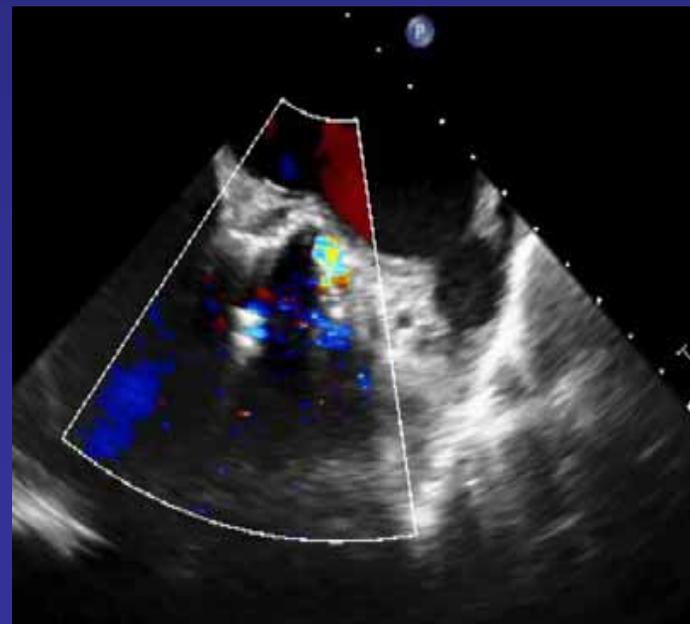
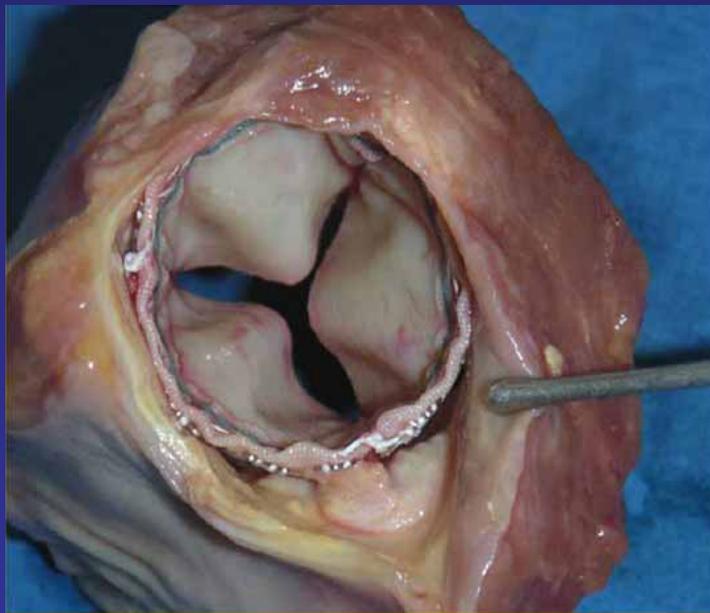
5 m/s



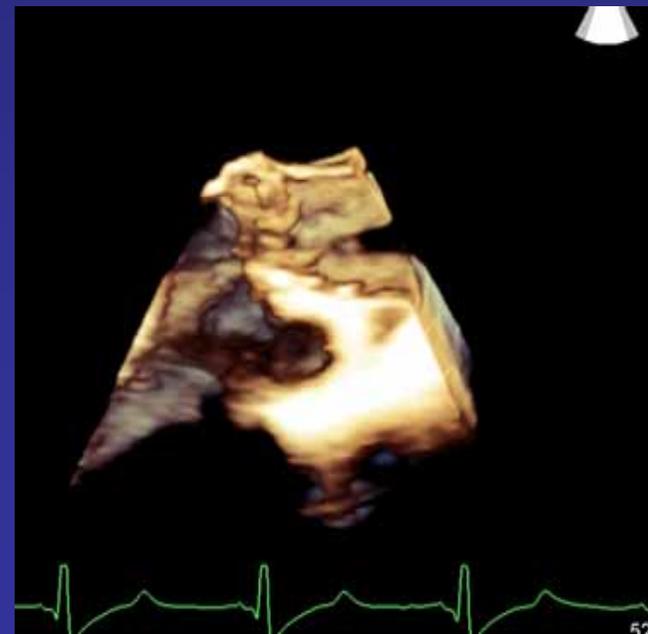
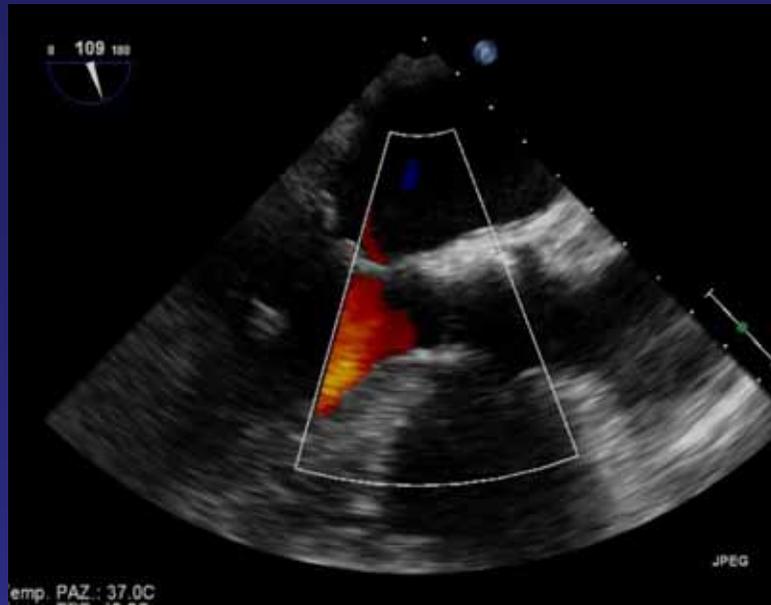
1,5 m/s



