

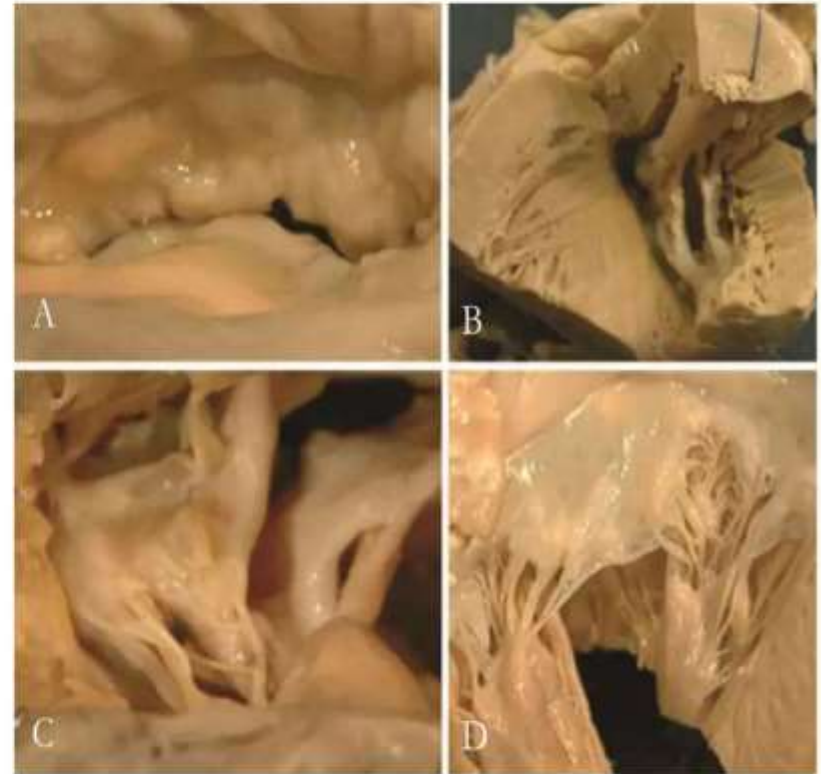
# Mitral Stenosis

# Causes of Mitral stenosis

- Rheumatic
- Congenital
- Carcinoid
- SLE
- mucopolysacharidosis
- Mitral annular calcification

# PATHOLOGIC CHANGES OF THE MITRAL VALVE IN MS

- Thickened, rigid, nodular appearance of the mitral valve leaflets as viewed from the atria **(A)** and ventricle **(B)**. The commissures are calcified and fused, thereby creating the characteristic “**fish mouth**”-shaped valve.
- **B** and **C**, The subvalvular apparatus is thickened, fused, and shortened.
- **D**, Healthy mitral valve leaflets.



From Chandrasekar Y, Westaby S, Narula J: Mitral stenosis. *Lancet* 374:1273, 2009.)



# Hemodynamics

- Normal Mitral valve 4-6 cm<sup>2</sup>
- ACC 2020 Valve guidelines
- A at risk: normal transmittal flow
- B Progressive MS: > 1.5cm<sup>2</sup> area, diastolic pressure half-time <150 ms
- C Asymptomatic severe MS: <1.5 cm<sup>2</sup> area, diastolic pressure half-time >150 ms with severe LA enlargement
- D. Severe symptomatic MS: <1.5 cm<sup>2</sup> area, diastolic pressure half-time >150 ms with severe LA enlargement with decreased exercise tolerance

# CLASSIFICATION OF MS SEVERITY

	Mild	Moderate	Severe
Specific findings			
Valve area (cm) <sup>2</sup>	>1.5	1.0-1.5	<1.0
Supportive findings			
Mean gradient (mmHg)*	<5	5-10	>10
Pulmonary artery pressure(mmHg)	<30	30-50	>50

