LV Reconstruction

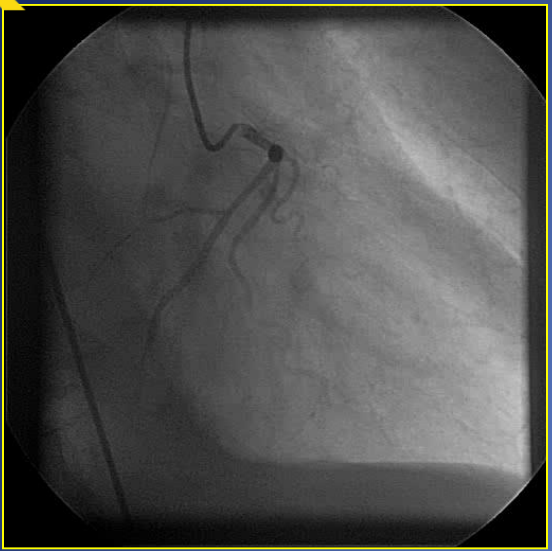
Still a tool for Heart Failure Treatment?

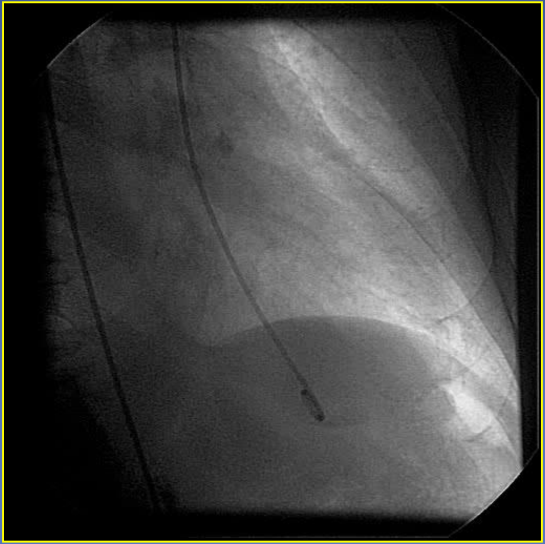
Matthew Panagiotou MD FETCS

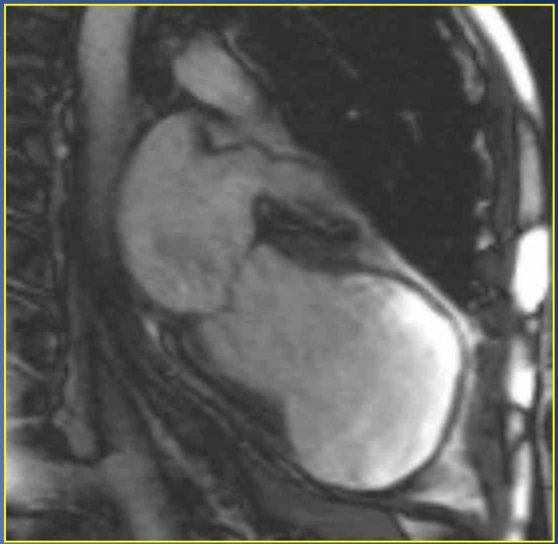
Cardiac surgeon

Athens Medical Center

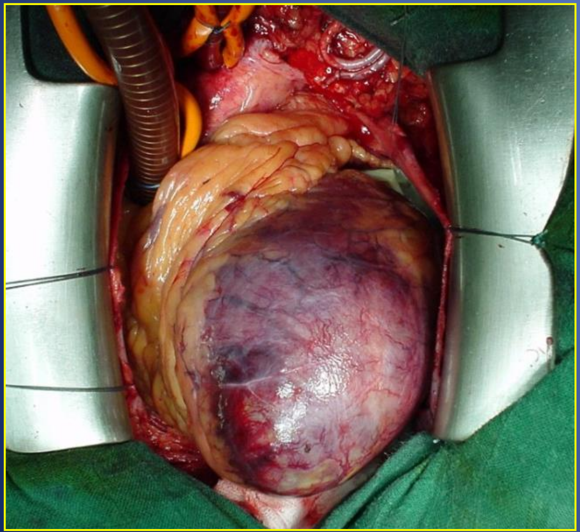
Transmural Infarct

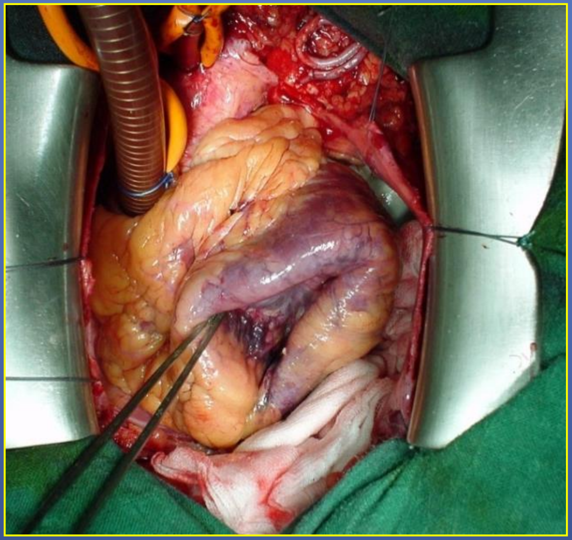


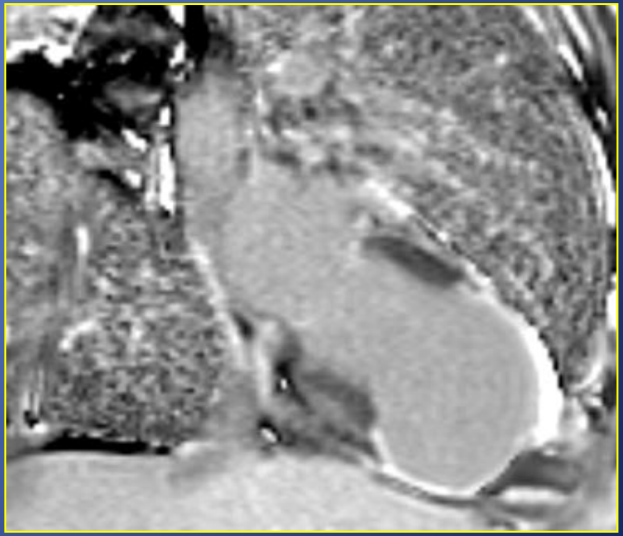




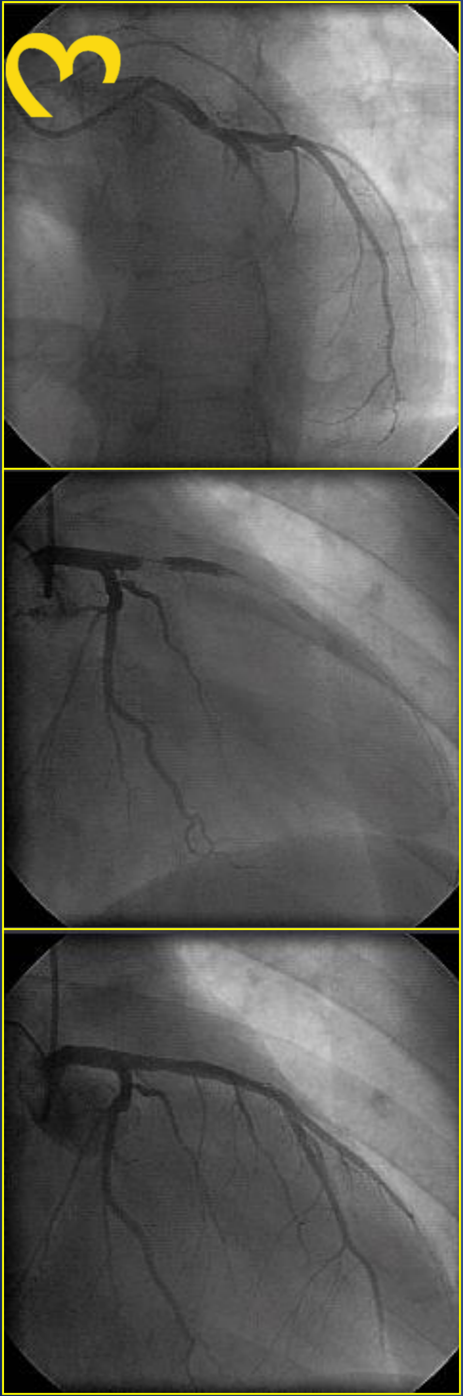
Regional infarction of more than 30% of LV circumference → progressive dilatation of remote viable muscle → convert normal elliptical shape to a sphere



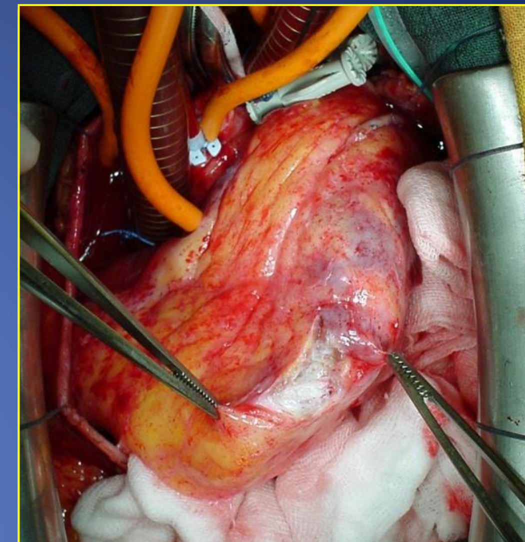


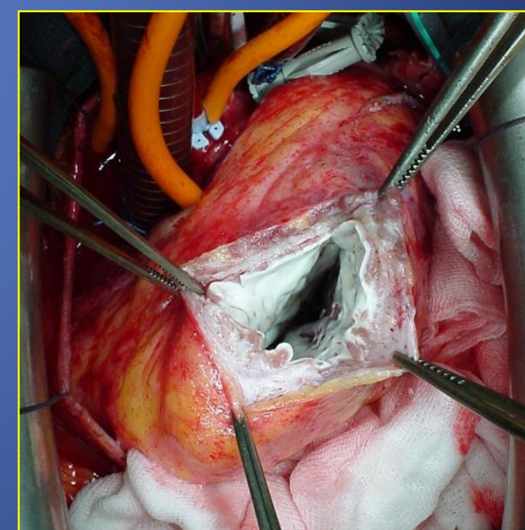


When ≥ 40% of muscle becomes nonfunctional the normal LVESVI of 25ml/m2 → LVESVI>60ml/m2



Sub Endocardial Infarct

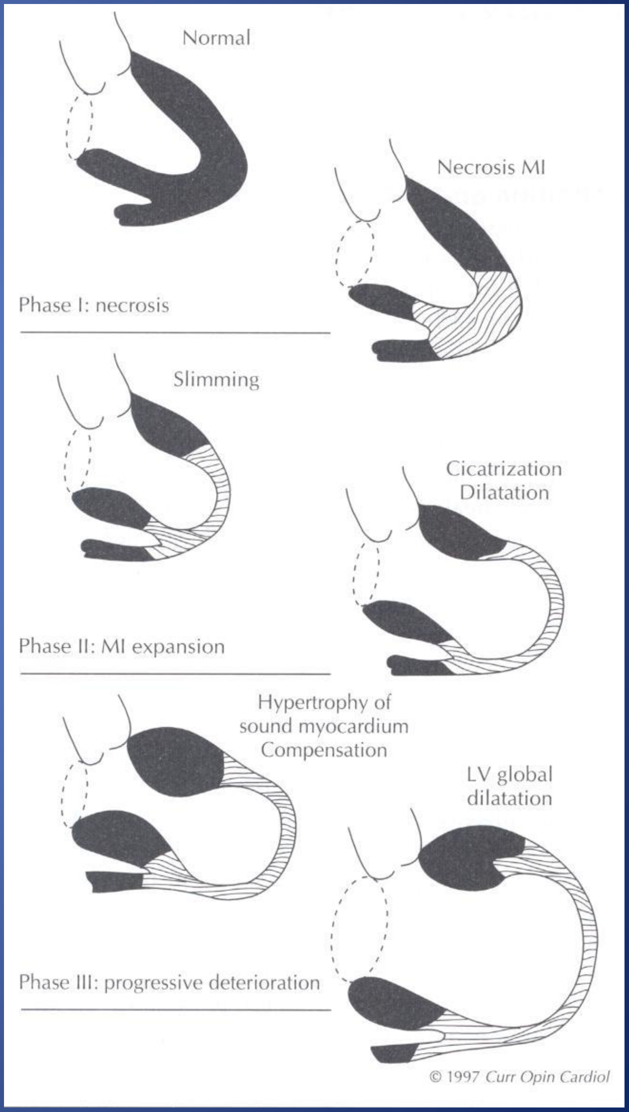




Partially necrosed scarred wall

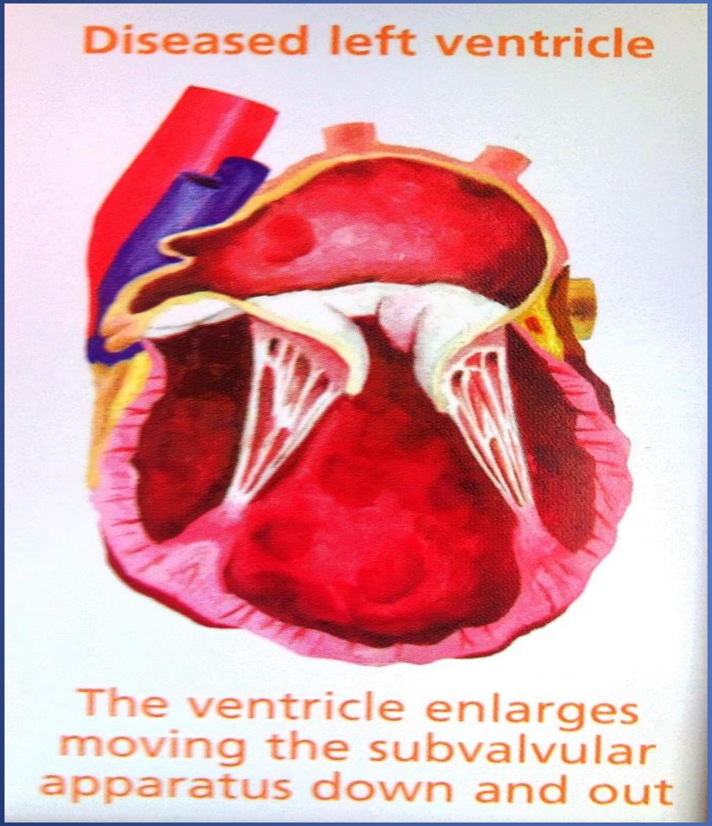
Postinfarction LV remodelling

- Fibrotic repair of the necrotic area
- Thinning of the infarcted zone
- LV volume increases
- Stroke volume augmentation in an attempt to maintain normal cardiac output as the EF decreases



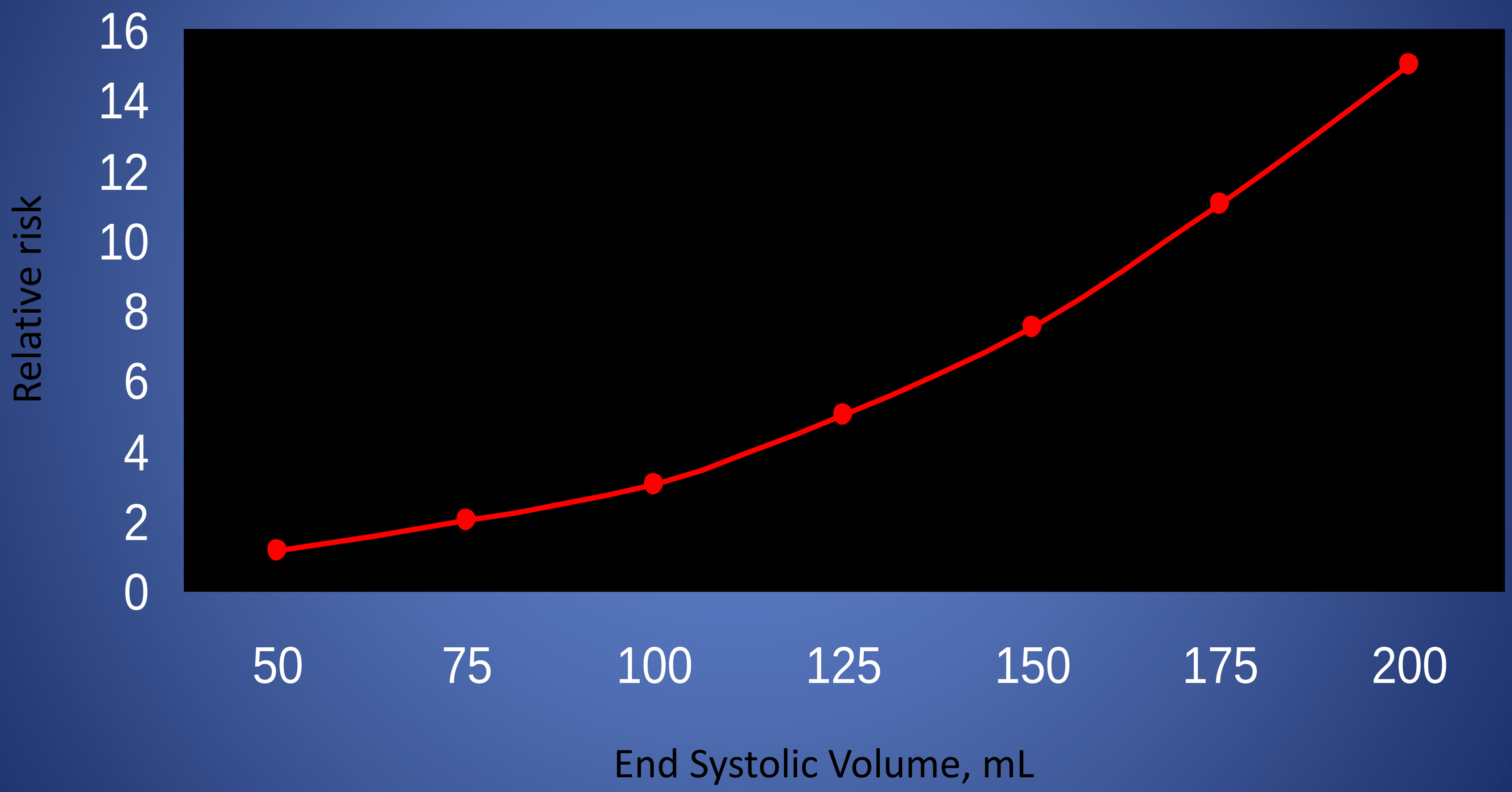
- Chamber dilatation
- Abnormal shape
- Systolic+ diastolic dysfunction
- Progressive heart failure syndrome
- Poor 3-year prognosis (NYHA class III-IV)

Geometric/secondary Mitral regurgitation



- Annular enlargement
- Papillary muscle displacement
- Tenting of the mitral valve at closure leading to lack of proper coaptation

