

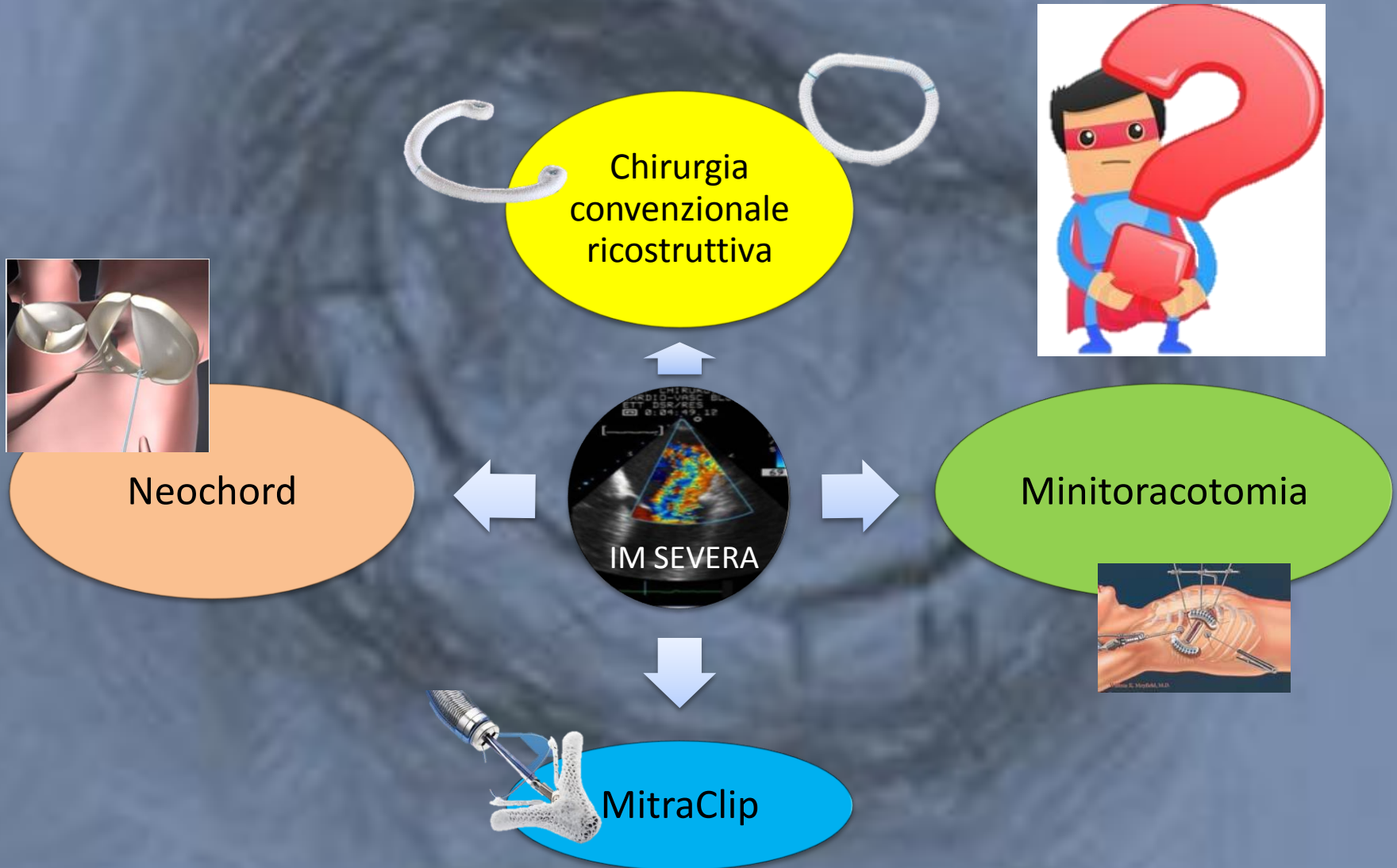
STENOSI VALVOLARE AORTICA E INSUFFICIENZA MITRALICA

Diagnosi, indicazione ad interventismo o cardiocirurgia

- ✓ Quando è più appropriata la correzione cardiocirurgica nell'insufficienza mitralica degenerativa.
- ✓ Le tecniche semplici di plastica della mitrale.

Marco Zanobini, MD, PhD

Un solo problema → diverse soluzioni



- Approccio multidisciplinare (HEART TEAM):

- Cardiologo interventista
- Cardiologo clinico
- Ecografista
- Cardiochirurgo
- Cardioanestesista



...dall'arruolamento del paziente al follow-up post intervento!

PRACTICE GUIDELINE

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease



A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

IM cronica severa in pz asintomatico con FE > 60% e LVESD < 40 mm e prob di successo e durata della riparazione valvolare >95% (recommendation class IIa, level of evidence B)

MV surgery is recommended for symptomatic patients with chronic severe primary MR (stage D) and LVEF >30%	I	B
MV surgery is recommended for asymptomatic patients with chronic severe primary MR and LV dysfunction (LVEF 30%–60% and/or LVESD ≥40 mm, stage C2)	I	B
MV repair is recommended in preference to MVR when surgical treatment is indicated for patients with chronic severe primary MR limited to the posterior leaflet	I	B
MV repair is recommended in preference to MVR when surgical treatment is indicated for patients with chronic severe primary MR involving the anterior leaflet or both leaflets when a successful and durable repair can be accomplished	I	B
Concomitant MV repair or replacement is indicated in patients with chronic severe primary MR undergoing cardiac surgery for other indications	I	B
MV repair is reasonable in asymptomatic patients with chronic severe primary MR (stage C1) with preserved LV function (LVEF >60% and LVESD <40 mm) in whom the likelihood of a successful and durable repair without residual MR is >95% with an expected mortality rate of <1% when performed at a Heart Valve Center of Excellence	IIa	B
MV repair is reasonable for asymptomatic patients with chronic severe nonrheumatic primary MR (stage C1) and preserved LV function in whom there is a high likelihood of a successful and durable repair with 1) new onset of AF or 2) resting pulmonary hypertension (PA systolic arterial pressure >50 mm Hg)	IIa	B
Concomitant MV repair is reasonable in patients with chronic moderate primary MR (stage B) undergoing cardiac surgery for other indications	IIa	C
MV surgery may be considered in symptomatic patients with chronic severe primary MR and LVEF ≤30% (stage D)	IIb	C
MV repair may be considered in patients with rheumatic mitral valve disease when surgical treatment is indicated if a durable and successful repair is likely or if the reliability of long-term anticoagulation management is questionable	IIb	B
Transcatheter MV repair may be considered for severely symptomatic patients (NYHA class III/IV) with chronic severe primary MR (stage D) who have a reasonable life expectancy but a prohibitive surgical risk because of severe comorbidities	IIb	B

Chirurgia convenzionale



European Heart Journal (2012) 33, 2451–2496
doi:10.1093/eurheartj/ehs109

ESC/EACTS GUIDELINES



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IM cronica severa in pz asintomatico con FE > 60% e LVESD ≥ 40 mm, (**recommendation class IIa, level of evidence C**)

Surgery not Mitral Repair !!

