GET IN TOUCH AND IN TUNE WITH

CARDIAC ASSESSMENT

Part 2

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Last month’s photo guide focused on normal heart sounds. This month, we’ll show you how to detect murmurs, clicks, and rubs.
THREE CAUSES OF MURMURS

A murmur may develop at any of the four heart valves.

Three causes of murmurs

To understand murmurs, recall how the heart's valves work. Normally, they open to let blood through, then close to prevent a backflow. The turbulence of abnormal blood flow through a valve produces the sound called a murmur. The three main causes of murmurs are:

A. high blood flow through a normal valve, which may occur with fever, hyperthyroidism, or pregnancy
B. blood flow through a stenotic (or constricted) valve
C. backflow of blood through a regurgitant (or insufficient) valve.

Palpating valve areas

Before you can auscultate for murmurs, you must perform the basic cardiac assessment described in last month's Assessment Photo Guide. This means inspecting and palpating the four valve areas and identifying the normal heart sounds, S₁ and S₂ (see Photograph 2).

The nurse assessing Mr. Wilson would begin by making sure he's lying on his back, with the head of the bed raised 30 to 45 degrees. This is a good position for an MI patient because it eases the work load on his heart.

When palpating the four valve areas, you can follow any sequence you like. But to ensure consistency, use the same sequence for palpation and auscultation. We'll use a common sequence, starting at the mitral valve area and moving on to the tricuspid, the aortic, and then the pulmonic valve areas.

The mitral valve area, you'll remember, is also the point of maximal impulse (PMI). It should be 1 to 2 cm in
Auscultating murmurs

After palpation comes auscultation. First, listen at each of the four valve areas for the normal heart sounds, S1 and S2. Then go back to the mitral valve area and auscultate for a murmur (see Photograph 3). Use both the diaphragm and the bell of your stethoscope for at least 30 seconds each, listening carefully between S1 and S2 and between S2 and S1.

If your patient has a murmur, you’ll hear a distinctive rumbling sound during these normally quiet periods. Detecting murmurs isn’t difficult. They have a unique sound; once you hear one, you’ll remember it.

Keep this auscultation tip in mind: Place the diaphragm firmly against the skin; place the bell lightly against the skin so it doesn’t act as another diaphragm.

When you’re done listening for murmurs at the mitral valve area, go to the tricuspid, aortic, and pulmonic valve areas. If you do detect a murmur, you’ll have to assess it for eight specific characteristics. Learning to perform this sophisticated assessment won’t happen overnight. It’ll take good teachers and lots of practice.

Let’s take a look at each of these eight characteristics of a murmur.

1. Location
The location of a murmur refers to the valve area where it’s best heard. Certain murmurs are best heard in one of the four valve areas. The murmur of aortic stenosis, for example, will be loudest at the aortic valve area.

2. Pitch
A murmur may be low, medium, or high pitched, depending on the velocity of blood flow. To evaluate a murmur’s pitch, listen with both the bell and the diaphragm. If you hear the murmur best with the bell, it’s low pitched. If you hear it best when using the diaphragm, the murmur is high pitched. And if you can hear the murmur just as well with the bell or the diaphragm, it’s medium pitched.

3. Timing
Timing refers to whether the murmur occurs during systole or diastole. If you hear a murmur between S1 and S2, it’s systolic. If you hear one between S2 and S1, it’s diastolic. Systolic murmurs may be benign; diastolic murmurs never are.

4. Place and duration
Identifying exactly where during systole or diastole a murmur occurs (place) and how long it lasts (duration) can be difficult. But with experience, you’ll learn to describe these features.

Systolic murmurs are classified as follows:
- A pansystolic or holosystolic murmur lasts for the entire systolic phase.
- An early systolic or ejection murmur starts right after S1 and ends at mid-systole.
- A middysytolic murmur starts after S1 and ends before S2.
- A late systolic murmur starts at mid-systole and ends at S2.

For diastolic murmurs, remember these classifications:
- An early diastolic murmur starts with S2 and ends at mid-diastole.
- A middiastolic murmur starts after S2 and ends before S1.
- A late diastolic or presystolic murmur starts at mid-diastole and ends at S1.

Murmurs that can be heard throughout systole and diastole are known as continuous murmurs.

5. Loudness or intensity
You’ll grade the loudness or intensity of the murmur on a six-point scale. The grades are written as a fraction using
AUSCULTATING FOR CHANGES IN A MURMUR

Murmurs may become louder or softer when the patient changes position. If you detect a murmur, have the patient sit up (Photograph 4) then lie on his left side (Photograph 5), so you can auscultate for any changes in the murmur.

Photograph 4

Murmurs may become louder or softer when the patient changes position. If you detect a murmur, have the patient sit up (Photograph 4) then lie on his left side (Photograph 5), so you can auscultate for any changes in the murmur.

Photograph 5

Roman numerals. The numerator indicates the loudness of the murmur; the denominator is always VI. Here’s the scale:
- I/VI: very faint, easily missed
- II/VI: barely audible
- III/VI: easily heard
- IV/VI: easily heard; may be accompanied by a thrill
- V/VI: louder with a thrill
- VI/VI: very loud with a thrill; can be heard with stethoscope 1 inch above chest wall.

If you’re just learning to listen to murmurs, grading the intensity can be especially challenging. But don’t worry. This is an advanced skill that you’ll develop with proper instruction and practice.

6. Quality
The quality of a murmur consists of its characteristic pattern and sound. When determining the quality, keep these four patterns in mind:
- A crescendo murmur starts softly and builds in intensity. Its sound may be described as coarse, rumbling, or whooping.
- A decrescendo murmur starts loudly, then becomes less intense. It may resemble a blowing or whistling sound.
- A crescendo-decrescendo murmur starts softly, becomes louder, then softens again. The sound may be described as harsh, grating, or coarse.
- A plateau murmur sounds the same throughout its duration.

7. Radiation
Determine if the murmur radiates to other parts of the precordium or to the neck, back, shoulders, or left axilla. Usually, the higher the pitch and the greater the intensity, the more likely a murmur will radiate. Knowing where it radiates helps you identify the murmur. For instance, the murmur caused by mitral insufficiency frequently radiates from the mitral valve area to the left axilla.

8. Changes
Some murmurs will be affected by changes in respiration or position. Ask your patient to hold his breath, then auscultate to see if the murmur gets louder or softer. You may also ask him to change position—perhaps to sit up or lie on his left side—so you can listen for any changes in the murmur (see Photographs 4 and 5).
A GUIDE TO CONDITIONS THAT COMMONLY PRODUCE HEART MURMURS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Location</th>
<th>Pitch</th>
<th>Timing</th>
<th>Place and duration</th>
<th>Intensity</th>
<th>Quality</th>
<th>Radiation</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>mitral insufficiency</td>
<td>mitral area</td>
<td>high</td>
<td>systolic</td>
<td>pansystolic</td>
<td>I-IV/V</td>
<td>plateau</td>
<td>to left axilla</td>
<td>↑ with squatting</td>
</tr>
<tr>
<td>tricuspid insufficiency</td>
<td>tricuspid area</td>
<td>medium</td>
<td>systolic</td>
<td>pansystolic</td>
<td>I-IV/V</td>
<td>plateau</td>
<td>to right sternal border</td>
<td>↑ with respiration</td>
</tr>
<tr>
<td>aortic stenosis</td>
<td>aortic area</td>
<td>medium</td>
<td>systolic</td>
<td>midsystolic</td>
<td>varies</td>
<td>crescendo-decrescendo</td>
<td>to neck, upper back, right carotid, apex</td>
<td>↑ with inspiration, Valsalva maneuver</td>
</tr>
<tr>
<td>idiopathic hypertrophic</td>
<td>aortic area, 3 RICS, 4 RICS</td>
<td>high</td>
<td>systolic</td>
<td>ejection</td>
<td>varies</td>
<td>crescendo-decrescendo</td>
<td>to neck, upper back, apex</td>
<td>↑ with inspiration, Valsalva maneuver</td>
</tr>
<tr>
<td>subaortic stenosis</td>
<td></td>
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</tr>
<tr>
<td>pulmonic stenosis</td>
<td>pulmonic area</td>
<td>medium</td>
<td>systolic</td>
<td>midsystolic</td>
<td>III-IV/V</td>
<td>crescendo</td>
<td>to left side of neck</td>
<td>↑ with inspiration</td>
</tr>
<tr>
<td>mitral stenosis</td>
<td>mitral area</td>
<td>low</td>
<td>diastolic</td>
<td>middiastolic/presystolic</td>
<td>I-II/V</td>
<td>crescendo</td>
<td>none</td>
<td>↑ in left lateral position, with exercise</td>
</tr>
<tr>
<td>tricuspid stenosis</td>
<td>tricuspid area</td>
<td>high</td>
<td>diastolic</td>
<td>early diastolic</td>
<td>varies</td>
<td>decrescendo</td>
<td>to apex, xiphoid</td>
<td>↑ with inspiration</td>
</tr>
<tr>
<td>aortic insufficiency</td>
<td>aortic area, 3 LICS, 4 LICS</td>
<td>high</td>
<td>diastolic</td>
<td>early diastolic</td>
<td>I-VI/V</td>
<td>decrescendo</td>
<td>to apex, left sternal border</td>
<td>↑ with leaning forward, exhalation</td>
</tr>
<tr>
<td>pulmonic insufficiency</td>
<td>pulmonic area</td>
<td>high</td>
<td>diastolic</td>
<td>early diastolic</td>
<td>varies</td>
<td>decrescendo</td>
<td>to apex</td>
<td>↑ with inspiration</td>
</tr>
</tbody>
</table>

Depending on the patient's condition, some examiners will ask the patient to squat. But you wouldn't have a patient like Mr. Wilson squat because of his recent MI.

Interpreting your findings

After you've assessed these eight characteristics, you'll be able to identify the condition that's producing the murmur (see chart). Here are the two main categories of murmurs and some common causes of each:

- **benign**—Many murmurs are classified as benign, innocent, physiologic, or functional. These terms simply mean that the murmur isn't the result of any cardiovascular pathology. Frequently, benign murmurs will be heard in children, adults over 50, and pregnant women.

- **abnormal**—Some systolic murmurs and all diastolic murmurs are abnormal or pathologic. The more common abnormal systolic murmurs result from aortic and pulmonic stenosis. Diastolic murmurs are produced by mitral and tricuspid stenosis as well as by aortic and pulmonic insufficiency.

Analyzing Mr. Wilson's murmur

Let's get back to Mr. Wilson, who had that anterior MI several days ago. During her cardiac assessment, Mr. Wilson's nurse detects a murmur that's best heard at the mitral valve area (location). She describes the pitch as high because she hears the murmur best with the diaphragm. The timing is systolic, and after listening carefully, she determines that the murmur is pansystolic (place and duration).

Mr. Wilson's murmur is loud, and his nurse can palpate a thrill at the mitral valve area, so she grades the intensity as V/VI. The sound is consistent throughout systole, which means it's a plateau murmur (quality). The nurse also hears the murmur at Mr. Wilson's left axilla (radiation). Because of his condition, she doesn't have him squat. If she did, though, his murmur would become louder (changes).

These assessment findings suggest to the nurse that Mr. Wilson has mitral
CAUSE OF A CLICK

Closes and the aortic valve opens so blood can be pumped from the left ventricle into arterial circulation.

Prolapse, the mitral valve doesn’t close in systole because its posterior leaflet slips back into the left atrium. The result is a click, usually heard in midsystole.

Illustration 1

CAUSE OF A RUB

When the pericardial and visceral sacs are inflamed, they rub together, producing a pericardial friction rub.

When the parietal and visceral sacs are inflamed, they rub together, producing a pericardial friction rub.

Illustration 2

insufficiency. In a patient like Mr. Wilson, who has had an anterior MI, mitral regurgitation may indicate papillary muscle dysfunction. His nurse reports her findings and documents them as follows: High-pitched, plateau, V/VI, pansystolic murmur heard in mitral area. Sound radiates to left axilla.

Three types of clicks

Next, we’ll look at another patient, Pamela Wood, age 24. She’s been experiencing dyspnea on exertion and palpitations. A nurse is about to assess her cardiac status. But before we watch that assessment take place, we need to review how clicks differ from murmurs.

For one thing, murmurs are sustained. Clicks aren’t: They’re short, high-pitched sounds best heard with the diaphragm of your stethoscope. Clicks can occur during systole or diastole.

There are three types of clicks. One is simply called a click: it occurs during systole and is usually caused by mitral valve prolapse (MVP). In patients with MVP, the posterior leaflet of the mitral valve slips back into the left atrium in systole, causing mitral insufficiency (see Illustration 1). The click usually occurs in mid-systole, as the valve starts to snap back into the left atrium. To hear it, auscultate at the mitral valve area, using the diaphragm. You may also hear the click at the tricuspid valve area.

The second type of click is called an ejection sound. It’s caused by the ejection of blood from the right ventricle through a defective pulmonic valve or from the left ventricle through a defective aortic valve. Again, the sound is short and high pitched. Best heard with the diaphragm, an ejection sound occurs in early systole, just after S1.

Aortic ejection sounds are best heard at the mitral valve area and may radiate to the aortic valve area. Respirations
don't affect these sounds, which may result from aortic stenosis or aortic re- 
gurgitation.

You'll hear pulmonic ejection sounds best at the pulmonic valve area; they may radiate to the xiphoid process. The sounds will decrease with inspiration and increase with expiration. Possible causes include pulmonic stenosis, pulmonary hypertension, and pulmonary embolism.

The only diastolic click is called an opening snap, which results from aortic stenosis or aortic re-

opening snap, embolism. causes include pulmonic stenosis, pul-

monary hypertension, and pulmonary hypertension.

The difference is in the nature of the clicks, friction rubs are high pitched. You'll hear an opening snap during early diastole, right after S1. It's best heard when you place the dia-

phragm between the tricuspid valve area and the mitral valve area. The sound won't radiate and isn't affected by respirations.

Now, we're ready for the assessment of Ms. Wood, who is experiencing dys-
pnea on exertion and palpitations. Following inspection, palpation, and auscultation of S1 and S2, her nurse listens for abnormal sounds. While auscultating with the diaphragm at the mitral valve area, she hears a click. The sound is short and high pitched. Listening more closely, she notes that the click occurs at midsystole. Given Ms. Wood's symptoms and this finding, the nurse suspects that Ms. Wood has MVP. The nurse charts her findings as follows: A high-pitched click heard at midsystole at the mitral valve area.

Pericardial friction rubs

Finally, let's look in on Harry Bullock, age 68, who had an anterior MI a couple of days ago. He's receiving a li-
docaine (lignocaine) drip at 2 mg/ minute for occasional premature ven-

tricular contractions, but his condition has been stable since the MI. Mr. Bul-

lock complains of discomfort in the an-

terior left chest, which worsens when he breathes deeply. His nurse suspects pericarditis, so she'll auscultate for a pericardial friction rub.

Like murmurs, pericardial friction rubs are sustained sounds. And like clicks, friction rubs are high pitched. The difference is in the nature of the sound itself. Friction rubs are often de- 
scribed as coarse or scratchy. To get an idea of what they sound like, try this: Hold the diaphragm of your stetho-
scope against your left palm, then rub your right thumb over the first and sec-

ond knuckles of your left hand. The sound you'll hear is similar to a friction rub.

What causes friction rubs? Nor-

mally, the movement of the parietal and visceral sacs is smooth and silent. But conditions such as infection, uremia, or MI can cause pericarditis. This condition produces a scratchy sound as the parietal and visceral surfaces rub against each other (see Illustration 2). Typical signs and symptoms of peri-

carditis can include precordial chest discomfort, shortness of breath, fever, chills, and weakness.

Listen for a pericardial friction rub with the diaphragm of your stetho-
scope. You may hear the sound anywhere along the anterior left chest, but you'll probably hear it best at the tri-
cuspid valve area. It may help to have the patient lean forward and exhale forcefully. After he's exhaled, listen for the friction rub. That way, you can hear the rub without any interference from the sounds of expiration. You should be able to hear the sound during both systole and diastole. Keep in mind, though, that friction rubs can be in-

termittent.

Mr. Bullock's nurse asks him to lean forward. Then she auscultates at the tricuspid valve area. There, she hears a scratchy sound that gets louder after Mr. Bullock exhales forcefully. In her nurses' notes, she writes: Pericardial friction rub heard at tricuspid valve area.