Murmur

- Hearing the red herring

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1

Murmur has always be the fascinating ‘disease’ in the medical students’ mind, even though it is only a sign rather than a diagnosis.

Where do the murmur come from ?

Murmur = turbulence

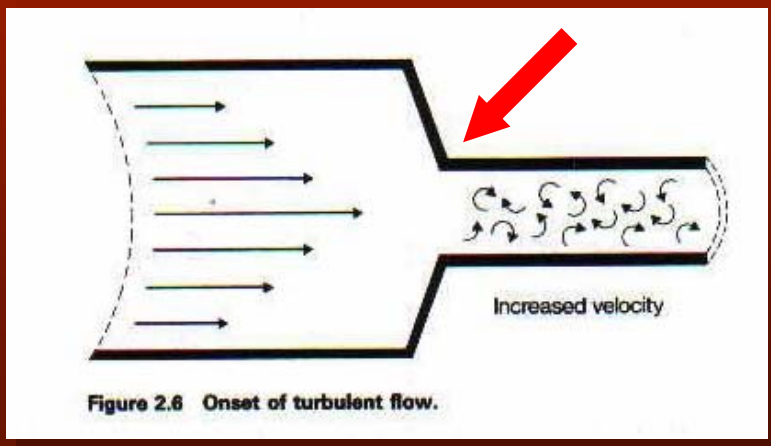
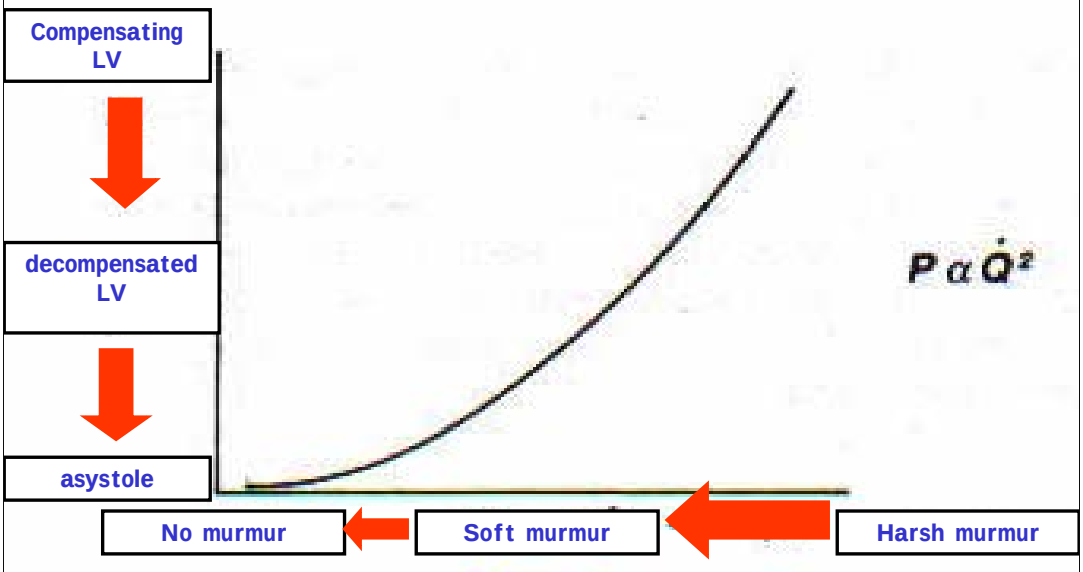
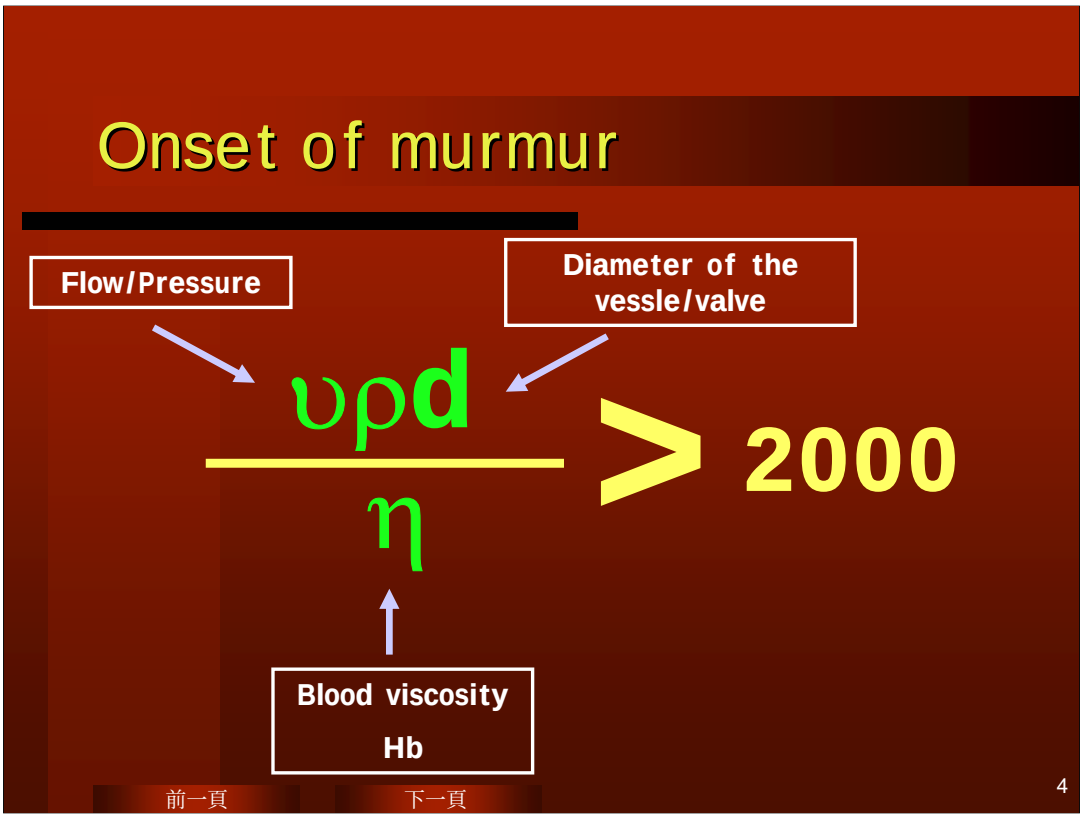


