HEART SOUNDS AND MURMURS

A Practical Guide

Barbara Erickson

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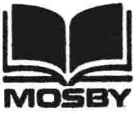

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Dedicated to
Leonard P. Caccamo, M.D., F.A.C.P., F.A.C.C.,
mentor, friend, and inspiration

PREFACE

This program is intended for the beginning auscultator who wishes to learn the basics of listening to and interpreting heart sounds. The more advanced auscultator may find this program helpful as a review of the basics.

The format used is one that has proven successful in teaching heart sounds over the past ten years. Basic information in the text is accompanied by an audio tape. By first reading the text and then listening to the tape, the learner should have the essential information necessary to understand and recognize the normal heart sounds and the most common abnormal heart sounds.

This book is intended to be an introduction and a guide to learning heart sounds. To become clinically proficient in heart-sound recognition, the learner must continually listen to as many hearts as possible. Although the reproduction of heart sounds on the tape may be very good, it cannot replace the experience of listening to actual heart sounds. Please remember that the sounds on the tape have been distinctly simulated to facilitate learning. Sounds from real hearts are similar but never as clear as those on the tape.

The tape was made with a heart sound simulator using studio recording equipment.

ACKNOWLEDGMENTS

I wish to thank Leonard W. Fagnano, audio visual supervisor at Youngstown State University, for the many hours of work he put into the production of the original master tapes.

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INSTRUCTIONS FOR USE

The learner is advised to

1. Read the basic information found in the text regarding the sound.
2. Listen to the sound on the accompanying audio tape. The tape should be listened to repeatedly until the learner is able to discern the sound being described. Before proceeding to the next section the learner must *understand* and *identify* each sound being described.
3. Listen to the tape with a stethoscope placed about 4 inches from the speaker. For best results, the tape should be played on a quality tape recorder. The better the sound transmission of the recorder, the better the learner will be able to hear subtle differences on the heart sound tape.
4. Listen to real hearts. Practice listening to heart sounds over and over in order to gain proficiency and expertise.
5. Test his or her own knowledge of the content of each chapter by
   a. Comparing behavioral objectives given at the beginning of each chapter with his or her own abilities after completing the chapter.
   b. Answering self-learning questions at the end of each chapter and checking answers against the answer key provided.
   c. Listening to the "unknowns" on the tape at the end of each chapter and checking answers against the answer key provided.

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CHAPTER 1
Introduction

LEARNING OBJECTIVES

After reading this chapter and answering the self-learning questions at the end of the chapter, the learner will be able to do the following:

1. Identify the requirements for adequate cardiac auscultation.
2. Differentiate between the use of the bell chest piece and diaphragm chest piece of a stethoscope.
3. Identify two basic mechanisms of cardiac sound production.
4. Identify the four basic characteristics of sounds.
5. Differentiate between sounds of high frequency and low frequency.
6. Identify three factors that enter into the transmission of sounds.
7. Choose the appropriate area on the chest for auscultation of a selected heart sound.
8. Differentiate between ventricular systole, ventricular diastole, and atrial systole.
9. Identify the relationship of cardiac sounds to the cardiac cycle.
10. Chart heart sounds using the one through six classification scale.

REQUIREMENTS FOR AUSCULTATION

Auscultation is one of the essential aspects of the cardiac examination. In order to perform adequate auscultation, one should do the following:

1. **Use a quiet, well-lit, warm room.**
   To facilitate hearing the heart sounds, ambient noise in the room should be eliminated as much as possible. This means that room doors should be closed, radios, TVs, etc., turned off, and conversations stopped. Unfortunately a quiet room may be one of the hardest elements to obtain. The room needs to be well-lit so that the inspection aspect of cardiac examination may be done. Many of the heart sounds can be seen and felt as well as heard. A warm room helps prevent the patient from shivering and causing extraneous sounds underneath the chest piece of the stethoscope.
2. **Have the patient properly disrobed.**
   The stethoscope should always be placed in direct contact with the chest wall. Most abnormal heart sounds cannot be heard through clothing because they are lower in frequency and softer than normal heart sounds. Also, listening through clothing will produce sound distortions caused by the stethoscope rubbing against the clothing.
3. **Examine the patient in three positions—supine, sitting, and left lateral recumbent** (see Fig. 1-1).
   Listening in various positions will bring out certain heart sounds, especially some abnormal ones. For instance, the third heart sound (S_3) may be brought out by having the patient turn to the left lateral recumbent position.
4. **Examine the patient from his or her right side.**
   Being on the patient's right side forces the examiner to reach across the chest to listen to the heart. This stretches out the tubing of the stethoscope and decreases the likelihood of extraneous sounds caused by the tubing hitting objects (chest wall, side rails, etc.).
5. **Use a stethoscope with a bell chest piece and diaphragm chest piece.**
   This is essential for complete cardiac auscultation.
   a. **Using the bell**
   When the bell is held *lightly* (leaving no after-imprint on the chest) it picks up *low-frequency* sounds.

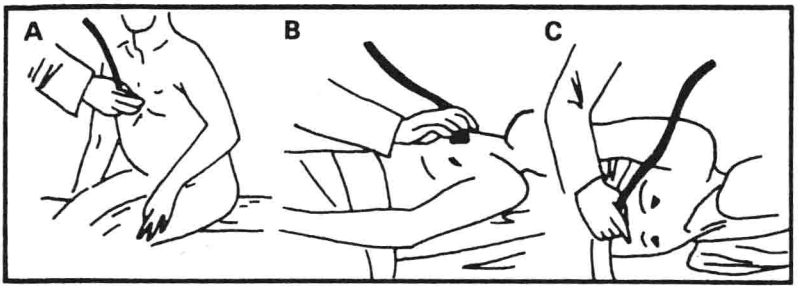

Fig. 1–1. Basic positions for cardiac auscultation. **A**, sitting; **B**, supine; **C**, left lateral recumbent. (Reproduced with permission from L. Caccamo and B. Erickson, *Cardiac Auscultation*, Youngstown, Ohio: St. Elizabeth Hospital Medical Center, 1975.)

Pressure on the bell causes the skin to be pulled tautly over the bottom of the bell and changes it to a diaphragm (see Fig. 1-2).

b. **Using the diaphragm**
When the diaphragm is applied *firmly* (leaving an after-imprint) it picks up *high-frequency* sounds.

c. **Differentiating frequencies**
The frequency of a sound is readily identified by noting with which chest piece of the stethoscope the sound is best heard. A sound best heard, or only heard, with the **bell held lightly is of low frequency.** A sound best heard with the **bell applied firmly, or with a diaphragm, is of high frequency.**

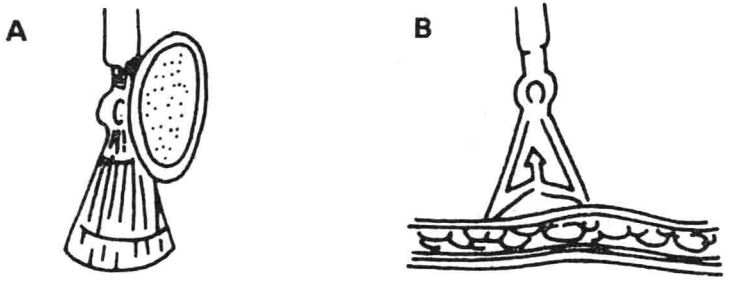

Fig. 1–2. **A**, *Lightly* applied to skin (no after-imprint is left) transmits *low*-frequency sounds. *B*, Firmly applied to skin (leaves an after-imprint) with skin pulled tautly over the bottom of the bell changes it into a diaphragm and transmits *high*-frequency sounds. (Modified with permission from L. Caccamo and B. Erickson, *Cardiac Auscultation*, Youngstown, Ohio: St. Elizabeth Hospital Medical Center, 1975.)

This simple maneuver of listening to a sound with the bell held lightly and then applied firmly permits you to determine the frequency of the sound to which you are listening. **This is an important point to remember.**

6. **Listen to each area of auscultation.**

Listen to each of the following areas using first the diaphragm and then the bell (see Fig. 1-3).

a. Left lateral sternal border: This is the fourth intercostal space (4 ICS) to the left of the sternum. Sounds from tricuspid valve and right heart heard best.
b. Apex: This is the fifth intercostal space (5 ICS) in midclavicular line. Sounds from mitral valve and left heart heard best.
c. Base right: This is the second intercostal space (2 ICS) to the right of the sternum. Sounds from aortic valve heard best.
d. Base left: This is the second intercostal space (2 ICS) to the left of the sternum. Sounds from pulmonic valve heard best.

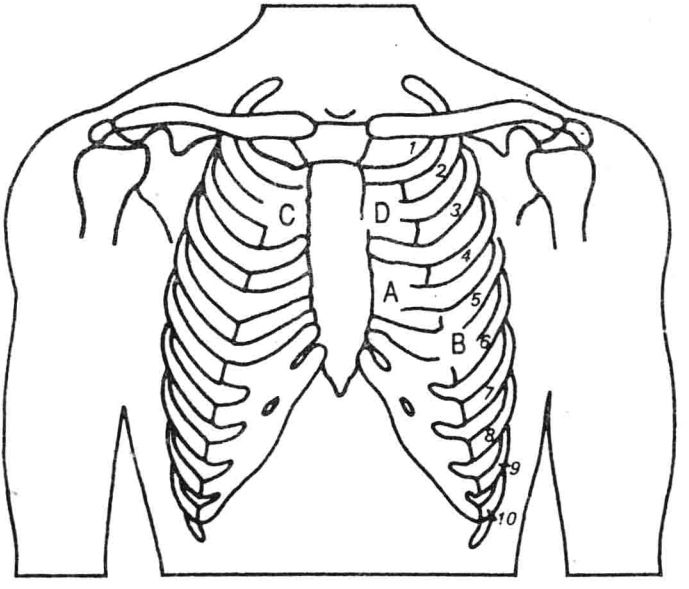

Fig. 1-3. Sites for auscultation: **A**, *left lateral* sternal border (sounds from tricuspid valve and right side of heart heard best); **B**, *apex* (sounds from mitral valve and left side of heart heard best); **C**, *base right* (sounds from aortic valve heard best); **D**, *base left* (sounds from pulmonic valve heard best).