# Murmur

## - Hearing the red herring

**Winnie Chan**
**AHNH MED**

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## Where do the murmur come from ?

Murmur = turbulence

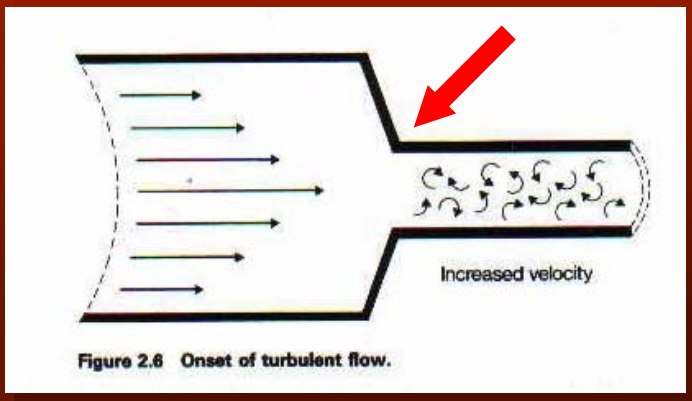


Figure 2.6 Onset of turbulent flow.

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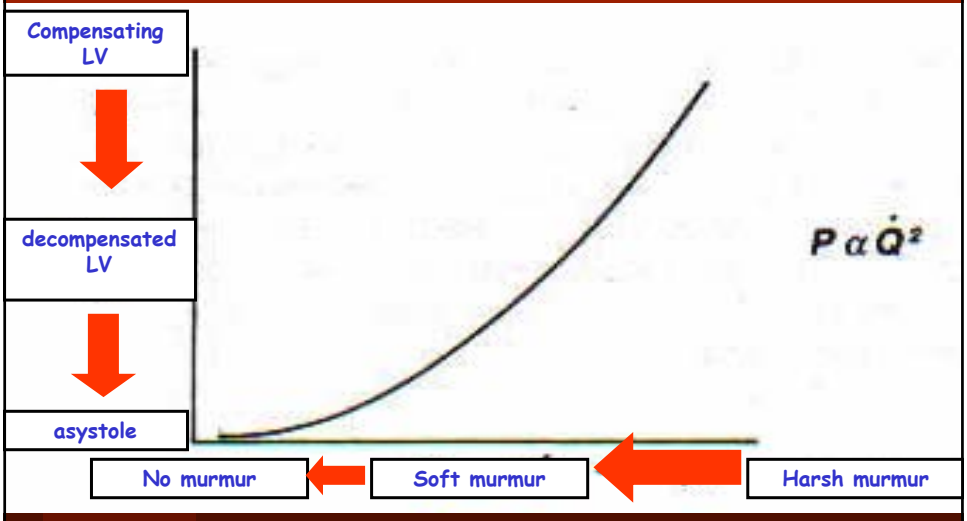
## Flow-dependent






## Onset of murmur

Flow/Pressure

Diameter of the vessle/valve

$$\frac{\upsilon \rho d}{\eta} > 2000$$

Blood viscosity

Hb

*You see only what you look for*

*You recognize only what you know*

*You remember only what you understand*



## Valvular heart disease

## 3 kinds of murmur

- When there is no surgical scar
- When there is a surgical scar (slide 85)
- When there are surgical scars (slide 103)

- Murmur when ‘there is no murmur!!!’



## 1 valve murmur: which is dominant?

| | Stenosis | Regurgitantion | Both |
|---|---|---|---|
| **Mitral** | MS | MR | MS + MR |
| **Aortic** | AS | AR | AS + AR |

| | AR | AS |
|---|---|---|
| Pulse | Mainly **collapsing** | Mainly **slow rising** |
| Apex | Thrusting, displaced | Heaving, not displaced much |
| Systolic thrill | Absent | **Present** |
| Systolic murmur | Not loud, not harsh | Loud, harsh |
| BP | | |
| Systolic | High | Low |
| Pulse pressure | Wide | Narrow |

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| | MS | MR |
|---|---|---|
| Pulse | **Small volume** | Sharp and abbreviated |
| Apex | **Tapping** | Displaced, thrusting |
| HS 1 | Loud | Soft |
| 3rd HS | Absent | Present |

An Aid to MRCP short cases; Ryder

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## 2 valve murmur: one disease or two disease

| | AS | AR | One disease |
|---|---|---|---|
| **MS** | MS + AS | MS + AR | Austin Flint |
| **MR** | MR + AS | MR + AR | - |



## Bed side Maneuvers

# How do you know he is the boss/one of the bosses?


- Age/Timing
- Attire
- Where he sit
- Where he goes
- What he said

- CMS login ID

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# How can you tell the difference?

