Physical Exam
Part II

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Physical Exam: Part II

• Heart Sounds
• Heart Murmurs
HEART SOUNDS

S1
• MITRAL + TRICUSPID CLOSURE (M1, T1)
• WIDE SPLITTING: RBBB, EBSTEIN’S

S2
• AORTIC + PULMONIC CLOSURE (A2, P2)
• WIDE, PHYSIOLOGIC SPLITTING: RBBB, MR
• REVERSED (PARADOXICAL) SPLITTING: LBBB, RV PACING, SEVERE AS, HOCM, ISCHEMIA
• FIXED SPLITTING: ASD
• PULMONARY HTN: LOUD, SINGLE S2
DIASTOLIC SOUNDS

- S3 (“proto-diastolic”) is a reliable indicator of LV systolic dysfunction with prognostic relevance.

- S4 (“pre-systolic”) is associated with ↑ LVEDP.

HEART SOUNDS

Systolic Clicks

• **Ejection**: Timing is co-incident with carotid upstroke
  
  *Examples*: Ao/Pulm click (ES)

• **Non-ejection**: Occurs after carotid upstroke
  
  *Example*: MVP
Adventitious Diastolic Sounds

- Opening snap of mitral stenosis
  P2-OS interval inversely related to LA-LV pressure gradient
- Pericardial knock
- Tumor plop (myxoma)
HEART MURMURS

Systolic Heart Murmurs

**Early**: Acute MR, TR with normal PA pressures

*Settings*: Acute MI (Inf/Post > Ant)

Endocarditis

Ruptured chordae
Acute vs. Chronic MR
Systolic Heart Murmurs

Mid-systolic/Ejection:
- Benign
- Left-sided: AS, HOCM, other
- Right-sided: PS
# LVOT OBSTRUCTION

<table>
<thead>
<tr>
<th>FINDING</th>
<th>AS</th>
<th>SAS</th>
<th>DMS</th>
<th>HOCM</th>
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<tbody>
<tr>
<td>Post-VPB PP</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>AR</td>
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<tr>
<td>S4</td>
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<tr>
<td>Paradox S2</td>
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<tr>
<td>EC</td>
<td>+</td>
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<td>1RIS</td>
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<tr>
<td>Carotid</td>
<td>↓</td>
<td>R&gt;L</td>
<td>+</td>
<td>↑</td>
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</tbody>
</table>

AS= aortic stenosis  
SAS= supra-valvular AS  
PP= pulse pressure  
EC= ejection click  
DMS= discrete, membranous AS  
HOCM= hypertrophic obstructive cardiomyopathy  
VPB= ventricular premature beat  
IS= interspace
HEART MURMURS

Caveats with Aortic Stenosis

• Elderly: preserved carotids
• Low output: ↓ intensity
• Confusion with MR:
  Gallarvardin effect
  ↑ Intensity post-VPB
HEART MURMURS

Systolic Heart Murmurs

- Mid-late:
  MVP (+/- click)
- Differential radiation with leaflet prolapse or flail:
  posterior leaflet → ante. radiation
  anterior leaflet → post. radiation
HEART MURMURS

Systolic Heart Murmurs

Holosystolic/Plateau:
- Chronic MR
- Chronic TR
- VSD
HEART MURMURS

DIASTOLIC MURMURS

EARLY

• AR
• PR (GRAHAM STEELL)

MID

• MS (ASSOCIATED FINDINGS)
• TS
• FILLING COMPLEX (R or L) WITH LARGE VOLUME LOAD DUE TO MR, TR, or ASD
• MYXOMA
HEART MURMURS

**DIASTOLIC MURMURS**

Aortic Regurgitation (AR)
- L > R sternal radiation with valve vs. root dis.
- Acute AR: soft, early diastolic murmur
- Chronic AR: classic high pitched, decrescendo

Pulmonic Regurgitation (PR)
- With severe PA HTN (loud P2, Graham Steell)
- After repair of TOF: low pitched, soft
HEART MURMURS

CONTINUOUS MURMURS

- PDA
- Ruptured Sinus of Valsalva aneurysm
- AV fistula (Coronary, other)
- Cervical venous hum, mammary souffle
QUESTION

For which of the following combination of findings would CT assessment of the ascending aorta be indicated?

A. Mid-systolic click at the apex with a mid-late grade 2 systolic murmur.
B. Late systolic click at the lower left sternal border
C. Early systolic click at the lower left sternal border with a grade 1 diastolic murmur along the left sternal border.
D. Early systolic click at the 2nd LICS with a grade 2 mid-systolic murmur. Click becomes softer on inspiration.
Dynamic Auscultation

Respiration

↑ R-sided murmurs
↓ L-sided murmurs

Example: TR (Carvalho’s sign)

Exception: pulmonic valve click
Dynamic Auscultation

Valsalva Manuever

↓ venous return, ↓ preload, ↑ afterload

Examples

HOCM: ↑ obstruction, ↑ murmur

AS: ↓ preload, ↓ murmur

MVP: ↓ preload, ↑ murmur
Dynamic Auscultation

Standing/Squatting

Standing: rapid ↓ preload/afterload
Squatting: rapid ↑ preload/afterload

Example

HOCM: stand: ↑ murmur
squat: ↓ murmur
Dynamic Auscultation

Standing/Squatting
Standing: rapid ↓ preload/afterload
Squatting: rapid ↑ preload/afterload

Example
MVP: stand: click/murmur closer
to S1, ↑ murmur
squat: click/murmur away
from S1, ↓ murmur
Dynamic Auscultation
MVP

Dynamic Auscultation

Hand Grip/4 Extremity BP Cuff
↑ afterload

Examples
MR: ↑ murmur
VSD: ↑ murmur
QUESTION

Which of the following murmurs decreases in intensity during the Valsalva maneuver?

A. Chronic mitral regurgitation
B. Aortic stenosis
C. HOCM
D. MVP