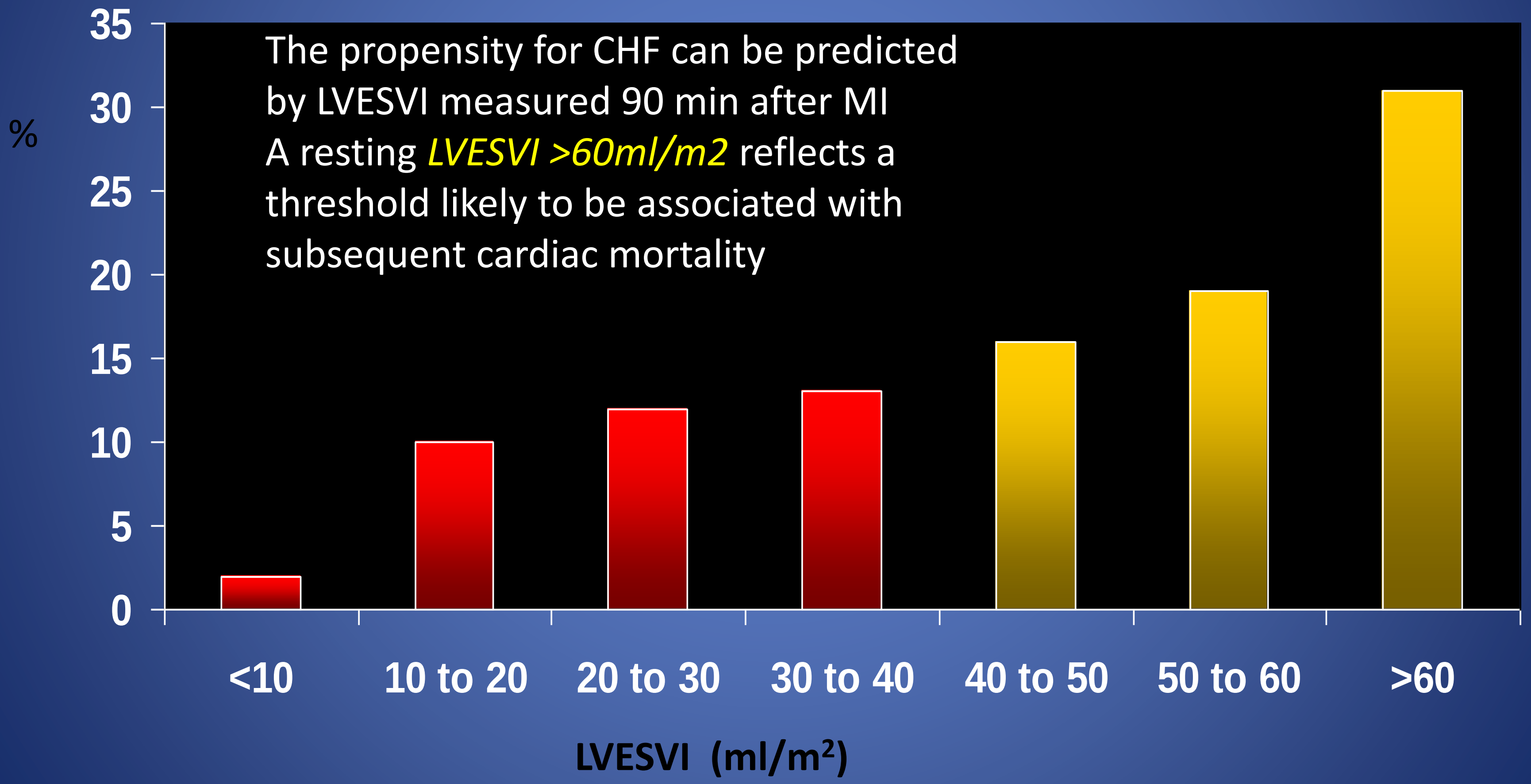
Relative Death Risk Post MI



White HD. *Circulation* l987

LVESVI and Congestive Heart Failure

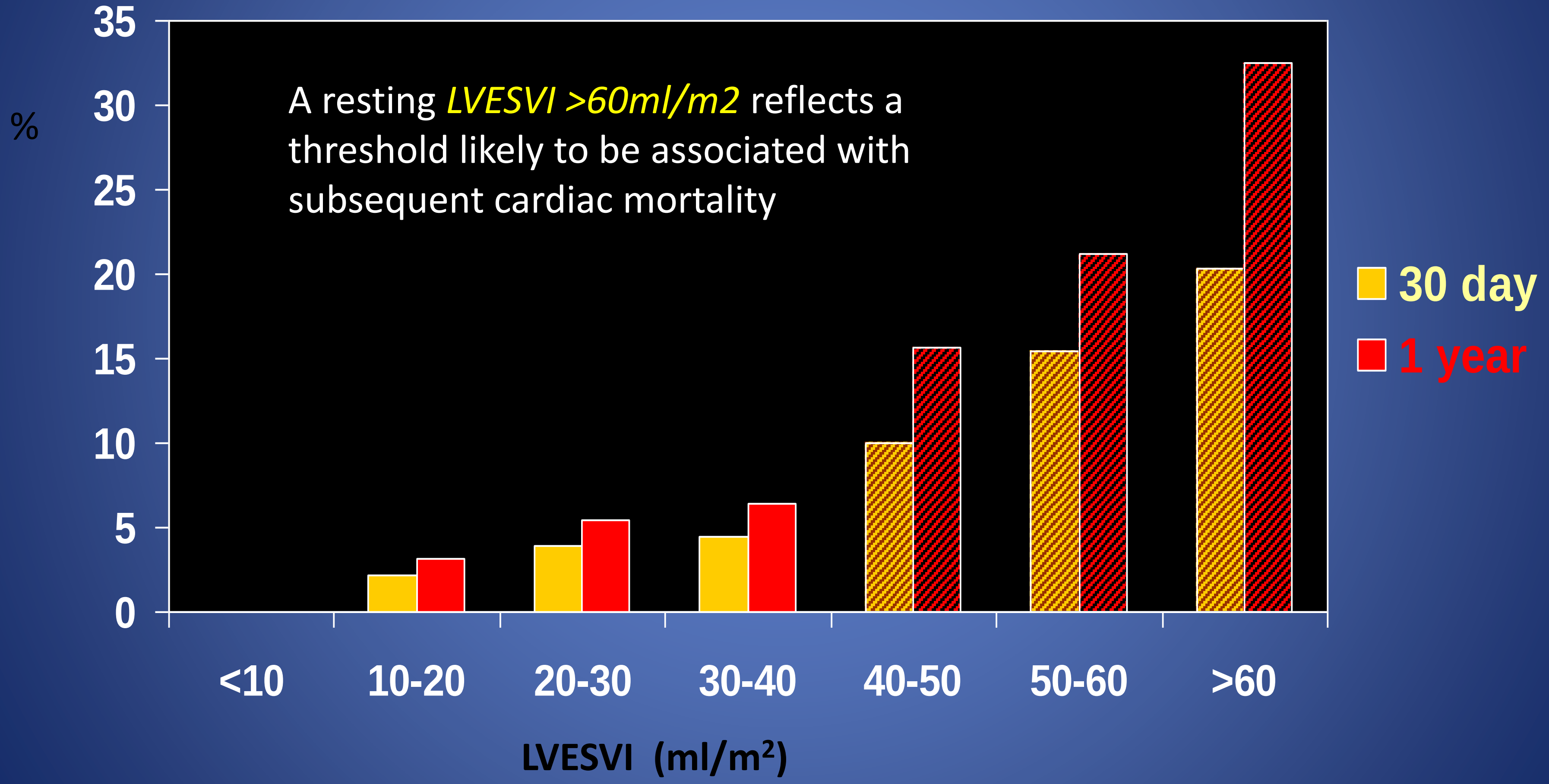
GUSTO I



Migrino RQ : *Circulation* 1997

LVESVI and Mortality

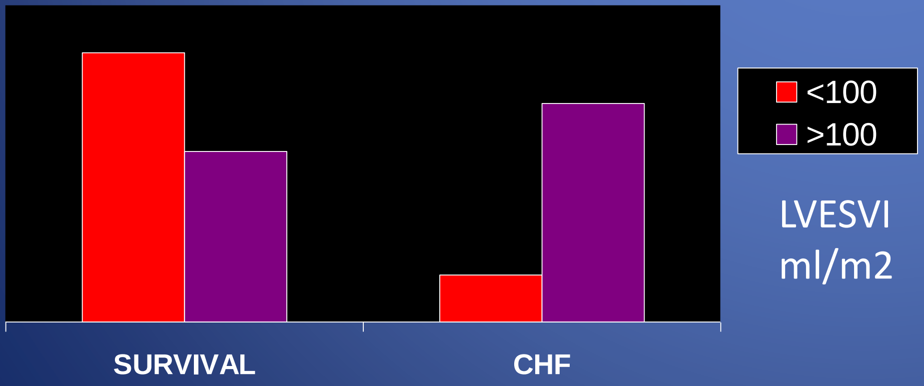
GUSTO I



Migrino RQ : *Circulation* 1997

LV Volume Predicts Postoperative Course in Patients with Ischemic Cardiomyopathy

- *The larger the hearts are, in both diastolic and systolic dimensions , the poorer the predicted response will be to CABG.*
- *A preoperative LVESVI greater than 100 ml/m2 is an independent predictor of the development of postoperative CHF*



CABG for Ischemic Cardiomyopathy EF < 30%: 5 yr. outcome

Yamaguchi A. et al. Ann Thorac Surg 1998;65:434-8

SVR

- Patients with a severely dilated LV
  LVESVI ≥ 75 ml / m^2
  have a low likelihood of showing improvement in LVEF after revascularization, even in the presence of substantial viability.

Vanoverschelde JL, et al. Time course of functional recovery after coronary artery bypass graft surgery in patients with chronic left ventricular ischemic dysfunction. Am J Cardiol 2000; 85: 1432-9

LV geometry is destiny

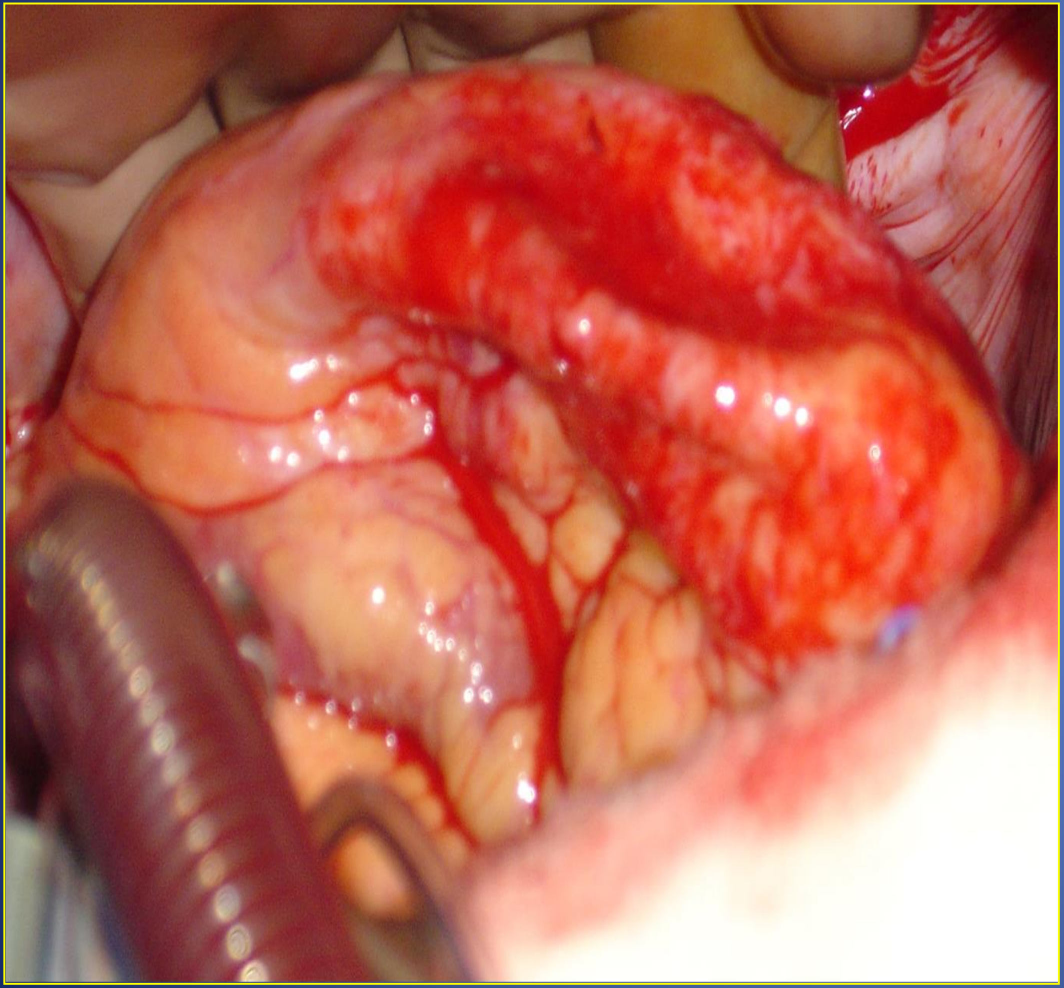
The Rationale to SVR

- LV volume reduction with the exclusion of the asynergic scar
- The reshaping of the distorted chamber
- Improving in cardiac function through the reduction of the LV wall stress
- Combined with myocardial revascularization
- Combined with mitral repair or improvement of mitral function by reducing LV volumes or papillary muscle distance
- Combined with Endocardiectomy /cryotherapy when VT is detected or induced

The triple V concept of heart failure

VESSEL -VALVE -VENTRICLE

Decision to pursue SVR should be based on:



-Viability studies
-MRI Volumetric studies
and
Final inspection in the OR

SVR for Anterior-Septal-Apical Asynergy

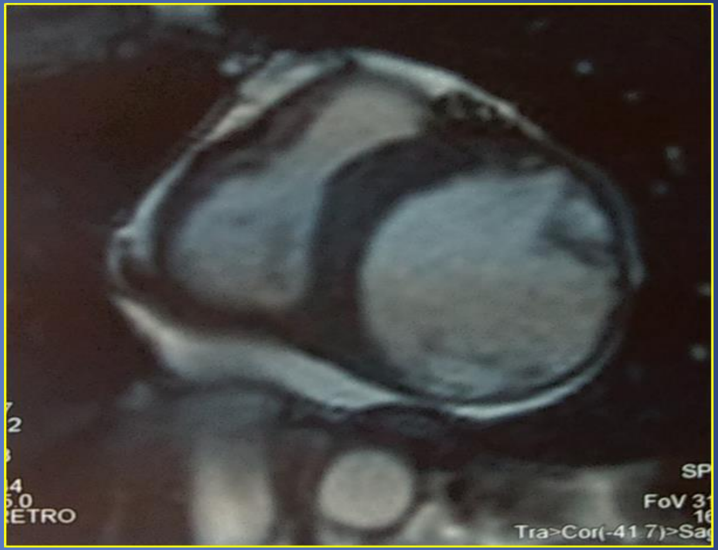
SURGICAL TECHNIQUES:

- Linear Closure
- Mod.Linear Closure + Septoplasty
- Septoexclusion
- EVCPP-Dor
- SAVE
- ELIET
- OVERLAPPING

SVR

Inferior LV asynergy

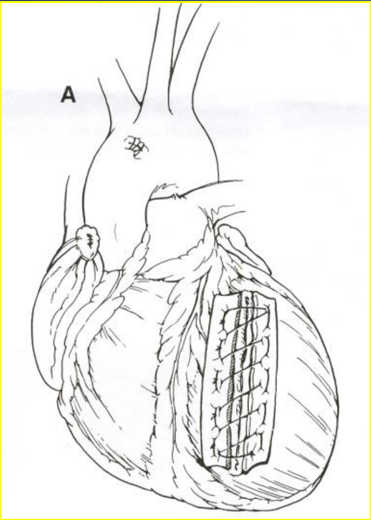
- Triangular patch
- +/- MV procedure



Lateral LV asynergy

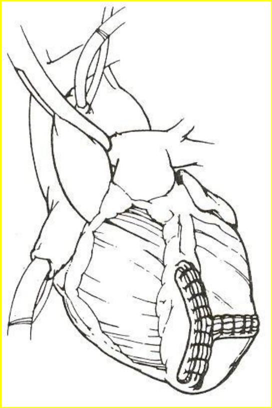
- PLV   (Batista)
- ELIET
- Apex-sparing PLV (Komeda)