Table 12 Indications for surgery in severe primary mitral regurgitation

	Class ^a	Level ^b	Ref ^c
Mitral valve repair should be the preferred technique when it is expected to be durable.	I	C	
Surgery is indicated in symptomatic patients with LVEF >30% and LVESD <55 mm.	I	B	127, 128
Surgery is indicated in asymptomatic patients with LV dysfunction (LVESD ≥45 mm and/or LVEF ≤60%).	I	C	
Surgery should be considered in asymptomatic patients with preserved LV function and new onset of atrial fibrillation or pulmonary hypertension (systolic pulmonary pressure at rest >50 mmHg).	IIa	C	
Surgery should be considered in asymptomatic patients with preserved LV function, high likelihood of durable repair, low surgical risk and flail leaflet and LVESD ≥40 mm.	IIa	C	
Surgery should be considered in patients with severe LV dysfunction (LVEF <30% and/or LVESD >55 mm) refractory to medical therapy with high likelihood of durable repair and low comorbidity.	IIa	C	
Surgery may be considered in patients with severe LV dysfunction (LVEF <30% and/or LVESD >55 mm) refractory to medical therapy with low likelihood of durable repair and low comorbidity.	IIb	C	
Surgery may be considered in asymptomatic patients with preserved LV function, high likelihood of durable repair, low surgical risk, and: • left atrial dilatation (volume index ≥60 ml/m ² BSA) and sinus rhythm, or • pulmonary hypertension on exercise (SPAP ≥60 mmHg at exercise).	IIb	C	

✓ La terapia dell'insufficienza mitralica degenerativa

Association Between Early Surgical Intervention vs Watchful Waiting and Outcomes for Mitral Regurgitation Due to Flail Mitral Valve Leaflets

Rakesh M. Suri, MD, DPhil; Jean-Louis Vanoverschelde, MD; Francesco Grigioni, MD, PhD; Hartzell V. Schaff, MD; Christophe Tribouilloy, MD; Jean-Francois Avierinos, MD; Andrea Barbieri, MD; Agnes Pasquet, MD; Marianne Huebner, PhD; Dan Rusinaru, MD; Antonio Russo, MD; Hector I. Michelena, MD; Maurice Enriquez-Sarano, MD

JAMA. 2013;310(6):609-616

Registro internazionale

- **NumeroPazienti arruolati:** 1021
- **Durata arruolamento:** 1980-2004
- **Criterio di inclusione:** IM degenerativa (flail lembo posteriore) con indicazione chirurgica almeno in Classe II
- **Criteri di esclusione:** indicazione chirurgica in classe I all'intervento CCH; IM ischemica o altre valvulopatie; pregressa chir valvolare; controindicazioni alla chirurgia per numerose comorbidità.

Chirurgia
convenzionale

Original Investigation

Association Between Early Surgical Intervention vs Watchful Waiting and Outcomes for Mitral Regurgitation Due to Flail Mitral Valve Leaflets

Rakesh M. Suri, MD, DPhil; Jean-Louis Vanoverschelde, MD; Francesco Grigioni, MD, PhD; Hartzell V. Schaff, MD; Christophe Tribouilloy, MD; Jean-Francois Avierinos, MD; Andrea Barbieri, MD; Agnes Pasquet, MD; Marianne Huebner, PhD; Dan Rusinaru, MD; Antonio Russo, MD; Hector I. Michelena, MD; Maurice Enriquez-Sarano, MD

JAMA. 2013;310(6):609-616

Table 3. Incidence Rates of Mortality During Different Periods Following Detection in the Overall Study Population

Time After Diagnosis	Initial Medical Management		Early Surgery		Rate Ratio (95% CI)	P Value	Relative Reduction of Mortality With Early Surgery, % ^b
	No. of Patients	Rate ^a	No. of Patients	Rate ^a			
Overall							
3-12 mo	12	2.8 (1.3-4.4)	2	0.6 (0-1.4)	0.3 (0.03-0.8)	.03	78.6
>1-5 y	75	3.6 (2.8-4.5)	17	1.0 (0.5-1.5)	0.3 (0.2-0.5)	<.001	72.6
>5 y	158	4.4 (3.8-5.1)	47	2.1 (1.5-2.7)	0.5 (0.4-0.7)	<.001	52.6

Serial Changes in Left Ventricular Shape Following Early Mitral Valve Repair

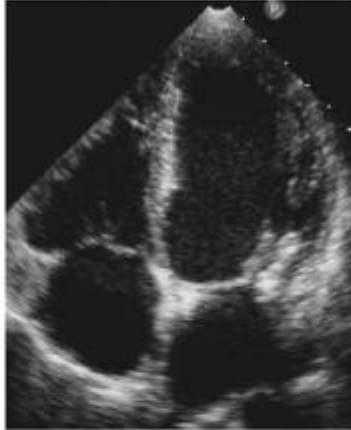
Francesco Maffessanti, MS^{a,b,*}, Enrico G. Caiani, PhD^a, Gloria Tamborini, MD^b, Manuela Muratori, MD^b, Lissa Sugeng, MD^c, Lynn Weinert, RDCS^c, Francesco Alamanni, MD^b, Marco Zanobini, PhD^b, Victor Mor-Avi, PhD^c, Roberto M. Lang, MD^c, and Mauro Pepi, MD^b

Mitral valve (MV) repair has become the preferred treatment for mitral regurgitation associated with degenerative MV disease. Although the functional benefits of early MV repair are known, the associated alterations in left ventricular (LV) shape have not been studied. The aim of this study was to evaluate serial changes in LV performance and 3-dimensional (3D) shape after MV repair using a new analytic technique. Fifty patients (mean age 59 ± 12 years) with severe asymptomatic mitral regurgitation and ejection fractions $>55\%$ who underwent MV repair were enrolled. Transthoracic real-time 3D echocardiography was performed the day before and 6 and 12 months after MV repair. An age-matched control group of 50 normal subjects was studied for comparison. Endocardial surfaces were extracted to compute 3D shape indexes of sphericity and conicity, which were compared in patients between different time points and versus the normal group. Postoperatively, LV volumes were decreased compared to presurgical values. Ejection fractions were slightly decreased 6 months after surgery but had restored by 12 months. These changes were associated with modifications in end-diastolic LV shape: before surgery, compared to normal controls, sphericity was augmented and conicity was decreased; at 6 months, these shape changes were reversed, with no further improvements at 12 months. In conclusion, patients with asymptomatic mitral regurgitation and preserved LV function already exhibit changes in LV shape. Early MV repair leads to near normal morphology after surgery, indicating the benefits of this procedure. Real-time 3D echocardiography and novel 3D shape analysis allow detailed serial examination of the complex relation between LV performance and shape. © 2010 Elsevier Inc. All rights reserved. (Am J Cardiol 2010;106:836–842)

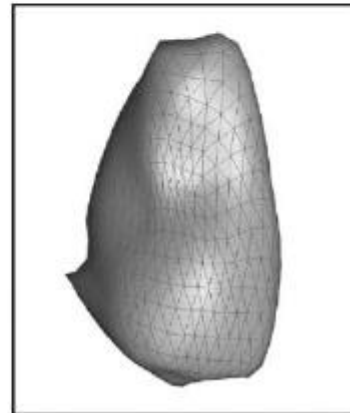
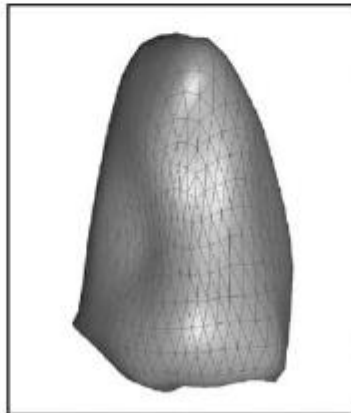
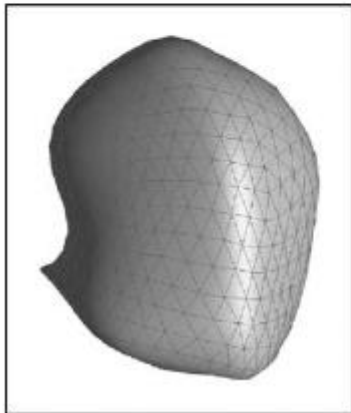
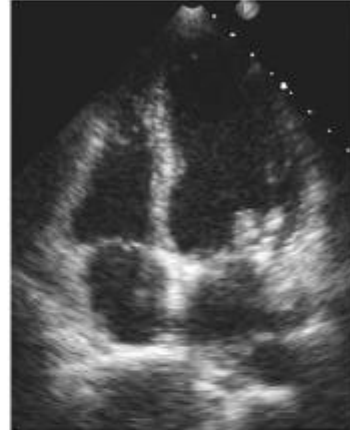
Pre-operative



6 months



12 months



Chirurgia
convenzionale
ricostruttiva



- Rimane il GOLD STANDARD per tutti i pazienti
- Ci sono chiare Guidelines sempre piu' «aggressive»
- Ottimi risultati a lungo termine

Minitoracotomia

Le stesse indicazioni

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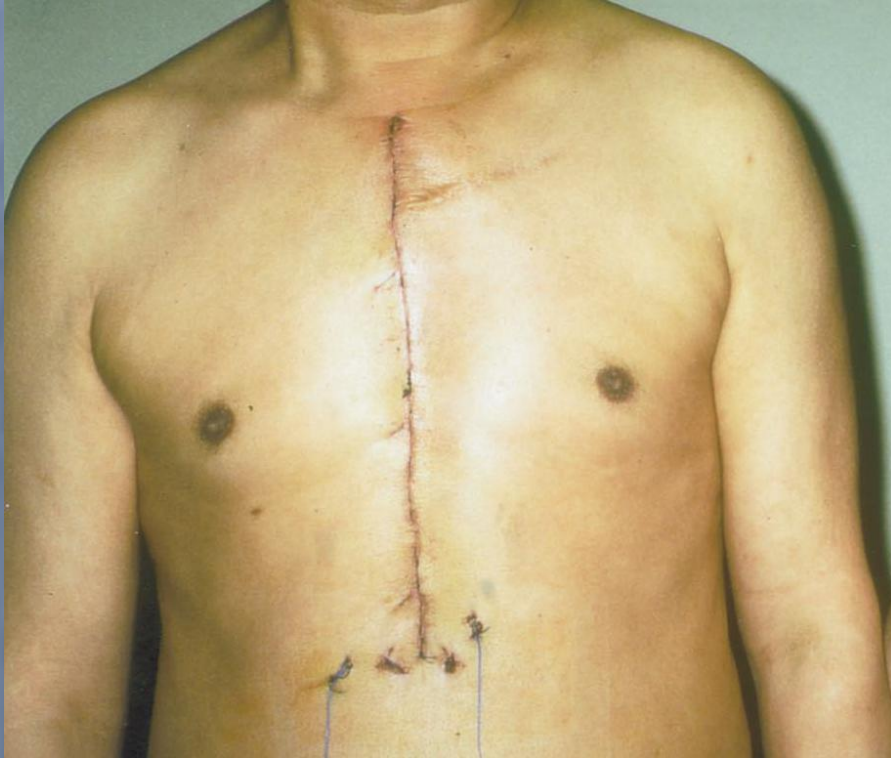
ESC/EACTS GUIDELINES



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E' solo questione di estetica?



Mitral Valve Surgery Can Now Routinely Be Performed Endoscopically

Filip P. Casselman, Sam Van Slycke, Francis Wellens, Raphael De Geest, Ivan Degrieck, Frank Van Praet, Yvette Vermeulen and Hugo Vanermen

Circulation 2003;108:II-48-II-54

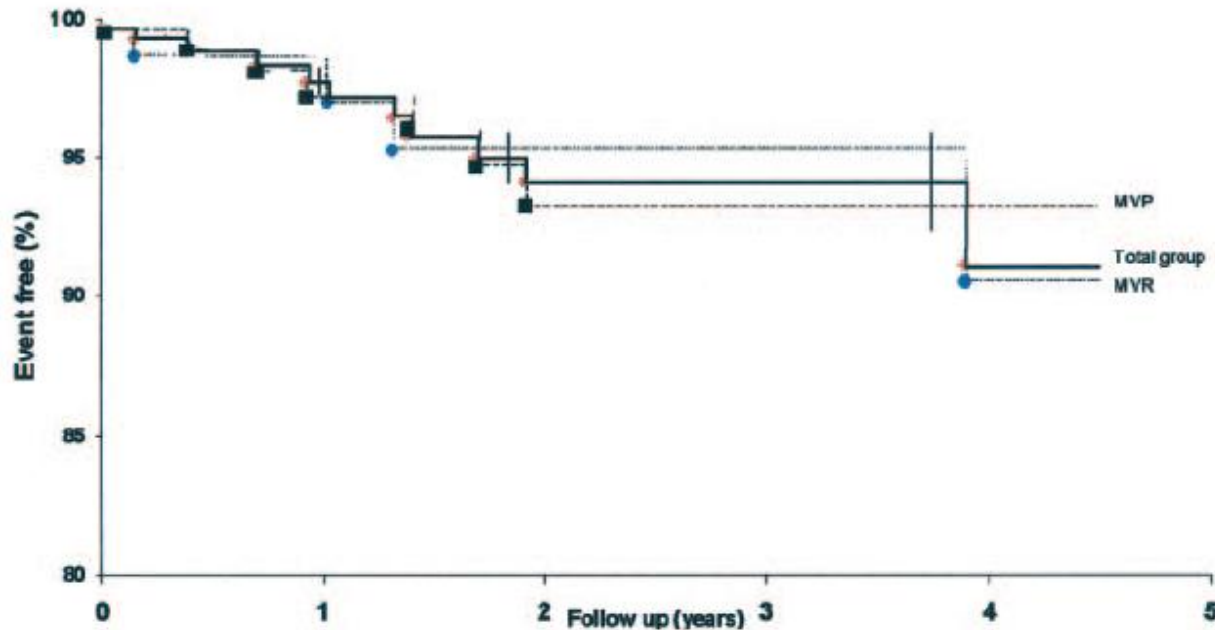


Figure 5. Freedom from mitral valve reoperation. MV: Total patient group (vertical lines show the SD). MVP: Mitral valve repair group. MVR: Mitral valve replacement group.

Considerando tali dati, confrontando la chirurgia convenzionale e l'approccio mininvasivo per la chirurgia dell'IM, possiamo affermare che le due metodiche offrono risultati simili in termini di sopravvivenza e necessità di reintervento.



MA...



Questo è vero solo in Centri esperti che hanno ampie casistiche.

Inoltre la maggior parte degli studi che trattano tale tematica contengono trials clinici non randomizzati monocentrici.

Quali sono i potenziali benefici?

- ✓ Piccola incisione → COSMESI e minor trauma chirurgico
- ✓ Riduzione del sanguinamento postop. (meno trasfusioni)
- ✓ Minor dolore
- ✓ Ospedalizzazione più breve
- ✓ Costi ridotti

Woo et al. Semin Thorac Cardiovasc Surg 2006

Ci sono degli svantaggi?

- ✓ Richiede una curva di apprendimento non solo per il chirurgo ma anche per il restante personale sanitario dedicato
- ✓ Incremento dei costi gestionali
- ✓ Necessaria una più accurata valutazione pre-op (TC-torace, Doppler dei vasi femorali)
- ✓ Allungamento dei tempi di clampaggio aortico e di CEC
- ✓ Accesso chirurgico periferico per la cannulazione femorale

Conclusioni 1

- ✓ L'approccio mininvasivo nella chirurgia della mitrale mostra simili outcomes (mortalità ed eventi neurologici) rispetto alla chirurgia convenzionale, ma mancano trials clinici randomizzati multicentrici.
- ✓ Oltre all'aspetto estetico, la minitoracotomia sembra offrire un vantaggio in termini di riduzione del sanguinamento e del dolore post operatorio. Possibile riduzione della degenza ospedaliera e dei costi.

Conclusioni 2

- ✓ La minitoracotomia possiede potenziali svantaggi, in particolare un clampaggio aortico ed una CEC prolungati, l'incremento dei costi e le eventuali complicanze vascolari.
- ✓ A fronte di benefici indiscussi.
- ✓ Questo è vero in un Centro di primo livello

Cosa ne pensano i pazienti dopo l'intervento mini-invasivo?

