Surgical Management of Heart Failure

Walid Abukhudair  MD, FRCSc
Head of Cardiac Surgery Department
KFAFH Jeddah
SURGICAL TREATMENT OF HEART FAILURE

• CABG……..Curative

• Valve repair or Replacement…..Curative

• LV remodeling surgery…..Curative?

• External compresion device….Paliative
SURGICAL TREATMENT OF HEART FAILURE

• Dynamic Cardiomyoplasty….Palliative

• LVADs…..Temporary, Palliative

• Heart Transplantation….Changing the situation

• Artificial hearts….definitive, Palliative
Heart Failure

• survival with advanced heart failure is estimated at only 50% at 1–2 years after diagnosis.

• Cardiac transplantation has a median survival of 10 years but is only an option for few patients due to limited donor supplies and other logistic restrictions.
Introduction

• Surgical management of patients with end-stage, refractory systolic HF are limited.

• Heart transplantation remains the ultimate treatment for end-stage HF, but the persistent shortage of donor hearts, contraindications due to recipient comorbidities
Introduction

• Surgical approaches to end-stage HF continue to evolve.
• Large randomized trials are unusual in this field
• Important steps have been made over the past 10 to 15 years
• Approaches of surgical treatment of heart failure remains highly individualized.
Surgical approaches to heart failure

1) Coronary revascularization in selected patients with ischemic cardiomyopathy and hibernating myocardium.

2) Left ventricular assist devices (LVADs) as a bridge to heart transplantation or as permanent circulatory assistance, also referred to as destination therapy.
Surgical approaches to heart failure

3) Mitral valve repair in selected patients with dilated cardiomyopathy. Despite significant functional improvement, no survival benefit has been demonstrated.

4) Reconstructive cardiac surgery in patients with large akinetic or dyskinetic regions can help improve LV structure and function but a uniform clinical benefit has not been established.
Causes of Heart Failure

- Ischemic: 68%
- Non-Ischemic: 32%

Gheorghiade, 1998
Patients with heart failure should be evaluated for coronary artery disease since 2/3 are due to ICM.

Coronary artery disease may also play a role in the progression of heart failure through mechanisms such as endothelial dysfunction, ischemia, and infarction.
Ischemic cardiomyopathy

- Ischemic cardiomyopathy was considered to be present in patients with HF who had a myocardial infarction (MI) or have evidence of viable hibernating myocardium or severe coronary disease.

- Such patients had a worse outcome than those with non ischemic cardiomyopathy.
Ischemic cardiomyopathy

• Patients with single vessel disease who had no history of myocardial infarction or revascularization had a similar prognosis as those with non ischemic cardiomyopathy

• presence of asymptomatic angiographic coronary artery disease in patients with dilated cardiomyopathy does not prove causality.

Detection of coronary disease

The evaluation for CAD typically consists of

1) exercise stress testing
2) some form of myocardial imaging, which can detect ischemia and provides prognostic information by assessment of exercise capacity
3) and/or coronary arteriography
Heart Failure Post MI

The development of HF after an MI is related to a variety of factors including:

1) the size and location of the infarct
2) the presence of ischemic mitral regurgitation (MR)
3) perhaps inflammatory status as assessed by serum C-reactive protein

Two clinical syndromes can be associated with LV dysfunction

Clinical syndromes of stunned or hibernating myocardium

1) Transient postischemic dysfunction, called "stunned" myocardium

2) Chronic, but potentially reversible, ischemic dysfunction, called "hibernating" myocardium
Detection of viable (hibernating) myocardium

- The 2013 ACCF/AHA guidelines on chronic heart failure (HF) concluded that, unless the patient is not a candidate for revascularization of any kind, noninvasive imaging to detect myocardial ischemia and viability is reasonable in patients with known coronary artery disease and no angina.
The diagnostic approach to ischemic cardiomyopathy consists of two steps:

- The detection of clinically significant coronary artery disease
- The detection of potentially reversible hibernating (ie, viable) myocardium
## Treatment of HFpEF