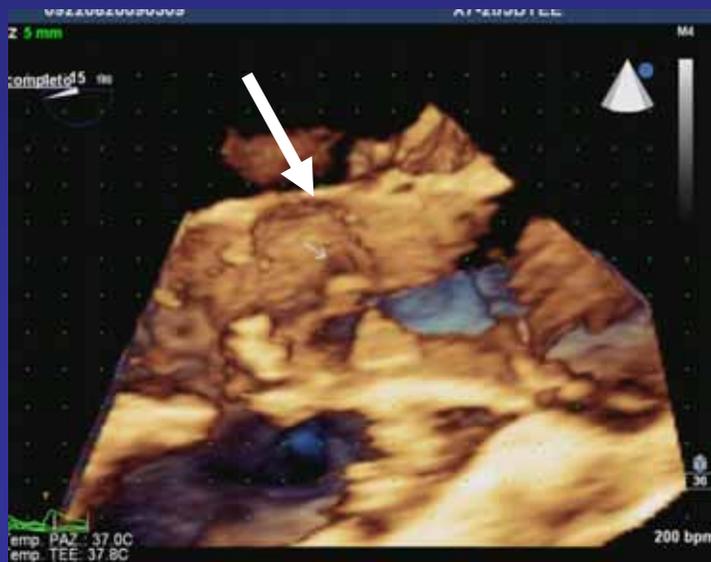
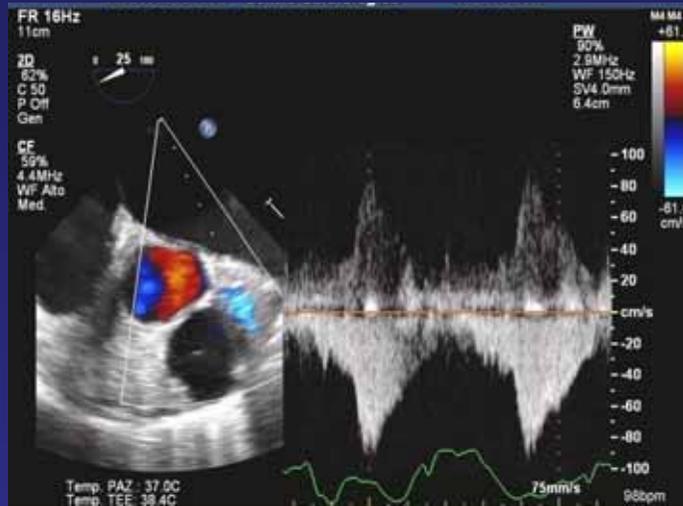
Post Implantation paraprosthetic leak