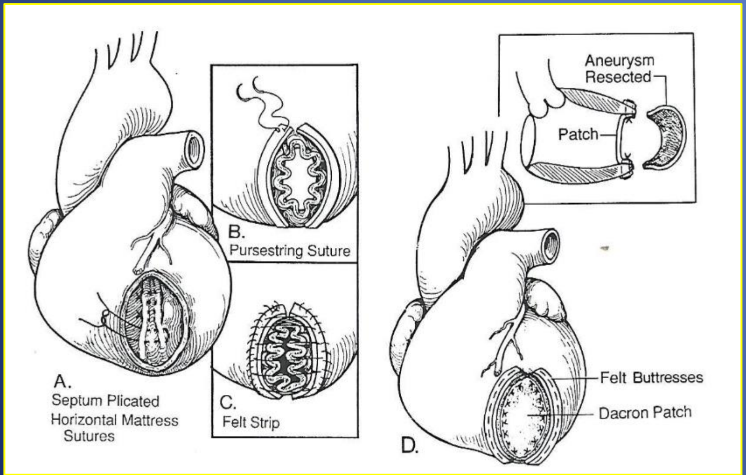
SVR



Scar Resection and
Linear closure
Cooley 1958

Inverted –T closure modification
Komeda - David

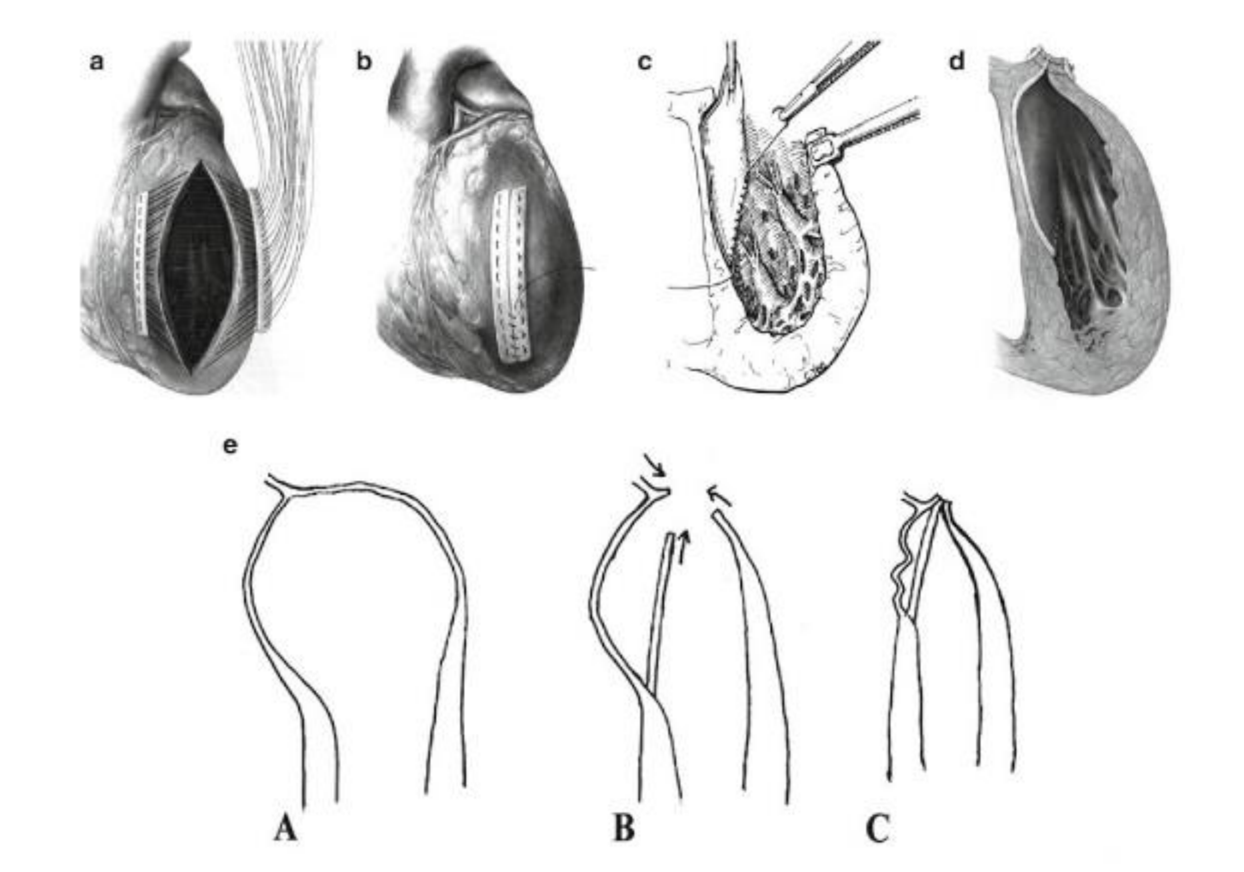




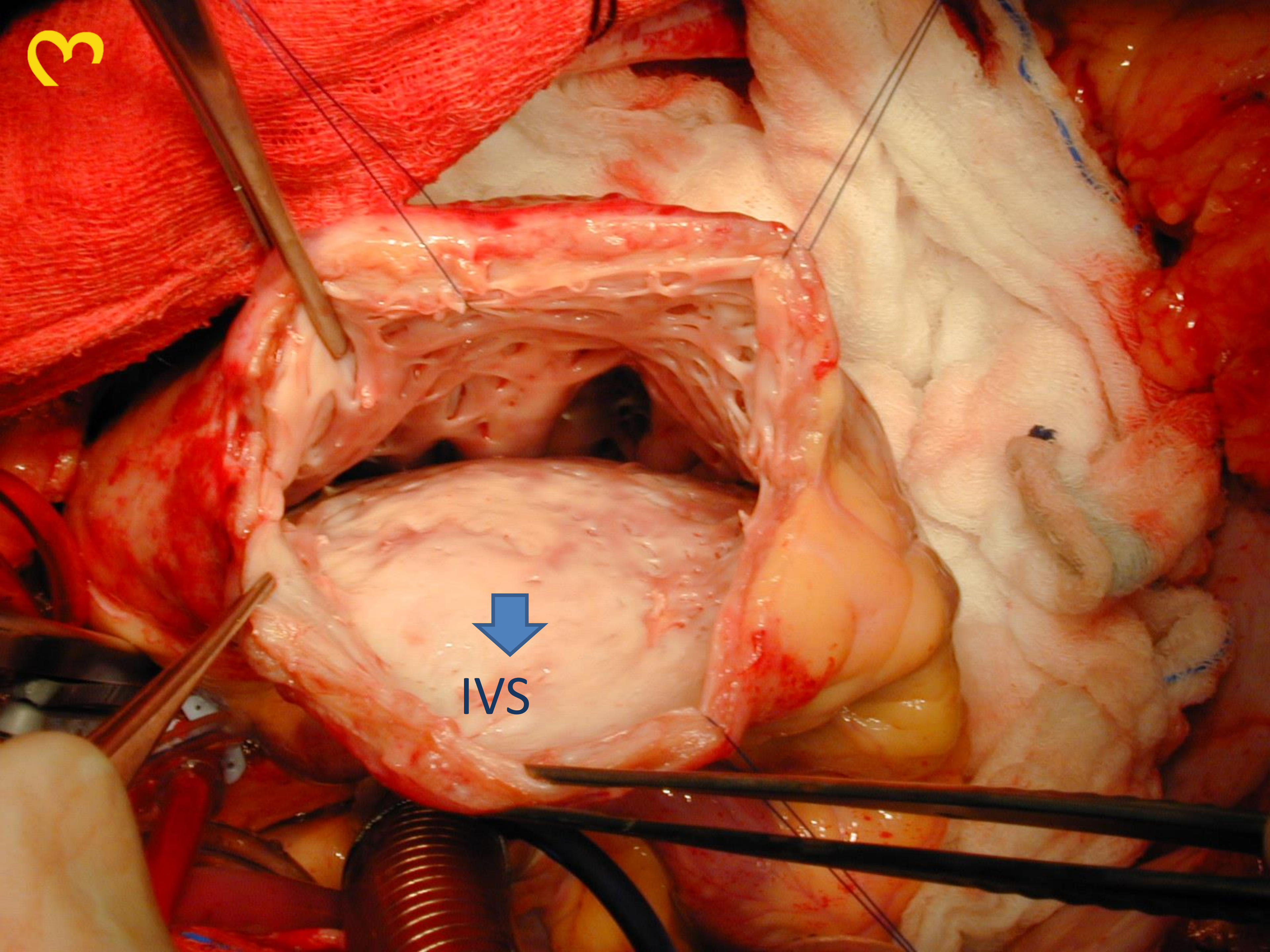
JATENE TECHNIQUES

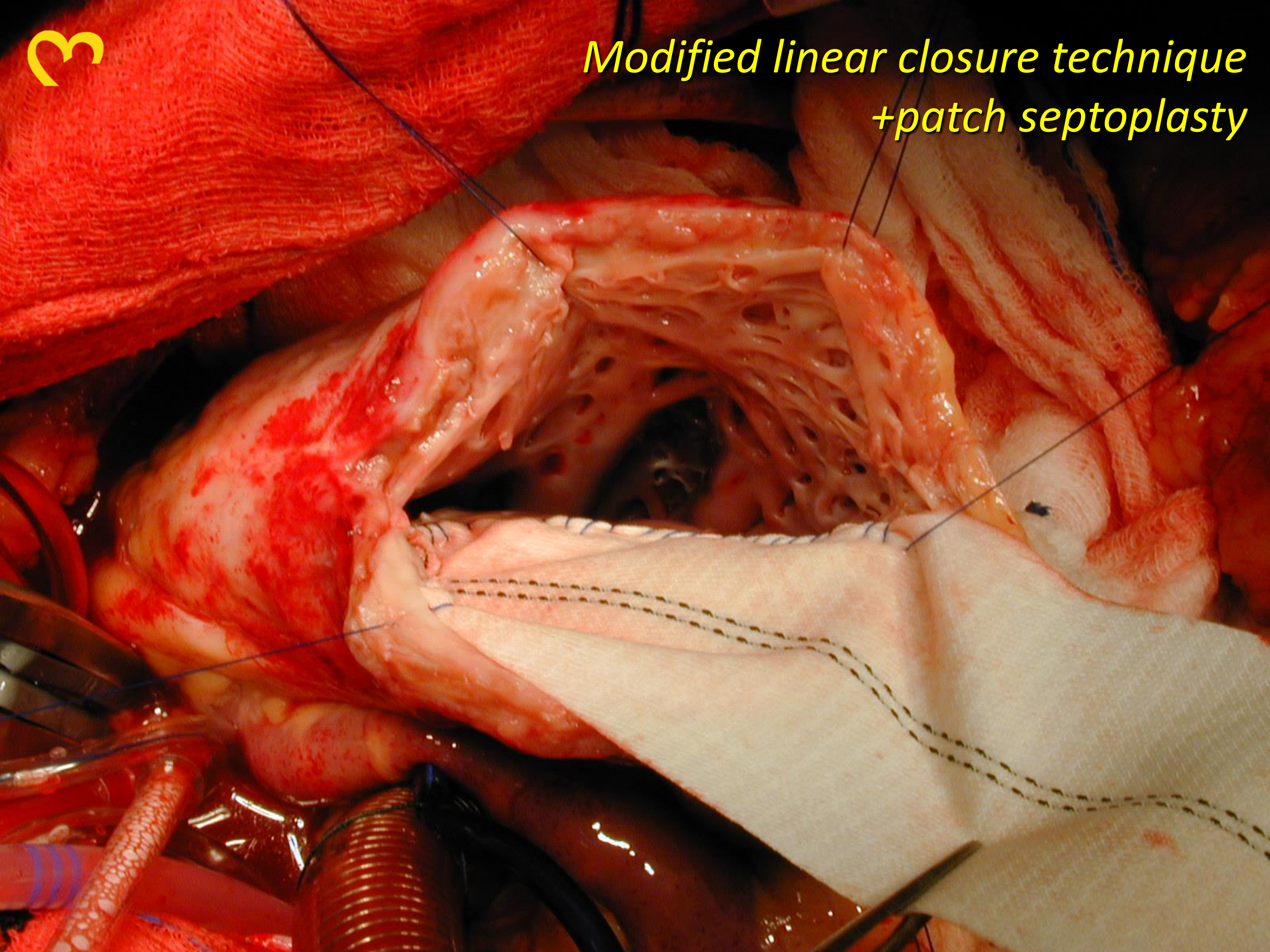
FIRST INDRODUCTION OF THE IDEA OF CIRCULAR CORECTION

MODIFIED LINEAR CLOSURE WITH PATCH SEPTOPLASTY

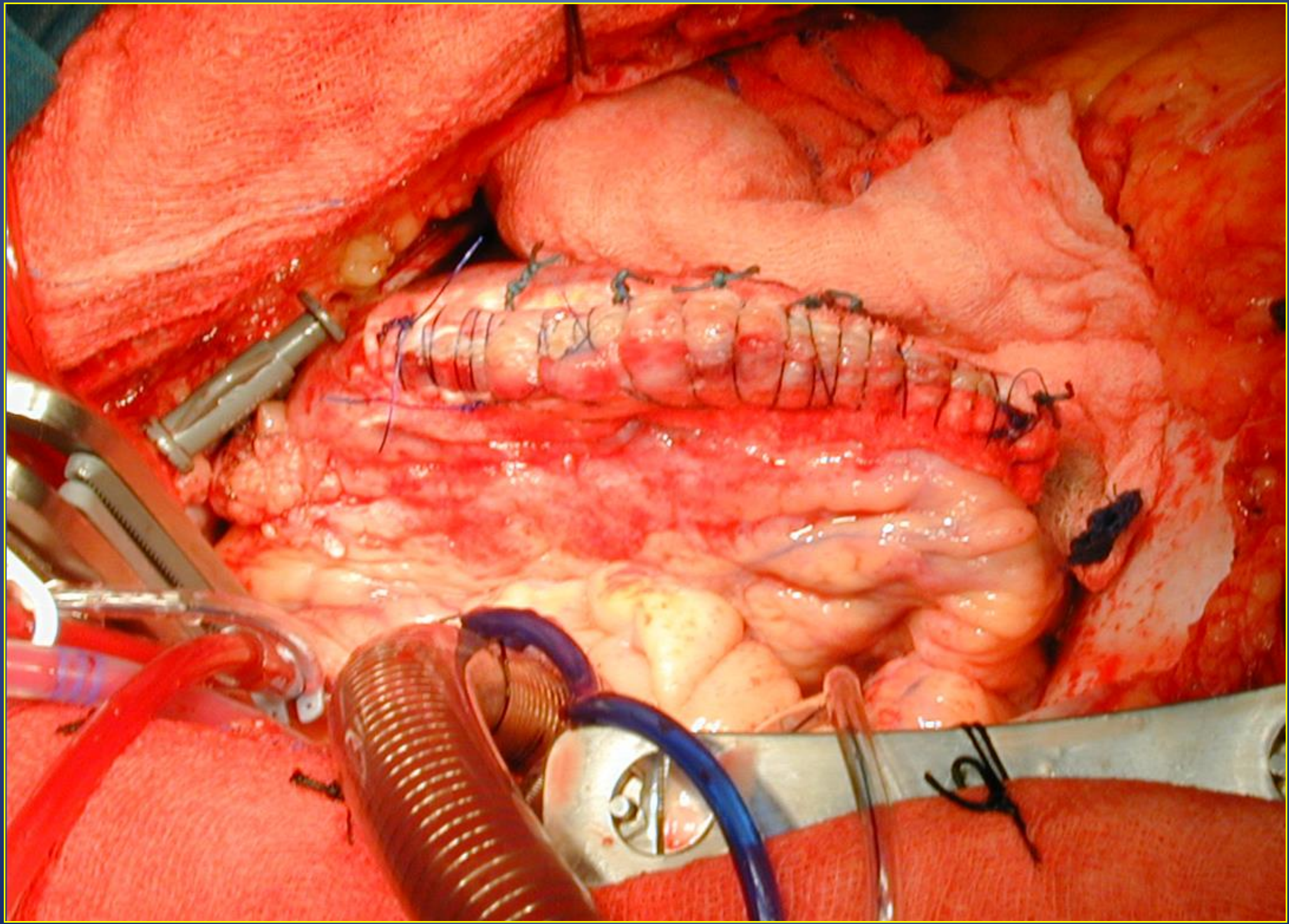


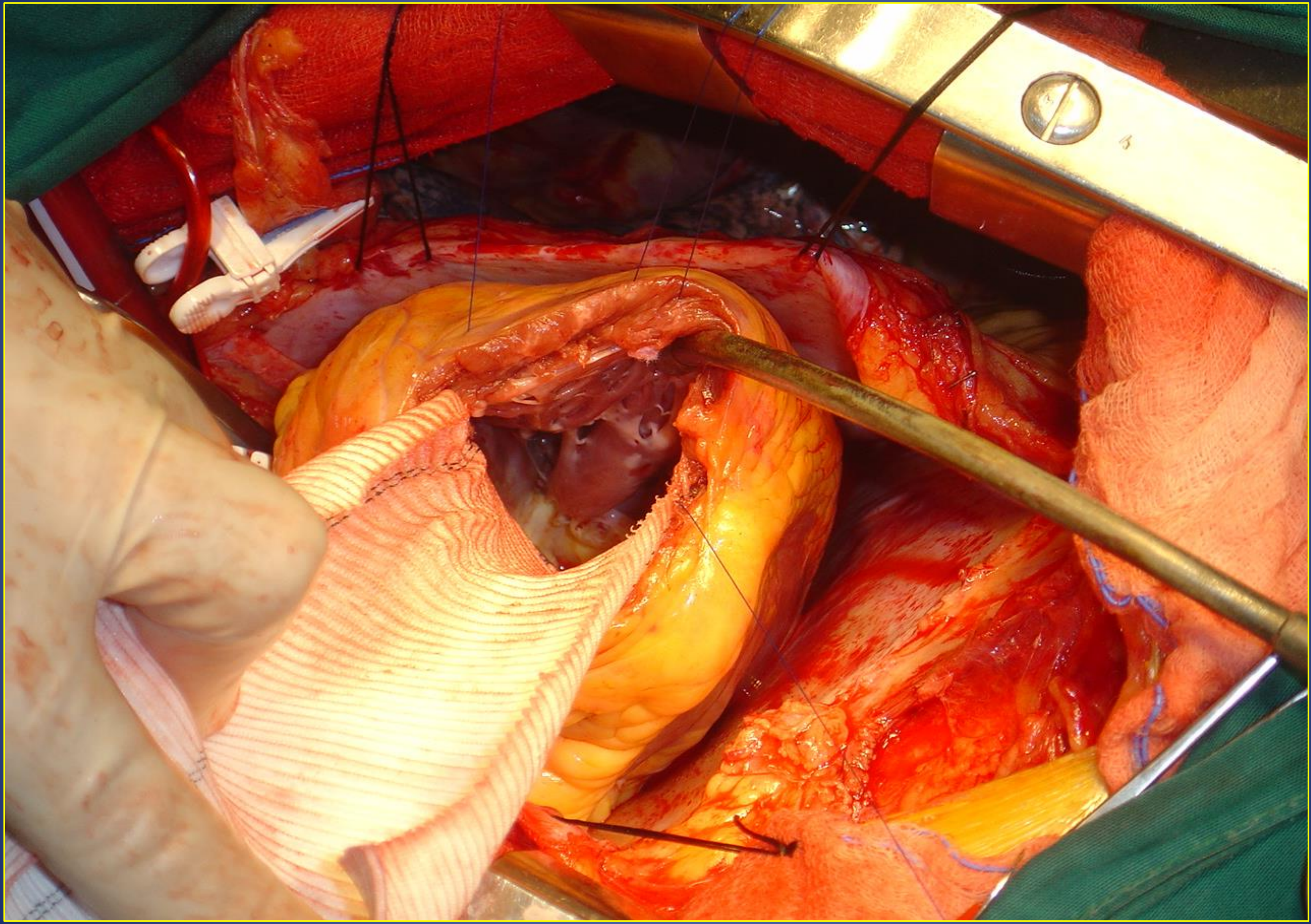
Mickleborough, et al. Left ventricular reconstruction: early and late results. J Thorac Cardiovasc Surg 2004; 128: 27-37