Cosmesi

Il 99.3% dei pazienti mostrava un giudizio positivo.

La rifarebbero?

Nel 93.5% dei casi se dovessero ripetere l'intervento sceglierebbero la medesima procedura.

Casselman F. Circ 2013

Se il paziente venisse adeguatamente informato prima di una procedura mininvasiva cosa sceglierebbe?

Do patients want minimally invasive aortic valve replacement?☆

Wolfgang Ehrlich, Woitek Skwara, Wolf-Peter Klövekorn, Matthias Roth, Erwin P. Bauer*

European Journal of Cardio-thoracic Surgery 17 (2000) 714–717

Table 3
Patients comments after the interview (multiple answers were given)

Full sternotomy (<i>n</i> = 21)	<i>n</i>	Partial sternotomy (<i>n</i> = 6)	<i>n</i>
Surgeon should have a good exposure to the aorta and the heart	15	Cosmetic aspects are important	6
Cosmetics aspects are not important	14	Stability is important	1
Operation time should be as short as possible	7	Fear of peritoneal opening (patient on hemodialysis)	1

Conclusioni: Solo il 20% dei pazienti sceglie l'approccio mininvasivo. I pazienti giovani lo scelgono per l'aspetto estetico.

MitraClip

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Transcatheter mitral valve repair may be considered for severely **symptomatic** patients (NYHA class III/IV) with **chronic severe primary MR** who have a reasonable life expectancy but a **prohibitive surgical risk** because of severe comorbidity

(recommendation class IIb, level of evidence B)

MitraClip



European Heart Journal
doi:10.1093/eurheartj/ehf109

ESC/EACTS GUIDELINES



Guidelines on the management of valvular heart disease (version 2012)

Percutaneous edge-to-edge procedure may be considered in patients with **symptomatic severe primary MR** who fulfil the echo criteria of eligibility, are **judged inoperable or at high surgical risk** by a 'heart team', and have a life expectancy greater than 1 year **(recommendation class IIb, level of evidence C)**.

MitraClip

Systematic Review

A meta-analysis of MitraClip system versus surgery for treatment of severe mitral regurgitation

Benjamin Wan¹, Mohammad Rahnavardi¹, David H. Tian¹, Kevin Phan^{1,2}, Stine Munkholm-Larsen^{1,3}, Paul G. Bannon^{1,2}, Tristan D. Yan^{1,2}

➤ 4 studi con dataset completo (da 433 pubblicazioni esaminate):

1 trial clinico randomizzato

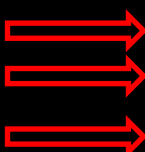
3 studi osservazionali prospettici

➤ 622 pazienti totali, IM degenerativa e funzionale

➤ Differenti caratteristiche della popolazione:

Gruppo MitraClip  pz più anziani, FE% <, EuroScore >

Differenza significativa per l'IM residua post-intervento

Differenza non significativa per  mortalità a 30 gg
mortalità a 12 mesi
classe NYHA III/IV

EVEREST II RCT

- **Trial clinico multicentrico randomizzato, prospettico**
- **279** pazienti tot arruolati
- 178 MitraClip: 130 **IM degenerativa** e 48 **IM funzionale**)
- **Confronto** tra MitraClip e Chirurgia convenzionale in termini di efficacia e sicurezza in pazienti con IM $\geq 3+$
- **Primary effectiveness endpoint:** morte, chirurgia per IM post intervento, IM $\geq 3+$ a 12 mesi.

The NEW ENGLAND
JOURNAL of MEDICINE

Percutaneous Repair or Surgery for Mitral Regurgitation

Ted Feldman, M.D., Elyse Foster, M.D., Donald G. Glower, M.D., Saibal Kar, M.D., Michael J. Rinaldi, M.D., Peter S. Fail, M.D., Richard W. Smalling, M.D., Ph.D., Robert Siegel, M.D., Geoffrey A. Rose, M.D., Eric Engoron, M.D., Catalin Loghin, M.D., Alfredo Trento, M.D., Eric R. Skipper, M.D., Tommy Fudge, M.D., George V. Letsou, M.D., Joseph M. Massaro, Ph.D., and Laura Mauri, M.D., for the EVEREST II Investigators*

CONCLUSIONS

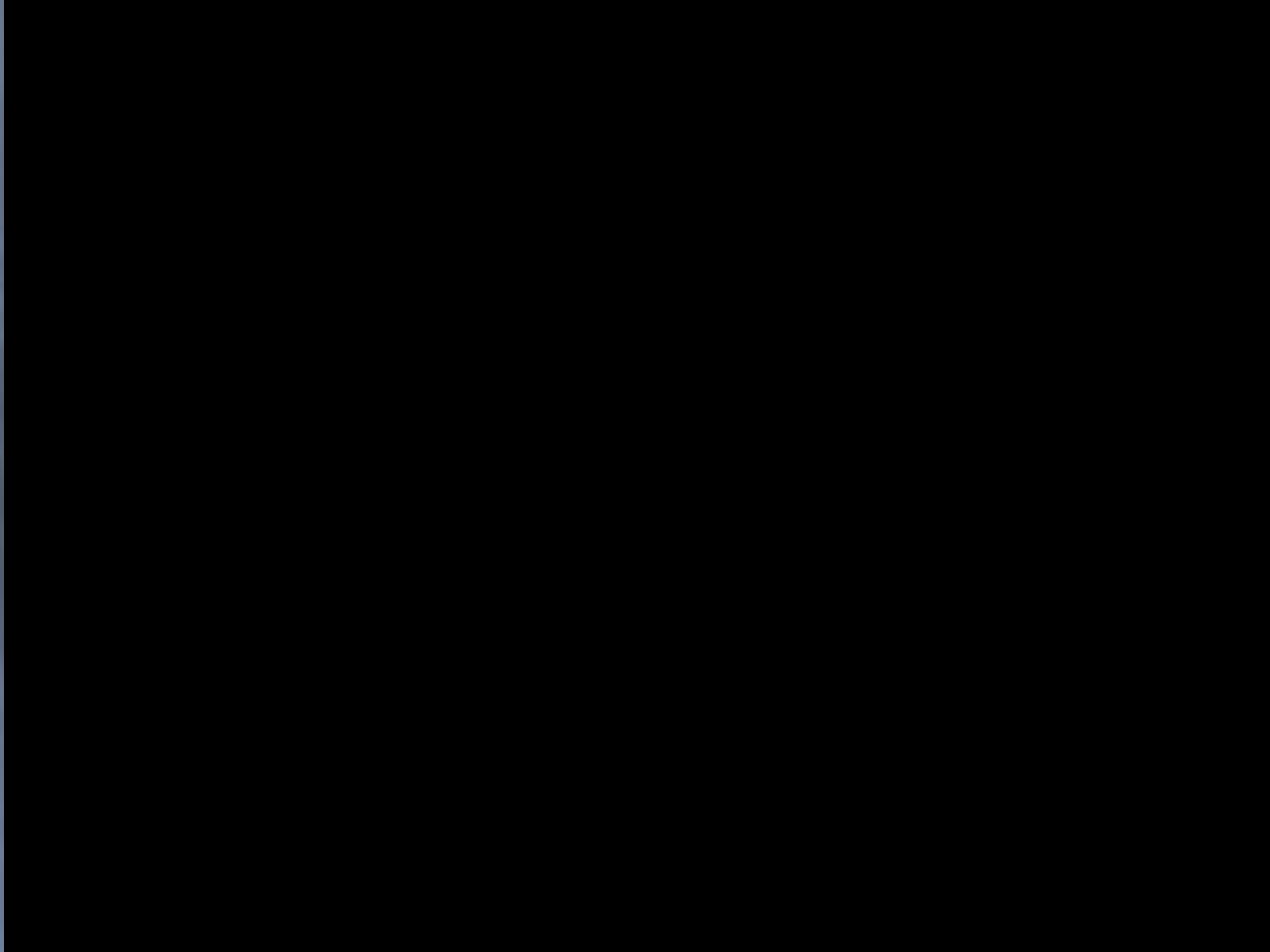
Although **percutaneous repair** was **less effective at reducing mitral regurgitation** than conventional surgery, the procedure was associated with **superior safety** and **similar improvements in clinical outcomes** (Funded by Abbott Vascular; EVEREST II ClinicalTrials.gov number, NCT00209274.)