Post Implantation paraprosthetic leak



Coronary flow



PRE OP

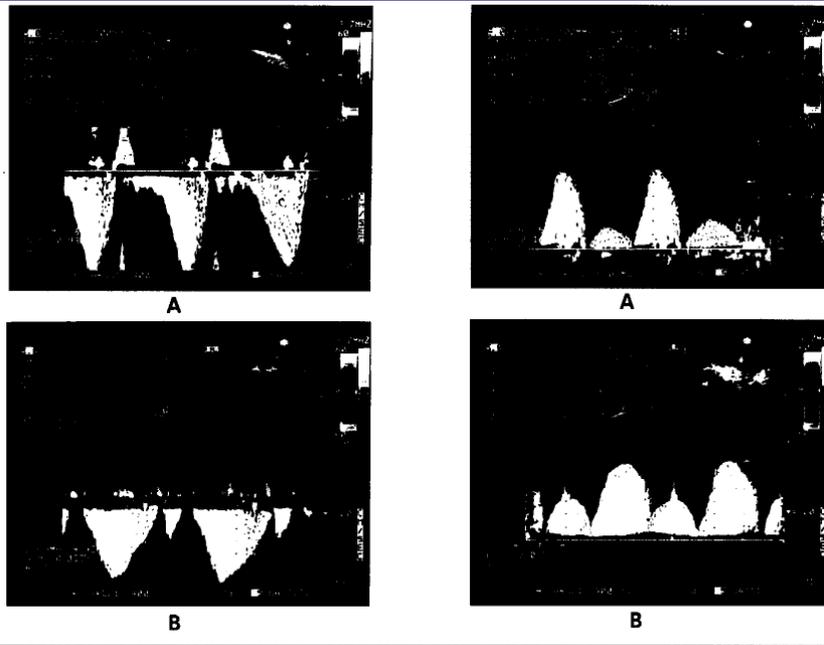
POST OP

Am J Cardiol 1996

AVR

Influences of Aortic Pressure Gradient and Ventricular Septal Thickness With Systolic Coronary Flow in Aortic Valve Stenosis

Gloria Tamborini, MD, Paolo Barbier, MD, Elisabetta Doria, MD, Claudia Galli, MD, Anna Maltagliati, MD, Deborah Ossoli, MD, Giuseppe Susini, MD, and Mauro Pepi, MD

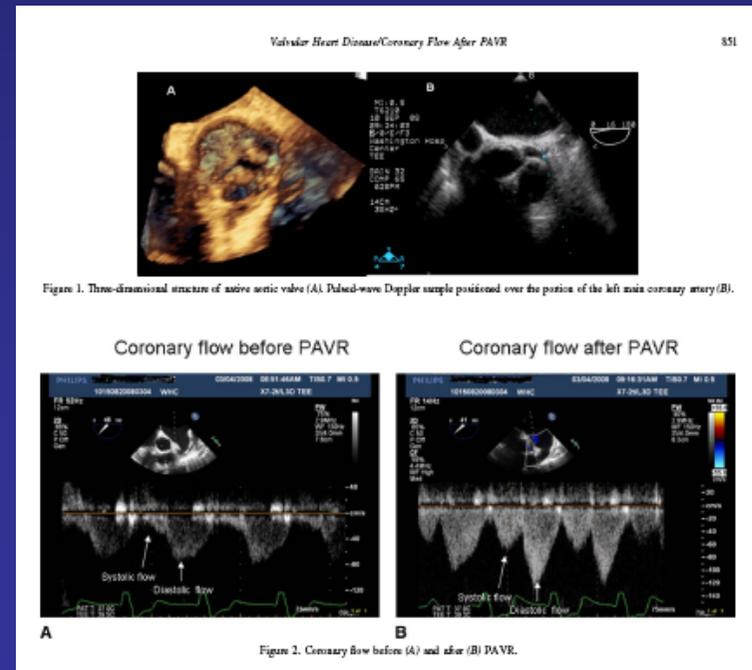


Am J Cardiol 2009

TAVI

Effects of Percutaneous Aortic Valve Replacement on Coronary Blood Flow Assessed With Transesophageal Doppler Echocardiography in Patients With Severe Aortic Stenosis

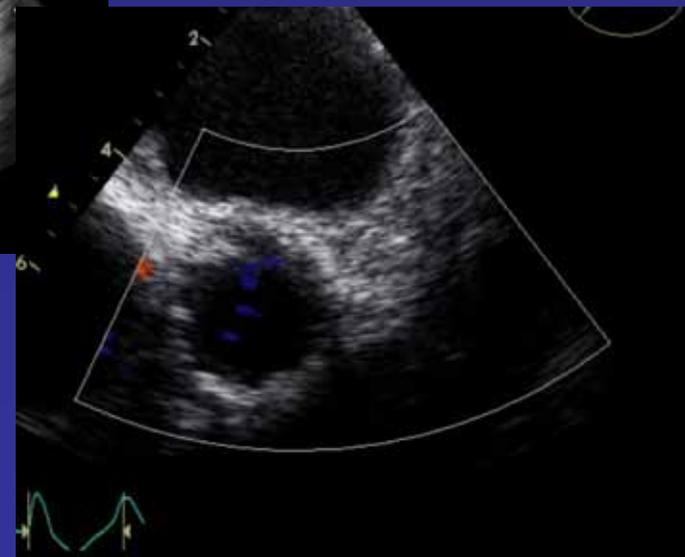
Itzik Ben-Dor, MD, Steven A. Goldstein, MD, Ron Waksman, MD*, Lowell F. Satler, MD,



Ann Thorac Surg 2010

Left Main Coronary Artery Occlusion After Percutaneous Aortic Valve Implantation

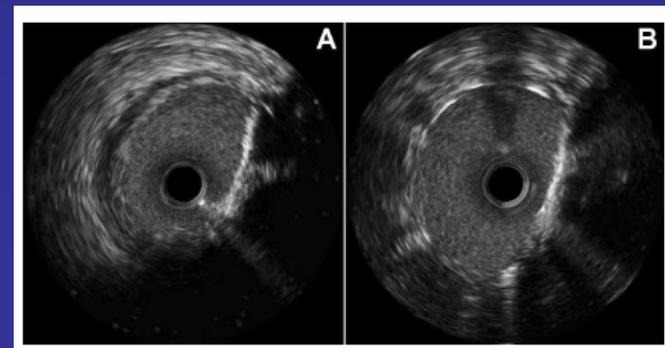
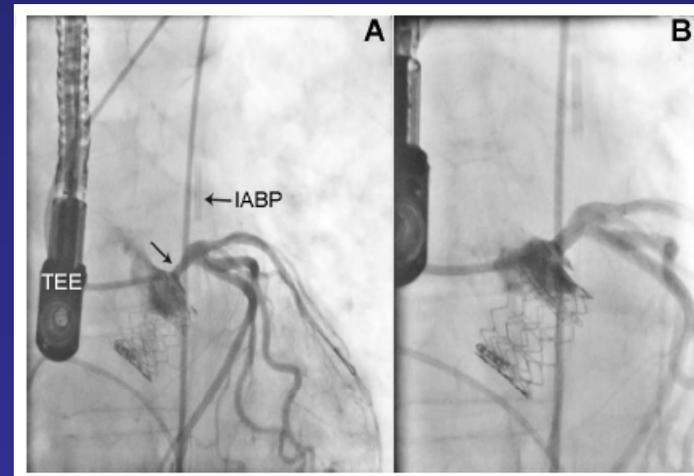
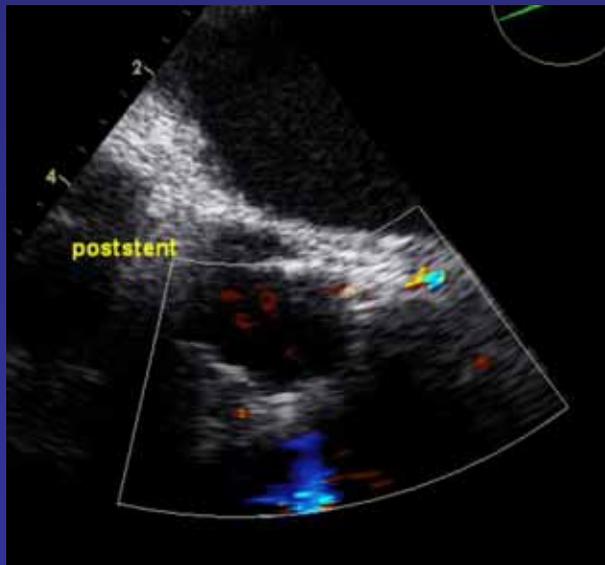
Antonio L. Bartorelli, MD, FESC, FACC,
Daniele Andreini, MD, Erminio Sisillo, MD,
Gloria Tamborini, MD, Melissa Fusari, MD, and
Paolo Biglioli, MD



Ann Thorac Surg 2010

Left Main Coronary Artery Occlusion After Percutaneous Aortic Valve Implantation

Antonio L. Bartorelli, MD, FESC, FACC,
Daniele Andreini, MD, Erminio Sisillo, MD,
Gloria Tamborini, MD, Melissa Fusari, MD, and
Paolo Biglioli, MD



***Il ruolo del cardiologo esperto in
imaging come guida alla
procedura corretta***

✓ ***Valutazione preoperatoria***

✓ ***Monitoraggio intraoperatorio***

✓ ***Valutazione del risultato***

✓ ***Follow up del paziente***

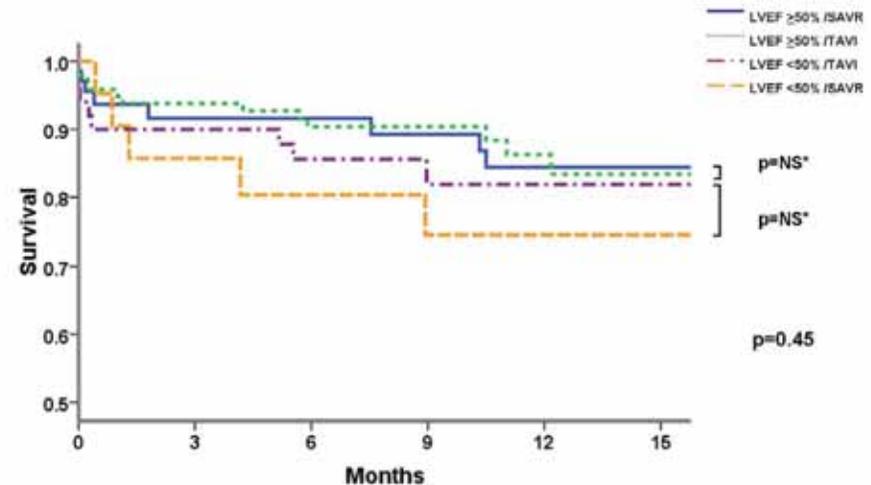
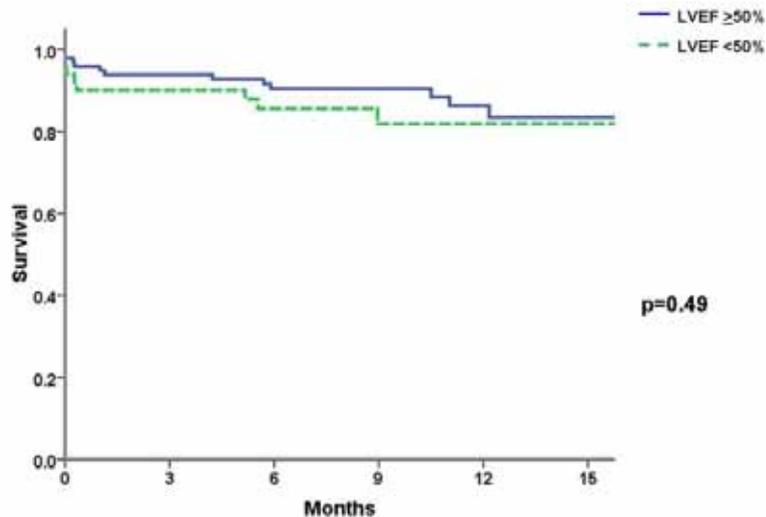
Impact of Left Ventricular Systolic Function on Clinical and Echocardiographic Outcomes following Transcatheter Aortic Valve Implantation for Severe Aortic Stenosis

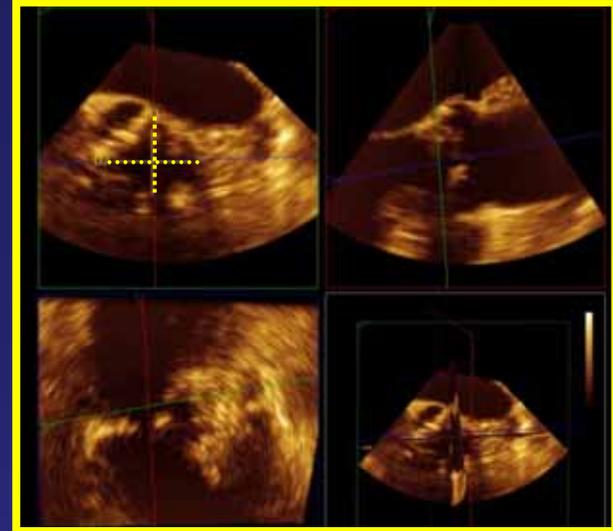
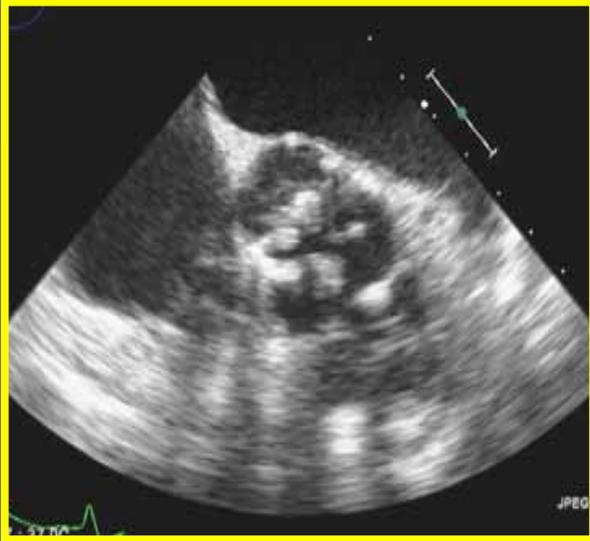
See Hooi Ewe, MBBS1,2* Nina Ajmone-Marsan, MD1*; Mauro Pepi, MD3; Victoria Delgado, MD1; Gloria Tamborini, MD3; Manuela Muratori, MD3; Arnold CT Ng, MBBS1; Frank van der Kley, MD1; Arend de Weger, MD1; Melissa Fusari, MD3; Paolo Biglioli, MD3; Jeroen J Bax, MD, PhD1.