\* At heart rate between 60 and 80 bpm and in sinus rhythm

# STAGES OF MITRAL STENOSIS

STAGE	DEFINITION	VALVE ANATOMY	VALVE HEMODYNAMICS	HEMODYNAMICS CONSEQUENCES	SYMPTOMS
A	At risk for MS	Mild valve doming during diastole	Normal transmitral flow velocity	None	None
B	Progressive MS	Rheumatic valve changes with commissural fusion and diastolic doming of mitral valve leaflets Planimetered MVA $>1.5 \text{ cm}^2$	Increased transmitral flow velocities $\text{MVA} > 1.5 \text{ cm}^2$ Diastolic pressure half-time $<150 \text{ msec}$	Mild to moderate LA enlargement Normal pulmonary pressure at rest	None
C	Asymptomatic severe MS	Rheumatic valve changes with commissural fusion and diastolic doming of mitral valve leaflets Planimetered MVA $\leq 1.5 \text{ cm}^2$ (MVA $\leq 1 \text{ cm}^2$ with very severe MS)	$\text{MVA} \leq 1.5 \text{ cm}^2$ (MVA $\leq 1 \text{ cm}^2$ with very severe MS) Diastolic pressure half-time $\geq 150 \text{ msec}$ (Diastolic pressure half-time $\geq 220 \text{ msec}$ with very severe MS)	Severe LA enlargement Elevated PASP $>30 \text{ mm Hg}$	None
D	Symptomatic severe MS	Rheumatic valve changes with commissural fusion and diastolic doming of mitral valve leaflets Planimetered MVA $\leq 1.5 \text{ cm}^2$	$\text{MVA} \leq 1.5 \text{ cm}^2$ (MVA $\leq 1 \text{ cm}^2$ with very severe MS) Diastolic pressure half-time $\geq 150 \text{ msec}$ (Diastolic pressure half-time $\geq 220 \text{ msec}$ with very severe MS)	Severe LA enlargement Elevated PASP $>30 \text{ mm Hg}$	Decreased exercise tolerance Exertional dyspnea

# Mechanisms

- **Forward Flow**

- Normally  $LAP = LVEDP$
- But in MS  $LAP > LVEDP$
- Opening snap is heard
- Isovolumetric relaxation interval shortens

- **Backward Pressure**

- In MS raised LAP -- increased PCWP-- exudation of fluids into lungs -- lung compliance reduce -- dyspnoea

- Also
- Increase in pulmo. htn -- RV systolic pressure increases -- RA pressure increases -- IVC pressure shoots up leading to Pedal edema or gnaomegaly and SVC pressure shoots up leading to raised JVP



# Clinical assessment of severity of MS

- Presence of significant symptoms class 3 and 4
- Narrow A2- OS gap
- Long murmurs
- Pulm htn
- Diastolic thrill
- AF is least reliable for the severity of MS as it is present in majority of elderly MS pts

# Precipitating factors

- Increases symptoms by
  - Exercise
  - Pregnancy
  - Atrial Fibrilatiof
  - Fever
  - LRTI
- Decreased by - Bed rest, Beta blockers, CCB

# Clinical Features

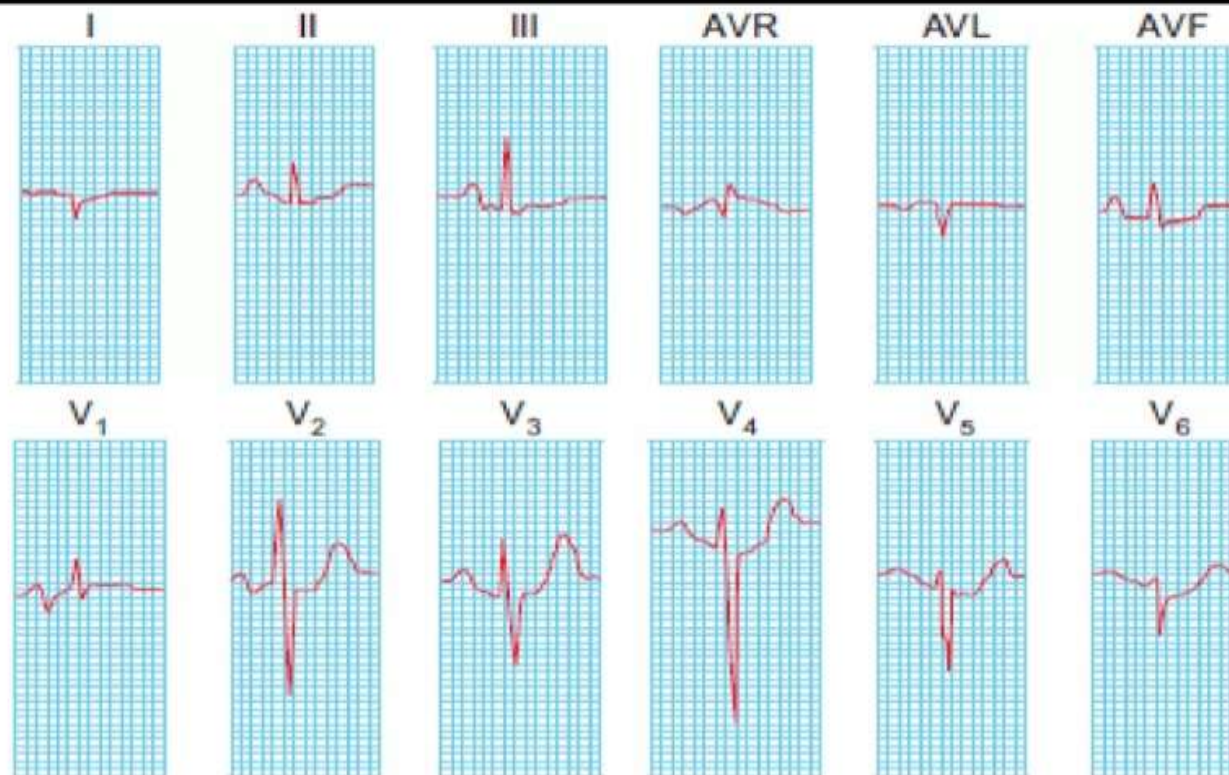
- Due to PAH- severe dyspnea, cough with frothy sputum, hemoptysis
- Due to RVH- pedal edema , fatigue, weakness
- 
- Due to AF- Palpitations, Angina, syncope

# Complications

- Left Atrial enlargement
- Pulmonary edema
- Tricuspid Regurgitation
- Right ventricular hypertrophy
- Right Atrial Hypertrophy
- Atrial Fibrillation
- Embolism
- Syncope