MitraClip



- 16.000 casi trattati nel mondo
- Quando funziona meglio? Dati a favore dell'IM funzionale (CMP dilatativa e CMP ischemica).
- *Nella nostra esperienza si ottengono buoni risultati anche nel Tipo II*

• MitraClip (9)



Neochord

Indicazioni?

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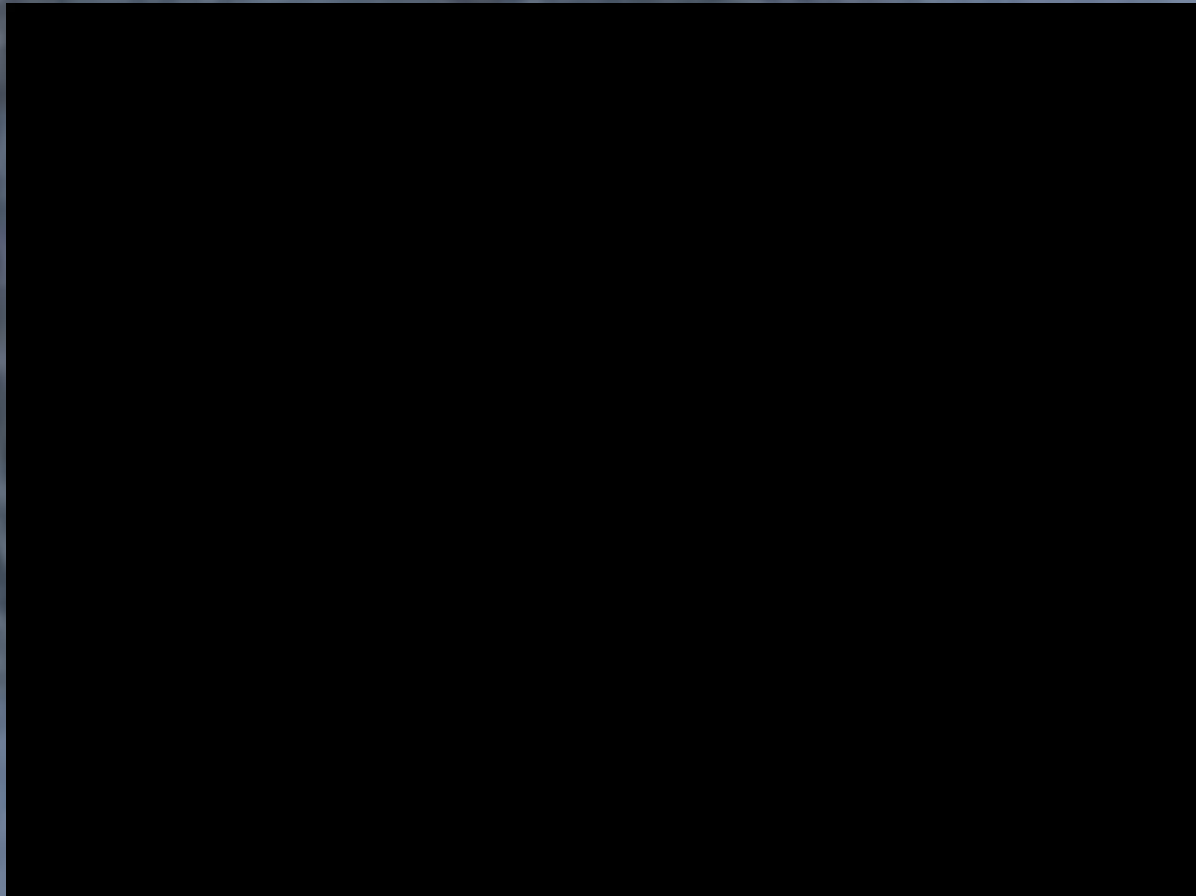
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Neochord



Neochord

Off-Pump Transapical Implantation of Artificial Neo-Chordae to Correct Mitral Regurgitation

The TACT Trial (Transapical Artificial Chordae Tendinae)
Proof of Concept

Joerg Seeburger, MD, PHD,* Mauro Rinaldi, MD, PHD,† Sten Lyager Nielsen, MD,‡
Stefano Salizzoni, MD,† Ruediger Lange, MD, PHD,§ Markus Schoenburg, MD,||
Ottavio Alfieri, MD, PHD,¶ Michael Andrew Borger, MD, PHD,*
Friedrich Wilhelm Mohr, MD, PHD,* Audrius Aidietis, MD, PHD#

**30 Pazienti selezionati
in 7 centri coinvolti:**

- Prolasso LMP isolato
- Assente dilatazione dell'anello

Studio prospettico multicentrico
che ha valutato la sicurezza e la
performance dell'impianto di
Neochord **con follow-up a 30 gg**

(J Am Coll Cardiol 2014;63:914–9)

Neochord

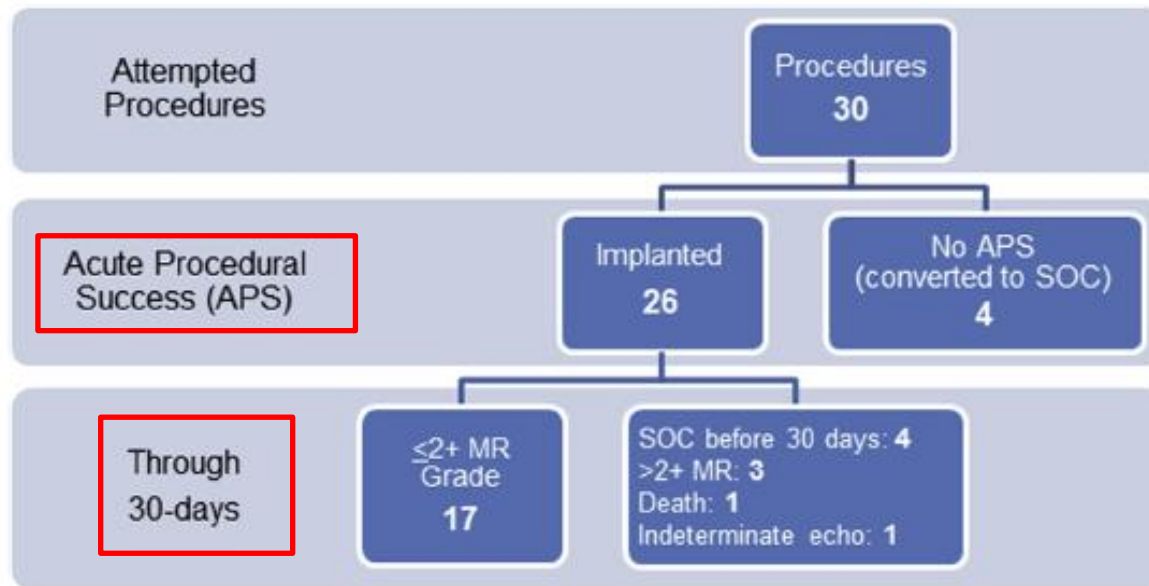


Figure 4 The TACT Study Flow Chart

(J Am Coll Cardiol 2014;63:914–9)

Nel nostro centro:

11 interventi eseguiti



✓ Range di età variabile (30-75 aa)

✓ Criterio di selezione variabile:

Alto rischio chirurgico

Basso rischio chirurgico e richiesta esplicita del pz

➤ Criterio anatomico → accurata valutazione ecocardiografica pre-op



✓ La terapia dell'insufficienza mitralica degenerativa³²

- Buoni risultati se collaborazione multidisciplinare



- Alla ricerca di una nicchia di pazienti selezionata

- In corso di studio la II fase del device.