Am Heart J 2010, in press

- 147 consecutive patients (age 80+7 yrs, logistic ES 22+11)
- 34% of patients LVEF <50% and 66% LVEF >50%.
- mean follow-up was 9.1+5.1 months.

B



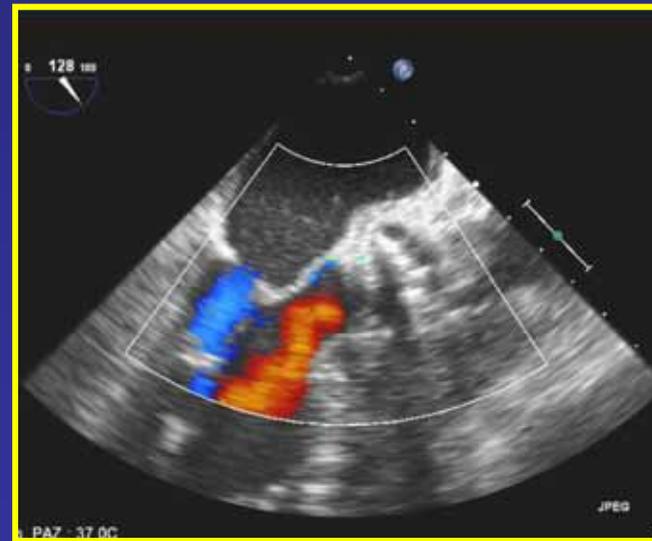


***commissura
calcification***

***prosthetic valve
overlapping***

***aortic annulus
eccentricity***

***predict the presence of
aortic regurgitation
with good sensitivity
(70%), specificity (87%)
and accuracy (82%)***

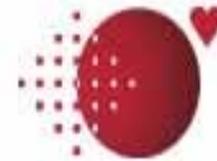


***Gripari P. et al. Euroecho
2010***

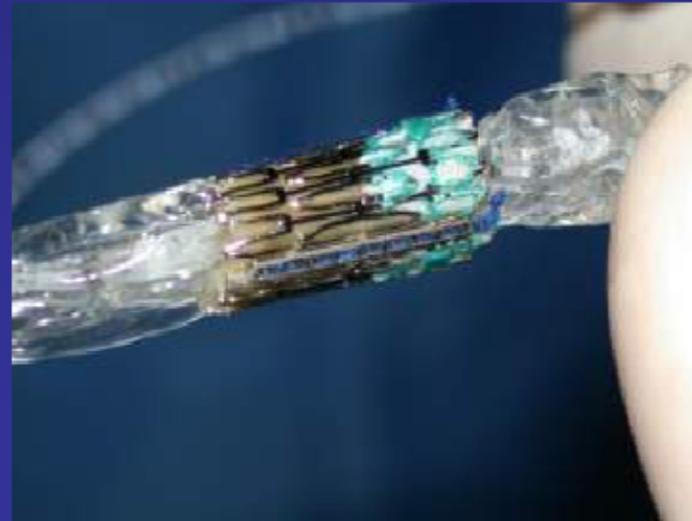
ESPERIENZA Centro Cardiologico F Monzino, IRCCS
Dipartimento Scienze Cardiovascolari Università Milano:

180 pazienti

Sala Op. IBRIDA
Team Multidisciplinare



Centro Cardiologico
Monzino



Dal gennaio 2008 al settembre 2010

■ ***Arruolati e operati 180 pazienti***

121 donne

59 uomini

■ ***Età media 81±6***

■ ***Approccio***

transfemorale 99

transapicale 81

■ ***Prot. Edwards-Sapien***

size 23 (91 pts)