Figure 2.6 Onset of turbulent flow.

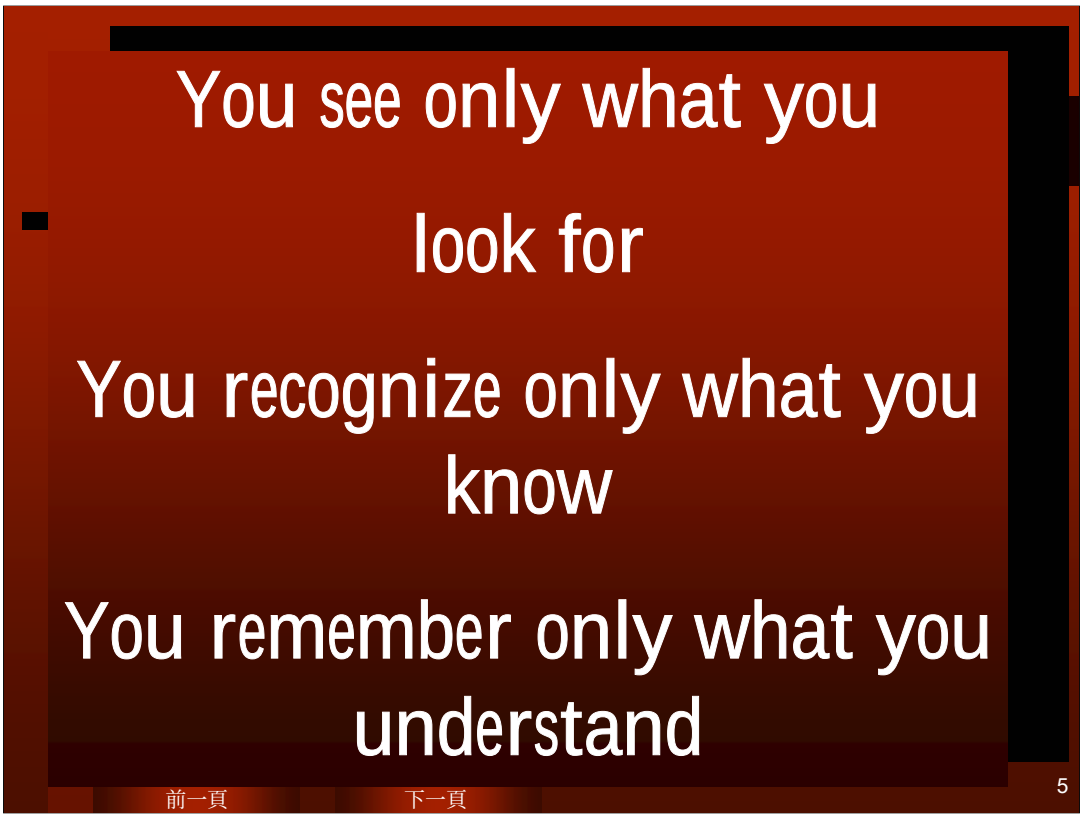
Flow-dependent





It is absolutely no use to remember this formula.

The formula just illustrate that apart from diameter of the valve, murmur also depend on the **FLOW** and blood viscosity. Therefore, murmur can occurs in normal vessel if the flow (or cardiac output) is high enough. Alternatively, murmur can disappear in low/no-flow state. E.g. in decompensated heart failure.



Again, again and again, you will see these three sentences throughout my presentations.

By the time you take out your stethoscope with no diagnosis in mind, will no murmur to look for, you have already failed.

On the other hand, if you do not know the disease in stages (early vs late) and states (compensated vs decompensated), you might not recognize he is he and she is she.

Lastly, you could not remember so many things in cardiology (not to mention medicine) if you do not understand it.

Therefore, the coming 100 slides try to help you to understand the pathophysiology of valvular heart diseases, so that you can remember it during examination. By knowing the disease in different stages and states, you recognize the different types of murmur pertaining to the same disease. You actively look for other important positive and negatives signs, make up your mind and get the diagnosis.

Your 戲肉

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!!!’

Which means:

1. Native valvular heart disease
2. Patients with prosthetic heart valve or hx of valvuloplasty
3. Patients with congenital heart diseases after multiple operations
4. Easy-to-miss diagnosis during examination

No-surgical-scar Murmur

Systolic	Diastolic	Continuous
Crescendo	Decrescendo	Pan-
1-2	3-4	5-6
Apex	LLSB	Radiate
Lean forward	Left decubitus	Breath hold

Mix and Match

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

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

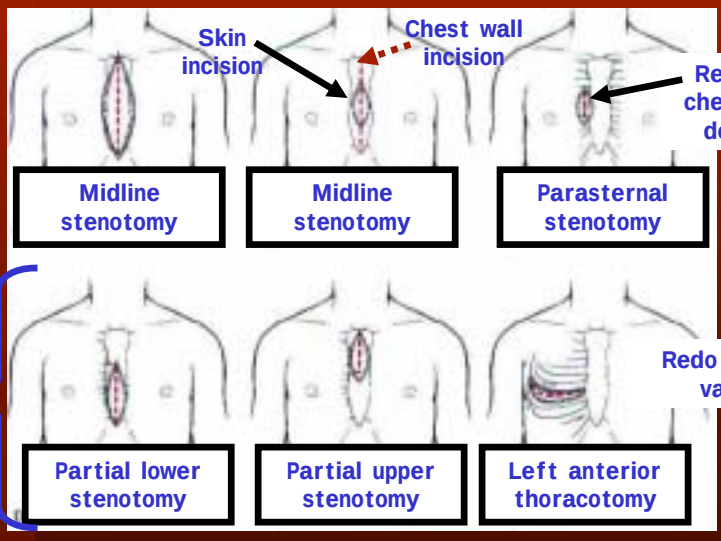
An Aid to MRCP short cases; Ryder

2 valve murmur: one disease or two disease

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

Unlike Love,

Scar is forever



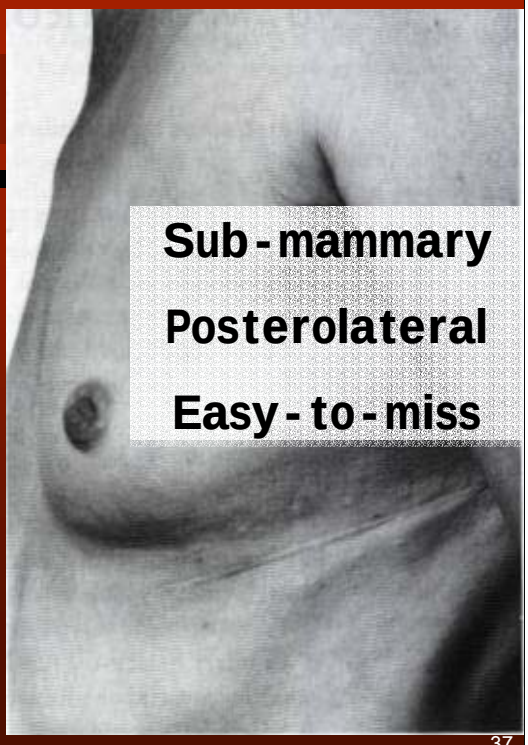
Tell-tale valvotomy scar

Closed	Open
GA, no CP bypass Transventricular dilator	GA, CP bypass +LAA amputation + DC version
Redo rate 1.3-2% per year[1]	Redo rate 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



Prosthetic Heart valve

- What is normal for the abnormal
- What is abnormal for the abnormal

Metallic heart sound

N

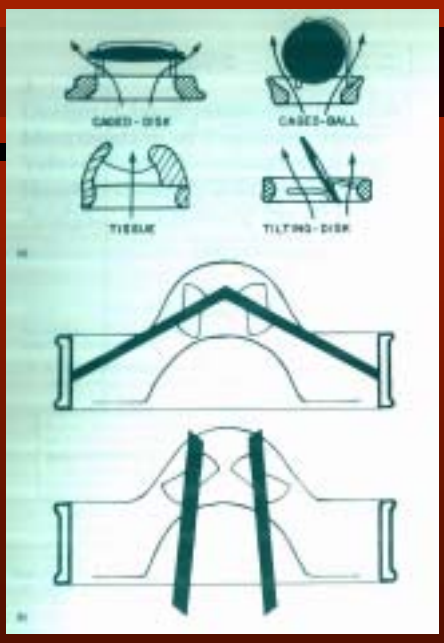
Y

Tissue

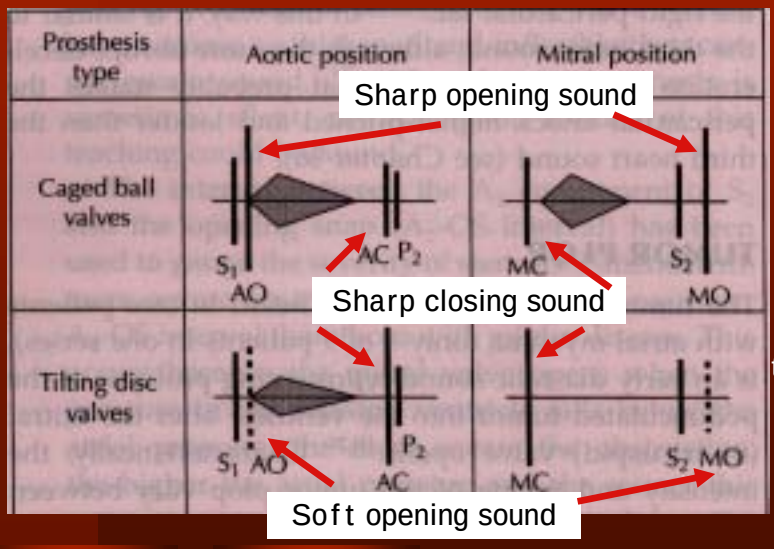
Mechanical

Ball

Disc



Murmur with a scar



More durable but more haemolysis

More thrombogenic

TABLE 2. CHARACTERISTICS OF VARIOUS PROSTHETIC VALVES.

VALVE TYPE	DURABILITY	EFFECTIVE ORIFICE AREA*		THROMBOGENICITY†
		AORTIC	MITRAL	
		cm²		
Caged-ball	Excellent	1.2–1.6	1.4–3.1	++++
Single-tilting-disk	Good to excellent	1.5–2.1	1.9–3.2	+++
Bileaflet-tilting-disk	Excellent	2.4–3.2	2.8–3.4	++
Heterograft bioprosthesis	Fair	1.0–1.7	1.3–2.7	+ to ++
Homograft bioprosthesis	Good	3.0–4.0	Not available	+

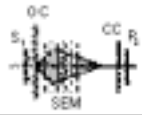
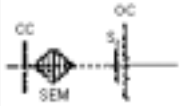
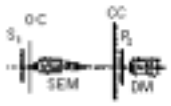
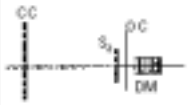
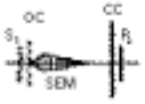
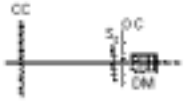
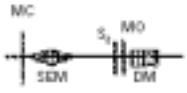
*The normal orifice area is 3.0 to 4.0 cm² for an aortic valve and 4.0 to 6.0 cm² for a mitral valve.

†A single plus sign denotes minimal thrombogenicity, and four plus signs maximal thrombogenicity.

High flow

Low flow

Aortic	Mitral
Yes	Yes
Yes	No
Yes	No
Yes	No

Type of Valve	Aortic Prosthesis		Mitral Prosthesis	
	Normal Findings	Abnormal Findings	Normal Findings	Abnormal Findings
Caged-Ball (Starr–Edwards)		Aortic diastolic murmur Decreased intensity of opening or closing click		Low-frequency apical diastolic murmur High-frequency holosystolic murmur
Single-Tilting-Disk (Bjork–Shiley or Medtronic–Hall)		Decreased intensity of closing click		High-frequency holosystolic murmur Decreased intensity of closing click
Bileaflet-Tilting-Disk (St. Jude Medical)		Aortic diastolic murmur Decreased intensity of closing click		High-frequency holosystolic murmur Decreased intensity of closing click
Heterograft Bioprosthesis (Hancock or Carpentier–Edwards)		Aortic diastolic murmur		High-frequency holosystolic murmur

What is abnormal in the abnormal?

- Loss of closing sound or opening sound
- Regurgitant murmur

- Life-threatening prosthetic valve dysfunction can occur ‘silently’

Murmur when there is no murmur

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

Singer, not the song

This is my 3rd stethoscope. It is because they have gone astray twice before, just before the final MB, coincidentally.....

Chief complaint from the Chef: