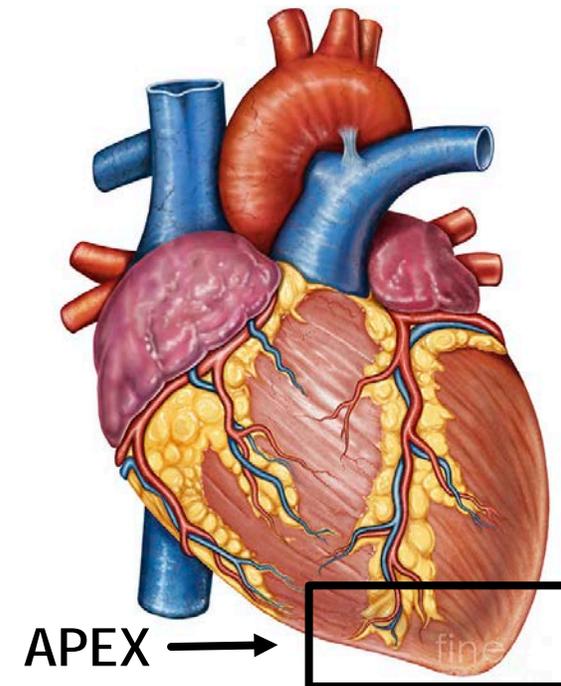
The background features abstract, overlapping geometric shapes in various shades of blue, ranging from light sky blue to deep navy blue. These shapes are primarily located on the left and right sides of the frame, creating a modern, dynamic feel. The central area is a clean white space where the text is placed.

An Introduction to Heart Tones

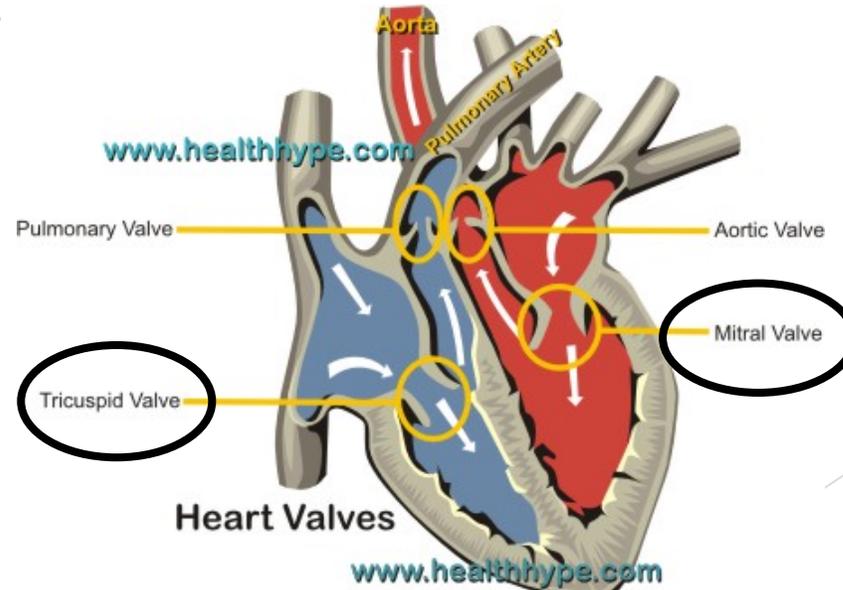
Identify the Apex

- ▶ Ideal position of the patient during auscultation is sitting up or semi-reclined (~45°)
- ▶ Normal position of the apex is at or near the 5th inter-costal space, in the mid-clavicular line
- ▶ If possible, palpate the apex
- ▶ Place the bell of the stethoscope over the apex
 - The bell of the stethoscope is helpful when auscultating low-frequency sounds, in this case, the first and second heart tones
 - The diaphragm of the stethoscope is more effective at detecting high-frequency sounds, but may also be used
- ▶ Take your time, and auscultate for several seconds



First Heart Sound: “Lub”

- ▶ The first heart sound is called S1 and is typically described as sounding like “lub”
- ▶ S1 occurs at the beginning of ventricular contraction (systole)
- ▶ S1 corresponds to the pulse felt at the carotid artery
- ▶ The sound is caused by the tricuspid (valve between the R atrium and R ventricle) and the mitral (valve between the L atrium and L ventricle) valves closing
- ▶ These two valves should close simultaneously, if they do not close simultaneously, two “lub” sounds will be present. This is referred to as a split S1 and is abnormal in most patients