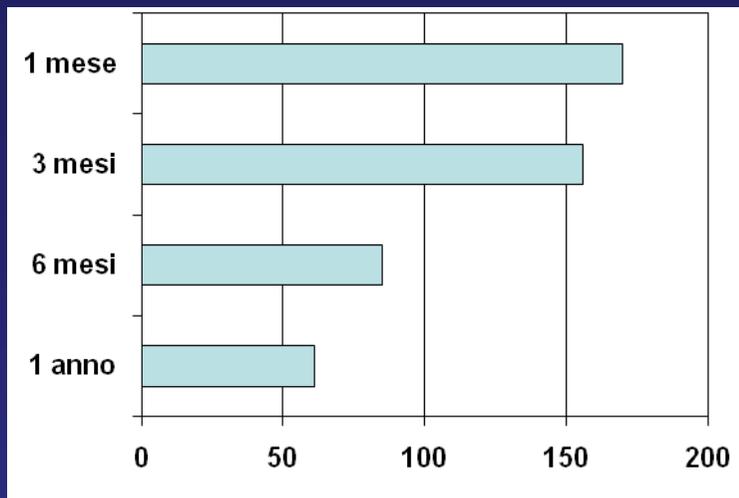
size 26 (89 pts)

***Mortalità: 2 intraoperatoria
14 decessi da 1 a 12 mesi post-impianto***

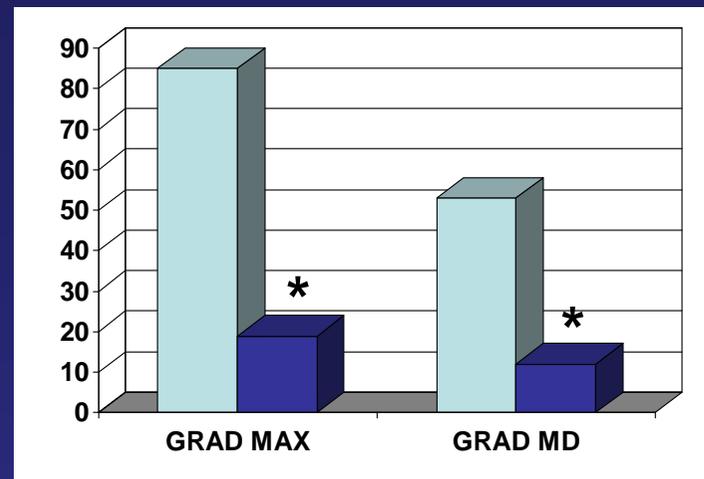


**Centro Cardiologico
Monzino**

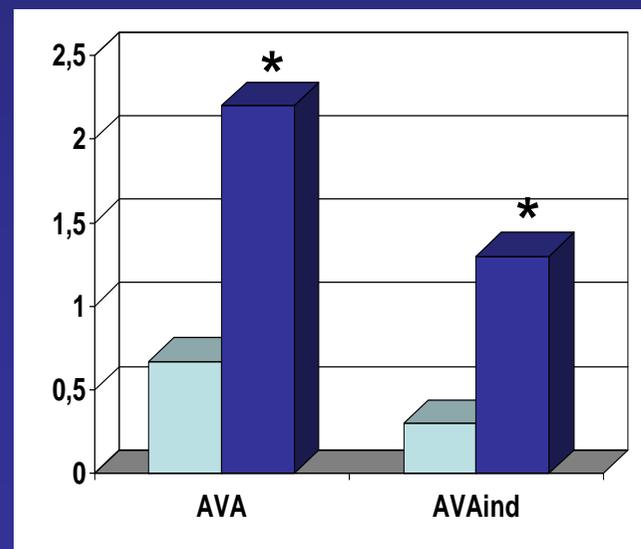
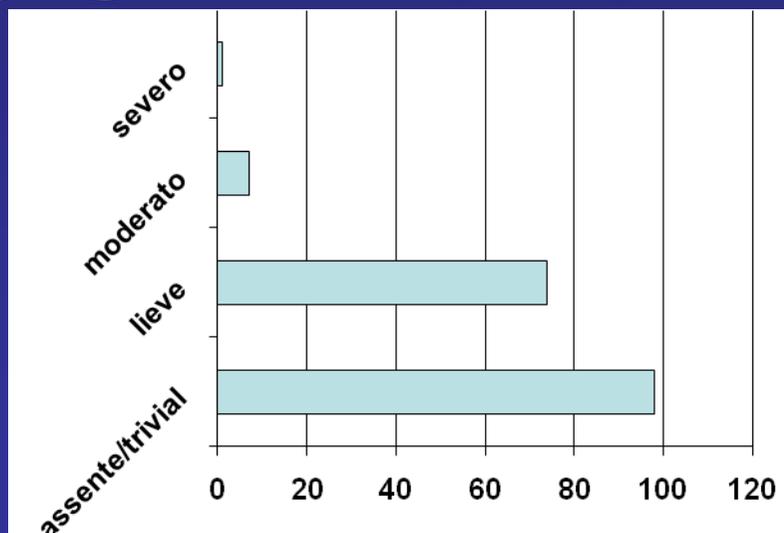
Follow up dei 180 pazienti

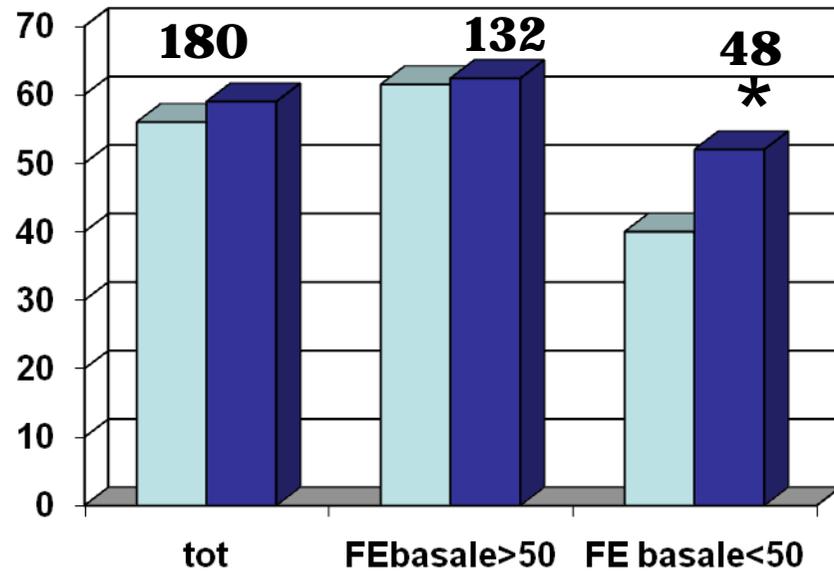


Gradiente sistolico massimo

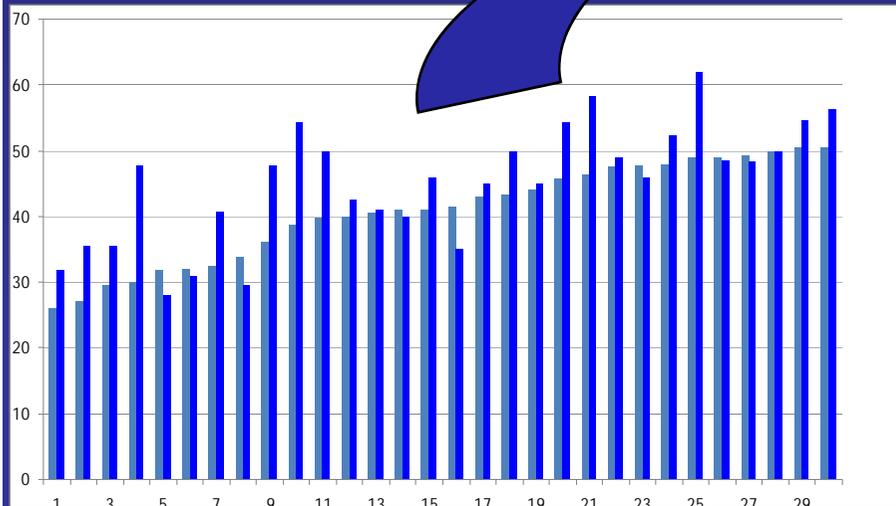


Rigurgito centro/para protesico Area valvolare (Doppler)





Frazione d'eiezione pre -e post-op



VISITA DI CONTROLLO CARDIOLOGICA

Anagrafica

Dati Paziente

Cognome	[REDACTED]	Nome	MASSIMO
Codice Fiscale	[REDACTED]	Sesso	M
Data di nascita	24/11/1932	Età	75
Comune di nascita	AGNADELLO (CR)		
Cittadinanza	ITALIA	No Tessera Sanitaria	

funzione ventricolare sx, severa per area funzionale (0.73 cmq, 0.43 mmHG), lieve insufficienza a Dilatazione dell'atrio sx. Dilatazione del ventricolo sx con FE 28.9%, protesi mitralica normoposiz normofunzionante.
 Giugno 2008 impianto di protesi aortica per via percutanea con però persistenza di ridotta FE= 2 ipertensione polmonare. Già in programma ecocardiogramma di controllo Dicembre 2008.
 E' stato benino.

Anamnesi Patologica Prossima

Motivo della Visita

controllo

Note di Anamnesi Patologica Prossima

E' stato bene.

It's a team work