4 fantastiche alternative...



... un team di esperti farà la scelta migliore!

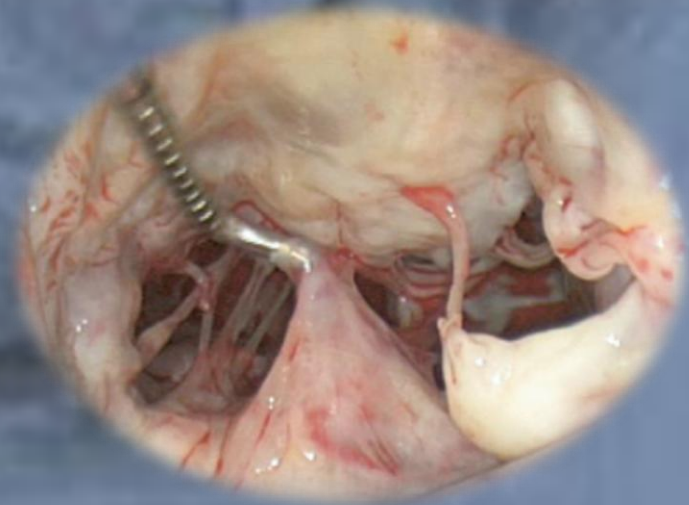
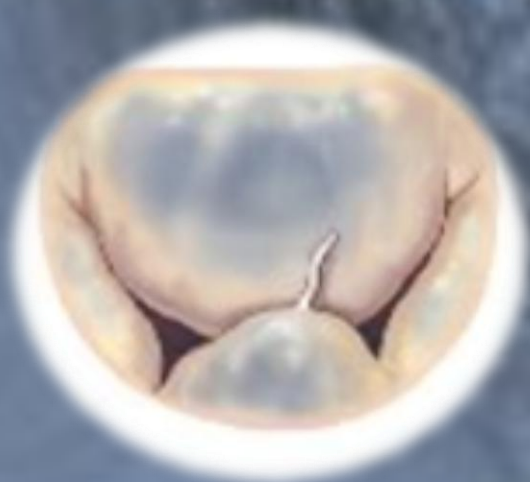
Tecniche semplici di plastica mitralica

Cosa definisce “Semplice?”

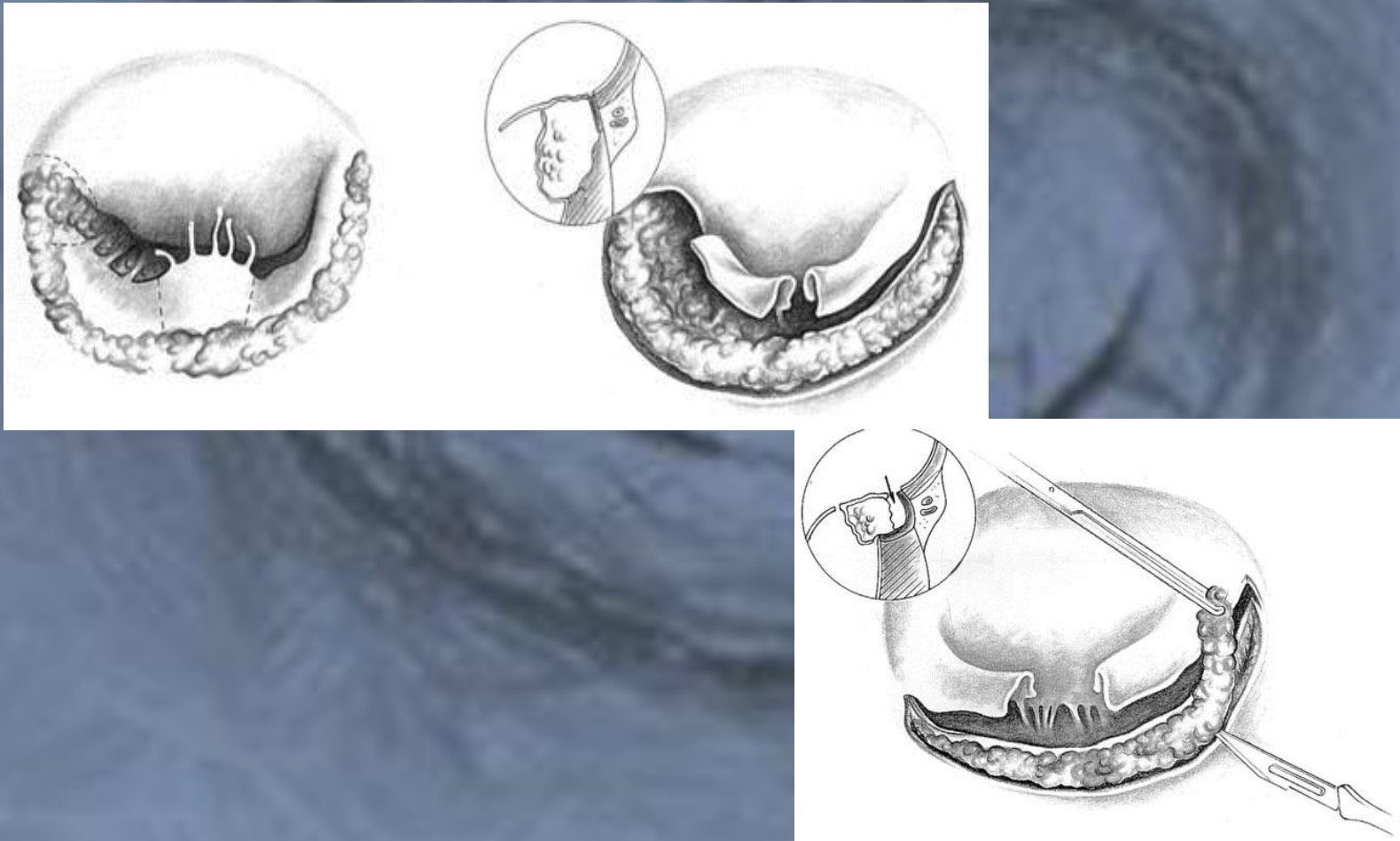
- E' semplice se semplice è la tecnica riparativa?
- E' semplice se è piccolo il numero di scallop coinvolto?

Dipende dalla localizzazione della malattia?

...dalla quantità di FED presente?