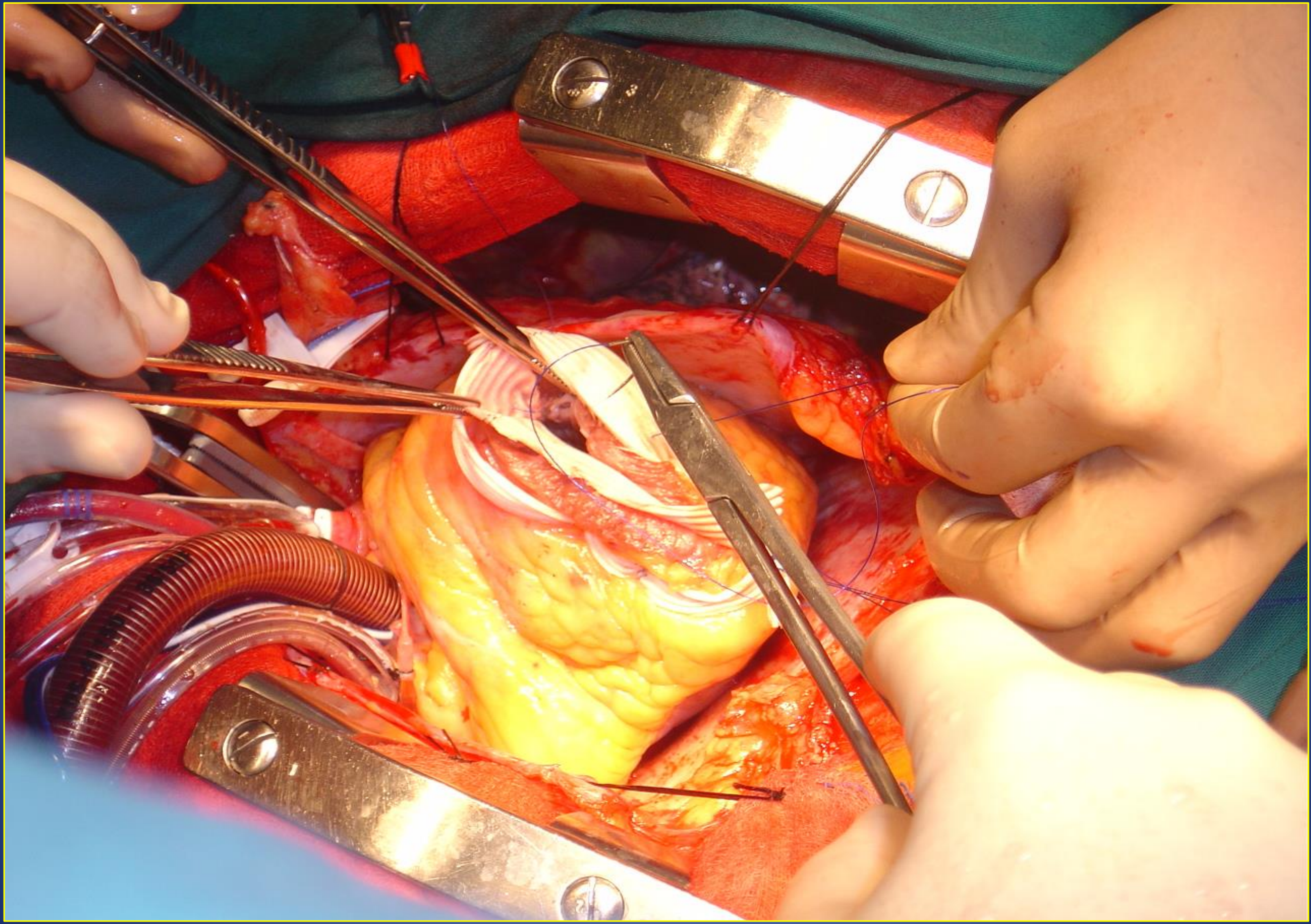

IVS

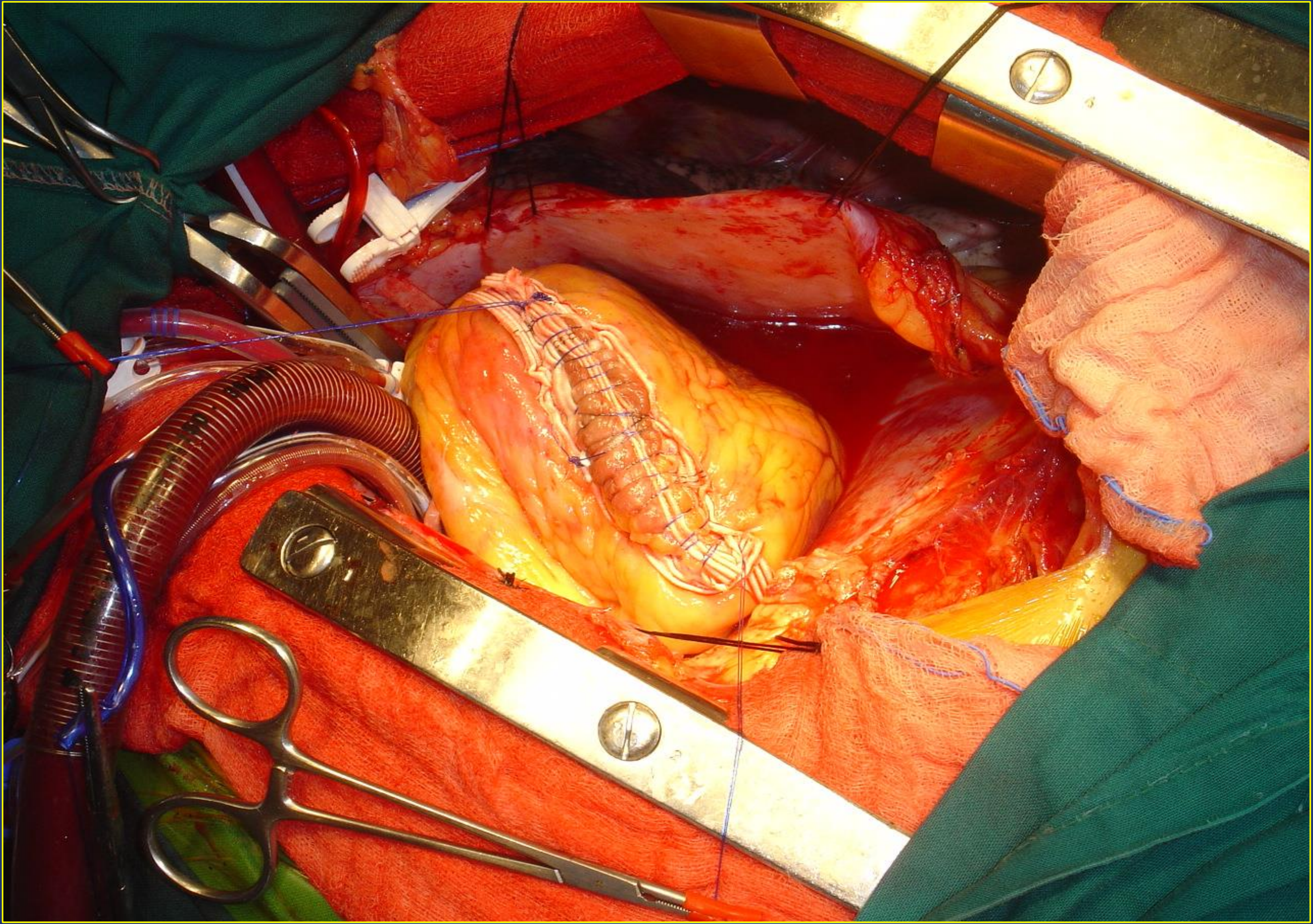

Modified linear closure technique
+patch septoplasty

Modified linear closure technique & patch septoplasty

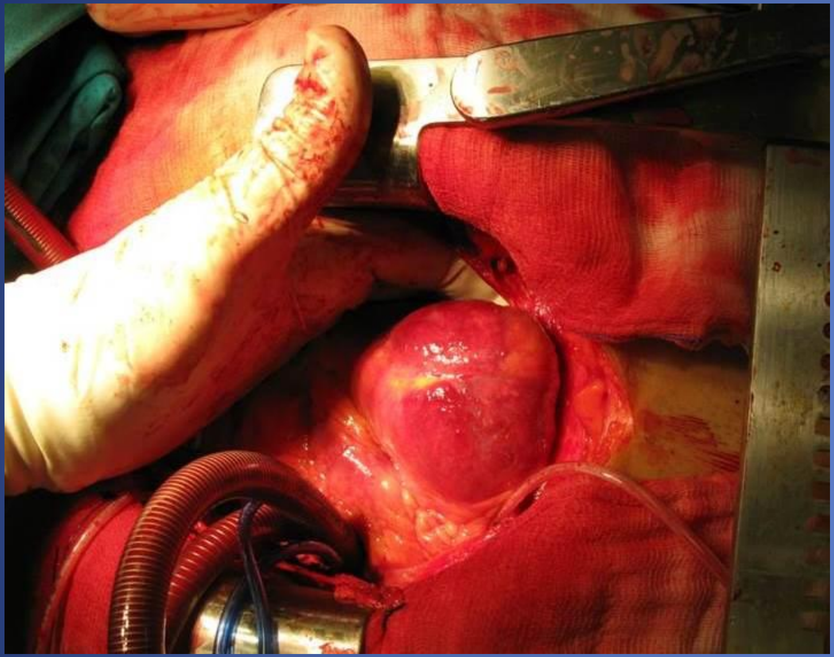


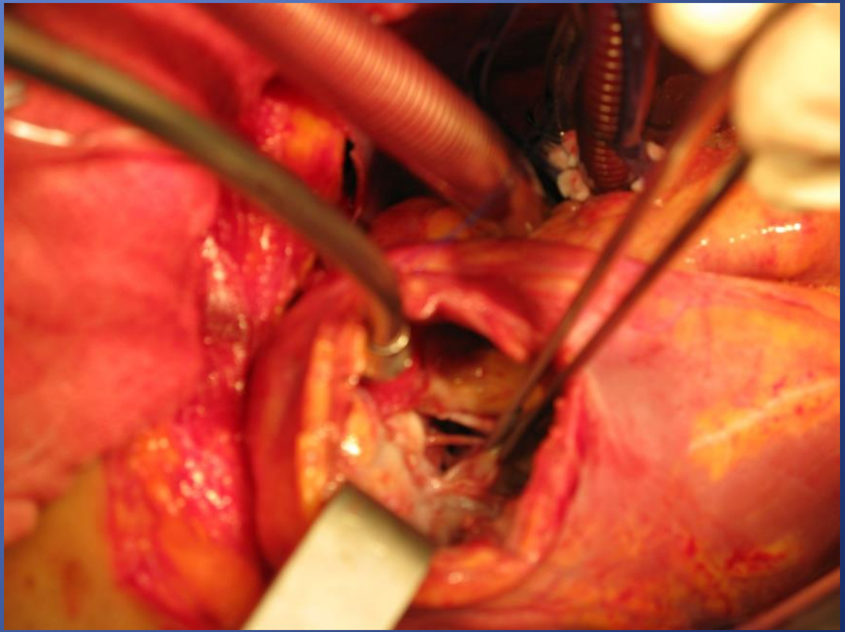




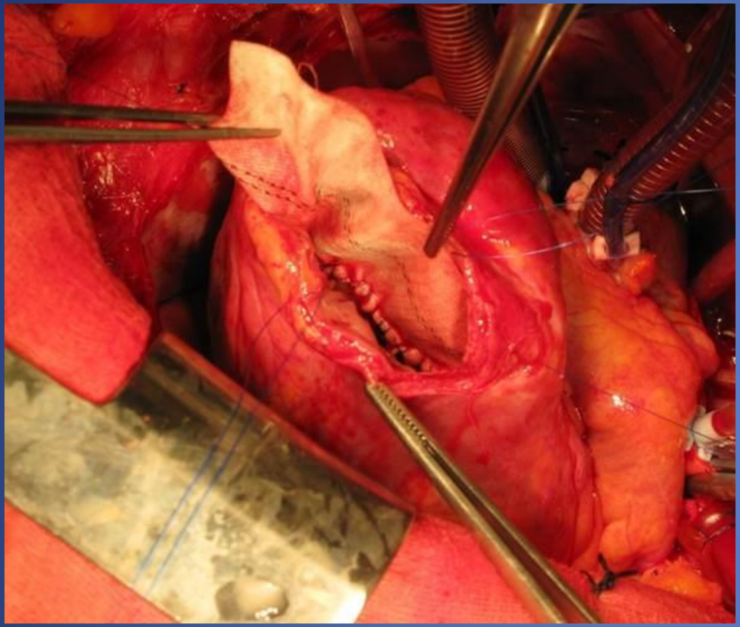


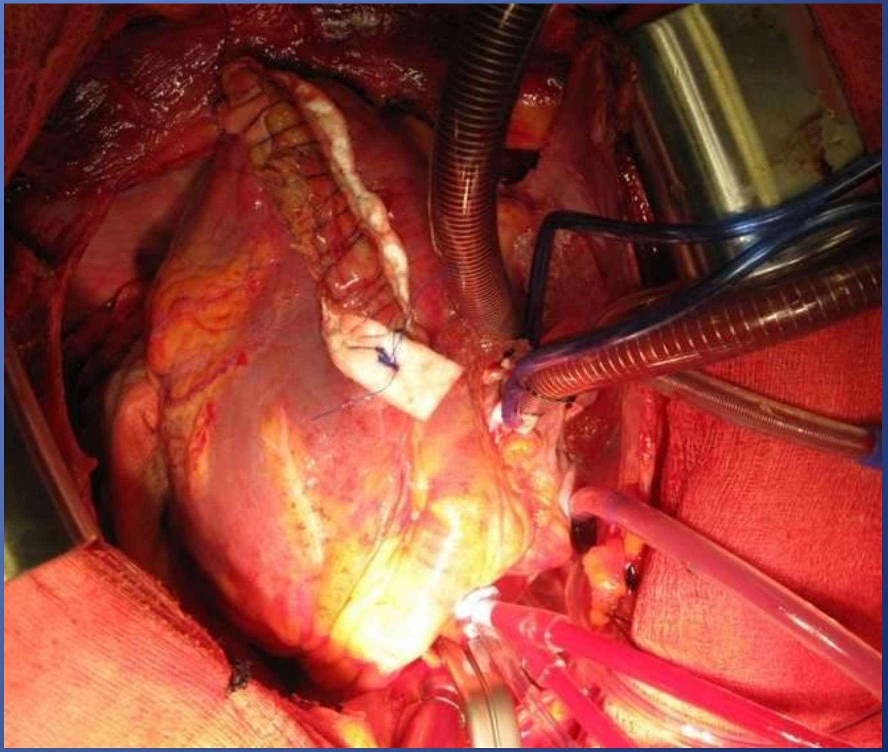
Post- MI VSR



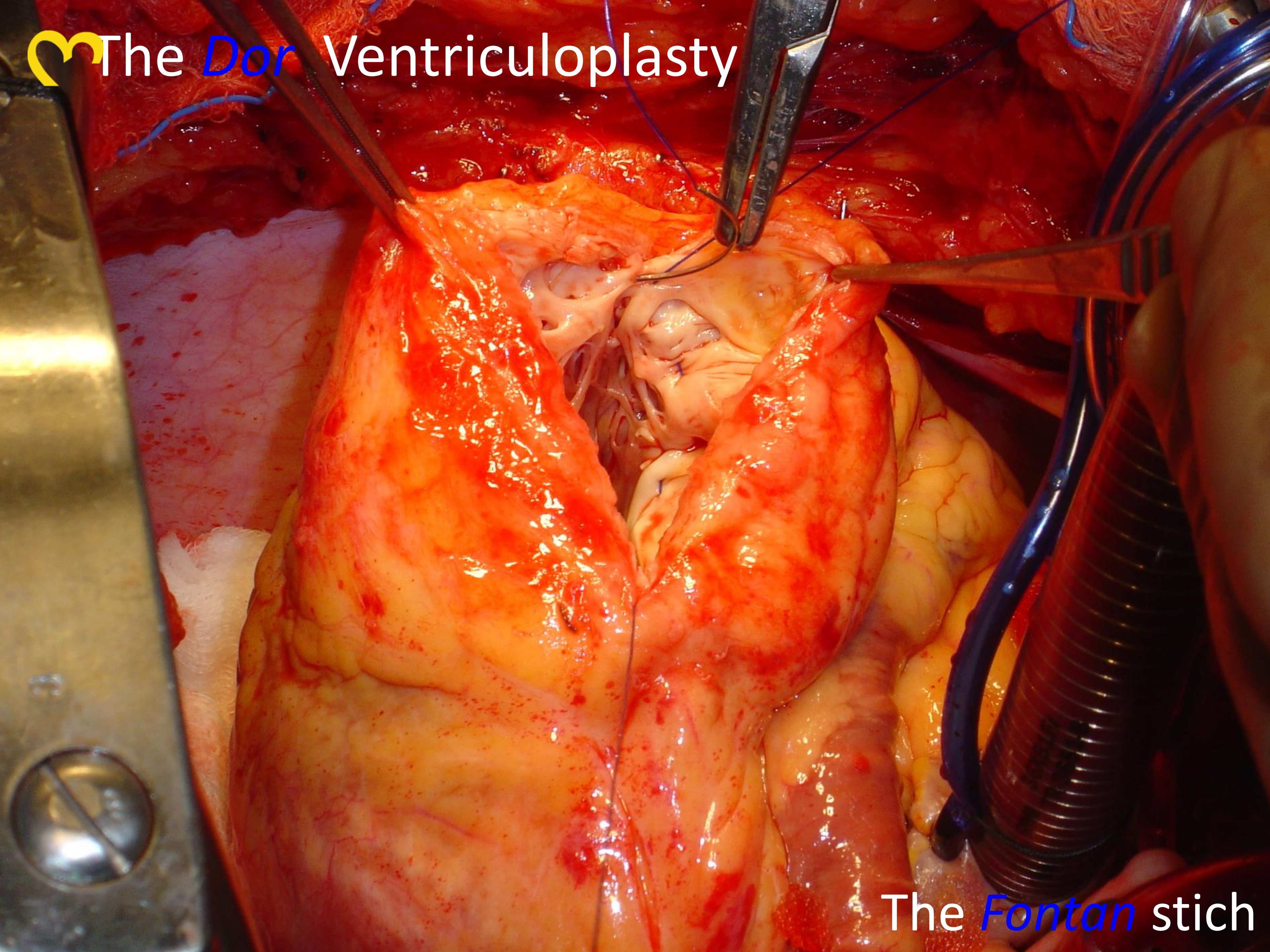


Post- MI VSR

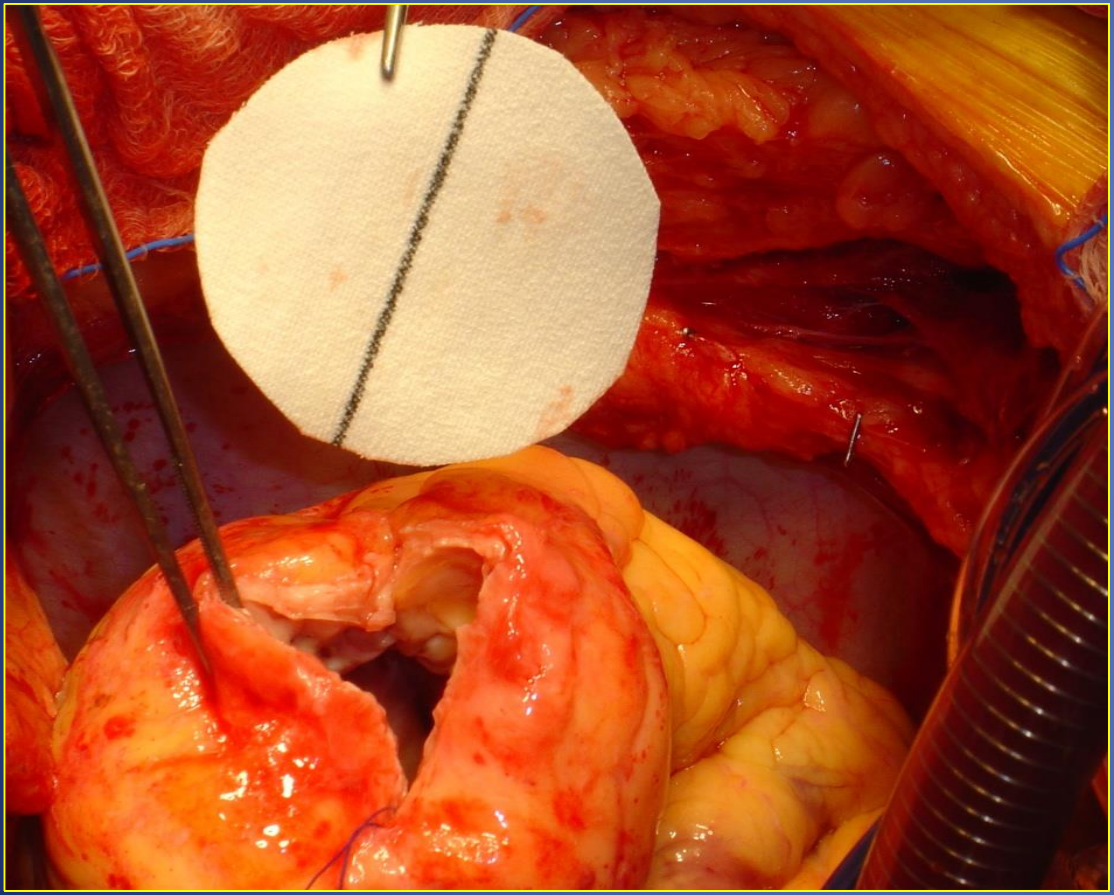




The *Dor* Ventriculoplasty



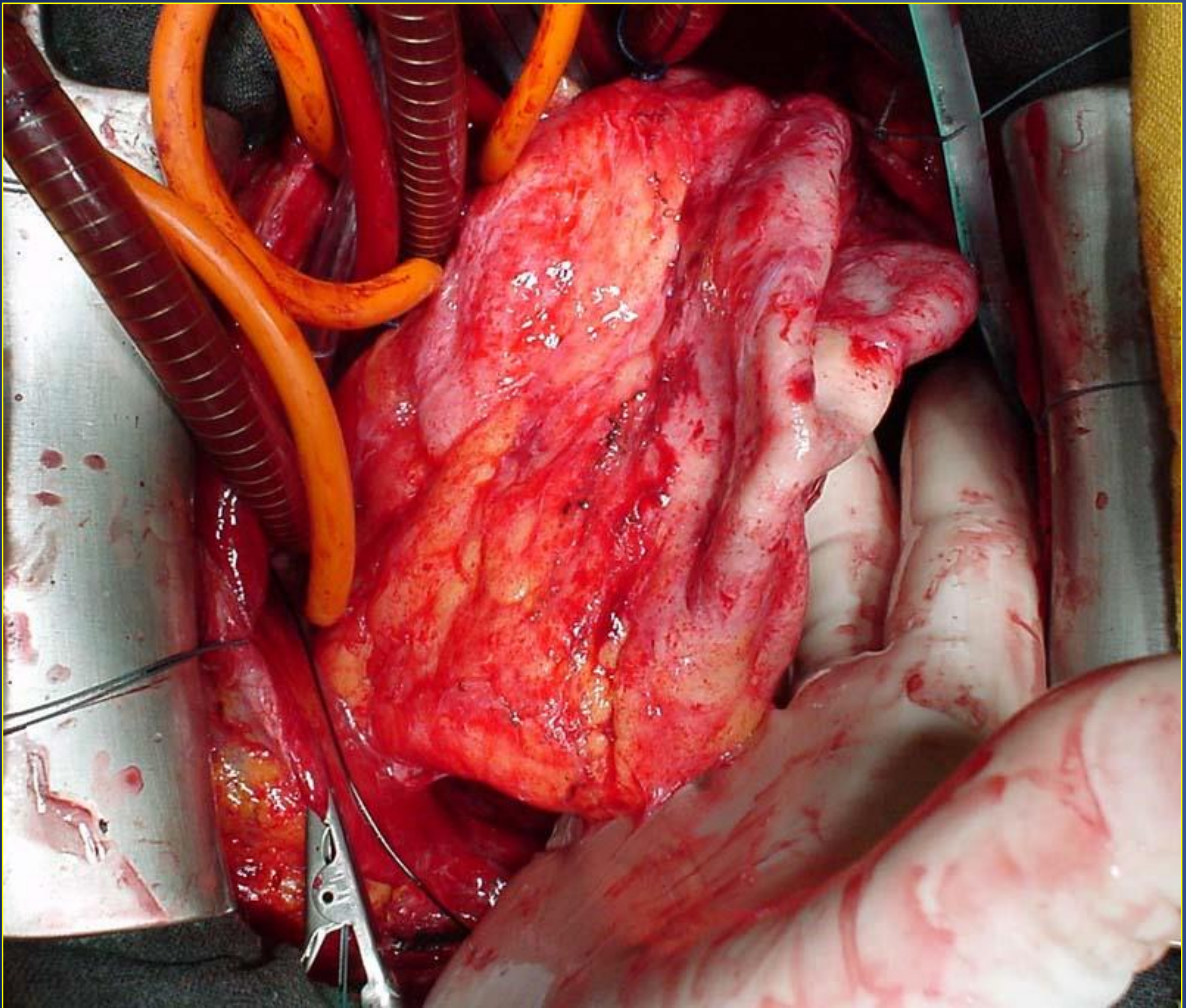
The Dor Ventriculoplasty



CIRCULAR
PATCH

when the diameter of the LV defect after the Fontan - suture ≥ 3cm

The Dor Ventriculoplasty



MI in the antero-septal wall

Enlarged LVEDVI 100-180 ml/m^2
EDD ≥6cm

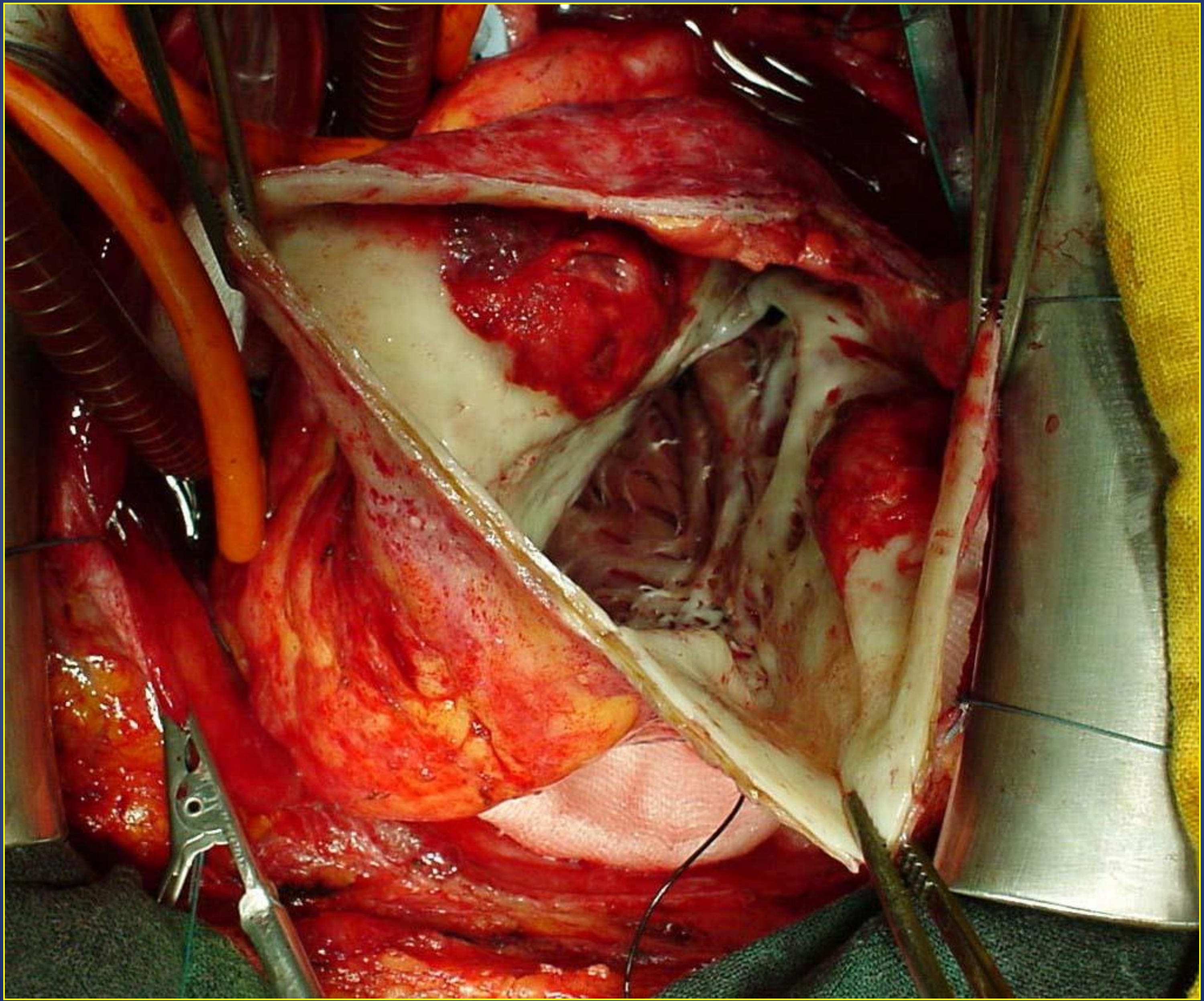
Asynergy of ≥35%

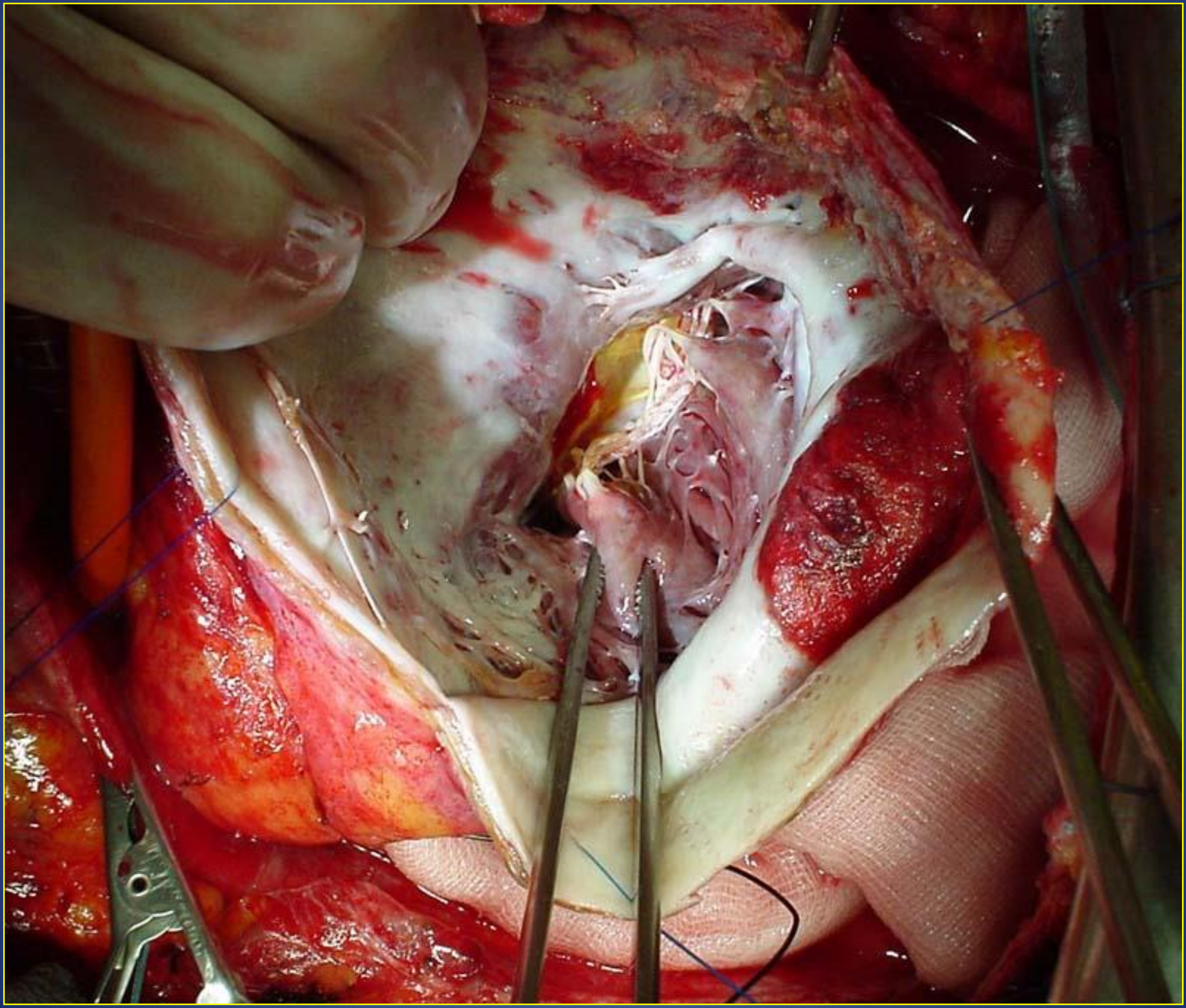
Good lateral wall motion

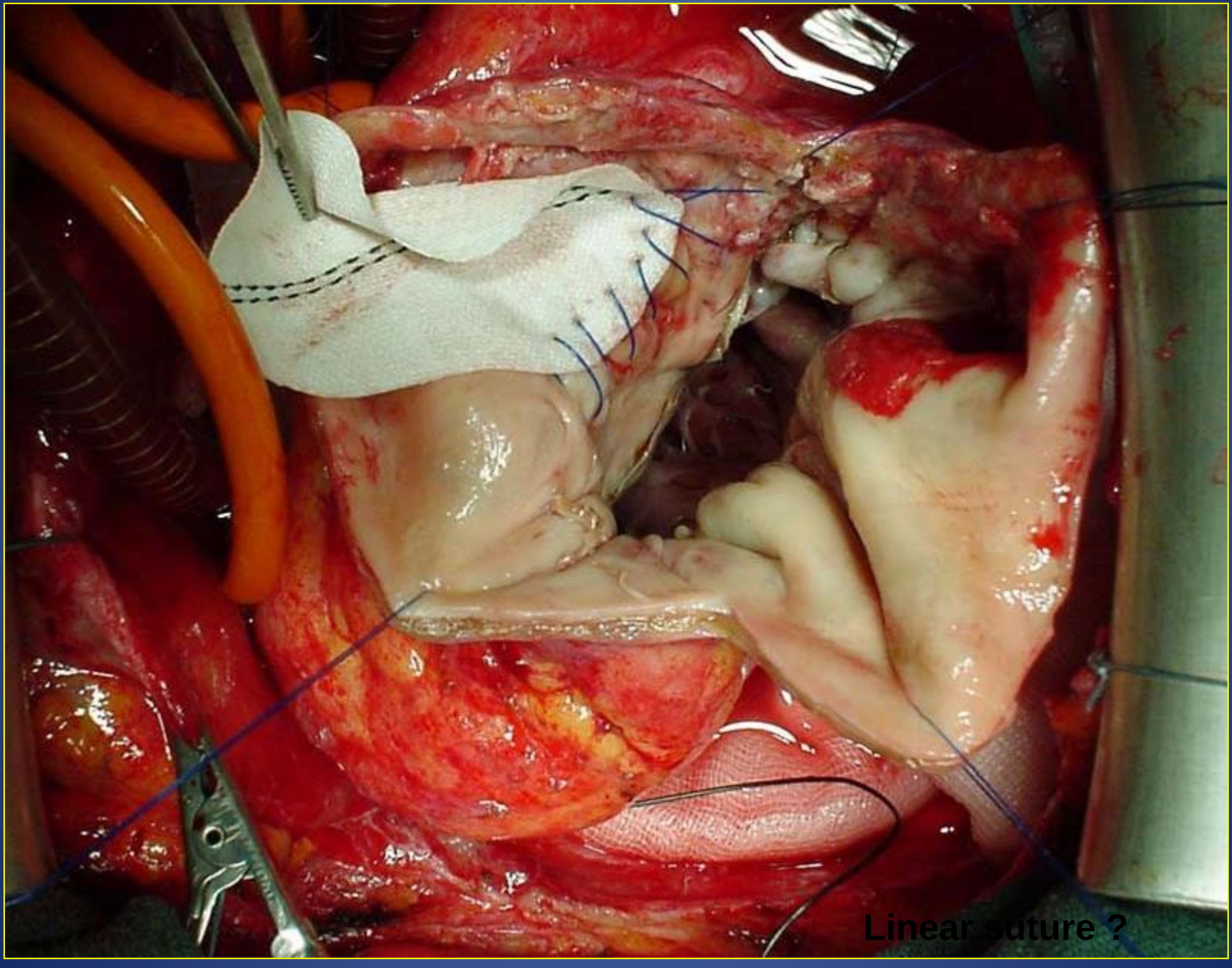
Good basal wall

Good RV function

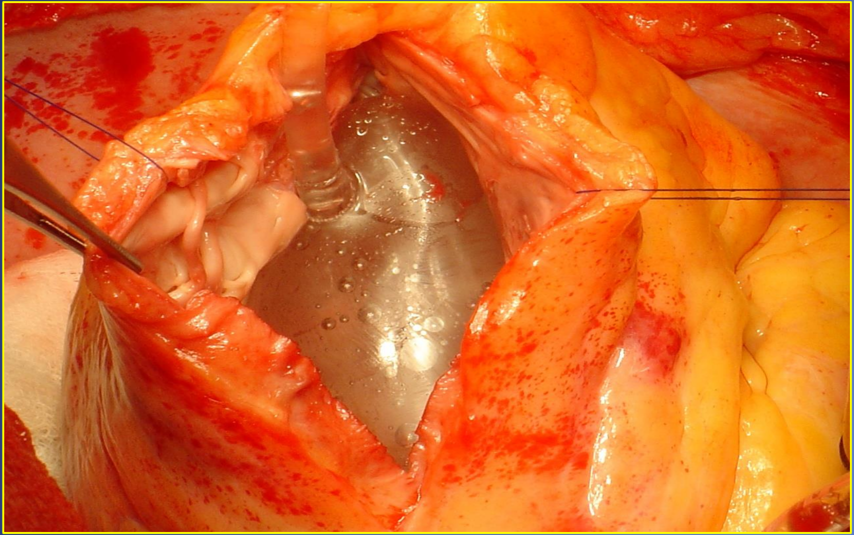
The Dor Ventriculoplasty

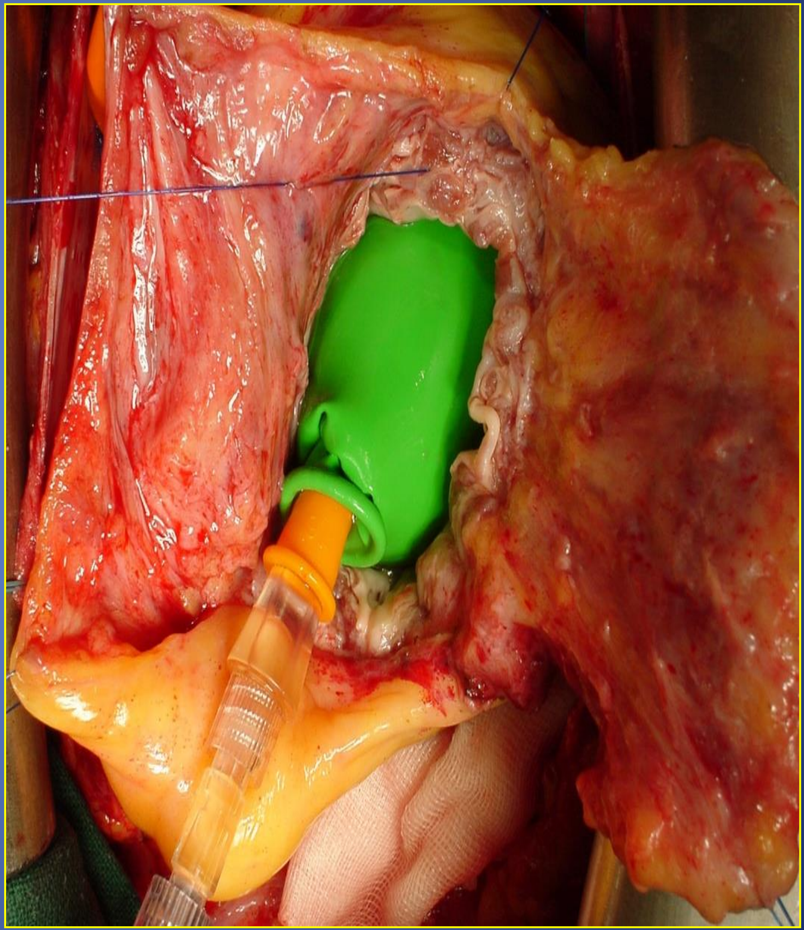


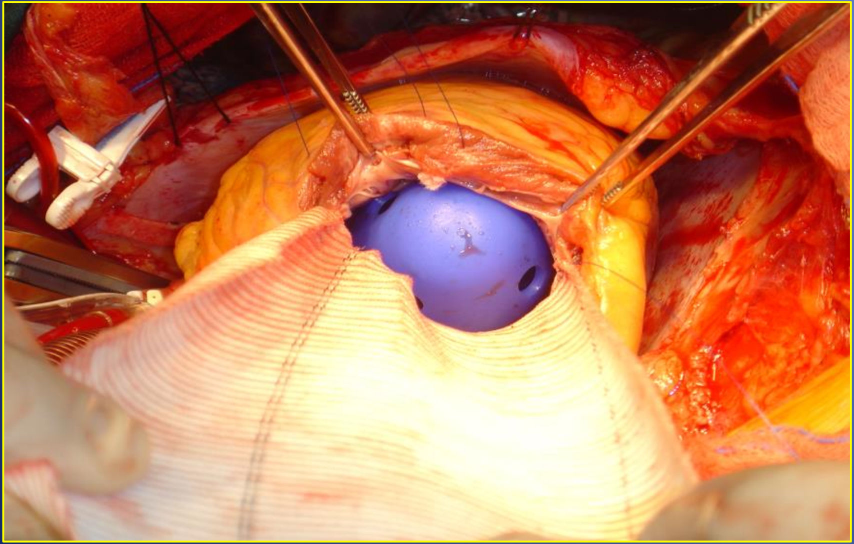



Linear suture ?

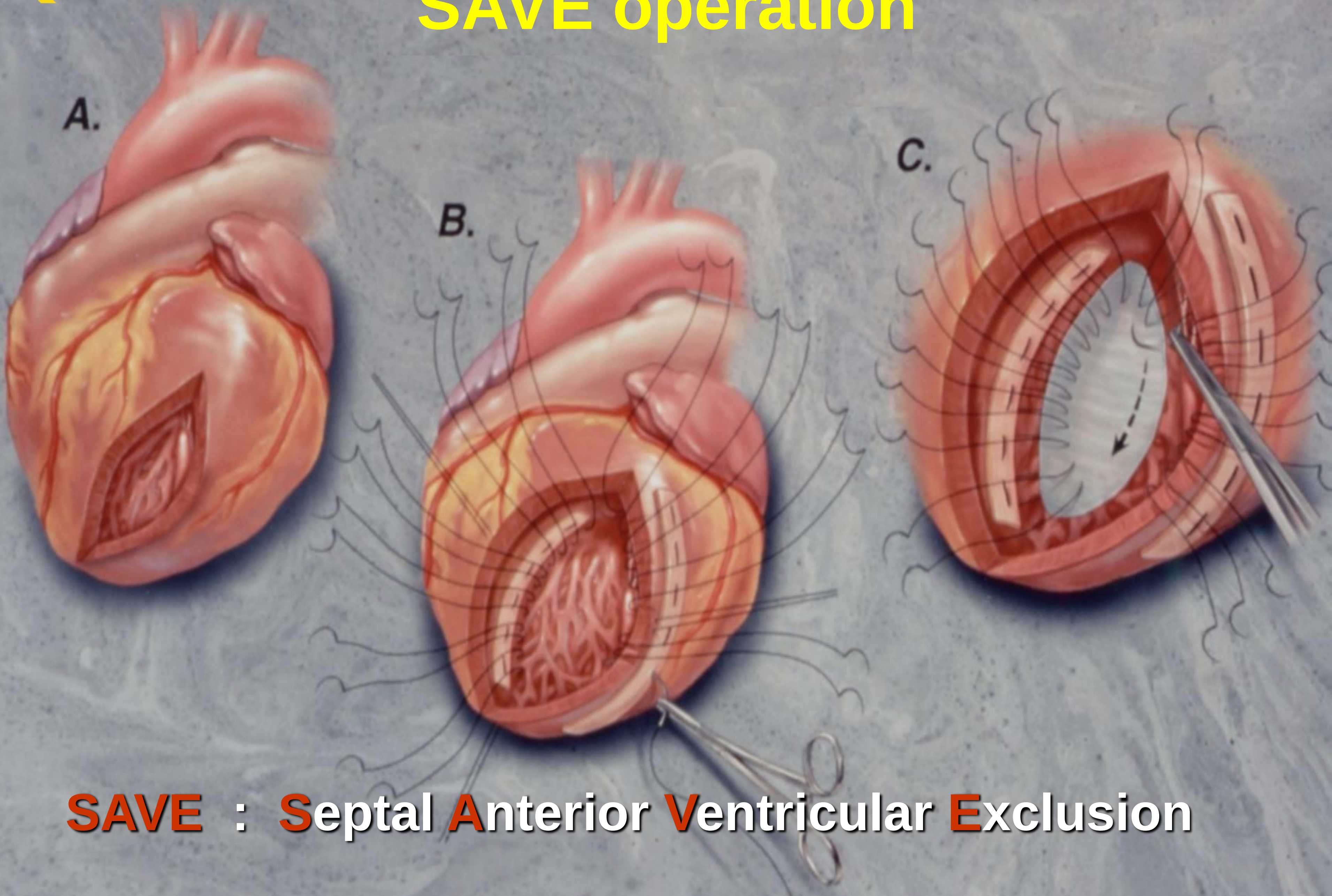
Diastolic volume of 50-60ml/m2





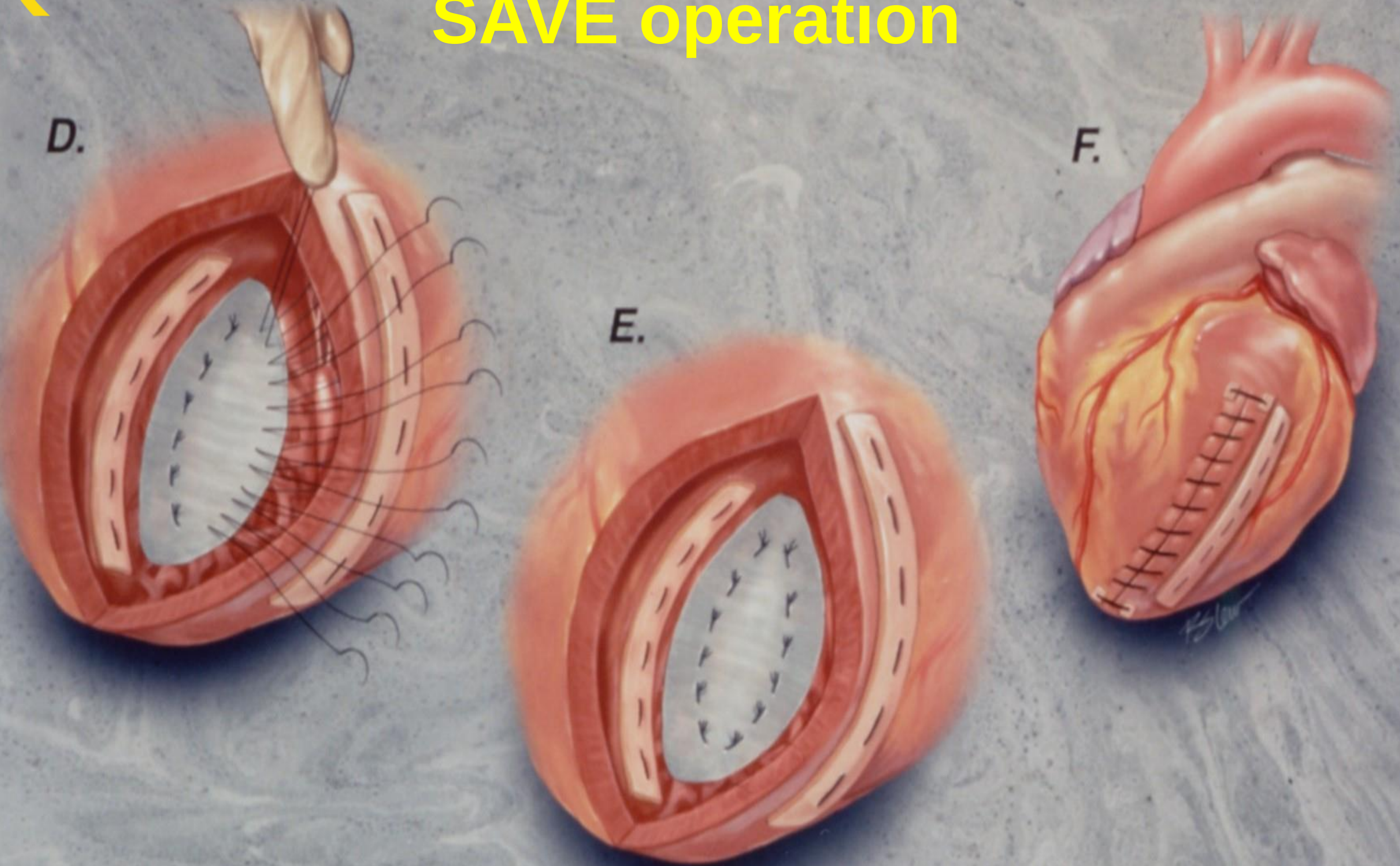


SAVE operation



SAVE : Septal Anterior Ventricular Exclusion

SAVE operation



Isomura T, Horii T, Suma H, et al. SAVE (Pacopexy) for ischemic dilated cardiomyopathy: treat form not disease Eur J Cardiothorac Surg 2006; 29 (suppl1) s245-250

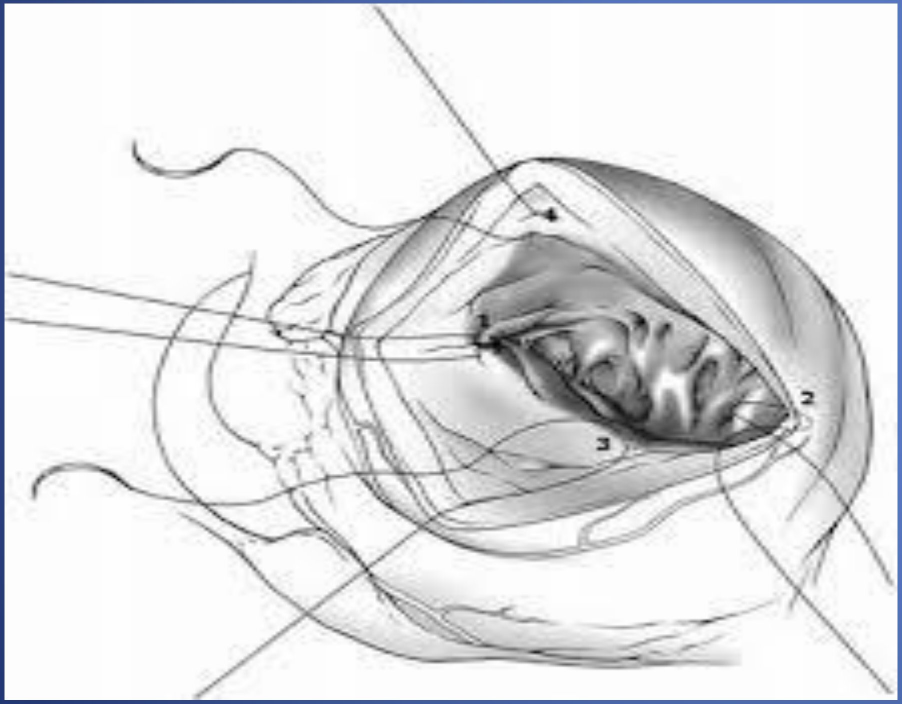
The Journal of Thoracic and Cardiovascular Surgery
Volume 139, Issue 5, May 2010, Pages 1123-1130

Acquired cardiovascular disease

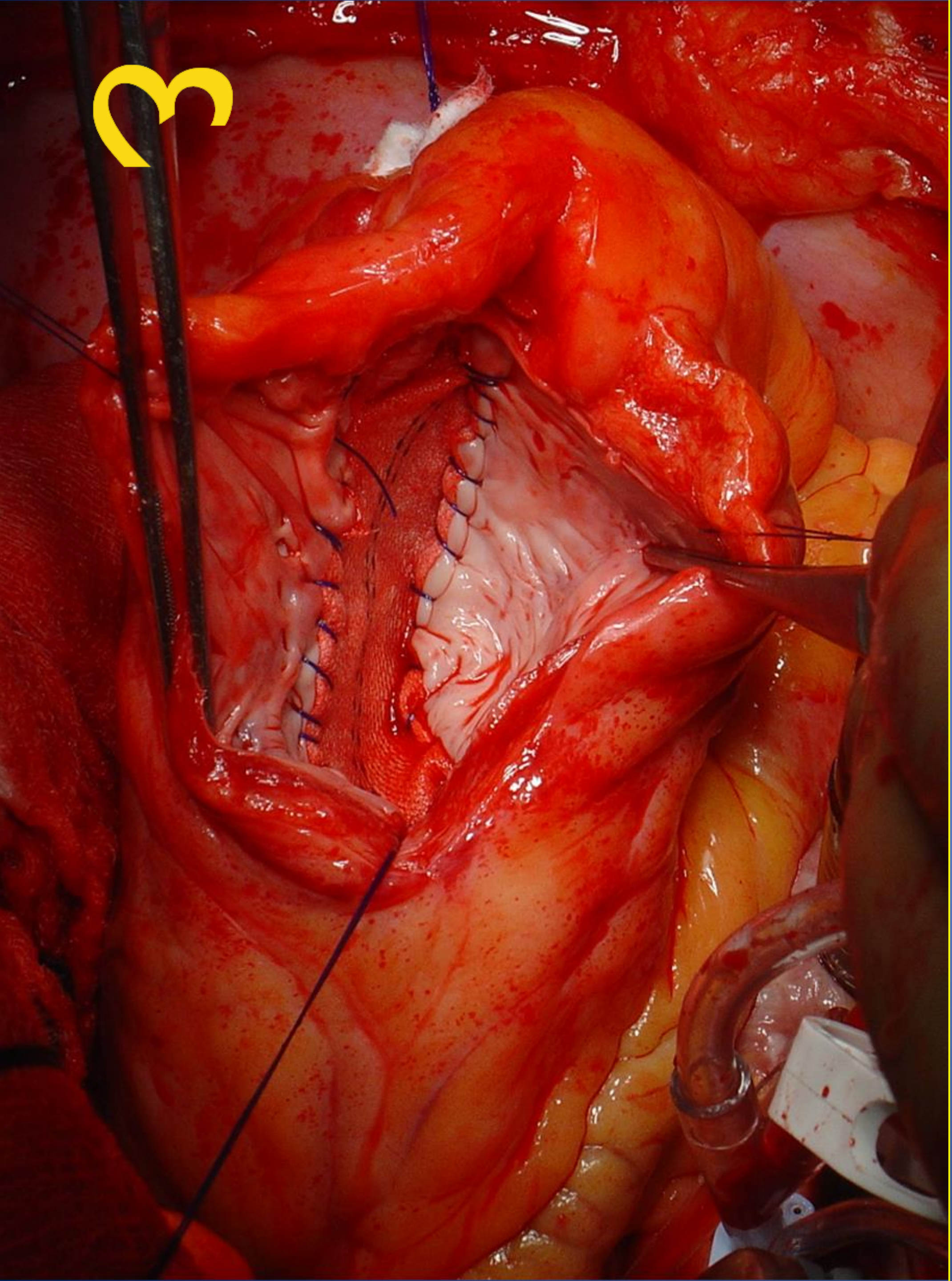
Left ventricular surgical restoration for anteroseptal scars: Volume versus shape

Read at the Eighty-ninth Annual Meeting of The American Association for Thoracic Surgery, Boston, Mass, May 9–13, 2009.

Antonio M. Calafiore MD [a], Angela L. Iacò MD [a], Davide Amata MD [b], Cataldo Castello MD [b], Egidio Varone MD [b], Fabio Falconieri MD [b], Antonio Bivona MD [b], Sabina Gallina MD [c], Michele Di Mauro MD [d]

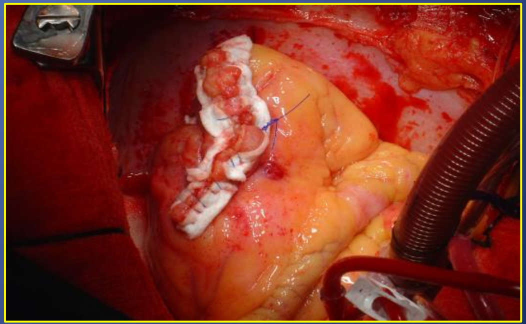


SEPTOEXCLUSION

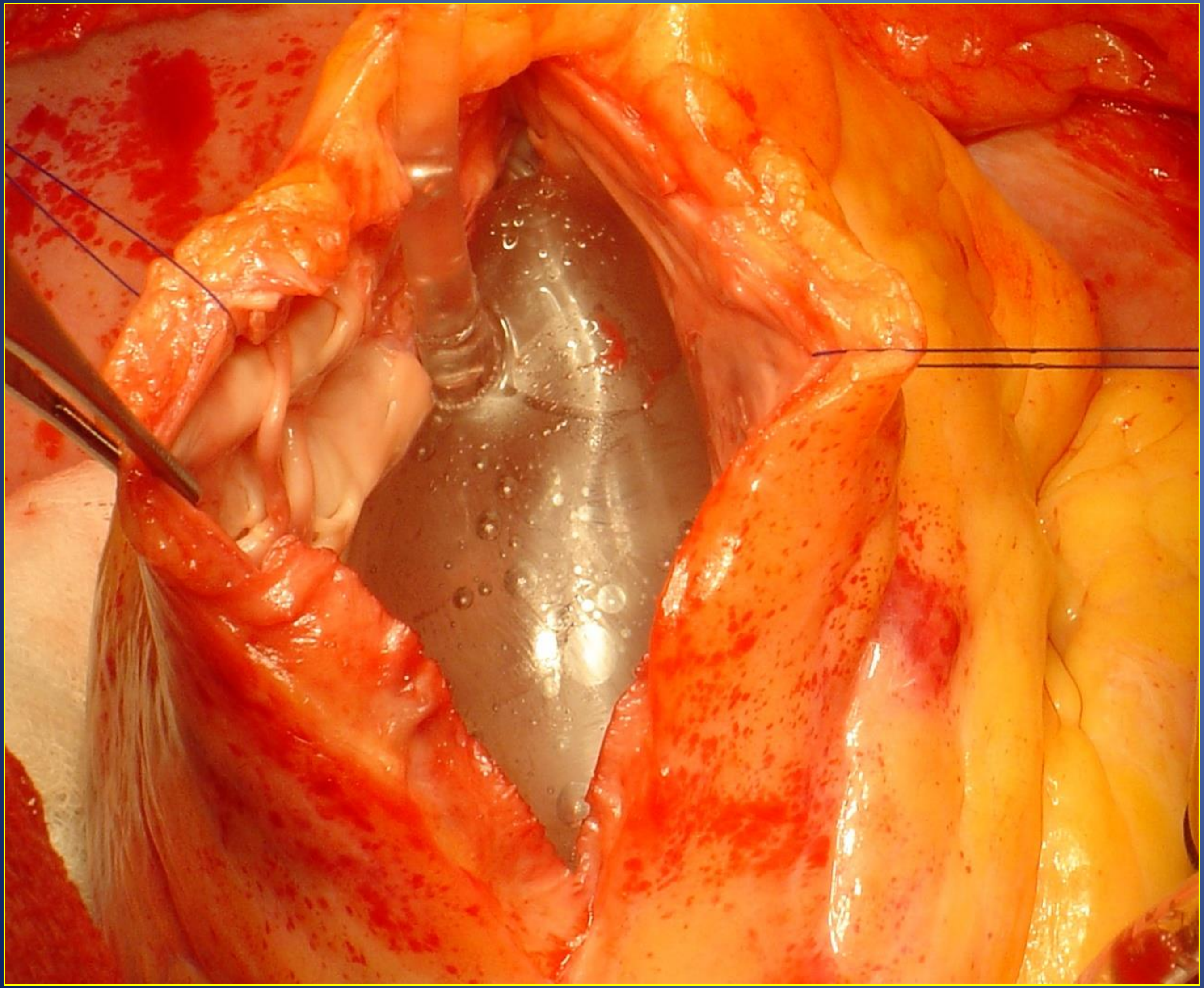


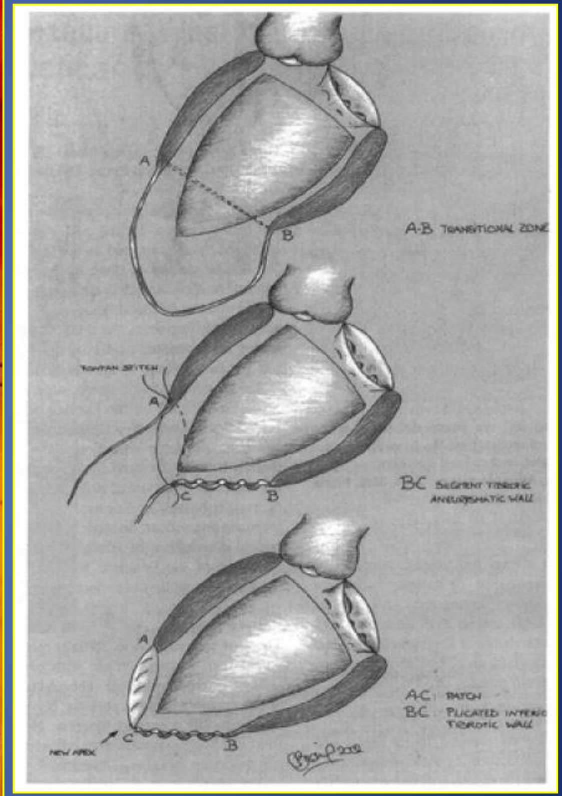
SEPTOEXCLUSION

- *To achieve an elliptical shape in the LV post – SVR*
- *creation of a new apex*
- *oblique orientation of the patch*

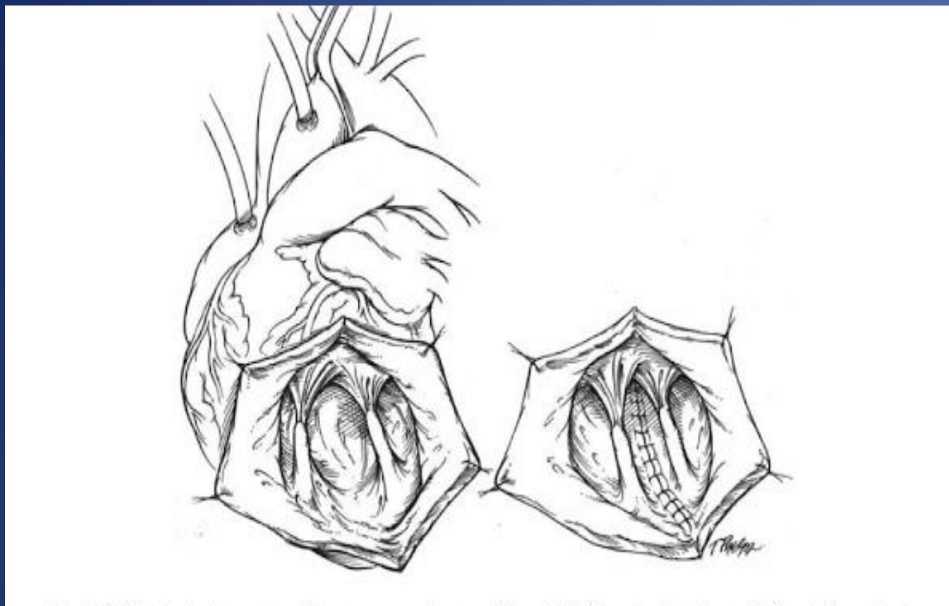


The Menicanti new apex concept

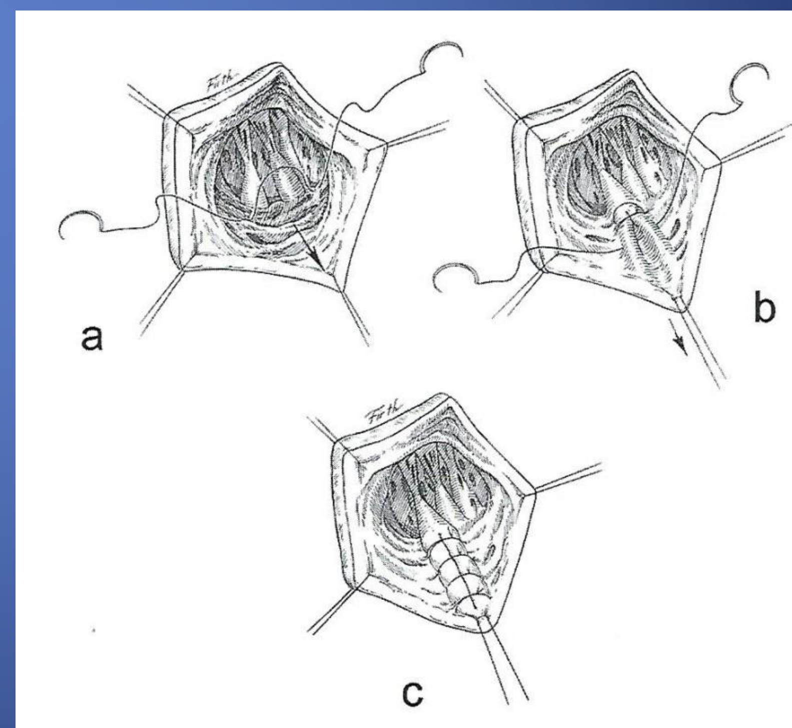




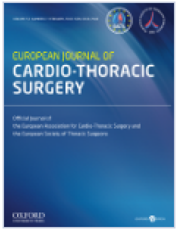
Imbricating suture method



Creation of new apex
Narrowing of inter-papillary distance
(when *Inter-PPM distance* is >3cm)



Inferior reconstruction from inside in multi-MI patients

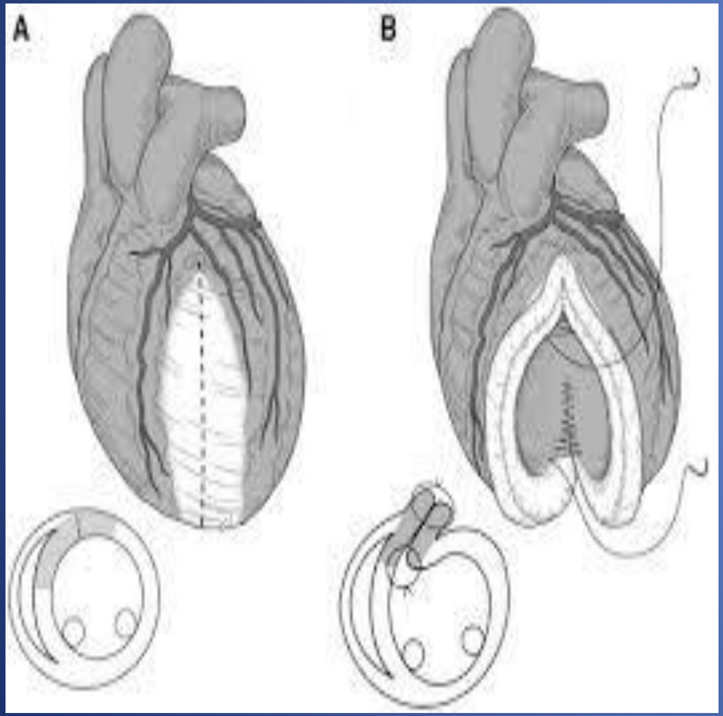


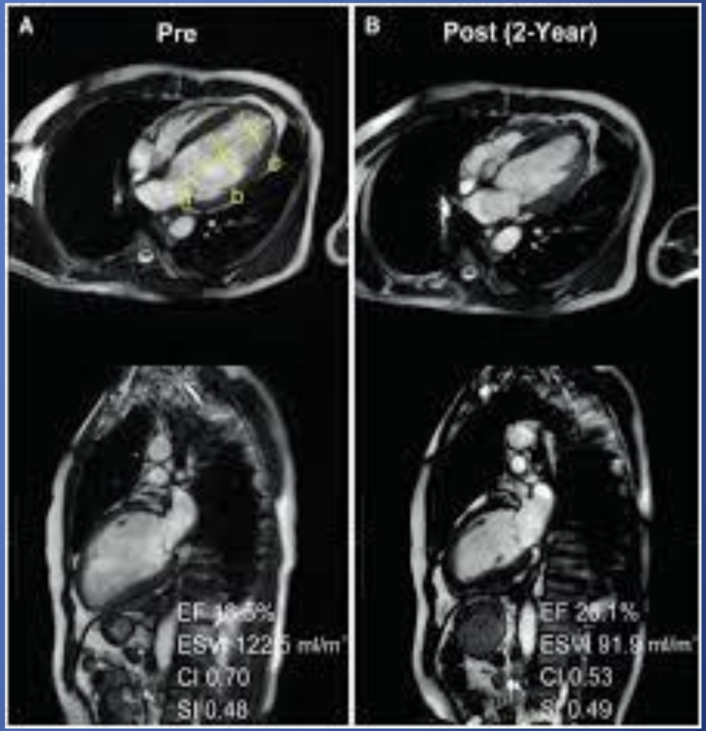
Volume 53, Issue 2

Ten-year experience of endocardial linear infarct exclusion technique for ischaemic cardiomyopathy

Suguru Ohira ✉, Sachiko Yamazaki, Satoshi Numata, Hidetake Kawajiri, Kazuki Morimto, Kiyoshi Doi, Hitoshi Yaku

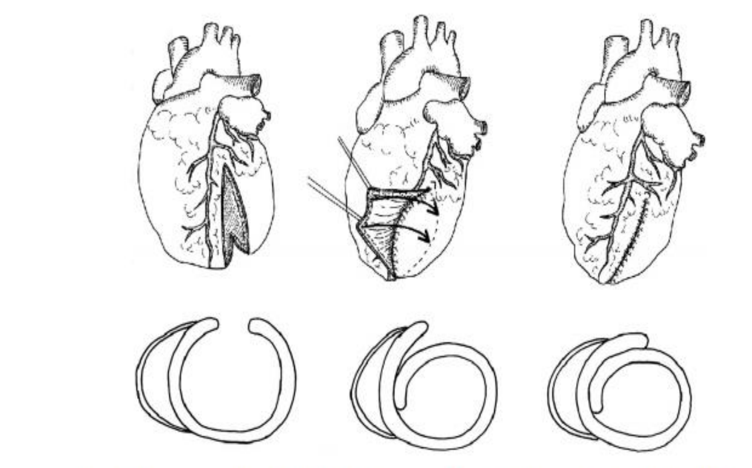
European Journal of Cardio-Thoracic Surgery, Volume 53, Issue 2, 1 February 2018, Pages 440–447, https://doi.org/10.1093/ejcts/ezx343

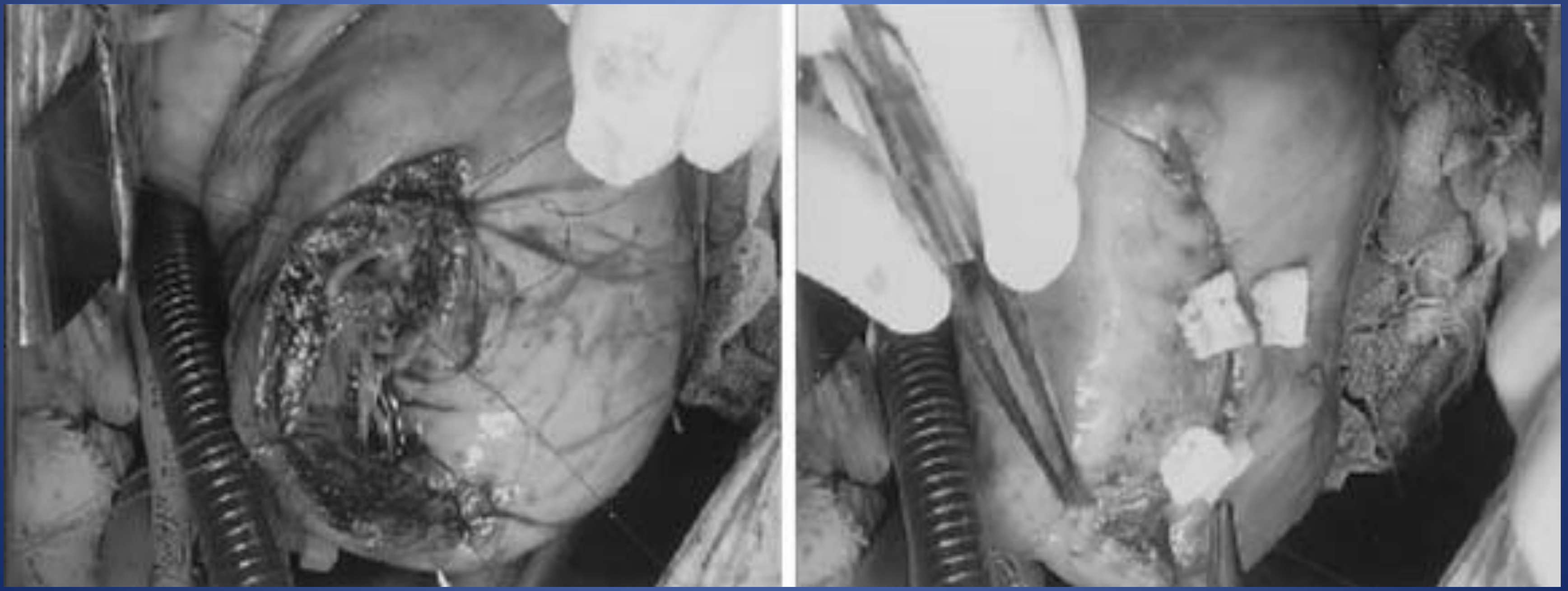




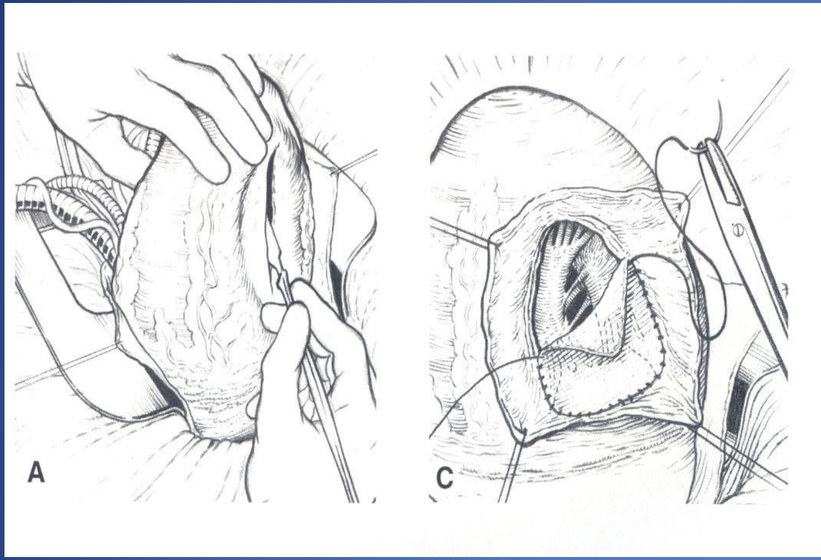
Overlapping cardiac volume reduction operation

Yoshiro Matsui, MD,[a] Yasuhisa Fukada, MD,[a] Yukio Suto, MD,[b]
Hidetoshi Yamauchi, MD,[b] Bin Luo, MD,[b] Masatoshi Miyama, MD,[b]
Shigeyuki Sasaki, MD,[c] Tatsuzo Tanabe, MD,[a] and Keishu Yasuda, MD,[b]
Sapporo and Ishikari-Tobetsu, Japan

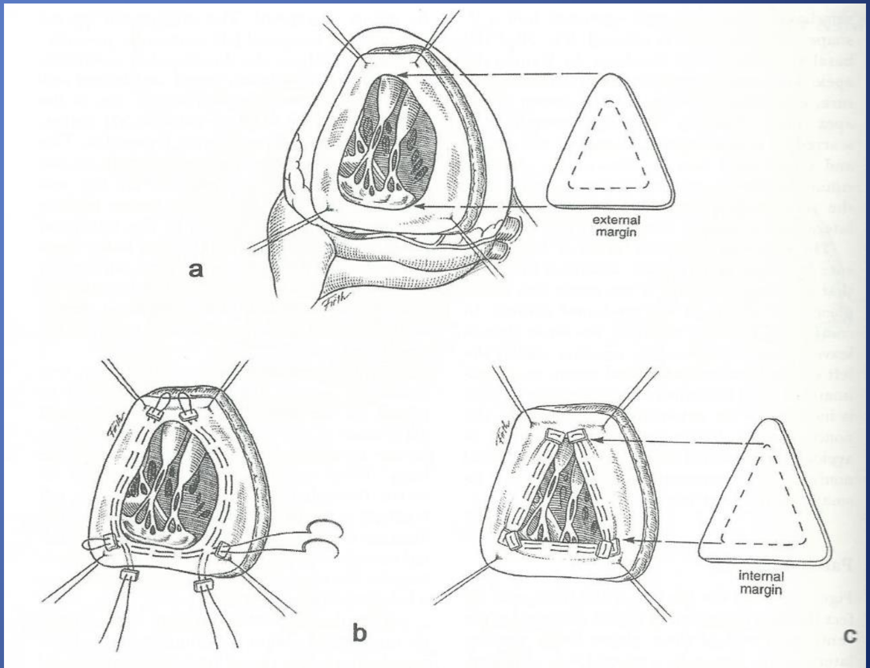




INFERIOR WALL RESTORATION



TRIANGULAR PATCH
FOR SEPTAL and BASAL
WALLS

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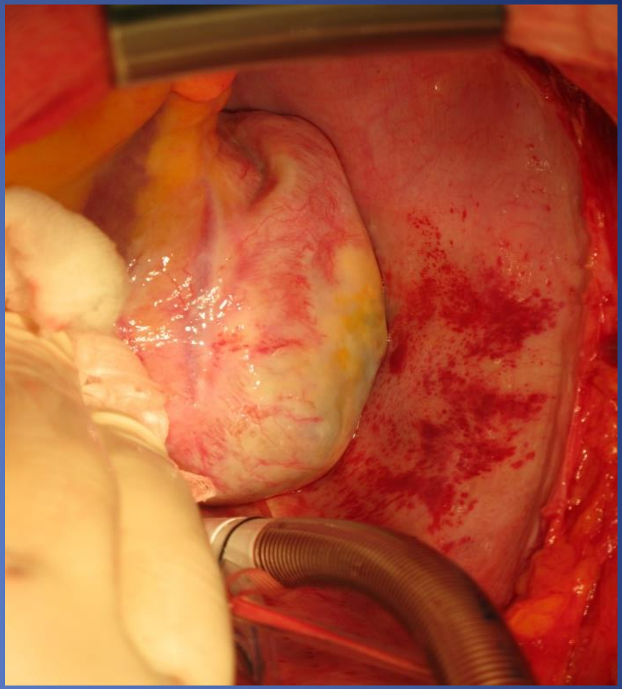
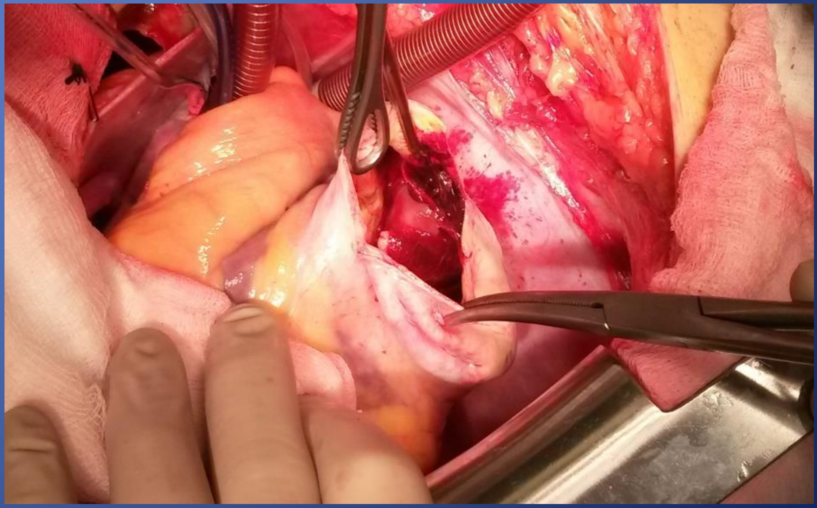
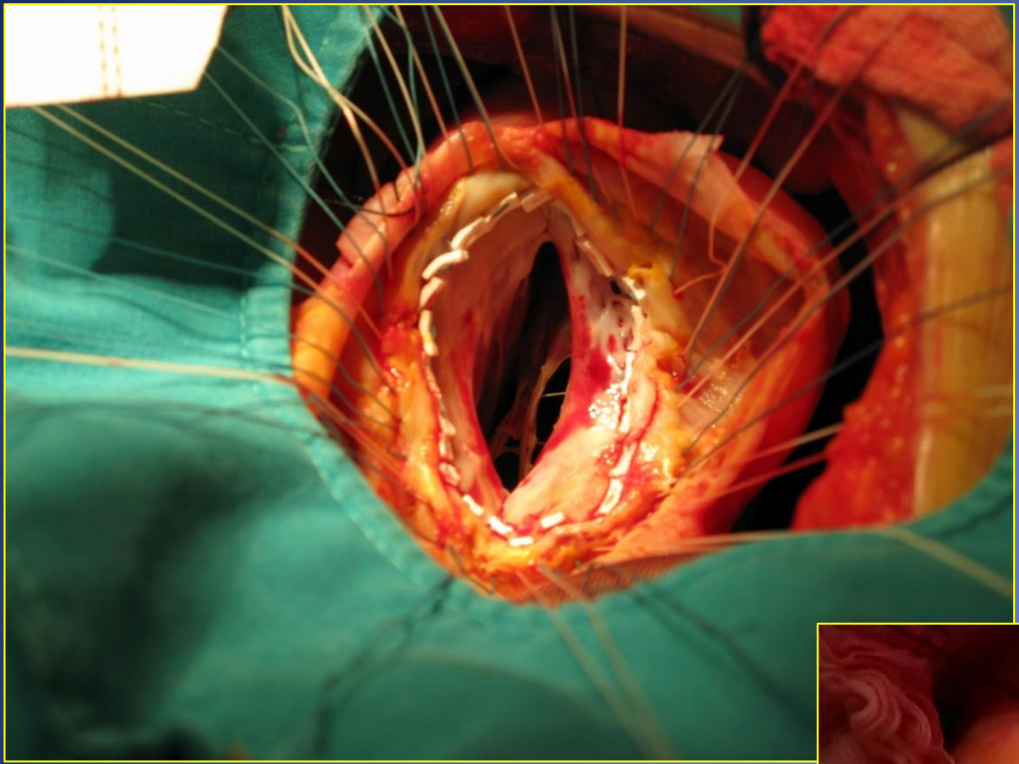
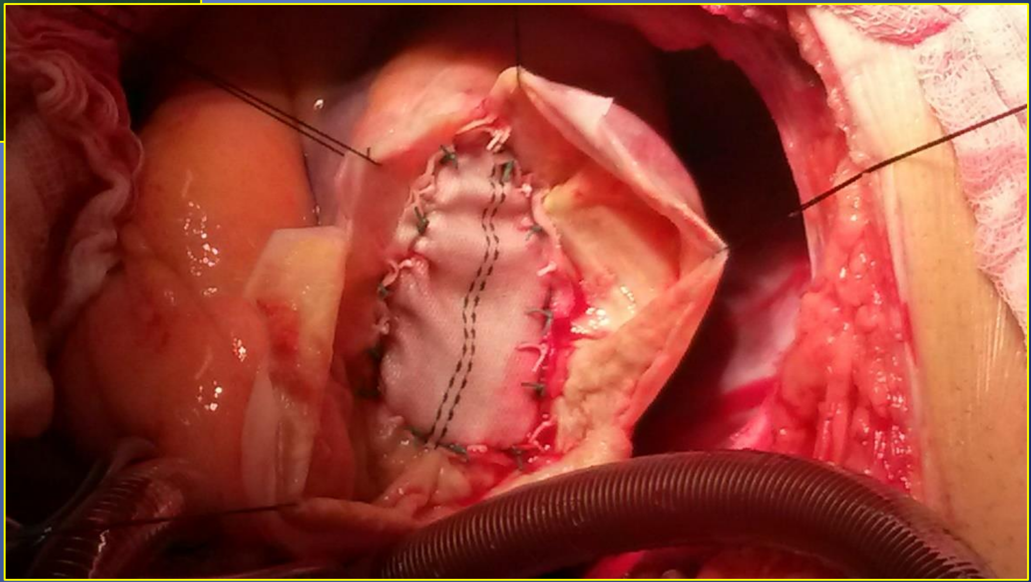
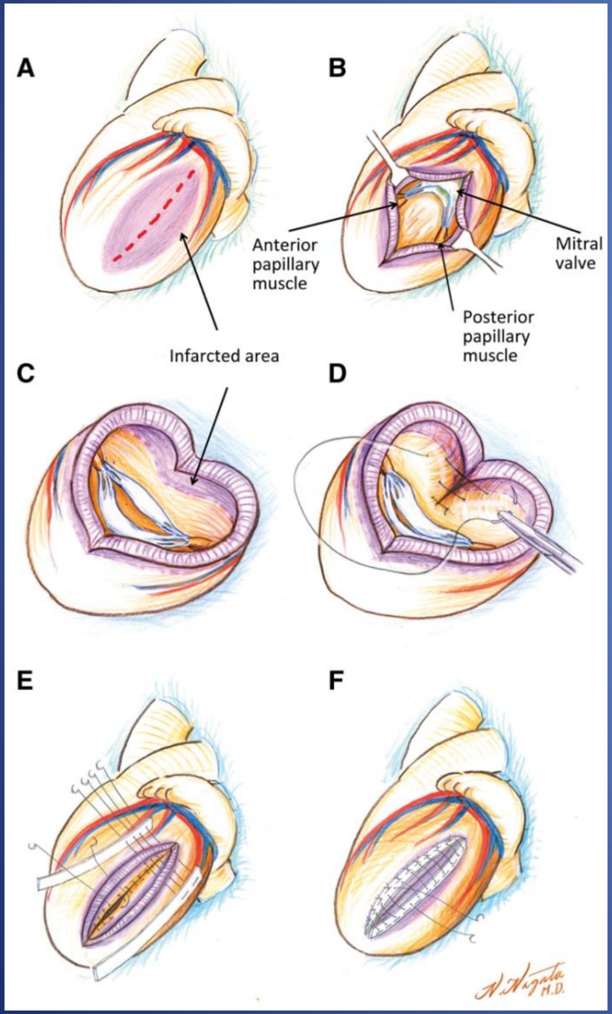







ELIET ± MV procedure for lateral wall (Kyoto group)



Endocardial linear infarct exclusion technique for infarcted lateral wall

Hitoshi Yaku, Suguru Ohira, Sachiko Yamazaki, Kiyoshi Doi, Hidetake Kawajiri, Kazuki Morimoto, Satoshi Numata

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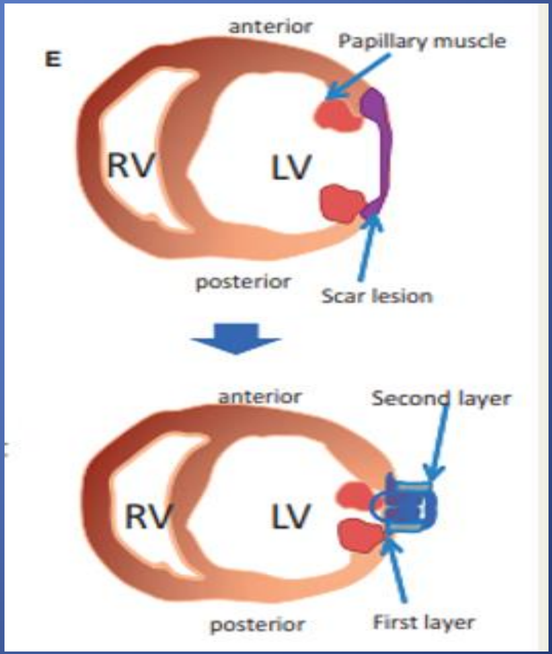
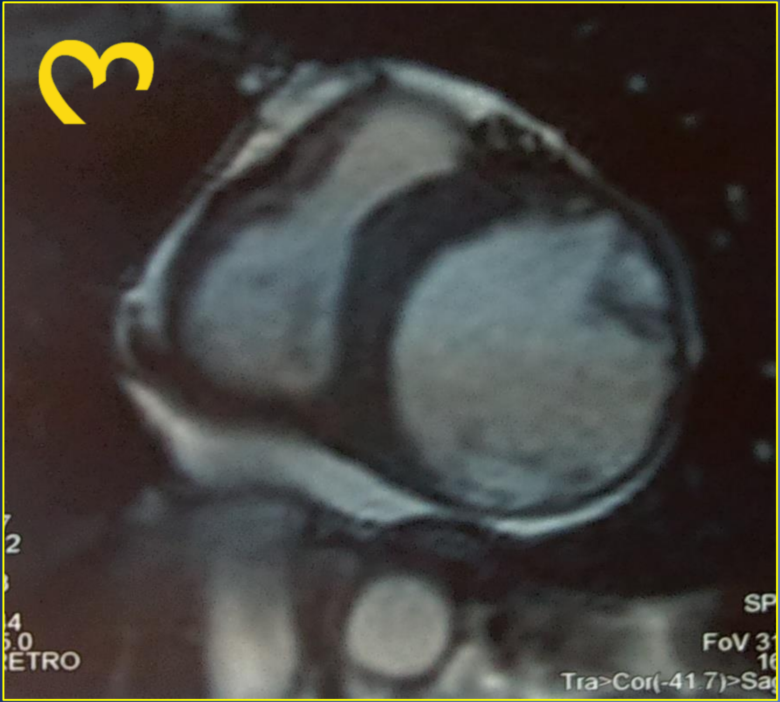




ELIET for lateral wall scar

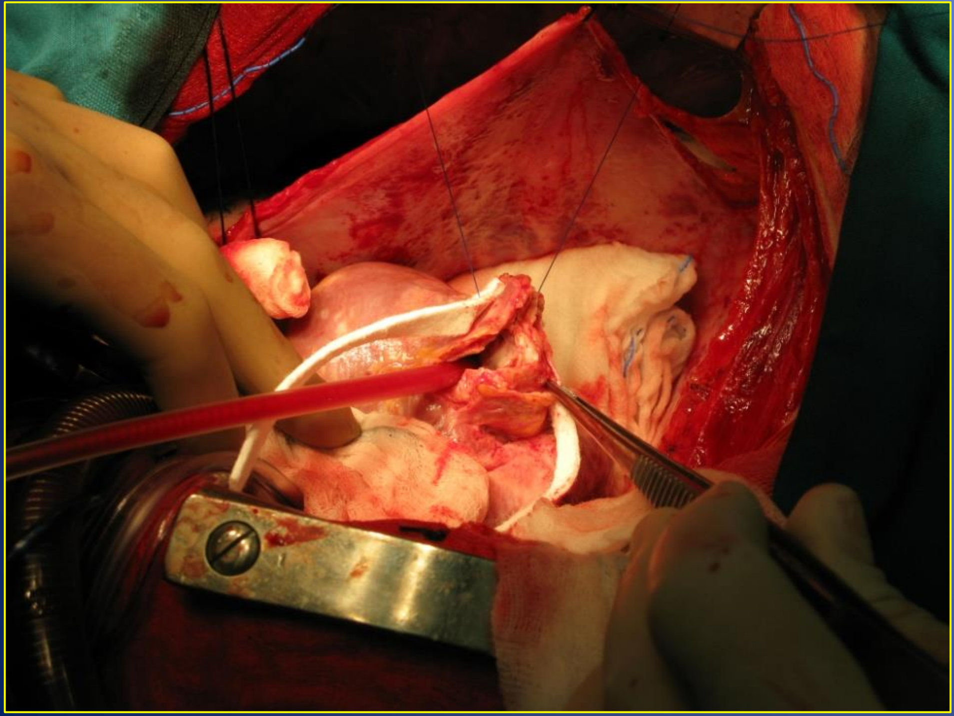
Advantages:

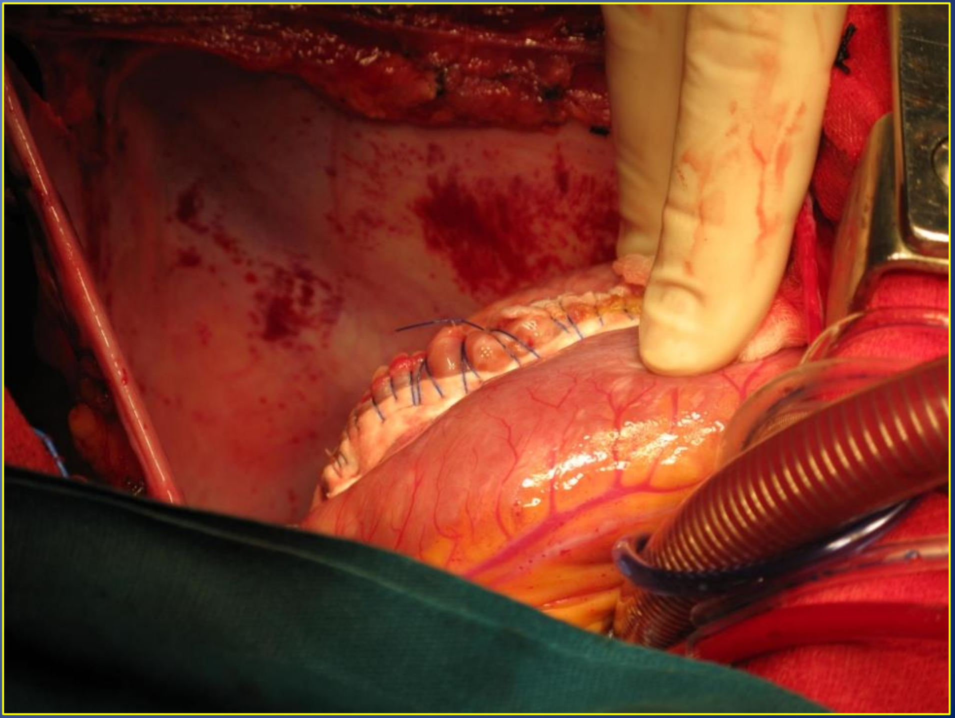
No resection of the wall

low risk for coronary damage

shortens the inter-papillary distance kai

reduces tenting





Novel left ventriculoplasty for nonischemic dilated cardiomyopathy with functional mitral regurgitation

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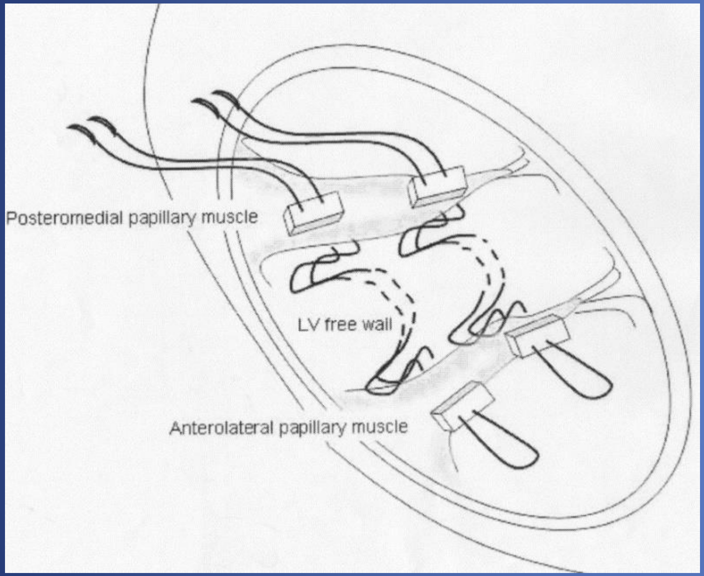
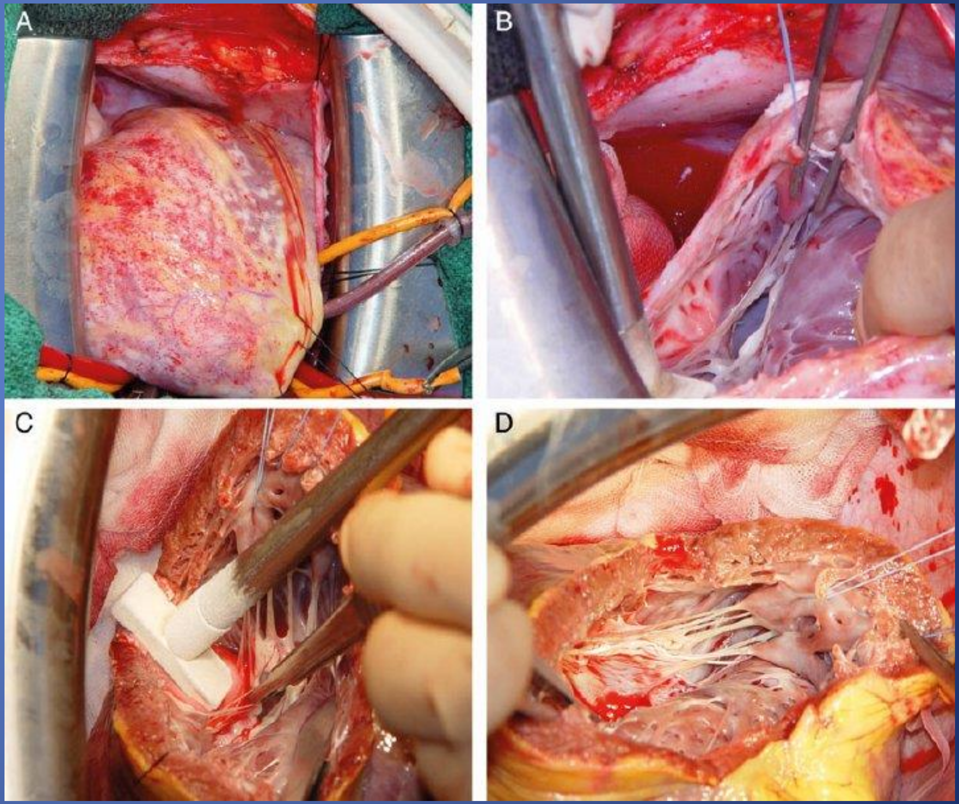
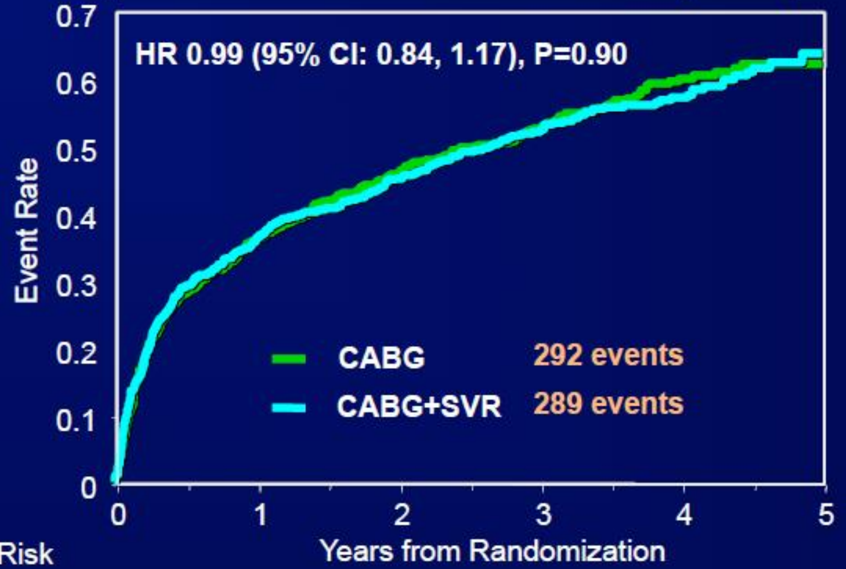




papillary muscle relocation

Death or Cardiac Hospitalization
Kaplan-Meier Estimates of Primary Endpoint



No. at Risk

CABG	499	319	270	220	99	23
CABG+SVR	501	319	275	216	11	23

STICH

Conclusions

- The STICH trial definitively shows adding SVR to CABG provides no clinical benefit beyond that of CABG alone in the study population.
- Both operative strategies provided similar short- and long-term relief of angina and HF and improvement in 6-minute walk test performance.

STICH

Conclusion

- *Adding surgical ventricular reconstruction to CABG reduced the left ventricular volume, as compared with CABG alone*

- *However, this anatomical change was not associated with a greater improvement in symptoms or exercise tolerance or with a reduction in the rate of death or hospitalization for cardiac causes*

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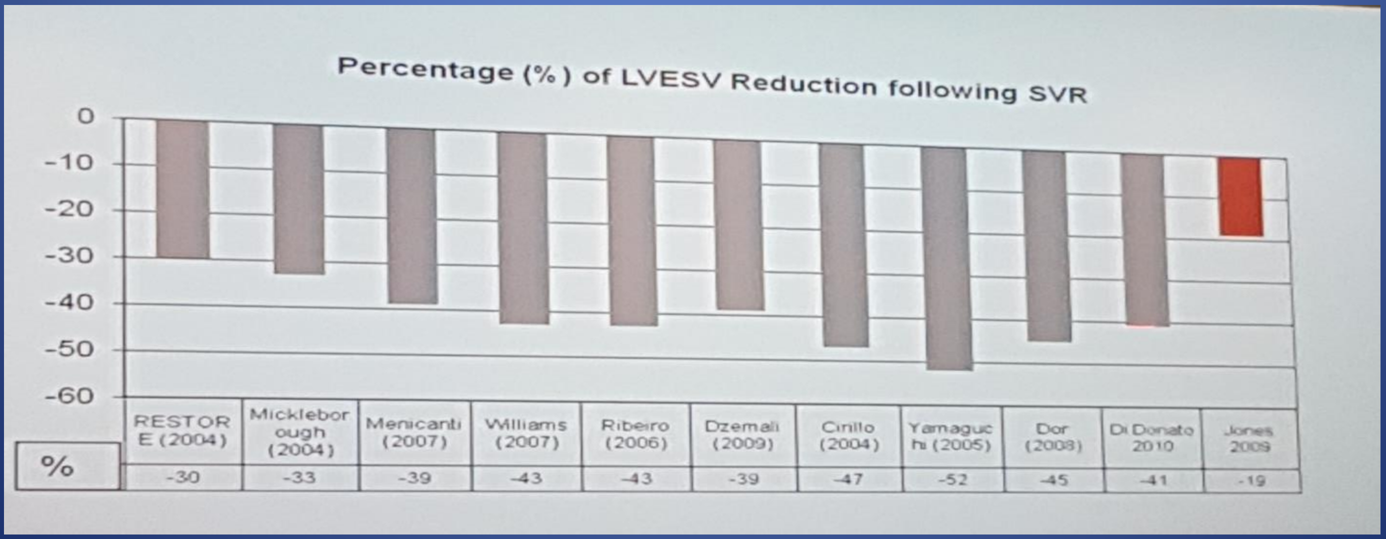
STICH-hypothesis 2

- The CABG+SVR resulted in a **16ml/m2 (19%) reduction in LVESVI,** larger than in the CABG –only group, but smaller than in previously reported observation studies.
- this observation raises concerns about the extent of the SVR procedure that was applied in this RCT.



STICH-hypothesis 2

- *Experienced surgeons decided to enroll pts for whom they recognized that SVR would prove unnecessary but offered the procedure directly ,instead of enrollment in the trial to all pts for whom they were confident the procedure would be beneficial.*

- *The STICH study did not include a registry arm for SVR-eligible pts who were not randomized*.

Patients eligible but not randomized into STICH

- SVR procedure: single center comparison of surgical treatment of ischemic heart failure (STICH) versus (non –STICH) patients

- The **NSSVR GROUP**

  -had more anterior wall asynergy (60% vs 45%),

  -larger preoperative heart volumes

  (LVESVI 108ml/m(2) vs 69%ml/m(2)

  -larger volume reductions (34% vs 11%)

- *Conclusion:* ***the STICH study may not have included pts most likely to benefit from SVR***

Goh S, et al. University of Melbourne, Australia

Ann Thorac Surg 2013 feb ; 95(2):505-12

Favorable effects of left ventricular reconstruction in patients excluded from the Surgical Treatments for Ischemic Heart Failure (STICH) trial

Vincent Dor, MD, Filippo Civaia, MD, Clara Alexandrescu, MD, Michel Sabatier, MD, and Françoise Montiglio, MD

Objective: We sought to examine the hemodynamic effects at 1 month and 1 year of left ventricular reconstruction by means of endoventricular patch plasty for patients with acute or chronic, very severe post–myocardial infarction heart failure who would have been systematically excluded from the Surgical Treatments for Ischemic Heart Failure (STICH) trial.

Methods: From 2002 to May 2008, 274 patients underwent left ventricular reconstruction for post–myocardial infarction scarring; 117 of these patients would not have been eligible for the STICH trial. The pertinent criteria for exclusion included 12 patients with no coronary vessel suitable for coronary artery bypass grafting; 17 patients within a month of myocardial infarction, including 11 with acute heart failure (8 septal ruptures and 3 cases of ventricular tachycardia); 48 patients receiving intravenous inotropes, intra-aortic balloon pumping, or both; 15 patients with bifocal or posterior scarring; 4 patients scheduled for heart transplantation; and 21 patients meeting 5 other exclusion criteria. These patients (mean age, 64 years; age range, 34–83 years) preoperatively had a mean 49% (range, 35%–75%) scarred left ventricular circumference, as determined by means of magnetic resonance imaging assessment. In the patients with chronic heart failure, the preoperative ejection fraction was 26% ± 4% (range, 9%–34%), the end-diastolic volume index was 130 ± 43 mL/m^2 (range, 62–343 mL/m^2), and the end-systolic volume index was 95 ± 37 mL/m^2 (range, 45–289 mL/m^2). Mitral regurgitation was mild to severe in 56 patients and associated with annular dilatation (≥35 mm) in 51 patients. A strategy of left ventricular reconstruction by means of endoventricular circular suturing and patching excluded the scarred left ventricular wall and was balloon sized to provide a diastolic volume of 50 mL/m^2. Circular patches were used for anteroseptoapical lesions, and triangular patches were used for posterior lesions. The mitral valve was repaired in 51 patients, and coronary revascularization was performed in 105 patients (arterial grafts in 95 and mixed in 12). Seventy-eight patients had endocardectomy, and cryotherapy was used in 39 patients for ventricular tachycardia.

Results: Four in-hospital and 2 delayed deaths occurred during the first year. In 101 patients with chronic heart failure, magnetic resonance imaging revealed that ejection fraction improved from 26% ± 4% preoperatively to 40% ± 8% at 1 month and 44% ± 11% at 1 year postoperatively. At these same time points, the end-diastolic volume index was reduced from 130 ± 43 mL/m^2 to 81 ± 27 and 82 ± 25 mL/m^2, respectively, and the end-systolic volume index was reduced from 96 ± 45 mL/m^2 to 50 ± 21 and 47 ± 20 mL/m^2, respectively.

Conclusions: With minimal associated mortality, left ventricular reconstruction produces durable improvement in left ventricular function in patients with a large scarred ventricular wall. Considering that this patient cohort would have been systematically excluded from the STICH trial, care should be taken not to extrapolate that study's results too widely so as to inappropriately deny selected patients an effective treatment for ischemic cardiomyopathies with an injured ventricle.
(J Thorac Cardiovasc Surg 2011;141:905-16)

117 patients excluded from the STICH TRIAL due to :

- No Coronary target
- Within 1 month post MI
- Acute heart failure
- Preop inotropes or IABP
- Bifocal scarring
- 49% scarred LV circumference
- EF 26 +/- 4%
- LVESVI 95+/- 37%
- LVEDVI 130+/-43%

- MV repair in 56
- CABG IN 106

Favorable effects of left ventricular reconstruction in patients excluded from the Surgical Treatments for Ischemic Heart Failure (STICH) trial (J Thorac Cardiovasc Surg 2011;141:905-16)

Vincent Dor, MD, Filippo Civaia, MD, Clara Alexandrescu, MD, Michel Sabatier, MD, and Françoise Montiglio, MD

- having an operative risk of less than 10% and an improvement at 1 year in more than 80% of survivors, **left ventricular reconstruction is a therapeutic option superior to other therapeutics**

➢ **In the end-stage situation of an ischemic failing ventricle with an asynergic scar of greater than 40% of the LV perimeter**

Surgical Ventricular Restoration for Patients With Ischemic Heart Failure: Determinants of Two-Year Survival

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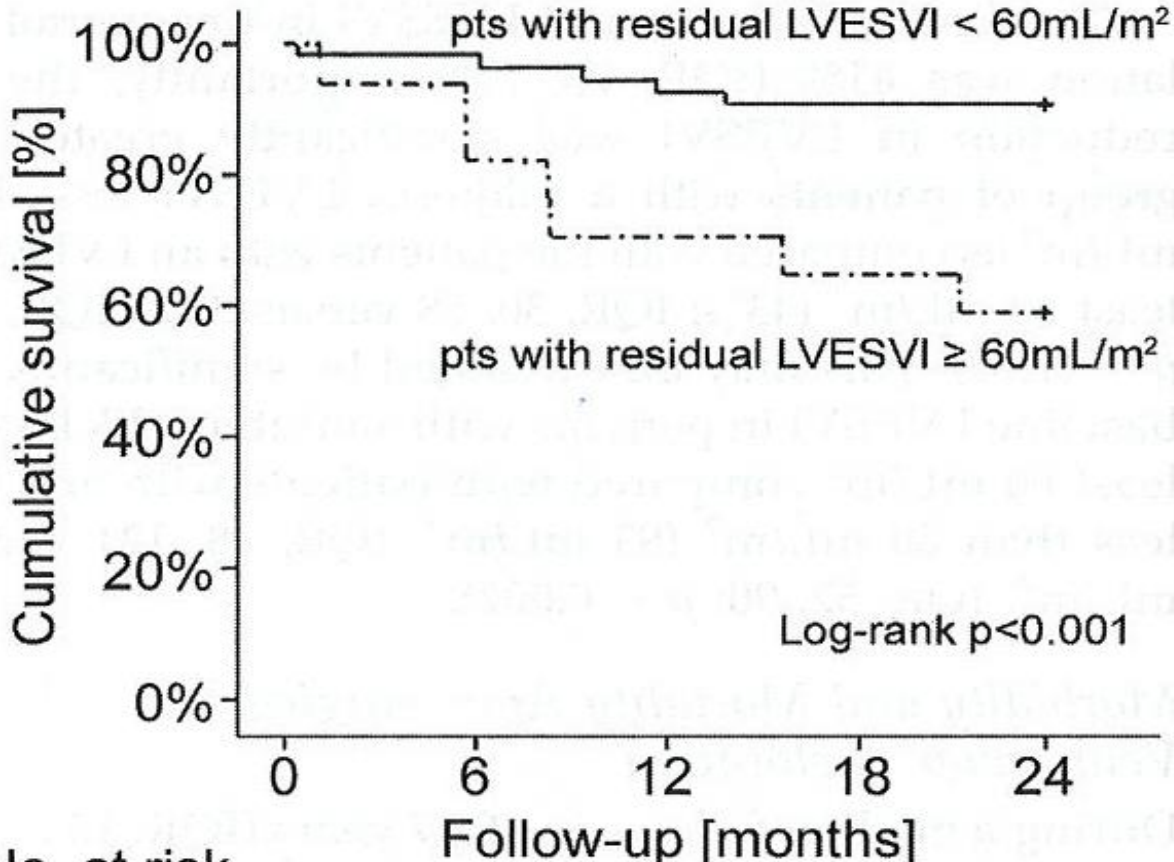
Background. Surgical ventricular restoration (SVR) improves left ventricular (LV) systolic function by partially restoring the normal geometry of the left ventricle. However, the beneficial effects of this surgical procedure on long-term clinical outcome remain controversial. The present study aimed to evaluate the independent determinants of 2-year morbidity and mortality rates after SVR.

Methods. Seventy-nine patients with ischemic heart disease and LV ejection fraction of 0.35 or less were included. All patients underwent SVR and additionally coronary artery bypass grafting or mitral valve surgery if clinically indicated. Clinical and echocardiographic examination was performed before SVR and at 6 months' follow-up. The primary end point was a composite of all-cause mortality and hospitalizations for heart failure.

Results. At 6 months' follow-up a significant improvement in heart failure symptoms was noted. In addition, LV ejection fraction increased from 0.27 ± 0.07 to 0.36 ± 0.10 ($p < 0.001$). During a median follow-up of 2.7 years, the primary end point was recorded in 22% of the patients. Baseline New York Heart Association functional class IV and a 6-month follow-up LV end-systolic volume index of at least 60 mL/m^2 were independently associated with worse outcome (hazard ratio, 5.4; 95% confidence interval, 1.9 to 15.2; $p < 0.001$; hazard ratio, 2.7; 95% confidence interval, 1.3 to 5.6; $p < 0.001$, respectively).

Conclusions. Advanced heart failure status at baseline and large residual postsurgery LV end-systolic volume index were independently associated with increased mortality and heart failure hospitalization rates at 2 years' follow-up after SVR.

(Ann Thorac Surg 2011;91:491–8)



No. at risk

LVESVI < 60 ml/m²	55	53	51	50	50
LVESVI ≥ 60 ml/m²	17	14	12	11	10

Fig 5. Kaplan-Meier curves with the cumulative survival rate for the composite end point (death and hospitalization owing to heart failure) in patients (pts) with ischemic heart failure with residual post-surgical left ventricular end-systolic volume index (LVESVI) of at least 60 mL/m² (solid line) or less than 60 mL/m² (dashed line).

Insights from the STICH trial: Change in left ventricular size after coronary artery bypass grafting with and without surgical ventricular reconstruction

Robert E. Michler, MD[a], Jean L. Rouleau, MD[b], Hussein R. Al-Khalidi, PhD[c], Robert O. Bonow, MD[d], Patricia A. Pellikka, MD[e], Gerald M. Pohost, MD[f,g], Thomas A. Holly, MD[d], Jae K. Oh, MD[e], Francois Dagenais, MD[h], Carmelo Milano, MD[c], Krzysztof Wrobel, MD[i], Jan Pirk, MD, DSc[j], Imtiaz S. Ali, MD[k], Robert H. Jones, MD[c], Eric J. Velazquez, MD[c], Kerry L. Lee, PhD[c], and Marisa Di Donato, MD[l] for the STICH Trial Investigators

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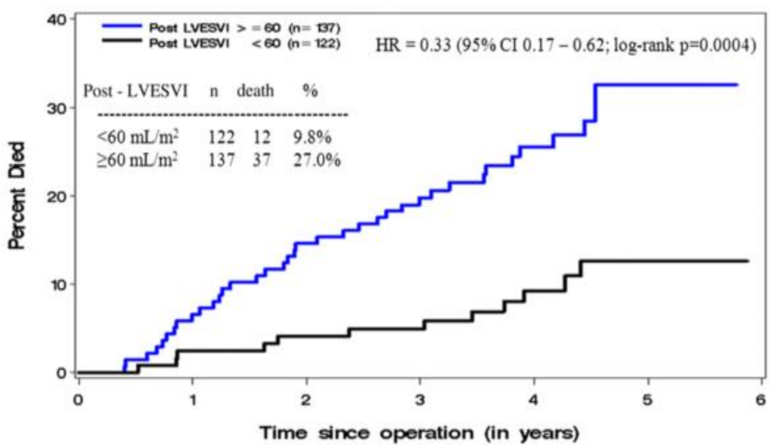

FIGURE 2.
Cumulative risk of death: coronary artery bypass grafting plus surgical ventricular reconstruction patients (n = 259) and postoperative left ventricular end-systolic volume index *(LVESVI)* less than or ≥60 mL/m^2. *HR,* Hazard ratio; *CI,* confidence interval.

Kaplan-Meier Curves: Cumulative risk of death

CABG + SVR patients with same modality
(n=259)

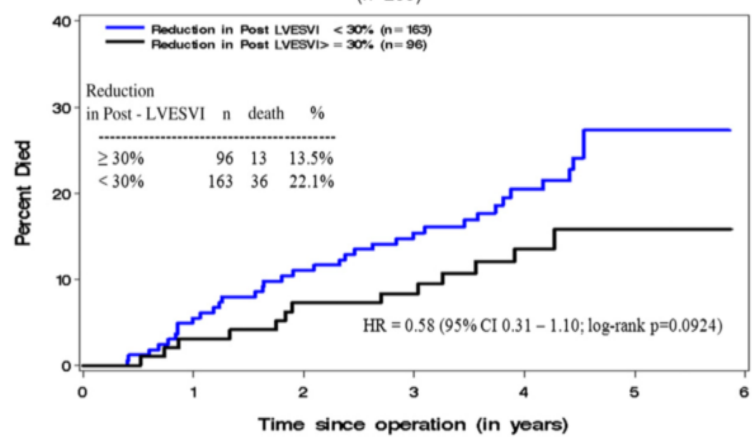

FIGURE 3.
Cumulative risk of death: coronary artery bypass grafting *(CABG)* plus surgical ventricular reconstruction *(SVR)* and reduction in postoperative left ventricular end-systolic volume index *(LVESVI)* less than or ≥30% of baseline LVESVI. *HR,* Hazard ratio; *CI,* confidence interval.

Insights from the STICH trial: Change in left ventricular size after coronary artery bypass grafting with and without surgical ventricular reconstruction

Robert E. Michler, MD[a], Jean L. Rouleau, MD[b], Hussein R. Al-Khalidi, PhD[c], Robert O. Bonow, MD[d], Patricia A. Pellikka, MD[e], Gerald M. Pohost, MD[f,g], Thomas A. Holly, MD[d], Jae K. Oh, MD[e], Francois Dagenais, MD[h], Carmelo Milano, MD[c], Krzysztof Wrobel, MD[i], Jan Pirk, MD, DSc[j], Imtiaz S. Ali, MD[k], Robert H. Jones, MD[c], Eric J. Velazquez, MD[c], Kerry L. Lee, PhD[c], and Marisa Di Donato, MD[l] for the STICH Trial Investigators

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Recommendations on revascularizations in patients with chronic heart failure and systolic LV dysfunction (ejection fraction ≤35%)

Recommendations	Class[a]	Level[b]	Ref[c]
CABG is recommended for patients with significant LM stenosis and LM equivalent with proximal stenosis of both LAD and LCx arteries.	I	C	-
CABG is recommended for patients with significant LAD artery stenosis and multivessel disease to reduce death and hospitalization for cardiovascular causes.	I	B	112,288
LV aneurysmectomy during CABG should be considered in patients with a large LV aneurysm, if there is a risk of rupture, large thrombus formation or the aneurysm is the origin of arrhythmias.	IIa	C	
Myocardial revascularization should be considered in the presence of viable myocardium.	IIa	B	55
CABG with surgical ventricular restoration may be considered in patients with scarred LAD territory, especially if a post-operative LVESV index <70 mL/m² can be predictably achieved.	IIb	B	291–295
PCI may be considered if anatomy is suitable, in the presence of viable myocardium, and surgery is not indicated.	IIb	C	

CABG = coronary artery bypass grafting; LAD = left anterior descending; LCx = left circumflex; LM = left main; LVESV = left ventricular end-systolic volume; PCI = percutaneous coronary intervention; SVR = surgical ventricular reconstruction.
[a]Class of recommendation.
[b]Level of evidence.
[c]References.

Conclusion: In patients undergoing coronary artery bypass grafting plus SVR a survival benefit was realized compared with bypass alone , with the achievement of a postoperative ESVI of 70ml/m2 or less.

J Thorac Cardiovasc Surg 2013;146:1139-1145

European Journal of Cardio-Thoracic Surgery 50 (2016) 693–701
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ORIGINAL ARTICLE

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Outcome of left ventricular surgical remodelling after the STICH trial

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Abstract

OBJECTIVES: After the publication of the Surgical Treatment for Ischaemic Heart Failure (STICH) trial, surgical indications to left ventricular surgical remodelling (LVSR) have become more restrictive. The experience we report reflects the changes in the real world after the publication of STICH trial.

METHODS: From May 2009 to July 2014, 113 patients underwent LVSR, targeted mainly to the left anterior descending territory (89.4%). Of these, 18 patients (15.9%) were operated on an emergency basis. Early and mid-term outcomes were assessed to identify clinical and echocardiographic risk factors.

RESULTS: Most patients (90.3%) had chronic ischaemic mitral regurgitation (CIMR) and were in New York Heart Association (NYHA) class III/IV (77.9%). The median ejection fraction (EF) was 26% [95% confidence interval (CI): 26, 28] and scarred areas were akinetic (86.7%) in most cases. Severe left ventricular diastolic dysfunction (LVDD) was found in 33.6% of patients. Mitral valve surgery was performed in 84.1% of patients. Five patients (4.4%) died while in hospital, all from cardiac causes. Risk factors were abnormal bilirubin and emergency status. After a median follow-up of 12 (95% CI: 6, 18) months, 22 patients died, 17 from cardiac causes. Five-year freedom from death any from cause was 73 ± 5%, emergency status and MR Grade 4 being the only risk factors. Five-year freedom from death from any cause and NYHA class III/IV was 61 ± 6%. Severe LVDD and emergency status were risk factors, along with high bilirubin and diabetes mellitus on insulin. Five-year freedom from death from any cause and non-fatal cardiovascular events (rehospitalization, reoperation and stroke) was 55 ± 6%. LVDD and atrial fibrillation were found to be risk factors. After a median follow-up of 31 (95% CI: 19, 38) months, 91 patients underwent postoperative echocardiography. EF increased by 20%, but stroke volume remained unchanged. Postoperatively, patients with severe LVDD had lower EF and higher end-systolic volumes than patients without LVDD.

CONCLUSIONS: Our findings show that patients, who are candidates for LVSR, have mostly akinetic areas and CIMR requiring surgical correction and are severely symptomatic. Severe LVDD is common and, along with emergency status, is the most important risk factor for early and late outcome.

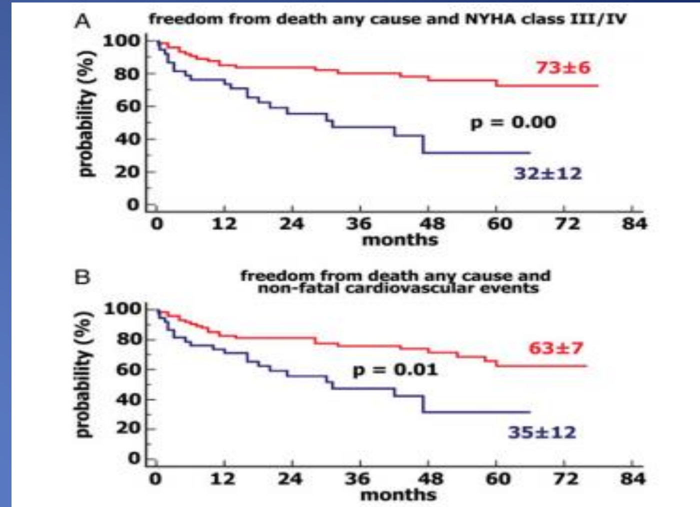


Figure 3: Patients grouped according to the presence (n = 38, blue line) or absence (n = 75, red line) of LVDD. **(A)** Freedom from death from any cause and NYHA class III/IV. **(B)** Freedom from death from any cause and non-fatal cardiovascular events. LVDD: left ventricular diastolic dysfunction; NYHA: New York Heart Association.

Mitral Valve procedure : 84,1%

Severe LV Diastolic Dysfunction : 33,6%

Tokyo Heart Center

228 pts
NYHA class III/IV
78 on preop inotropes
Prerequisite for SVR :LVESVI> 100ml/m2
EVCPP: 35%
SAVE :51%
PRP: 14%
Cabg: 84%
MVr/R: 65%
Tv plasty :26%

● Original Paper J Jpn Coron Assoc 2016; **22**: 266–272

Surgical Ventricular Restoration (SVR) for Ischemic Cardiomyopathy: Is the SVR Alternative Treatment to Heart Transplantation?

Tadashi Isomura, Yasuhisa Fukuda, Takuya Miyazaki, Minoru Yoshida, Akimasa Morisaki, Masahiro Endo and Masanori Hirota

Objectives: Ischemic cardiomyopathy (ICM) is defined as the end-stage of ischemic heart disease. The treatment for ICM is not only medication or heart transplantation, but also non-transplant surgery including surgical ventricular restoration (SVR). We studied the effectiveness of the SVR for ICM and the possibility of alternative treatment to heart transplantation. **Methods**: Since May 2000, SVR for ICM were performed in 186 patients. There were 163 men and 23 women with a mean age of 62±10 years old. There were 164 elective operations and 22 emergent operations. In addition to routine echocardiogram, speckle tracking echocardiogram was introduced to detect the lesion of LV since 2005. After cardioplegic arrest, complete coronary revascularization, and/or mitral or tricuspid surgery was performed, followed by SVR of either anteroseptal or posterior exclusion. The patients were followed up by transthoracic echocardiography. **Results**: The procedures of SVR was endoventricular circular patch plasty (EVCPP) in 66, septal anterior ventricular exclusion (SAVE) in 94, and posterior restoration procedure (PRP) in 26 patients. In addition to SVR, CABG was performed in 159, mitral surgery in 121 (plasty 105, replacement 16), and tricuspid annuloplasty in 48. Perioperative intra-aortic balloon pumping (IABP) was required in 46 and the hospital mortality was 4.3 % in elective and 18% in emergent operation. After the operation, 132 patients (75%) improved their functional class to class I or II. In the late follow-up, there were 17 cardiac deaths (congestive heart failure 11, ventricular arrhythmia 6). After 2005, the eight-year survival rates were 76.2% in elective operation. **Conclusions**: Our results demonstrated that the eight-year survival rate was equivalent to that after heart transplantation and 71% of the indicated patients for SVR could avoid heart transplantation with relief of their symptoms.

KEY WORDS: coronary artery bypass grafting, ischemic cardiomyopathy, non-transplant surgery, speckle-tracking echocardiography, surgical ventricular restoration

J Jpn Coron Assoc 2016; **22**: 266–272

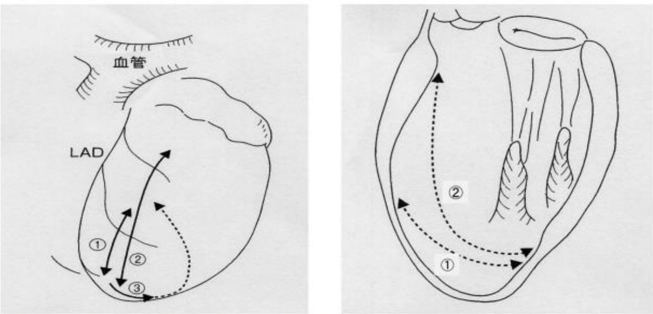


Fig. 2 Incision and location patch for surgical ventricular restoration
① EVCPP: end-ventricular circular patch plasty ② SAVE: septal anterior ventricular exclusion ③ PRP: posterior restoration procedures

: 2016; **22**: 266–272

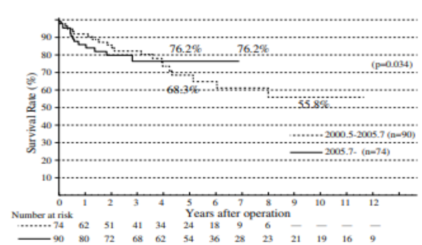


Fig. 3 Survival of patients in elective operation (n=164)

SVR in patients with suffient reduction of dilated LV may be an alternative to heart transplantation

Conclusions

- The choice to perform SVR should be based on a *careful evaluation of patients* , including :

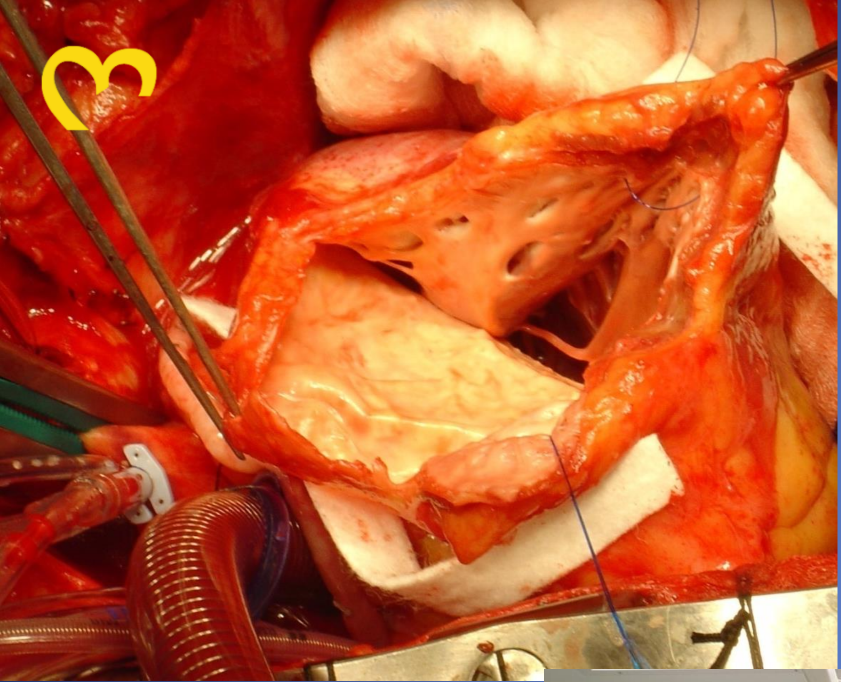
  - HF symptoms predominant over angina
  - accurate measurements of LV geometric parameters
  - careful evaluation of mitral valve
  - assessment of transmural extent of myocardial scar
  - viability of regions remote from the myocardial scar

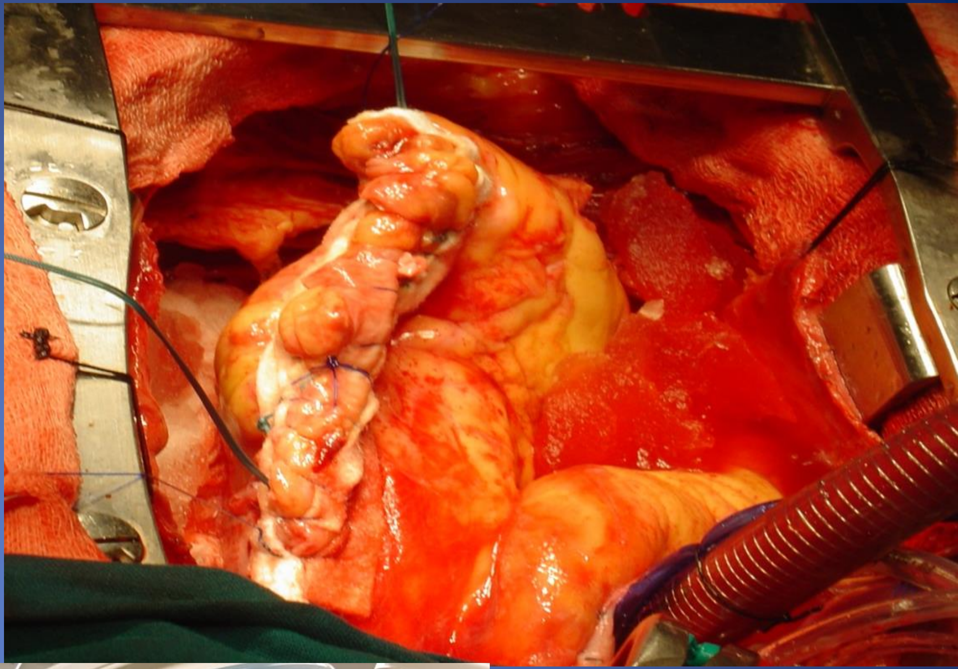
and should be performed

only in centers with a high level of surgical expertise

Conclusions

- Despite controversies SVR seems to have a role in treatment of ischemic HF patients , especially if a post-operative LVESVI ≤70ml/m2 can be predictably achieved.
- The choice to add SVR to CABG should be based on a *careful selection of patients,* coming from a tight collaboration between surgeons, cardiologists and radiologists
- ***So SVR is still a useful tool for heart failure surgical treatment especially as a part of the triple V concept***





Ευχαριστώ για την προσοχή σας

THANK YOU FOR YOUR ATTENTION