ADVANCED CARDIAC AUSCULTATION
(Putting it all together…)

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*Disclosure of relevant financial relationship in the past 12 months:
I have no financial relationships with commercial entities producing health care related products and/or services.

THE 5 FINGER APPROACH

- General Appearance
- Jugular Venous Pulse and Central Venous Pressure
- Arterial Pulse
- The Precordial Impulse
- Auscultation

GENERAL APPEARANCE

- Body Habitus
- Face
- Ears and Eyes
- Skin
- Extremities
- Thorax and abdomen

BEDSIDE CARDIAC DIAGNOSIS

- General Look
- Feeding Pipe
- Exit Pipe
- PMI
- Auscultation…

Differential Cyanosis and Clubbing
CASE 1

A 44-year body-builder of Austrian descent, later recycled as a semi successful action hero, presents to your office complaining of a throbbing headache. He blames it on his obsession to become one day governor of a large American state.

- His blood pressure is 160/50 mmHg
- Examination of the central arterial pulse reveals the following:

Sir Dominic John Corrigan (1802-1880)
CASE 1 (cont)

Auscultation at the precordium reveals the following:

- Patent Ductus Arteriosus
- 3-Component Pericardial friction Rub
- Diastolic Murmur of AR with Systolic Companion
- Systolic Murmur of MR with Diastolic Rumble

Systolic Murmur Touches S2 (regurgitant)

Work-up.

Most likely A-V Regurgitation

Spares S2 (ejection)

"Bad Company"

Late Peak

Soft S2

Work-up

Probably Benign

*There are no known diastolic murmurs.

Alexander Gardner (Nov 8, 1863)
A 32-year old lawyer presents to you complaining of increasing shortness of breath over the past six months. Although she exercises regularly, she has now become limited to only a few minutes of gym, because of dyspnea, lightheadedness and chest discomfort. She was told by her physician that it’s all due to “nerves”.

Auscultation reveals the following:
A 24-year old medical student presents to you complaining of sharp and excruciating chest pain, worsened by swallowing and exhalation, and gradually developing after an upper respiratory tract infection.

Auscultation at the precordium reveals the following:
A 24-year old medical student presents to you complaining of sharp and excruciating chest pain, worsened by swallowing and exhalation, and gradually developing after an upper respiratory tract infection.

Auscultation at the precordium reveals the following:

- **Patent Ductus Arteriosus**
- **3-Component Pericardial friction Rub**
- **Diastolic Murmur of AR with Systolic Companion**
- **Systolic Murmur of MR with Diastolic Rumble**
  
  **Systolic Murmur**
  
  **Diastolic Murmur**
  
  **Touches S2**  
  
  **Spares S2**  
  
  **ejection**
  
  **Regurgitant**

**Work-up.**

Most likely **A-V Regurgitation**

**Adolph Kussmaul (1822-1902)**

**Very Important Case**

- It is April 7, 30 AD
- You are outside Damascus Gate in Jerusalem, watching three men being executed by an occupying imperial power.
- The execution has started at 9AM, and has now been going on for close to 6 hours
- One man suddenly cries a loud shout, and then expires.
- Two hours later one of the soldiers spears him on the side, and blood and water spring out.
THE DNA OF GOD

• The bloodstains on the cloth are not artist's pigment but real blood.
• The densest stain is on the right side of the frontal chest, often referred to as the "side" or "spear" wound.
• Working independently, two different groups have identified the blood as AB, rare in Europe but common in the Middle-East. DNA testing has revealed a human male pattern (there were small amounts of female contamination from restoration work).
• Further analysis demonstrated high levels of bilirubin, consistent with hemolysis from severe concussive beating (bright color).
• Albumin is present in the serum halo.

"...So the soldiers came and broke the legs of the first and of the other who had been crucified with Him, but when they came to Jesus and saw that He was already dead, they did not break His legs, but one of the soldiers pierced His side with a spear and at once there came out blood and water."

(John 19:32-34)

PERICARDIAL TAMponade

• General Look
  • Tachycardic and tachypneic
  • Sitting up, leaning forward
• Neck veins
  • Elevated mean pressure; no "Kussmaul’s"
  • Prominent ‘X’ descent but no ‘Y’ descent
• Arterial Pulse
  • May be Small
  • Narrow Pulse Pressure
  • Pulsus Paradoxus
• Precordial Exam
  • Quiet Heart
  • Clear Lungs
• Auscultation
  • Pericardial friction rub in 10% of cases (varies with respiration)

CASE 4

A 58-year old patient is admitted to your hospital because of progressive dyspnea and a "congested chest-x-ray". He is given a presumptive diagnosis of pneumonia and placed in isolation. The admitting resident thinks he heard a murmur of aortic regurgitation, and the following morning asks you to examine the patient.

Over the pulmonic area you hear the following:

"LOTS OF NOISE"

NO

YES

• Patent Ductus Arteriosus
• 3-Component Pericardial friction Rub
• Diastolic Murmur of AR with Systolic Companion
• Systolic Murmur of MR with Diastolic Rumble

Touches S2 (regurgitant)

Work-up.

Most likely A-V Regurgitation

Work-up*

Spares S2 (ejection)

"Bad Company"

Late Peak

Soft S2

Probably Benign

"Good Company"

Early Peak

Loud S2

*There are no benign diastolic murmurs.
CASE 4 (cont)

You turn the patient, so that you can listen to the interscapular area, and you notice a left shoulder scar. The patient says that it is the result of an old stab wound, but that the surgery must have been not too successful, since it resulted in progressive weakening of his left arm, which he now claims it is much cooler and wasted than the other.

He says that he went back to the hospital complaining about it, but they did a test over his heart with a microphone and a jelly, and told him that everything was fine.

CASE 4 (cont)

You turn the patient, so that you can listen to the interscapular area, and you notice a left shoulder scar. The patient says that it is the result of an old stab wound, but that the surgery must have been not too successful, since it resulted in progressive weakening of his left arm, which he now claims it is much cooler and wasted than the other.

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CASE 5

A 75-year-old award-winning actor presents to your office complaining of increasing and debilitating shortness of breath.

Examination at the apex reveals the following:

MITRAL REGURGITATION AND DIASTOLIC S3/RUMBLE

- 25-50% of patients with mitral regurgitation lack the murmur
- Presence of a murmur argues for moderate-to-severe MR
- Intensity of the murmur argues for severity, but only in rheumatic disease, not in ischemic or “functional” mitral regurgitation (i.e. due to dilatation of the valvular ring from cardiomyopathy)
- S3/early-diastolic rumble is present in 90% of cases with severe regurgitation

MITRAL REGURGITATION (MR)
A 24-year old medical student presents to your office complaining of atypical chest pain prior to an important exam. Pain is fleeting, sharp, non-radiating and associated with neither dyspnea nor diaphoresis. She has an entirely normal arterial, venous and precordial exam. Auscultation at the apex reveals the following:

**APICAL AREA**

**MITRAL VALVE PROLAPSE**

John Brereton Barlow (1924 - 2008)

**ATTENZIONE**

Le immagini che seguono potrebbero urtare la vostra sensibilità
CASE 7

A 62-year old villager is brought by basket to your clinic in the mountains of Nepal.

Thanks to a friendly translator you understand he has been having increasing and debilitating shortness of breath.

Examination at the apex reveals the following:

LOTS OF NOISE

NO

• Patent Ductus Arteriosus
• 3-Component Pericardial friction Rub
• Diastolic Murmur of AR with Systolic Companion
• Systolic Murmur of MR with Diastolic Rumble

Systolic Murmur
Diastolic Murmur
Touches S2 (regurgitant)

Work-up.

Most likely A-V Regurgitation

Work-up*

Spares S2 (ejection)

“Bad Company”

Late Peak
Soft S2
“Good Company”

Early Peak
Loud S2

Work-up

Probably Benign

There are no benign diastolic murmurs

MITRAL STENOSIS

Facies Mitralica
ACUTE MYOCARDIAL INFARCTION

- **General Look**
  - Mesomorphic, overweight, anxious, sweaty, balding, earlobe crease

- **Neck veins**
  - Increased CVP, but may be normal

- **Arterial Pulse**
  - Hypokinetic, thready, but may be nl
  - Decreased BP, but may be normal

- **Precordial Exam**
  - Hypokinetic PMI with palpable S4
  - Diskinetic ectopic area (aneurysm)

- **Auscultation**
  - Paradoxical split of S2, decreased S1
  - Mitral Regurgitation, often crescendo
  - S4 > S3

CONGESTIVE (DILATED) CARDIOMYOPATHY

- **General Look**
  - Anasarca

- **Neck veins**
  - Elevated mean pressure
  - Giant ‘A’ wave – Giant ‘V’ Wave

- **Arterial Pulse**
  - Small and Hypodynamic
  - Narrow Pulse Pressure

- **Precordial Exam**
  - Interlateral displacement of PMI, which is enlarged and sustained
  - Palpable S4, S3 and right-sided impulse

- **Auscultation**
  - Loud P2, possible PR
  - S3 and MR at the apex
  - Possible right-sided S4

CASE 8

A 72-year old College Professor presents to your office complaining of lightheadedness while playing golf, with occasional chest discomfort.

He also reports some shortness of breath which he attributes to age.

Auscultation over the left heart border reveals the following:

AORTIC STENOSIS

- **General Look**
  - Normal

- **Neck veins**
  - Normal mean pressure
  - Normal waveform

- **Arterial Pulse**
  - Pulsus parvus and tardus
  - Narrow Pulse Pressure

- **Precordial Exam**
  - Medially displaced, sustained and mildly enlarged PMI
  - Palpable S4

- **Auscultation**
  - SEM + ES over aortic area
  - S4 and ES at the apex
CASE 7 - THE INFAMOUS 3/6 SEM OVER THE LSB

Ranking of Auscultatory Findings by Program Directors
The Stethoscope

... Over young woman abdomen tense
I have heard the sound of creation
And over a dead man's chest
The silence before creation began

Danny Abse, MD