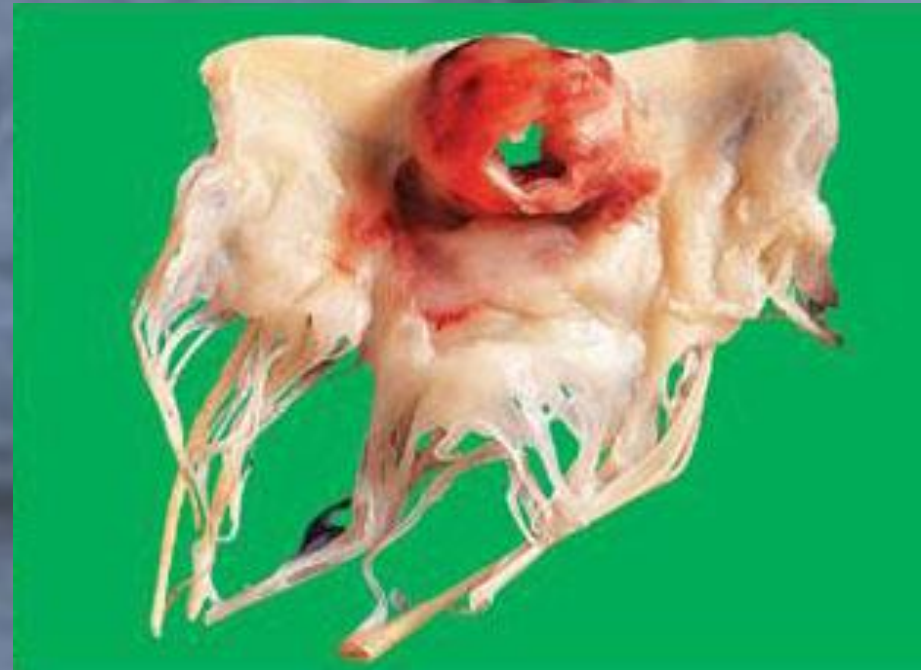
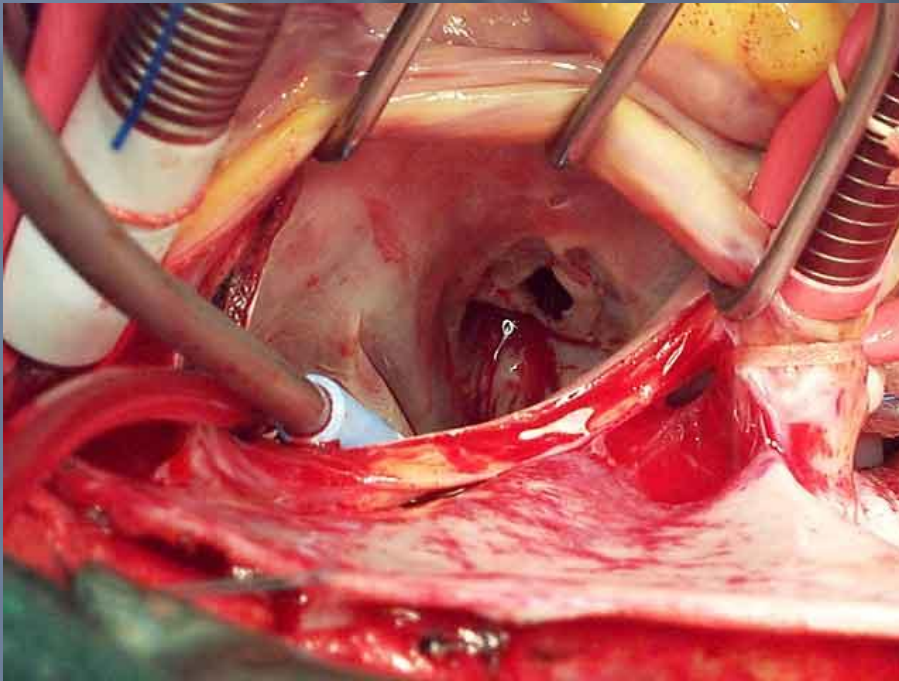


Dalla calcificazione dell'anello posteriore?



✓ La terapia dell'insufficienza mitralica degenerativa

Se fosse il caso di un'endocardite?



✓ La terapia dell'insufficienza mitralica degenerativa

Come rendiamo tutto più facile?

Accurata valutazione ECO pre-operatoria:

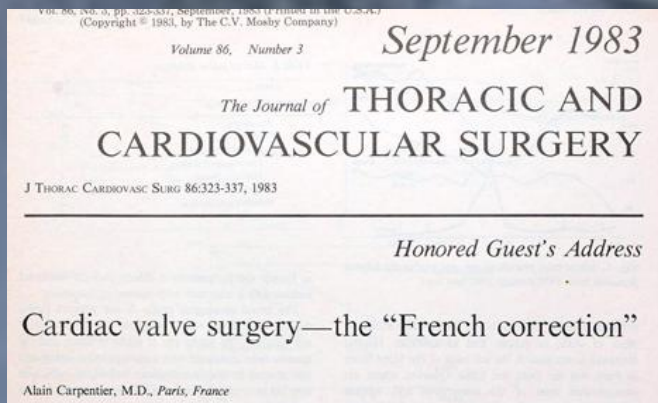
No ecocardiogramma transesofageo

Precise valutazioni mediante l'ECO TT 2D e 3D

Pianificazione dell'intervento chirurgico !!

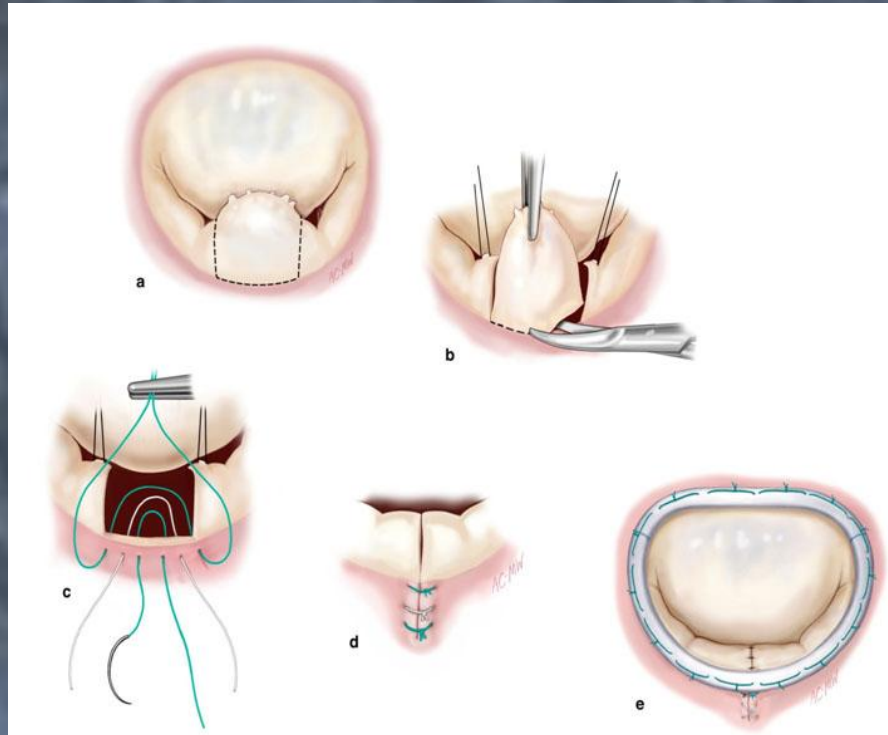
Tecniche semplici di plastica mitralica

- Resezione quadrangolare e plicatura
- Sutura dei residui margini liberi dei lembi (sliding)
- Folding plasty
- Anuloplastica mediante anello protesico