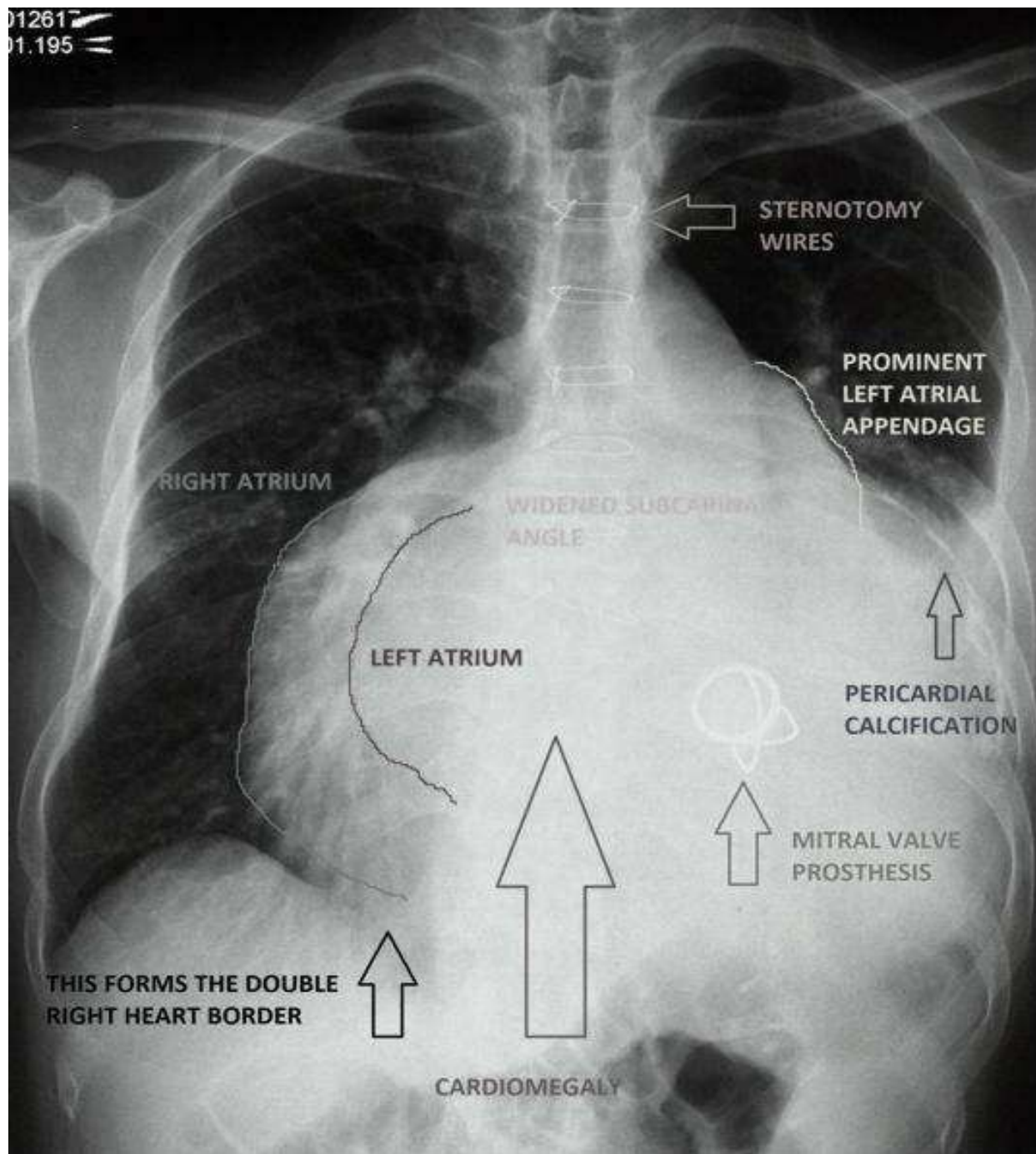
# Investigation

- Xray chest - straightning of left heart border, increased heart size, pulm congestion/edema
- ECG - right axis deviation, P Mitrale, RV strain pattern
- Echo - Fish mouth orifice, thickened valves, Commissural fusion
- Severe MS- may be LA clot formation



**Fig. 13.79** Severe mitral stenosis shown by a 12-lead ECG. Note the right axis deviation (frontal plane axis = + 120°), the left atrial conduction abnormality (large terminal negative component of the P wave in V<sub>1</sub>) and the right ventricular hypertrophy (R wave in V<sub>1</sub> and right axis deviation).

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# ECHO EVALUATION OF MITRAL STENOSIS

A. Appearance of the MV & the mobility of its leaflets





# ASSESSMENT OF MV ACCORDING TO THE WILKINS SCORE

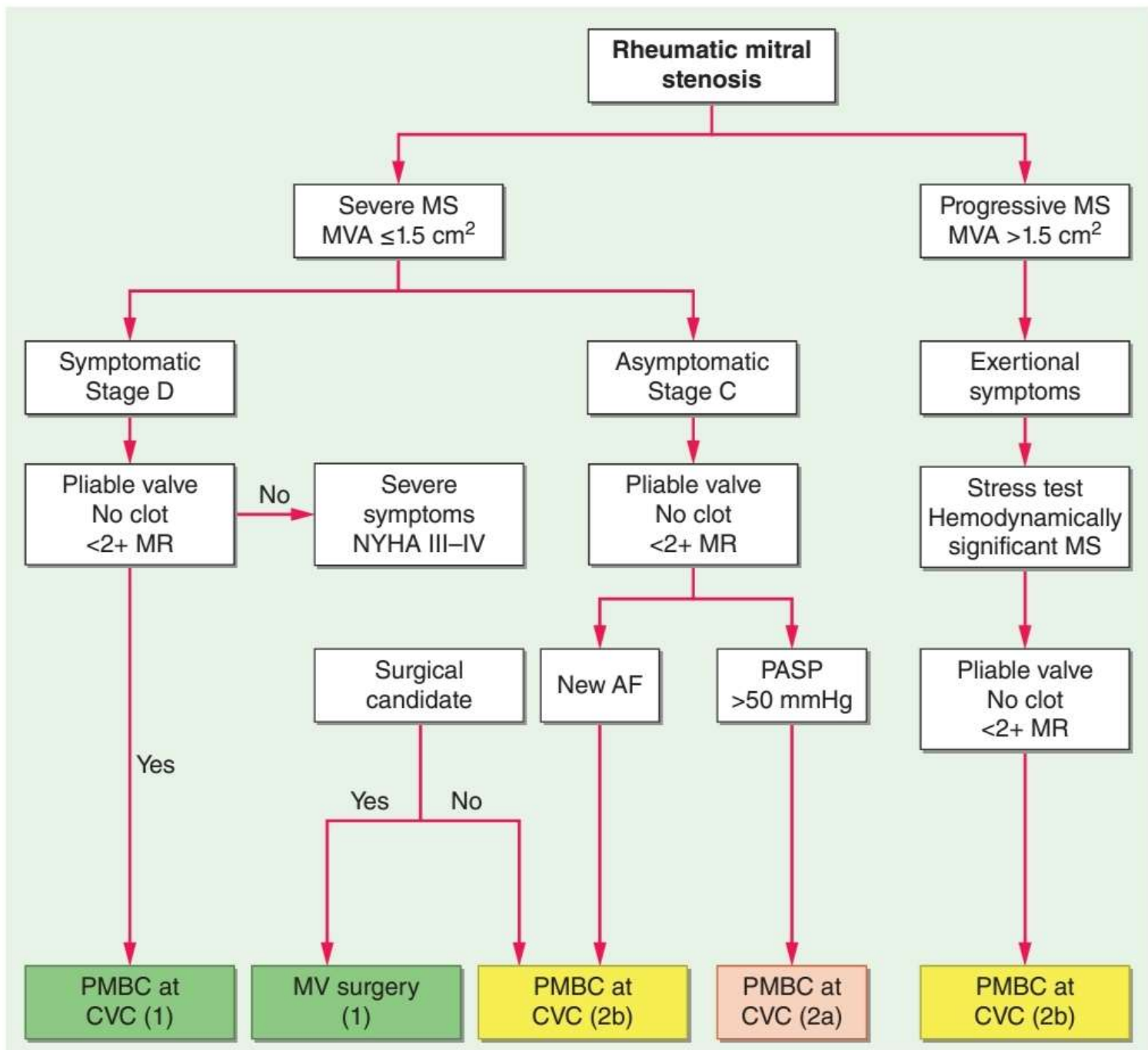
GRADE	LEAFLET MOBILITY	VALVE THICKENING	CALCIFICATION	SUBVALVULAR THICKENING
1	Highly mobile valve with only leaflet tips restricted	Leaflets near normal in thickness (4-5 mm)	Single area of increased echo brightness	Minimal thickening just below the mitral leaflets
2	Leaflet mid and base portions have normal mobility	Mid leaflets normal, considerable thickening of margins (5-8 mm)	Scattered area of brightness confined to leaflet margins	Thickening of chordal structures extending to one-third of the chordal length
3	Valve continues to move forward in diastole, mainly from base	Thickening extending through the entire leaflet (5-8 mm)	Brightness extending into mid-portions of the leaflets	Thickening of chordal structures extending to one-third of the chordal length
4	No or minimal forward movement of the leaflet in diastole	Considerable thickening of all leaflet tissue (> 8-10 mm)	Extensive brightness throughout much of the leaflet tissue	Extensive thickening and shortening of all chordal structures extending down to the papillary muscles

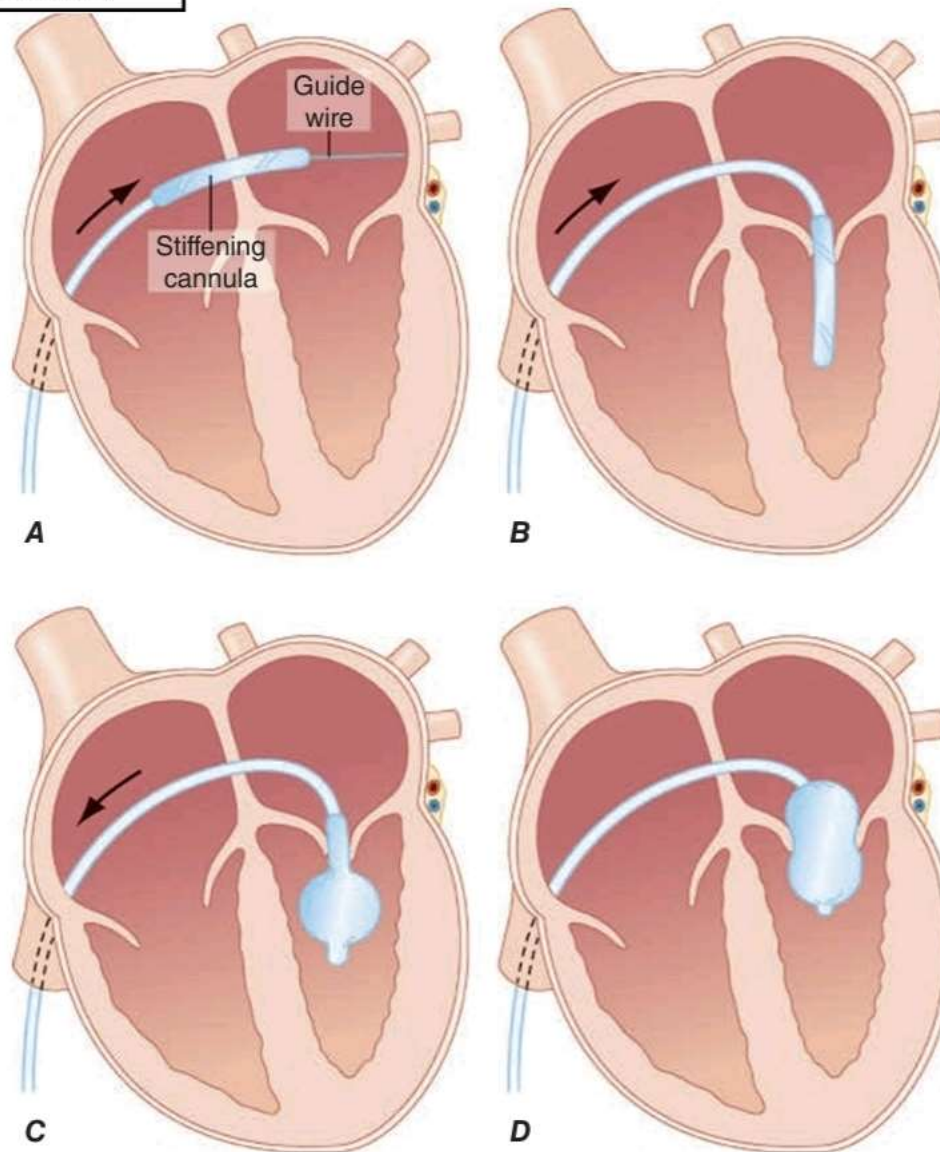
- Wilkins score - for MV stenosis
  - Based on mobility, leaflets thickening, calcification, and sub valvular thickening
  - Total 4 Grades
  - Pliable valve < 8 -- suitable for BMV
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- Cardiac Catheterization - when discrepancy btwn clinical synonyms and ECHO To assess PA pressure

# Management

- HR reduction - Beta blockers, Diltizem, Digoxin,
- Target heart rate - 60/min
- Anticoagulation- AF/LA clot/systemic embolism - only Vitamin K antagonists
- Diuretics/ salt restriction for volume reduction
- Surgical management
  - 1) Balloon Mittal Valvotomy
  - 2) MV repair
  - 3) MV replacement

- Indications for BMV -
  - NYHA class 2 , 3, 4 symptoms with MV  $<1.5 \text{ cm}^2$
  - Wilkins score  $< 8$
  - No LA clot
  - Commissural calcification
- 
- Successful BMV- split of one or more commissures with post BMV valve area  $>1.5 \text{ cm}^2$





**FIGURE 263-2 Inoue balloon technique for percutaneous mitral balloon commissurotomy. A.** After transseptal puncture, the deflated balloon catheter is advanced across the interatrial septum, then across the mitral valve and into the left ventricle. **B–D.** The balloon is inflated stepwise within the mitral orifice.

# Thank you

Source - Harrison 21 st edition  
Up-to-date