Echo 3D et Chirurgie Mitrale

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Aetiology of Single Valvular Heart Diseases in the Euro Heart Survey

43% 13% 32% 12%

(Ilang et al. Eur Heart J 2002;24:1244-53)
Burden of valvular heart diseases: a population-based study
Voyville Takano, Julies M Goodie, Thomas N Skelton, John S Gottlieber, Christopher G Scott, Maurice Enriquez-Sarano

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2030</th>
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<tr>
<td>MR</td>
<td>2.7</td>
<td>4.8</td>
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<tr>
<td>millions</td>
<td>Millions</td>
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Lancet 2006, 368 :1005-11

Trends in Mitral Valve Surgery in the United States: Results From The Society of Thoracic Surgeons Adult Cardiac Database
James S. Gammie, MD, Shubin Sheng, PhD, Bartley P. Griffith, MD, Eric D. Peterson, MD, J. Scott Rankin, MD, Sean M. O’Brien, PhD, and James M. Brown, MD
Division of Cardiac Surgery, University of Maryland Medical Center, Baltimore, Maryland; Duke Clinical Research Institute, Durham, North Carolina; and Centennial Medical Center, Vanderbilt University, Nashville, Tennessee

% Replaced
- Mechanical: 59%
- Bioprosthetic: 63%

The Functional approach

Goal of repair: to correct *dysfunction*

The Functional Approach
MR: loss of surface of coaptation

Based upon 2D Leaflet Motion
Segmental Analysis

Anterior commissure
Anterior leaflet
Posterior commissure

A1 A2 A3
P1 P2 P3

Cardiopexia
Retrograde cardioplegia

Lethal suction
3D Surgical View: 2 landmarks

- Aortic Valve (top)
- LAA (left)

Left Atrial View
A plea for an integrated 2D/3D approach
3D: an « easy » surgical view
Superiority of 3D: indentation prolapse ++

Case P2 P3 ?
Width of Prolapse and Indentation?
VALVE ANALYSIS

- Dysfunction
  - Functional classification
  - Segmental analysis
- Lesion
- Etiology
- Risk of SAM
- Tricuspid

Extent of calcification?
VALVE ANALYSIS

✓ Dysfunction
  ✓ Functional classification
  ✓ Segmental analysis

✓ Lesion
√ Etiology
✓ Risk of SAM
✓ Tricuspid
Etiology

- Rheumatic
- **Degenerative**
- Endocarditis
- Ischemic
- Cardiomyopathies

Spectrum of Degenerative MR*

* A. Carpentier, J Thorac Cardiovasc Surg 1983

Excess of tissue?
VALVE ANALYSIS

✓ Dysfunction
  ✓ Functional classification
  ✓ Segmental analysis

✓ Lesion: quality and quantity of tissue

✓ Etiology

✓ Risk of SAM

✓ Tricuspid

Height A2: ring size
Anterior Surface Area & Ring Size

VALVE ANALYSIS

- Dysfunction
  - Functional classification
  - Segmental analysis
- Lesion: quality and quantity of tissue
- Etiology
- Risk of SAM
- Tricuspid
Echocardiography:

Echo: 40 mm or 21 mm/m²

Surgery:

Surg: 70 mm


Landmark A3P3
3D Intra-op and Mitral Surgery

✓ Mitral Valve Reconstruction
  - valve analysis
  - intra-op control

✓ Mitral Valve Replacement
  - mechanical
  - bioprosthesis
3D Intra-op and Mitral Surgery

- Mitral Valve Reconstruction
  - valve analysis
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- Mitral Valve Replacement
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3D Intra-op and Mitral Surgery

- Mitral Valve Reconstruction
  - valve analysis
  - intra-op control
- Mitral Valve Replacement
  - mechanical
  - bioprosthesis
Malposition
REAL TIME 3D ECHO in CATH LAB
Closure of ASD with Amplatzer device
TAVI Devices

3D LVOT view++
Pre-deployment guidewire positioning

Prosthesis positioning
Positioning (50/50): team decision

Prosthesis deployment
Residual AR

Coronary obstruction

✓ Segmental LV wall motion ++
✓ 3D ++
Emerging issues
Valve in Valve

Transapical Transcatheter Mitral Valve-in-Valve Implantation in a Human
Anson Chung, MD, John G. Webb, MD, Osmol F. Wong, MD, MPH, Ron Yc, MD, Jean-Bernard Musson, MD, Ronald G. Carere, MD, and Samuel V. Lichtenstein, MD, PhD
Divisions of Cardiovascular Surgery and Cardiology, St. Paul’s Hospital, University of British Columbia, Vancouver, Canada

We describe a human transcatheter transapical mitral valve implant within a mitral bioprosthetic valve-in-valve. A high-risk, 86-year-old man with symptomatic bioprosthetic mitral stenosis was positioned for anterior minithoracotomy. Left ventricular apex access was obtained. After balloon valvuloplasty, a closed, St. Jude Medical-Edwards transcatheter valve (Edwards Lifesciences LLC, Irvine, CA) was deployed within the mitral bioprosthesis using rapid ventricular pacing. The transcatheter valve functioned properly postoperatively; however, the patient died of multiple organ dysfunction.
Valvular Heart Disease
The Value of 3-Dimensional Echocardiography

Roberto M. Lang, MD, Wendy Tsung, MD, Lynn Weinert, BS, Victor Mor-Avi, PhD,
Sonal Chandra, MD
Chicago, Illinois

Significant advances in 3-dimensional echocardiography (3DE) technology have ushered its use into clinical practice. The recent advent of real-time 3DE using matrix array transesophageal and transesophageal transducers has resulted in improved image spatial resolution, and therefore, enhanced visualization of the pathomorphological features of the cardiac valves compared with previously used sparse array transducers. It has enabled an unparalled real-time visualization of valves and subvalvular anatomic features from a single volume acquisition without the need for offline reconstruction. On-scene or offline post-processing using commercially available and custom 3-dimensional analysis software allows the quantification of multiple parameters, such as orifice area, prolapse height and volume in mitral valve disease, area of the left ventricular outflow tract, and tricuspid annular geometry. In this review, we discuss the incremental role of 3DE in evaluating valvular anatomic features, volumetric quantitation, pre-surgical planning, intra-procedural guidance, and post-procedural assessment of valvular heart disease. (J Am Coll Cardiol 2011;58:933-44) © 2011 by the American College of Cardiology Foundation

Take home messages
a surgical precision

- 3D Live Intra-op TEE facilitates surgeon’s-echographist team effort
- segmental analysis: surgical view
- localisation and mechanism of residual MR after repair
- early diagnosis of unexpected complications after MV replacement