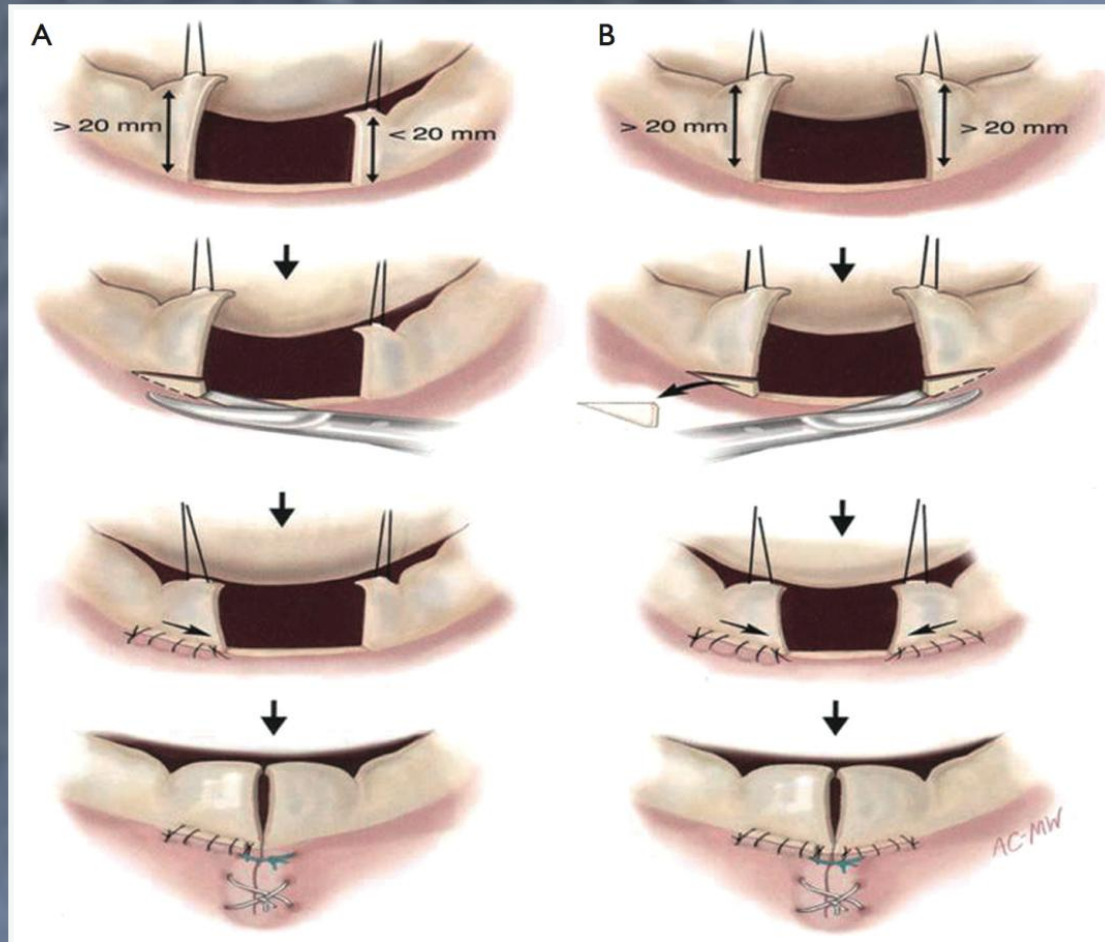
Tecniche di plastica mitralica

Resezione quadrangolare e plicatura



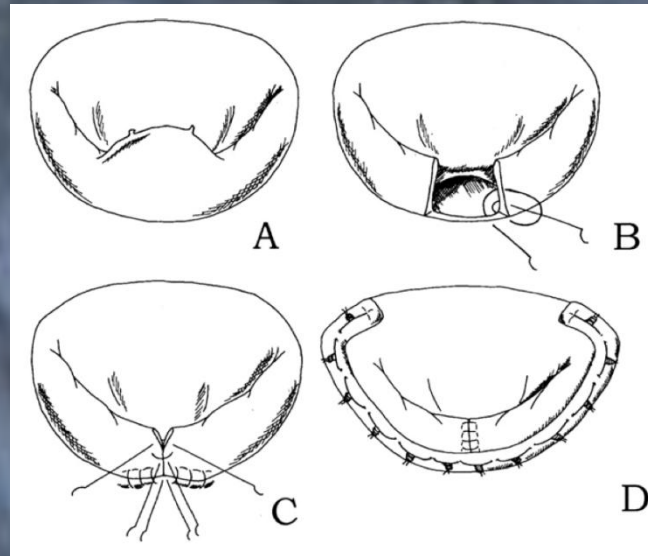
Tecniche di plastica mitralica

Sliding



Tecniche di plastica mitralica

Folding plasty



- Ripiegamento verso il basso dei margini verticali del segmento posteriore e chiusura dei conseguenti cleft
- Riduzione dell' altezza centrale del lembo posteriore.
- Spostamento della linea di coaptazione posteriormente al fine di scongiurare il rischio di SAM

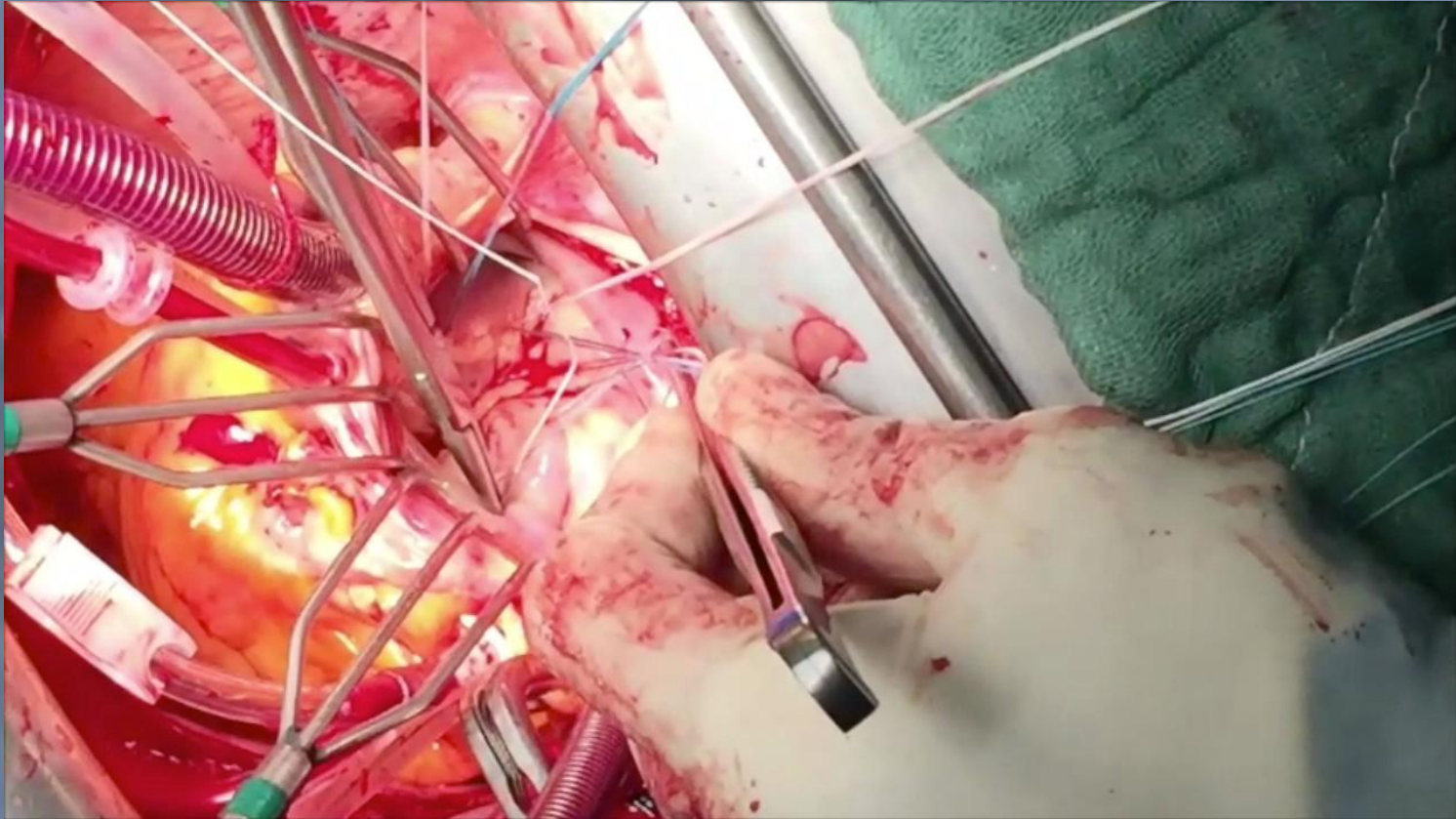
Tecniche di plastica mitralica

L'anello protesico

- Indipendentemente dalla tecnica impiegata per correggere l'apparato cordale o i lembi, per tutte le procedure mitraliche di riparazione è mandatorio l'utilizzo di un anello per effettuare un'anuloplastica
- La mancanza di un'anuloplastica contestualmente alla riparazione mitralica è un fattore predittivo di insuccesso che si ripercuote in una maggiore probabilità di recidiva di insufficienza



Tecniche di plastica mitralica



✓ La terapia dell'insufficienza mitralica degenerativa