Rheumatic Mitral Stenosis: What does the ESC Guideline say?

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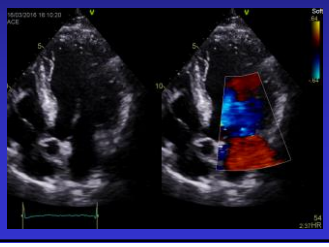
RHD Mitral Stenosis

Stenotic mitral valve seen from left atrium. Both commissures are fused; the cusps are severely thickened. The left atrium is huge. The valve is both incompetent & stenotic

Mitral Stenosis – ESC Guidance 2017

- Rheumatic mitral stenosis
- Prosthetic mitral dysfunction
- Calcific/degenerative mitral stenosis
- Congenital



Rheumatic Mitral Stenosis ESC Guidance 2017

- Echo is the preferred method for diagnosis and assessment of severity

How best to assess severity of Mitral Stenosis?

1. Mitral valve area by 2D planimetry
2. Mitral valve area by 3D TTE
3. Mitral valve area by 3D TOE
4. Mitral valve area by Doppler (P ½ time)
5. Peak mitral gradient
6. Mean mitral gradient

Mitral Stenosis – ESC Guidance 2017

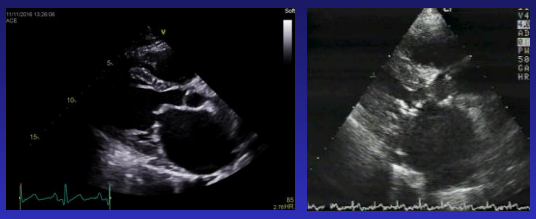
- Echo is the preferred method for diagnosis and assessment of severity
- Mitral Valve Area is the preferred reference measurement of severity
- Valve area is measured by 2D planimetry!
- Mean valve gradient and estimated pulmonary artery pressure reflect the consequences of mitral stenosis and have prognostic value

Quantitation of Mitral Stenosis
1. Measurement of valve area by planimetry

Normal valve area	3-5 sqcm
Mild MS-	>1.5
Moderate	1.0 - 1.5
Severe	<1.0

Echo features of mitral stenosis

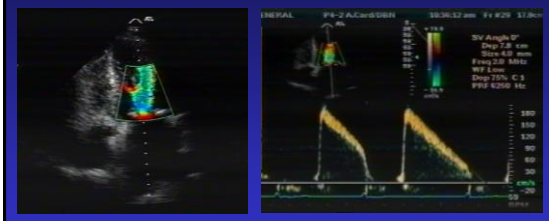
Parasternal long-axis views



Dilated left atrium
Thickened leaflet tips
Bowing anterior leaflet
Immobile posterior leaflet
Reduced mitral orifice

Leaflet fibrosis / calcification
Rigid, non - pliant leaflets
Chordal thickening & shortening

Quantitation of Mitral Stenosis
2. Measurement of valve area by pressure half-time

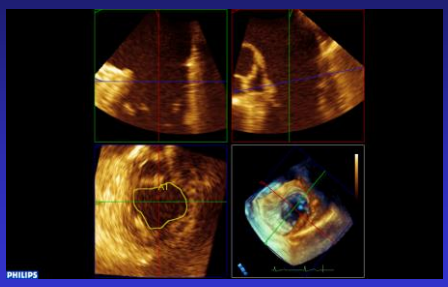


PHT - time (ms) for mitral diastolic gradient to fall by 50%

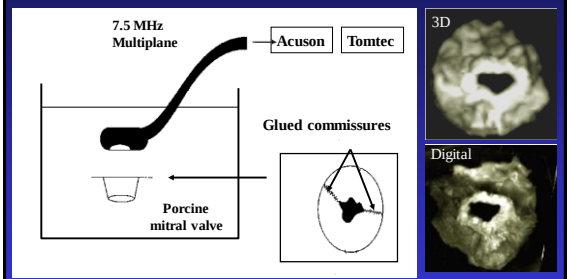
$$\text{area} = \frac{220}{\text{Pressure half time (ms)}}$$

Normal valve area 3-5 sqcm
Mild MS- >1.5
Moderate 1.0 - 1.5
Severe <1.0

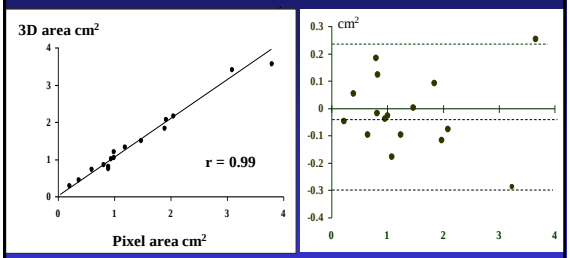
3. Mitral Oriface Area Measurement by 3D TOE



In vitro 3D Echocardiography of porcine mitral valves



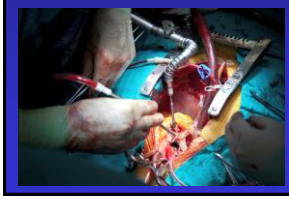
3DE valve area vs digital (pixel) valve area
n = 16 porcine valves in vitro



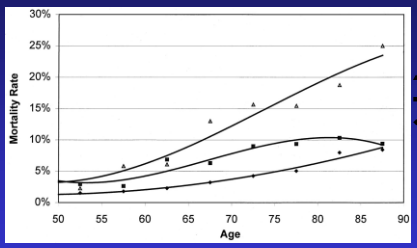
Mean difference = 0.11cm²

Mitral Stenosis – ESC Guidance 2017

- **Intervention (surgical MVR or BMV/PMC) should be considered in symptomatic patients with clinically significant MS (MVA < 1.5cm2)**



Observed in-hospital mortality after cardiac surgery among all patients

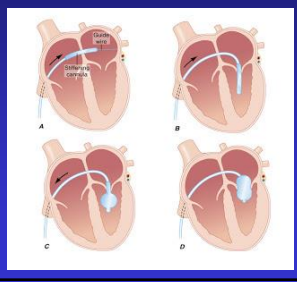


- In-hospital morbidity and mortality in 67,764 patients undergoing cardiac surgery at 22 centers in the US National Cardiovascular Network.

Alexander, K. P. et al. *J Am Coll Cardiol* 2000;35:731-738

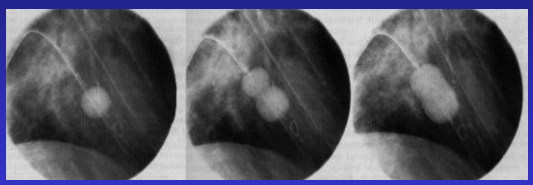
Balloon Mitral Valvuloplasty

- Introduced in 1984 as alternative to surgical valvotomy
- Percutaneous technique under LA or GA with echo guidance
- Inter-atrial septum punctured
- Stepwise inflation of the Inoue balloon



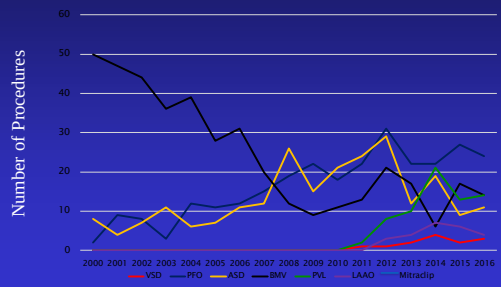
Balloon mitral valvuloplasty

- Controlled inflation of the Inoue balloon



Edinburgh Heart Centre

Non-TAVI Structural Heart Disease Intervention at EHC 2000-16



Mitral Stenosis – ESC Guidance 2017

Recommendations	Class[a]	Level[b]
PMC is indicated in symptomatic patients without unfavourable characteristics[c] for PMC.[144,146,148]	I	B
PMC is indicated in any symptomatic patients with a contraindication or a high risk for surgery.	I	C
Mitral valve surgery is indicated in symptomatic patients who are not suitable for PMC.	I	C

Unfavourable Clinical Characteristics: Old age, previous BMV, NYHA Class IV, severe PHT

Mitral Stenosis: Contra-indications to BMV

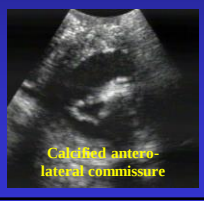
Contra-indications
Mitral valve area >1.5 cm²[a]
Left atrial thrombus
More than mild mitral regurgitation
Severe or bi-commissural calcification
Absence of commissural fusion
Severe concomitant aortic valve disease, or severe combined tricuspid stenosis and regurgitation requiring surgery
Concomitant CAD requiring bypass surgery

Balloon mitral valvotomy (BMV): Predicting the outcome

- Primary mechanism involves splitting fused mitral commissures.
- Optimal results expected when both commissures are fused and non - calcified ('splittable'), and only mild scarring of the cords

TTE (TOE): Assess commissural fusion and Ca++
Assess cords for thickening and fusion

Echo features of mitral stenosis - commissure morphology



RESULTS

Mean MVA **1.1** +/- 0.28 cm^2 ⟶ **1.8** +/- 0.45 cm^2
51% had a successful outcome.

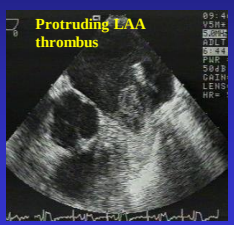
Commissure Score	n	Successful (n=23)	Unsuccessful (n=22)	% obtaining successful outcome	
0	1	0	1	0 %	
1	12	1	11	8 %	
2	10	7	3	70 %	
3	10	7	3	70 %	
4	12	8	4	67 %	**P<0.01**

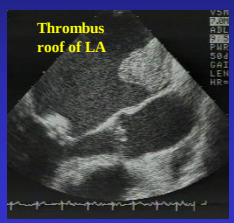
Score 0 or 1 predicts adverse outcome with positive and negative predictive accuracy of 92% and 69%, respectively

Commissural calcification

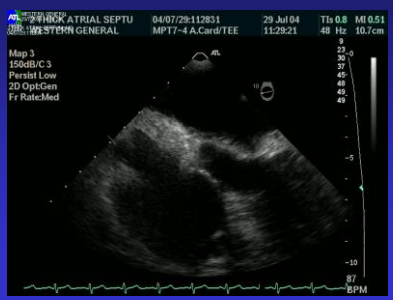
- Detected in 40% of patients (mean age 63)
- Increased significantly with age
- Strongest independent predictor of unsuccessful outcome after BMV (P<0.01)

Thrombus detection: Pre-valvuloplasty

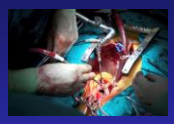




Thick Atrial Septum Pre-valvuloplasty



Surgery Or BMV for Severe Symptomatic Mitral Stenosis

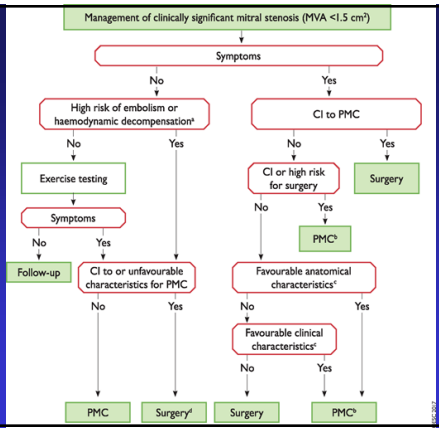


- Young patients with non-calcified valves
- High surgical risk eg Elderly, PHT, previous surgery

- Middle aged patients
- Mitral regurgitation
- AVR, TVR or CABG
- Ca++ Commissure
- LA Thrombus

Mitral Stenosis – ESC Guidance 2017

PMC should be considered in asymptomatic patients without unfavourable clinical and anatomical characteristics[c] for PMC and: • high thromboembolic risk (history of systemic embolism, dense spontaneous contrast in the LA, new-onset or paroxysmal atrial fibrillation), and/or • high risk of haemodynamic decompensation (systolic pulmonary pressure >50 mmHg at rest, need for major non-cardiac surgery, desire for pregnancy).	IIa	C



Balloon Mitral Valvuloplasty Case

29 year old woman from Inverness, originally from Fiji

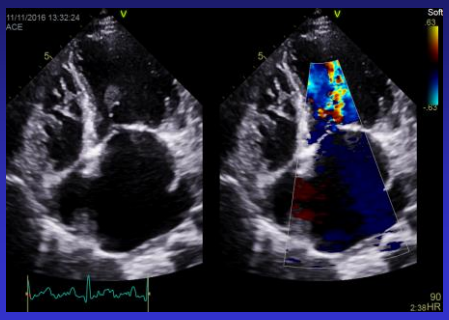
Known to have rheumatic mitral stenosis since first pregnancy with twins which ended in pulmonary oedema and emergency section

'No plans to extend family'

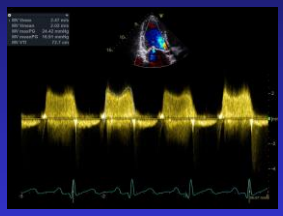
Presents very SOB, with orthopnoea, 25 weeks pregnant

Balloon Mitral Valvuloplasty Case

Balloon Mitral Valvuloplasty Case

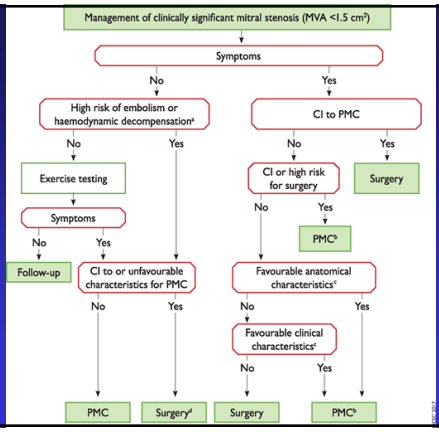


Balloon Mitral Valvuloplasty Case

Balloon Mitral Valvuloplasty Case

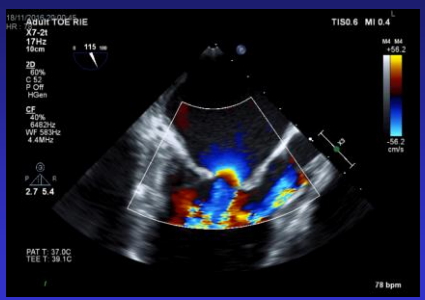
1. Surgical MVR
2. Balloon mitral valvuloplasty
3. Continue close monitoring
4. Plan to intervene soon after delivery



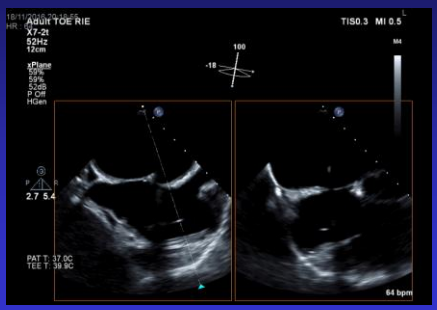
Balloon Mitral Valvuloplasty Set Up

- General Anaesthetic
- Femoral Vein Access (US)
- TOE Guidance
- Inoue balloon

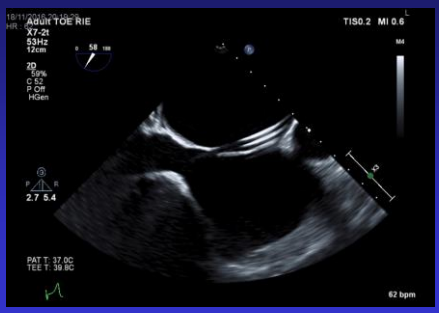
Balloon Mitral Valvuloplasty Case



Balloon Mitral Valvuloplasty Case



Balloon Mitral Valvuloplasty Case



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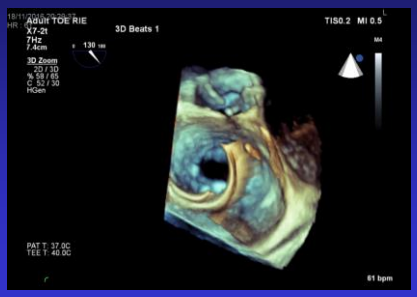
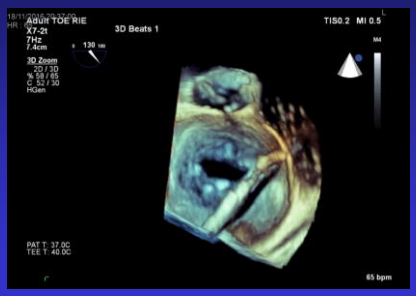
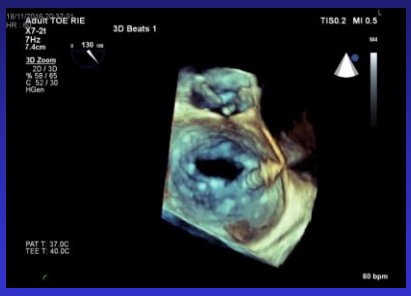


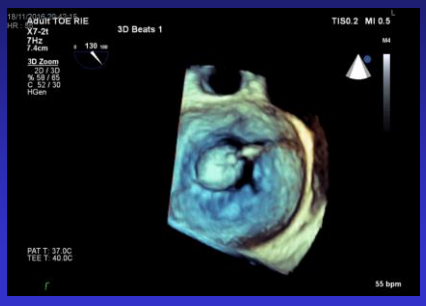
Balloon Mitral Valvuloplasty Case



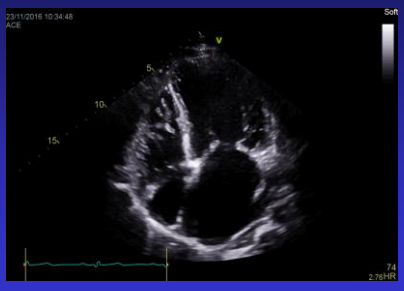
Balloon Mitral Valvuloplasty Case



Balloon Mitral Valvuloplasty Case

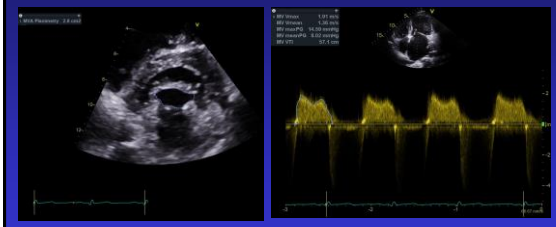


Post Balloon Mitral Valvuloplasty



Post Balloon Mitral Valvuloplasty

Balloon Mitral Valvuloplasty Case



Balloon Mitral Valvuloplasty -Procedure

- General Anaesthetic
- Femoral Vein Access (US)
- Transeptal Puncture
- TOE Guidance
- Home two days later
- Subsequent normal vaginal delivery
- Healthy baby
- No further intervention required (yet)