Same age
Same attire


Sit near
Talk similar

·Give them a question
·Look for circumstantial evidence
·Imaging/cath

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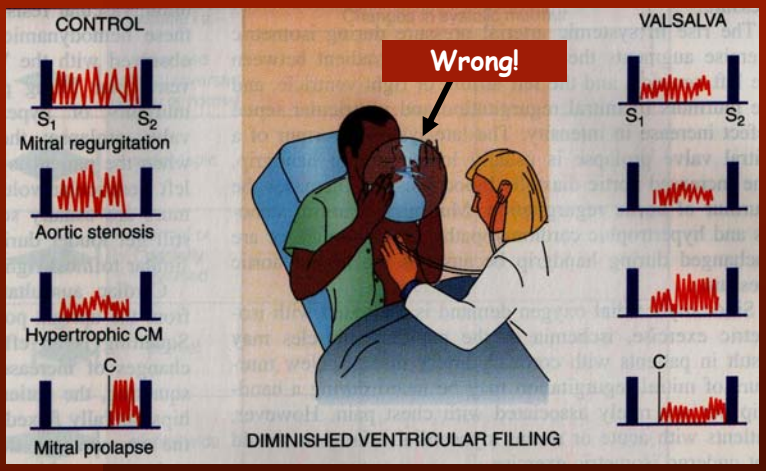
| AS | MR |
|---|---|
| When S2 absent, appear holosystolic | Acute MR - early systolic<br>PM dysfx – midsystolic<br>MVP – late systolic |
| Calcific aortic stenosis best heard at the apex | Posterior leaflet MR – best heard at right base |



# What kind of questions?

| Why | How | When to listen |
|---|---|---|
| Respiration | See | simulatneously |
| ↑↓ venous return | Valsalva<br>Squat –Stand<br>Leg elevation | End of Valsalva<br>Immediate after S-S<br>20s after elevation |
| ↑↓ vascular resistance | Handgrip<br>Cuff occlusion<br>Amyl nitrite | 1min after max grip<br>20s after cuff inflation<br>30s after nitrite |

# Valsalva (1704) = forced expiration against a closed glottis after a full inspiration




Mayo Clin Proc 61:211-217, 1986

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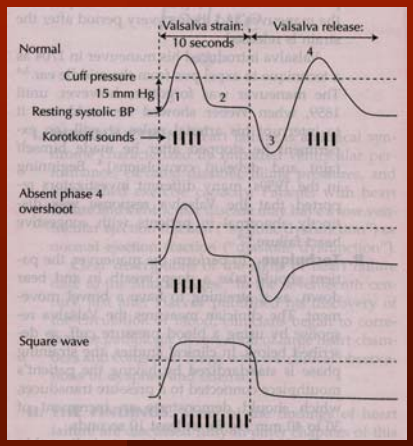
# Contraindication to Valsalva




- Recent eye or neurosurgery or haemorrhoage
- ACS : may induce arrhythmia although it relieves ischaemia

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## What kind of circumferential evidence (A)?