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic and diastolic blood pressure should be controlled according to published clinical practice guidelines</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Diuretics should be used for relief of symptoms due to volume overload</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Coronary revascularization for patients with CAD in whom angina or demonstrable myocardial ischemia is present despite GDMT</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>Management of AF according to published clinical practice guidelines for HFpEF to improve symptomatic HF</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>Use of beta-blocking agents, ACE inhibitors, and ARBs for hypertension in HFpEF</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>ARBs might be considered to decrease hospitalizations in HFpEF</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td>Nutritional supplementation is not recommended in HFpEF</td>
<td>III: No Benefit</td>
<td>C</td>
</tr>
</tbody>
</table>
Multiple society guidelines from both North American and Europe discuss surgical revascularization in patients with heart failure and reduced left ventricular function and a variety of coronary anatomies (significant left main disease, left main equivalent disease [$\geq 70$ percent stenosis of the proximal LAD and proximal left circumflex arteries], proximal LAD stenosis with two or three vessel disease).
Most observational studies have found that revascularization of viable hibernating myocardium in patients with ischemic cardiomyopathy improves both survival and left ventricular function compared to medical therapy.
Coronary artery revascularization via CABG or percutaneous intervention is indicated for patients (HFpEF and HFrEF) on GDMT with angina and suitable coronary anatomy, especially for a left main stenosis (>50%) or left main equivalent disease.

CABG to improve survival is reasonable in patients with mild to moderate LV systolic dysfunction (EF 35% to 50%) and significant (≥70% diameter stenosis) multivessel CAD or proximal LAD coronary artery stenosis when viable myocardium is present in the region of intended revascularization.
Improvement in survival with revascularization

- The potential survival benefit from revascularization was best demonstrated in a 2002 meta-analysis of 24 nonrandomized viability studies involving 3088 patients with coronary artery disease and left ventricular dysfunction who had a mean left ventricular ejection fraction (LVEF) of 32 percent.
Improvement in survival with revascularization

- Patients with myocardial viability had a significant 80 percent reduction in annual mortality with revascularization (3.2 versus 16 percent with medical therapy)
- No difference in annual mortality with revascularization in patients without myocardial viability (annual mortality 7.7 versus 6.2 percent with medical therapy)
Improvement in survival with revascularization

- 2011, the Surgical Treatment for Ischemic Heart Failure (STICH) trial was the first randomized trial to compare surgical revascularization with medical therapy in patients with LVEF of 35 percent or less and coronary artery disease amenable to CABG.
REVASCULARIZATION IMPROVE THE EF AND SURVIVAL

• Large randomized trial that suggested optimal medical therapy may be as good as surgical revascularization for such patients

• Secondary analyses of the data based on treatment received suggest a benefit from surgery

N Engl J Med 2011; 364:1607
Most patients with LVEF of 35 percent or less and coronary artery disease amenable to CABG surgery should be treated with an initial course of medical therapy alone rather than medical therapy plus CABG surgery.
CABG surgery preferred by patients who are willing to accept the increased risk of morbidity related to surgery in exchange for a potentially greater mortality benefit versus medical therapy alone.

• Revascularization should also be considered for patients with ongoing anginal symptoms despite optimal medical therapy.
Improvement in survival with revascularization

- Data from a large subsequent randomized trial have not supported the observational data, showing no significant improvement in mortality between surgical revascularization plus medical therapy and optimal medical therapy alone as an initial management strategy.

Improvement in LVEF with revascularization

• The improvement in survival after revascularization in patients with myocardial viability is typically associated with an increase in left ventricular ejection fraction (LVEF).

Improvement in LVEF with revascularization

• This was illustrated in a review of 29 studies
• mean increase in LVEF of about 8 percent after revascularization when myocardial viability was present (37 versus 45 percent)
• No change in the absence of viability (36 versus 37 percent)

Time to Improve LVEF with revascularization

• Recovery of contractile function after restoration of normal flow to areas of viable (ie, hibernating) myocardium can take several days, weeks, or even months after blood flow is restored

Circulation 1993; 87:1630
Improvement in LVEF and Remodeling with revascularization

• The improvement in LVEF is associated with reverse left ventricular remodeling, which is characterized by reductions in the left ventricular end-systolic and end-diastolic dimensions and a less spherical shape of the left ventricle.

Improvement in LVEF and Remodeling with revascularization

• Improvement in contractility and myocardial thickness among thinned myocardial segments has also been shown following revascularization

Improvement in LVEF and Remodeling with revascularization

- Improvement was limited to segments in which myocardial scar burden (as detected by late gadolinium enhancement during cardiac magnetic resonance [CMR] imaging) was less than 50 percent of the myocardium.

JAMA 2013; 309:909.
Improvement in LVEF and Remodeling with revascularization

- The degree of improvement in EF is significantly correlated with the number of segments that recover function after revascularization.
Quantitative assessment of wall scar

• Can Re-vascularization be effective on this large and transmural scar?
Integration of Wall Thickening and Viability

Wall thickening + Viability = Revascularization Bull’s-eye

Recoverable
Contractile
Non-Recoverable
Ventricular dilation and Improvement in LVEF with revascularization

- The impact of left ventricular enlargement on the improvement in left ventricular function after surgery was illustrated in a review of 61 patients with ischemic heart disease and a mean LVEF of 28 percent, all of whom had evidence of myocardial viability.
Ventricular dilation and Improvement in LVEF with revascularization

• Left ventricular size may be a determinant of outcome after surgical revascularization in patients with ischemic cardiomyopathy.

• When the left ventricular end diastolic dimension is greater than 7.0 cm (4.0 cm per m2), operative mortality is high and surgery should be carefully reconsidered.

J Am Coll Cardiol 2002; 39:1151
Pre medication help Improvement in LVEF with revascularization

• There is some evidence that pre surgical medical therapy with beta blockers can increase the likelihood that surgical revascularization will improve outcomes when viability is present.

• In the CHRISTMAS trial of 387 patients with ischemic cardiomyopathy treated with

Pre medication help Improvement in LVEF with revascularization

• Carvedilol or placebo, there was a significant linear relationship between the number of cardiac segments with viable myocardium at baseline and the improvement in LVEF seen at six months with carvedilol.

• Beta blockade may improve the function of viable but hibernating myocardium by reducing myocardial oxygen consumption and increasing diastolic perfusion.

Improvement in LVEF and Survival with revascularization

• Improved survival after coronary artery bypass graft (CABG) surgery may not require an improvement in LVEF.
• This was suggested in a study of 104 consecutive survivors of CABG by a single surgeon with a baseline LVEF $\leq$30 percent (mean 24 percent)

Circulation 1999; 100:1298.
Improvement in LVEF and Survival with revascularization

• The postoperative LVEF increased over the baseline value by more than 5 percent in about two-thirds of patients (24 to 39 percent) and was unchanged in the remaining one-third (24 versus 23 percent).

• Survival free of cardiac death at a mean of 32 months was similar in the two groups (93 and 94 percent).

Circulation 1999; 100:1298.
Improvement in LVEF and Survival with revascularization

• The authors concluded that effective revascularization of ischemic myocardium protects against future MI and cardiac death even without improvement in the LVEF. 30

• Most repeat LVEF studies were performed soon after CABG (median seven days, mean 16 days), late improvement in left ventricular function may contribute

Circulation 1999; 100:1298.
# Surgical/Percutaneous/Transcatheter Interventional Treatment of HF

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABG or percutaneous intervention is indicated for HF patients on GDMT with</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>angina and suitable coronary anatomy especially, significant left main stenosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or left main equivalent disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CABG to improve survival is reasonable in patients with mild to moderate LV</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>systolic dysfunction and significant multivessel CAD or proximal LAD stenosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>when viable myocardium is present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CABG or medical therapy is reasonable to improve morbidity and mortality for</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>patients with severe LV dysfunction (EF &lt;35%), HF and significant CAD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical aortic valve replacement is reasonable for patients with critical aortic</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>stenosis and a predicted surgical mortality of no greater than 10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transcatheter aortic valve replacement is reasonable for patients with critical aortic</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>stenosis who are deemed inoperable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CABG may be considered in patients with ischemic heart disease, severe LV</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td>systolic dysfunction and suitable coronary anatomy whether or not viable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>myocardium is present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transcatheter mitral valve repair or mitral valve surgery for functional mitral</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td>insufficiency is of uncertain benefit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical reverse remodeling or LV aneurysmectomy may be considered in HFrEF for</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td>specific indications including intractable HF and ventricular arrhythmias</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Functional Mitral Regurgitation

• INTRODUCTION — In patients with functional or secondary mitral regurgitation (MR), the papillary muscles, chordae, and valve leaflets are normal.

• There are two major causes of this problem: ischemia and any cause of dilated left ventricle
Functional Mitral Regurgitation
Most Common Pathophysiology

• Annular enlargement secondary to left ventricular dilatation
• Papillary muscle displacement due to left ventricular remodeling, which results in tethering and excess tenting of the leaflet [2]
Functional MR Rarely

- RV pacing simulates the effects of left bundle branch block, with dyssynchronous contraction of the left and right ventricles.
- This dyssynchrony may alter the timing and function of papillary muscles and mitral valve apparatus, resulting in MR that can be severe, even in the setting of otherwise normal cardiac structure and function.
<table>
<thead>
<tr>
<th>Dysfunction</th>
<th>View Atrial</th>
<th>Lesions</th>
<th>Etiology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type I</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal motion</td>
<td><img src="image1" alt="Normal motion image" /></td>
<td>Annular dilatation&lt;br&gt;Annular deformation&lt;br&gt;Perforation of leaflets&lt;br&gt;Clefts in leaflets</td>
<td>Ischemic heart disease&lt;br&gt;Dilated cardiomyopathy&lt;br&gt;Endocarditis&lt;br&gt;Congenital pathology</td>
</tr>
<tr>
<td><strong>Type II</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excess motion</td>
<td><img src="image2" alt="Excess motion image" /></td>
<td>Myxomatous degeneration&lt;br&gt;Elongation of chordae&lt;br&gt;Rupture of chordae&lt;br&gt;Elongation of papillary muscle&lt;br&gt;Rupture of papillary muscle</td>
<td>Degenerative disease&lt;br&gt;Fibromuscular defects&lt;br&gt;Martian syndrome&lt;br&gt;Fornix fructis&lt;br&gt;Ehlers-Danlos disease&lt;br&gt;Endocarditis&lt;br&gt;Rheumatic disease&lt;br&gt;Trauma&lt;br&gt;Ischemic heart disease&lt;br&gt;Ehlers-Danlos disease</td>
</tr>
<tr>
<td><strong>Type IIIA</strong></td>
<td><img src="image3" alt="Restricted motion (Retraction) image" /></td>
<td>Thickening of leaflets&lt;br&gt;Thickening of chordae&lt;br&gt;Rupture of leaflets&lt;br&gt;Rupture of chordae&lt;br&gt;Fusion of chordae&lt;br&gt;Calcification&lt;br&gt;Fusion of commissures&lt;br&gt;Ventricular forces</td>
<td>Rheumatic disease&lt;br&gt;Congenital syndrome&lt;br&gt;Radiotherapy&lt;br&gt;Systolic hypertension&lt;br&gt;Ergotamine consumption&lt;br&gt;Hypereosinophilic syndrome&lt;br&gt;Mucopolysaccharidosis</td>
</tr>
<tr>
<td><strong>Type IIIB</strong></td>
<td><img src="image4" alt="Restricted motion (Apical displacement) image" /></td>
<td>Tethering of leaflets&lt;br&gt;Papillary displacement&lt;br&gt;Ventricular dilatation&lt;br&gt;Ventricular aneurysm&lt;br&gt;Ventricular forces</td>
<td>Ischemic heart disease&lt;br&gt;Dilated cardiomyopathy</td>
</tr>
</tbody>
</table>
WHAT IS FUNCTIONAL MR?

Mitral valve components:
- valve annulus
- leaflets
- chordae tendinae
- papillary muscles
- left ventricular muscle
- and the left atrium
THE MITRAL VALVE APPARATUS AND ITS ABERRATION IN HEART FAILURE

- Enlargement of the left ventricle
- Annular dilation
- Increase in the interpapillary muscle distance
- Amplified leaflet tethering
- Decreased closing forces from muscle weakness
- Asynchrony of papillary muscle contractile timing.
Functional MR PATHOPHYSIOLOGY

• The ratio of flow at the two peaks also correlates with QRS duration, and cardiac resynchronization therapy, which shortens QRS duration, reduces the early but not the late regurgitate peak.
Mitral Valve repair

• Treatment of functional mitral regurgitation should focus on optimizing medical therapy of heart failure (HF)
• when appropriate, cardiac resynchronization therapy.
• In selected patients mitral valve repair if all of the above fail
FMR Replacement

• Subvalvular apparatus including the chordal and papillary muscles, is left intact, can lead to reduced ventricular size, improvements in LV ejection fraction (LVEF), and improved symptoms of HF.

• However, observational data suggest that these benefits are not associated with improved survival
Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomised controlled trials

Gordon C S Smith, Jill P Pell

Parachutes reduce the risk of injury after gravitational challenge, but their effectiveness has not been proved with randomised controlled trials

BMJ 2003;327:1459–61
CABG may be considered with the intent of improving survival in patients with ischemic heart disease with severe LV systolic dysfunction (EF <35%), and operable coronary anatomy whether or not viable myocardium is present.

Transcatheter mitral valve repair or mitral valve surgery for functional mitral insufficiency is of uncertain benefit and should only be considered after careful candidate selection and with a background of GDMT.

Surgical reverse remodeling or LV aneurysmectomy may be considered in carefully selected patients with HF/EF for specific indications including intractable HF and ventricular arrhythmias.
Significant LV dilatation (>20% of LV volume) occurred in a relevant proportion (30%) of patients with AMI successfully treated with primary angioplasty very close to 34% observed in thrombolysed patients.

LEFT VENTRICULAR RECONSTRUCTION

- In the setting of systolic heart failure (HF), the ventricular cavity size enlarges to maintain stroke volume with associated changes in ventricular geometry (the ventricle becomes less ellipsoid and more spherical).
REMODELLING PROCESS: THREE PHASES

Phase I: necrosis

Phase II: MI expansion
  - Hypertrophy of sound myocardium
  - LV global dilatation
  - Compensation

Phase III: progressive deterioration
LV Dilatation in Ischemic Cardiomyopathy falls into three categories

• Dyskinetic aneurysms from extensive scar in the absence of reperfusion - The commonest acute LAD occlusion

• Akinetic extensively scarred regions following early reperfusion with epicardial salvage
LV dilatation in ischemic Cardiomyopathy falls into three categories

• Akinetic areas occurring late due to remote muscle dilation after early aneurysm formation - These patients have significantly dilated poorly contracting left ventricles but without massive scars.
LEFT VENTRICULAR RECONSTRUCTION

• Increases in ventricular cavity size (without adequate compensatory hypertrophy) result in increases in wall stress as governed by Laplace's law (stress = [pressure x radius] ÷ [2 x wall thickness]).

• Increased wall stress stimulates processes that lead to changes in size and geometry are thought to lead to progressive LV dysfunction and worsening HF.
LEFT VENTRICULAR RECONSTRUCTION

Left ventricular (LV) reconstruction or volume reduction procedures were developed as potential alternatives to cardiac transplantation. This strategy grew out of earlier experience with ventricular aneurysmectomy.
LEFT VENTRICULAR RECONSTRUCTION

• The procedure can produce more normal LV geometry and improve LV systolic function but a beneficial impact on clinical status and long-term survival has not been established.
STICH Trial

- RCT of 1000 patients with EF < 35% and coronary artery disease CABG or CABG SVR
- 5 Years in 127 centers
- 499 CABG and 501 CABG SVR
- Did not report screening to enrollment ratio
STICH Trial

• The 50 original STICH centers expanded to 127 in 26 countries.

• 501 SVR CABG performed, this means 4 cases per center (1 per center per year).
STICH Trial

• 49% of patient NYHA III/VI (70% in RESTOR)

• STICH changed the entry criteria during the trial. Heart failure symptoms were not required any more.

• They did not report it during the trial
STITCH Trial

The right question was asked at the beginning but the right patients weren’t enrolled.
NOTE

• STICH has the limitation of RCT dealing with a very well known procedure and consistent results

• It was CONSIDERED UNETHICAL THE RANDOMISATION OF Patient in whom the BENEFIT OF SVR WAS EVIDENT
NOTE

• The number of randomized patients was LESS than 20% OF ELIGIBLE PATIENTS

• 80% OF ELEGIBLE PATIENTS WERE TREATED WITH SVR BECAUSE THE CLINICAL EVIDENCE OF THE SUPERIORITY OF THIS PROCEDURE
STICH Trial

- The two questions are different because we have patients with viable anterior wall and patients with died scared anterior wall.

- We have patients with dilated LV and others with normal LV volume.
Average % ESV reduction following CABG plus SVR

- Cirillo (2004)
- Menicanti (2007)
- Aguiar Riberio (2006)
- Yamaguchi (2006)
- Conte (2004)
- STICH (2009)
NYHA : PRE AND POSTOP.

NYHA CLASS

Pre-Op

Post-Op

0
0.5
1
1.5
2
2.5
3
3.5
4

3.3
1.3
I.R.C.C.S. SAN DONATO
HOSPITAL EXPERIENCE

Death from any cause following SVR

A) Study population

P = 0.024

Post-op ESVI >= 60 ml/m² 30%

Post-op ESVI < 60 ml/m²

5.00 Years since Surgery

B) STICH pts

P = 0.98

32%

Post-op ESVI
SVR (-16) = 66 ml/m²
CABG (-5) = 78 ml/m²

LVESI changes
EF changes

PREOP EV(%)  POSTOP LVEF%  POST Operative EF@1Y
STICH Main Problem

• Inspite of the lv volume reduction of 20% no impact on the survival. this is against to what was previously published.

• The inclusion criteria did not need to have Heart Failure symptums

• The did viability to only 40% of the patients
LEFT VENTRICULAR RECONSTRUCTION

• Neurohormonal activation may be reduced by LV reconstruction.

• Data on clinical benefit are limited and a mortality benefit has not been proven.
SAVER procedure

- The safety and efficacy of this procedure was initially evaluated in the RESTORE study of almost 1200 patients who underwent the procedure between 1998 and 2004.
- 30-day operative mortality of 5.3 percent

References:
SAVER procedure

• A modification of the Dor procedure, surgical anterior ventricular endocardial restoration (SAVER), is performed on the dilated, remodeled ventricle after anterior MI and consists of exclusion of noncontracting segments from the ventricular cavity.
SAVER procedure

- Reduction in LV end-systolic volume index
- Increase in LVEF from 30 to 40 percent
- Overall survival at five years of 69 percent.
- A subsequent report showed a higher (9.3 percent) 30-day mortality in a "real world" cohort
Dor procedure

• LV aneurysmectomy has been offered as an option for selected patients with symptomatic aneurysms that have been defined as including those associated with HF, angina pectoris, systemic embolization, and/or malignant ventricular tachyarrhythmias.

• The Dor procedure, also called endoventricular circular patch plasty (EVCPP) or endoventricular patch reconstruction, is an approach to surgical reconstruction in the setting of post-infarction aneurysm formation.

Dor procedure

• Prior to the development of the Dor procedure, surgical treatment for post-infarction aneurysms involved removal of the aneurysmal area and reapproximation of the viable wall (endoaneurysmorrhaphy) in an attempt to restore LV geometry.

• exchanged one LV morphologic abnormality for another and has not been found to improve LV performance.

Am J Cardiol 1980; 45:923.
Dor procedure

- The hospital mortality rate fell over time with increasing experience.
- The hospital mortality rate was 4.8 percent, and during this period the mortality rate for those with EF <30 percent was 7.5 percent.
- The mean LVEF improved between 10 to 15 points.

Heart Fail Rev 2004; 9:269.
Conclusion

• The large registry of SVR performed by expert surgeon and good long term results can not be ignored

• SVR registry show improvement of the NYHA class and improvement of the neurohormonal activation which help remodling
Conclusion

- Surgeon cannot SVR without viability and volume information; this would defeat the propose of the concept of the operation.
MECHANICAL INHIBITION OF DILATATION

• The Acorn CorCap device is a knitted polyester sock that is drawn up and anchored over the ventricles in order to limit left ventricular (LV) dilation and remodeling and improve LV ejection fraction (EF). In an unblinded trial, 193 patients with heart failure (HF) and significant mitral regurgitation requiring mitral valve surgery were randomly assigned to surgery with or without the Acorn device and an additional 107 patients not requiring mitral surgery were randomly assigned to medical therapy or medical therapy plus the Acorn device.
MECHANICAL INHIBITION OF DILATION

- Insertion of the device resulted in reduction in the composite end point of major cardiac procedure, worsened New York Heart Association (NYHA) functional class (table 1), or death at median follow-up of two years. There were reductions in LV end-diastolic function in the device group but no differences in survival between the device and control groups at two- and three-year follow-up [24]. At five-year follow-up limited to patients not receiving mitral surgery, there was sustained decrease in LV diastolic volume and more frequent improvement in NYHA functional class in the device group but no difference in mortality.
LARGELY ABANDONED PROCEDURES

• Batista procedure — As originally described, the Batista procedure, or partial left ventriculectomy (or partial left ventricular [LV] resection)

• Involved the removal of a section of the LV free wall, between both papillary muscles and extending from the apex to the mitral annulus

• An improvement in heart failure (HF) and LV ejection fraction (LVEF) was thought to result from a reduction in peak wall stress and possibly a more uniform pattern of LV contraction and relaxation
Acorn Cardiac Support Device
Cardiomyoplasty — Cardiomyoplasty, also referred to as "dynamic cardiomyoplasty," is a surgical therapy for dilated cardiomyopathy in which the latissimus dorsi muscle is wrapped around the heart and paced during ventricular systole. Postoperative observations suggested that progressive LV dilation could be slowed in some patients by the diastolic "girdling" effect of the muscle wrap [36]. This observation led to the development of the Acorn CorCap device (see 'Mechanical inhibition of dilation' above).
THANKS

Please do not deny your patient the Chance