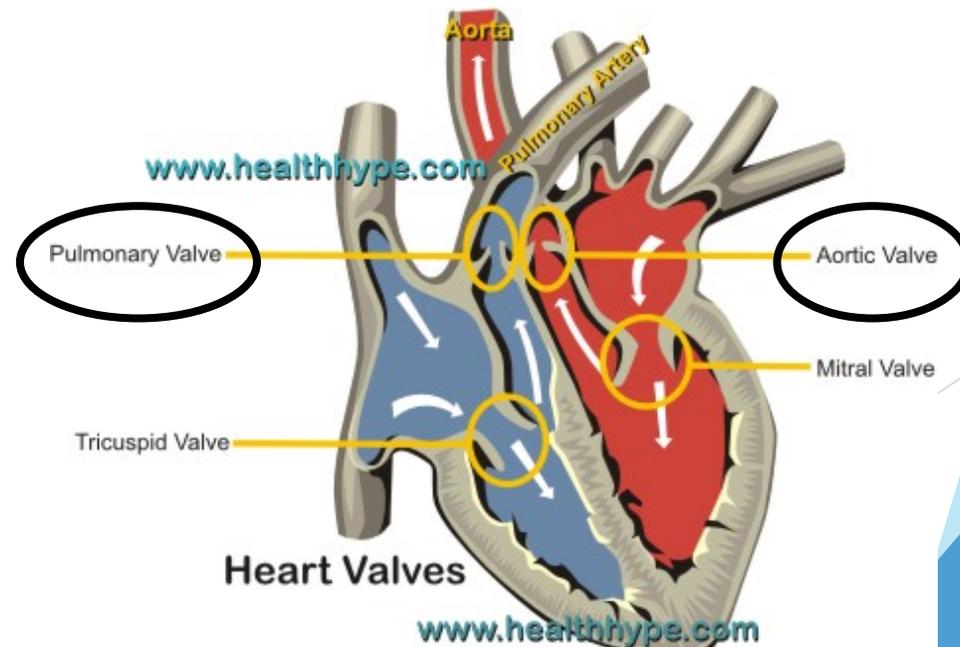


S1 Continued

- ▶ Louder S1 sounds may be observed in patients with anemia, fever, or hyperthyroidism
 - Louder S1 sounds are caused by the tricuspid and mitral valves being open when the ventricles begin to contract
 - Louder S1 sounds may also be caused by stenosis of the mitral valve
- ▶ Decreased S1 sounds may be observed in patients with fibrosis or calcification to the mitral valves
 - Other causes of decreased S1 sounds are obesity, emphysema, and cardiac tamponade

Second Heart Sound: “Dub”

- ▶ The second heart sound is called S2 and is typically described as sounding like “dub”
- ▶ S2 occurs near the end of ventricular contraction when the pulmonary and aortic valves close (this closure is the end of systole and beginning of diastole)
- ▶ The valves can close simultaneously or with a slight delay under normal circumstances
- ▶ If there is a significant delay between the two valves closing two “dub” sounds will be heard, and this is referred to as a split S2
- ▶ The main causes of split S2 sounds are right and left bundle branch blocks



S2 Continued

- ▶ Louder S2 sounds may be present in patients with chronic high blood pressure or pulmonary hypertension
 - S2 is louder in these cases because the aortic and pulmonary valves close under a higher pressure than normal
- ▶ Decreased S2 sounds are typically heard with hypotensive patients

<https://www.youtube.com/watch?v=dDg7GDpR1RE>

Abnormal Sounds: S3

- ▶ S3 is an extra heart sound that is considered abnormal
- ▶ S3 is caused by vibrations in the ventricular walls due to rapid filling of the ventricles (during diastole)
- ▶ If S3 is present it will be heard shortly (120-170 milliseconds) after S2
- ▶ In older adults, S3 is often indicative of heart failure
- ▶ In children and young adults, especially athletes and pregnant women, S3 may be a normal variant
- ▶ S3 is often described as a “galloping” sounds

<https://www.youtube.com/watch?v=x2qh6Z8Zi6o>

Abnormal Sounds: S4

- ▶ S4 is a rare, abnormal sound
- ▶ S4 is heard just before S1
- ▶ S4 is caused by the turbulent filling of a stiff ventricle(s)
- ▶ S4 is typically seen with cases of ventricular hypertrophy and sometimes with myocardial infarction

<https://www.youtube.com/watch?v=lx9ovaJ5xFs>

Don't Despair!!

- ▶ Auscultating heart tones takes practice!
- ▶ For documentation purposes, list whether or not S1 and S2 were clearly auscultated, and if abnormal sounds were observed. It's ok if you don't know how to classify the abnormal sound(s) you hear, just document that extra abnormal sounds were present. It is better to document a general abnormality than cite a specific diagnosis that you are unsure of.
 - Example: Heart sounds auscultated- S1 and S2 present, abnormal high-pitched sound also present
 - Example: Heart sounds auscultated- S1 and S2 present w/ extra sound, possible S3 gallop present
- ▶ There are other abnormal sounds such as an opening snap, ejection click, pericardial friction rub, murmur, thrill, and pericardial knock
- ▶ For information regarding advanced auscultation techniques, additional explanations, and audio examples of different heart sounds, refer to:
<http://www.easyauscultation.com/heart-sounds>

References

1. Caroline, Nancy L., Andrew N. Pollak, Bob Elling, and Mike Smith. *Nancy Caroline's Emergency Care in the Streets*. Sudbury, MA: Jones & Bartlett Learning, 2013. Print. Pages 934-935
2. "Heart Sounds." *Lessons, Quizzes and Reference Guides*. Web. 26 Apr. 2016.