Pulse

Pulse pressure

Heart sound



## Pulse/PP - Provided that LV not yet decompensate

| Stenosis | Regurgitation |
|---|---|
| Pressure overload | Volume overload |
| Small volume | Large volume |
| Slow rising | Fast falling |

Valve → Heart sound & added sound

Chamber → Added sound

RBC → Murmur

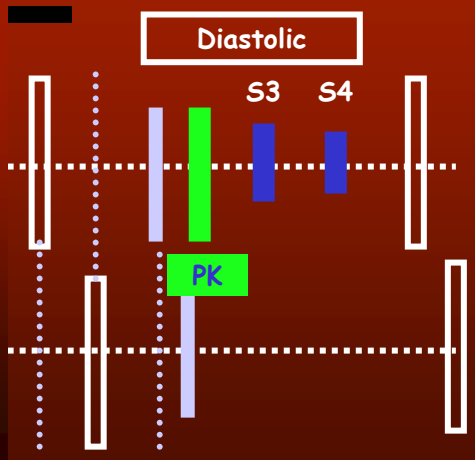


All that glitters is not gold: added sound

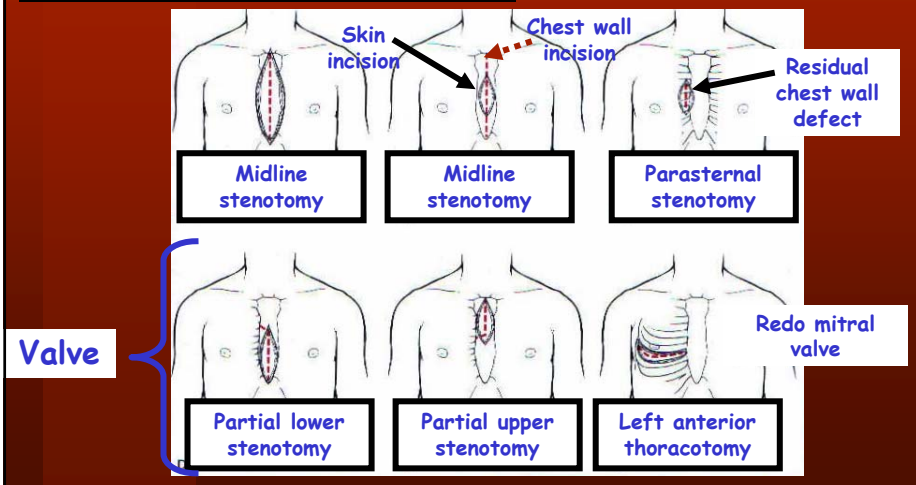
S4: atrial kicking the LV

S3:LV knocked down along the long axis

PK: earlier and pathological S3



# Unlike Love, Scar is forever

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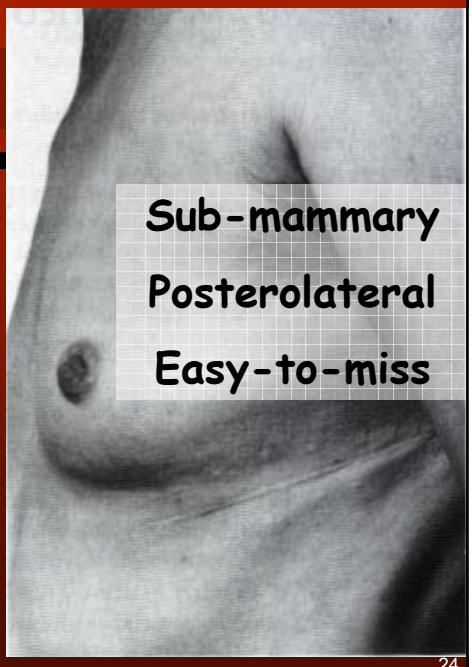
# Tell-tale valvotomy scar

| Closed | Open |
|---|---|
| GA, no CP bypass<br>Transventricular dilator | GA, CP bypass<br>+LAA amputation<br>+ DC version |
| Redo rate<br>1.3-2% per year[1] | Redo rate<br>0.7% per year[2] |
| 0.3% severe MR[3] | Moderate MR is corrected on table |

1.Otto: Valvular Heart disease. Philadelphia, WB Saunders, 1999, 468pp
2.Cohn LH, Allred EN, Cohn LA, et al: Long-term results of open mitral valve reconstruction for mitral stenosis. Am J Cardiol 55:731, 1985
3.English T: Closed mitral valvotomy.. In Wells FC, Shapiro LM (eds): Mitral Valve Disease. 2nd ed. London, Butterworths, 1985 pp139-152

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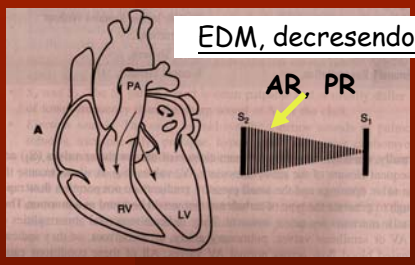
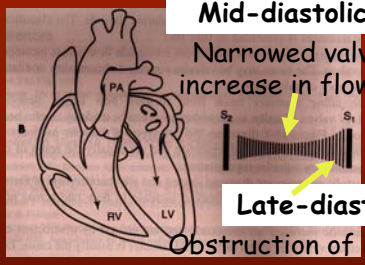
# Diastolic murmur – never innocent




Regurgitant murmur

Retrograde flow

Semilunar valve

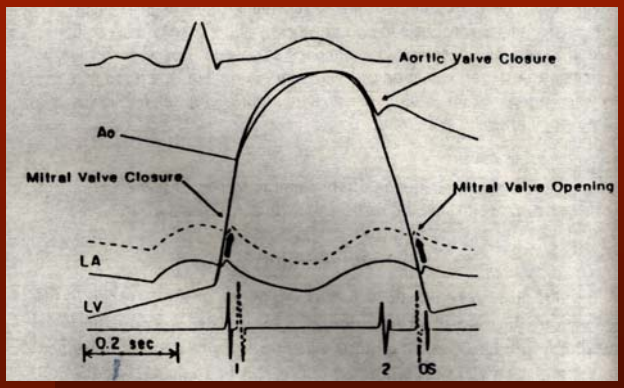
Filling murmur

forward flow

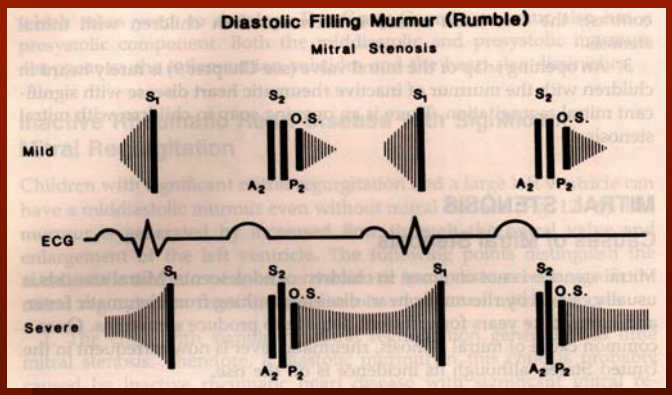
AV valve



# Severity



# Severity

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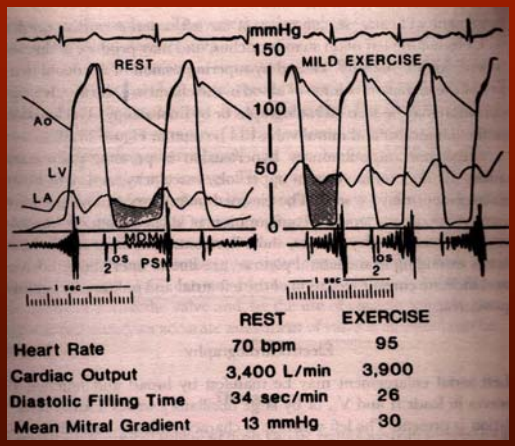
# MS in Ex

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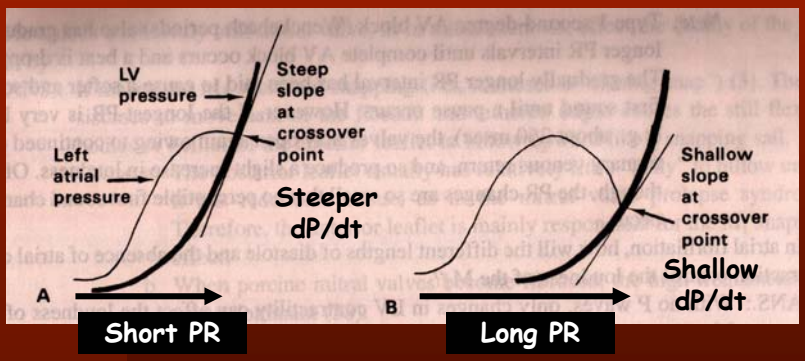
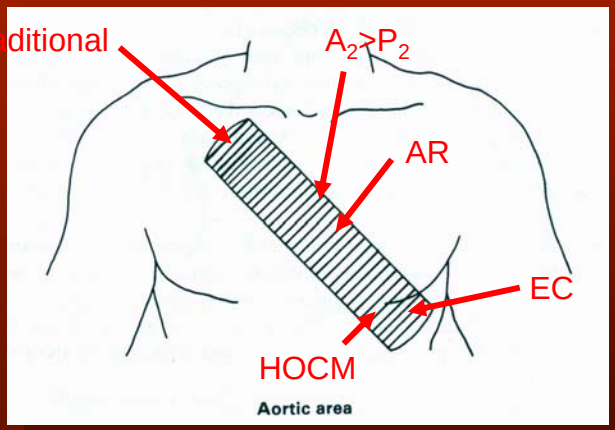
# Wide-open door make more noise?




……only if the door is made to accelerate as it closes



# Aortic area during examination




**Shoulder harness**

# Austin Flint
## American physician 1862

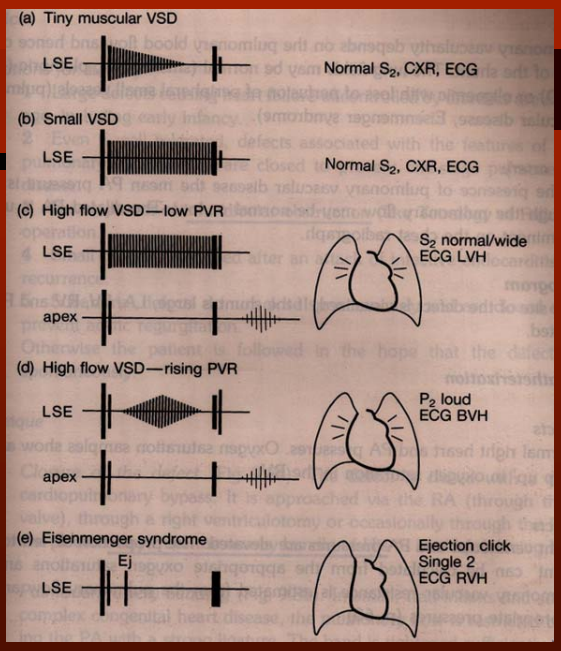
- Diastolic rumbling murmur at the apex in patients with severe AR, which resembles MS even though the MV is completely normal
- Mechanism (debatable)
  - The regurgitant jet cause
    - Fluttering of the AMVL
    - Premature closure of the MV from elevated LVEDP
    - collision with the AMVL
    - Ventricular vibration
    - Harmonic distortion



# Continuous murmur

1. PDA
2. Rupture of the sinus of valsalva
   → RA or RV
3. AV Fistula
   - coronary, pulmonary, systemic
4. Aortopulmonary connection (e.g. Blalock Shunt)
5. Mammary souffle
   - late pregnancy & post-partum
6. Venous hum
   - over the right supraclavicular fossa and abolished by ipsilateral compression of the IJV

# VSD

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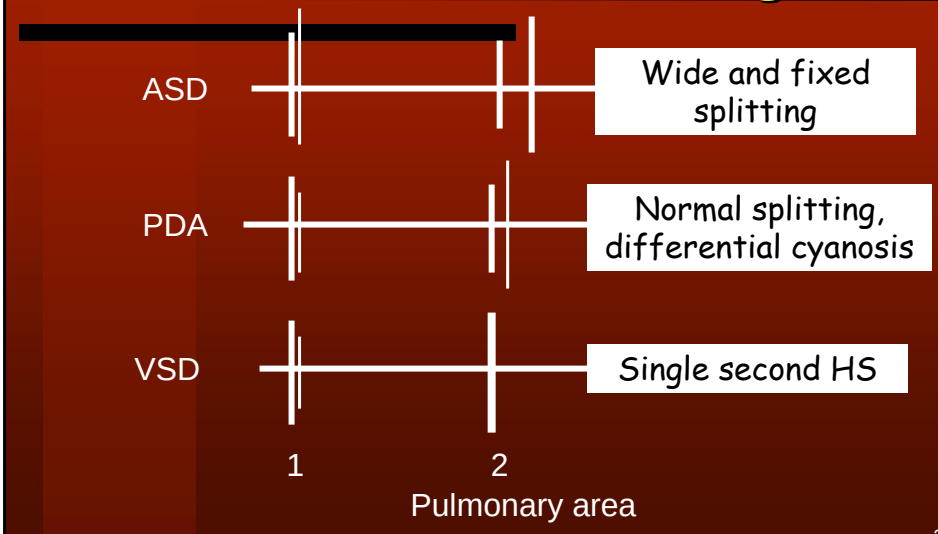
# DDx of VSD in Eisenmenger

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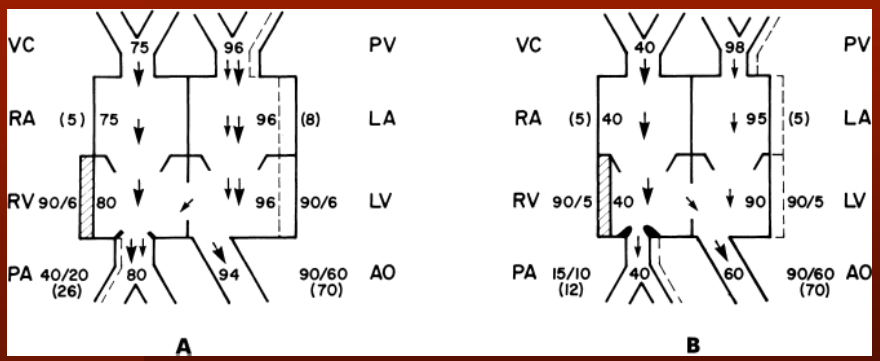
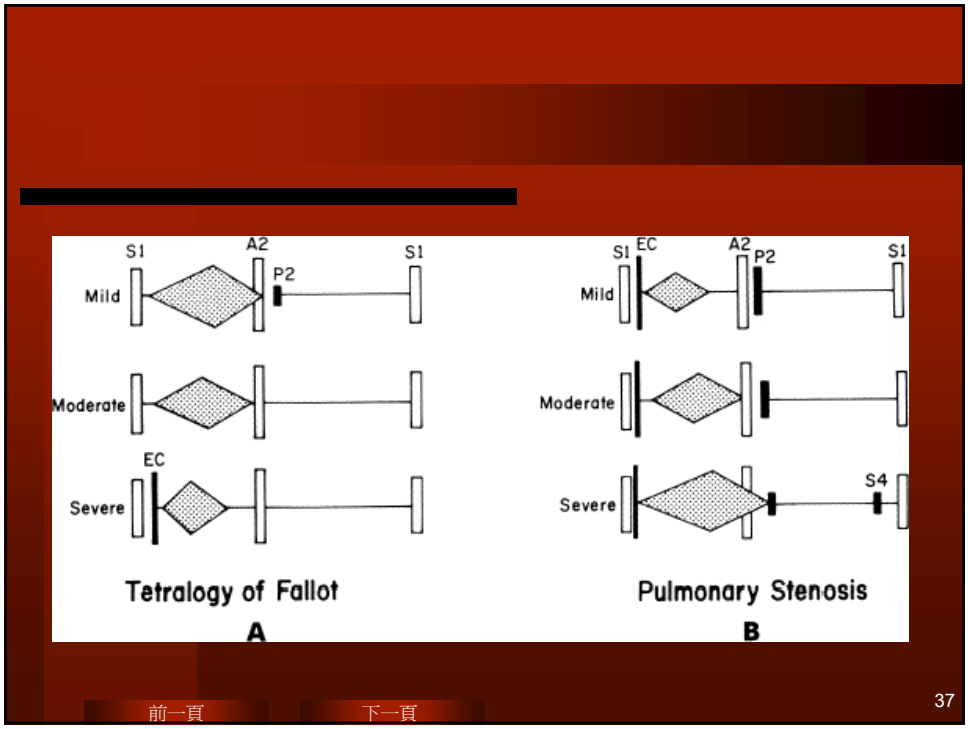
# Contribution a l'anatomie pathologique de la maladie bleu (cyanose cardiaque).

Fallot, E

Mars Med 1888; 25:418.






S1
A2
S1
P2
Mild
Moderate
EC
Severe
Tetralogy of Fallot
A
S1
EC
A2
P2
S1
Mild
Moderate
S4
Severe
Pulmonary Stenosis
B
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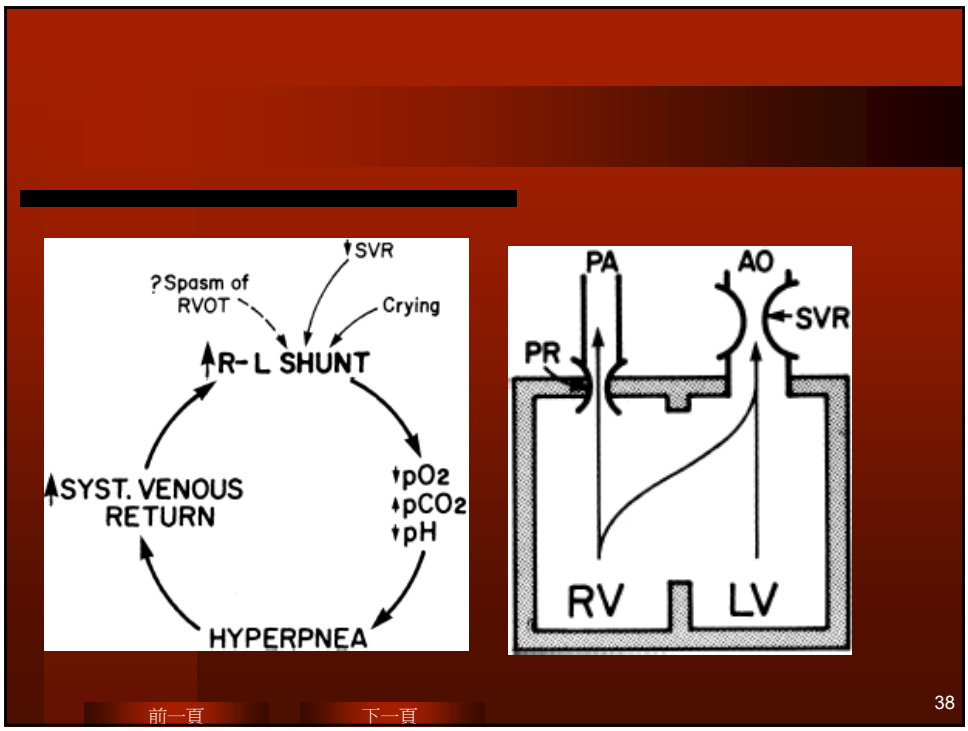
SVR
?Spasm of RVOT
Crying
R-L SHUNT
pO2
pCO2
pH
HYPERPNEA
SYST. VENOUS RETURN
PA
AO
SVR
PR
RV
LV
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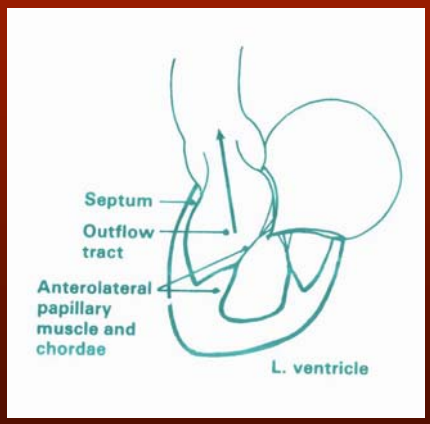
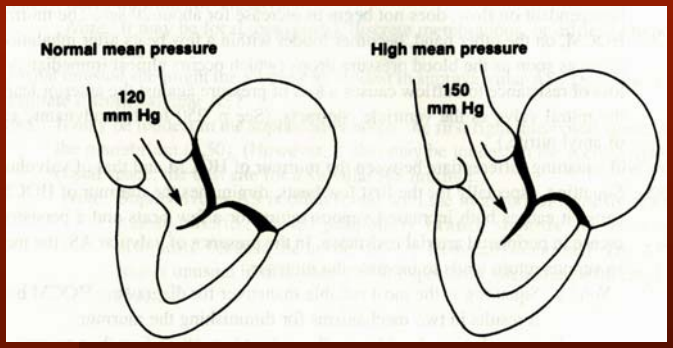
# Normal

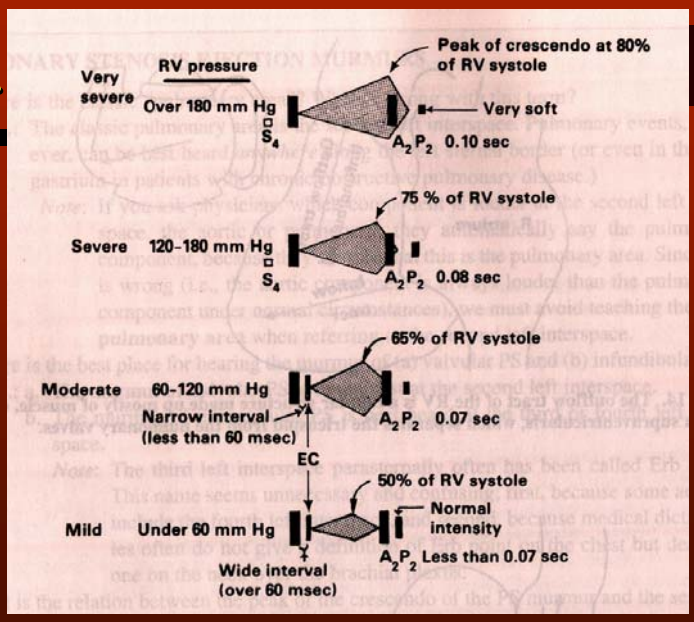

Septum
Outflow tract
Anterolateral papillary muscle and chordae
L. ventricle



# HOCM


Normal mean pressure
120 mm Hg
High mean pressure
150 mm Hg

# PS...






# Murmur when there is no murmur

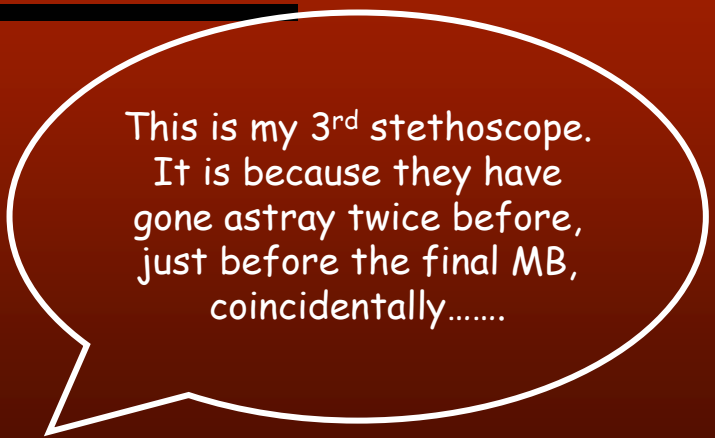
- MS – position and exercise
- ASD – Splitting
- Coarctation of aorta – RF delay
- MVP – Valsalva
- Constrictive pericarditis

## Constrictive Pericarditis

- Pulsus paradoxus
- Square root JVP, Kussmaul's sign
- Impalpable apex
- Faint and distant heart sound
- Early S3 and knock
- Hepatosplenomeagly, ascites and edema
- cachexia



## Singer, not the song




Chief complaint from the Chef: