Auscultatory Findings in Pericardial Effusion and in Ventricular Aneurysm

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Both heart sounds may be markedly diminished in the presence of a large pericardial effusion. On the other hand, with a pericardial effusion of moderate size, the heart sounds maintain normal intensity. Likewise, the x-ray and electrocardiogram may not show typical changes. In such cases angiocardiography is sometimes used for diagnosis; sometimes a diagnostic pericardial aspiration is attempted with an exploratory needle, or direct operative exploration is performed.

A useful sign in selected cases of pericardial effusion has been the effect of position on intensity of heart sounds. In normal individuals, as shown in figure 1, heart sounds remain the same or become louder when the subject turns on his stomach. When the patient turns on his stomach auscultation is easier and more convenient if the patient props himself up on his elbows. The heart sounds may become louder, presumably, because the heart is in closer proximity to the chest wall, and in turn, to the stethoscope. On the other hand, in some cases of pericardial effusion, as illustrated in figure 2 (top), the heart sounds became fainter instead of remaining the same or becoming louder. In one case the diagnosis of pericardial effusion was not evident at that particular time by the usual clinical evaluation, but subsequently there developed typical signs of pericardial effusion which was verified at post mortem examination when a tumor involving the pericardium was found.

The sign was most useful in the case of a 45-year-old woman with rheumatic mitral stenosis and insufficiency, aortic stenosis and insufficiency, and tricuspid insufficiency (fig. 2). The heart was enlarged as a result of the valvular lesions and the patient’s clinical condition was noted to be steadily worsening. The possibility of pericardial effusion arose, but could not be established by x-ray or fluoroscopic examination, or electrocardiogram. On turning the patient from her back to her abdomen, the heart sounds and murmurs were noted, and demonstrated on the phonocardiogram, to significantly decrease. Her condition continued to deteriorate, and approximately 1 week later the heart, by x-ray, had significantly increased in size and the silhouette was now suggestive of pericardial effusion. Under direct vision in the operating room, approximately 1,000 ml. of bloody fluid was removed from the pericardial cavity. Following this, her condition improved.

**EFFECT OF POSITION ON NORMAL HT. SDS.**

![Graph showing heart sounds in different positions](https://example.com/graph.png)

**Fig. 1.** Healthy young physician with no heart disease. Heart sounds ($S_1$, $S_2$) remained same on change of position.

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Auscultatory evidence of pericardial effusion is variable, however. Often patients having the largest effusions show little change and 2 weeks later, as shown in the phonocardiogram (fig. 2, lower tracings), the effect of position on her heart sounds and murmurs was again tested. This time, as noted, there was a definite increase in both sounds and murmurs coincident with the patient's turning to her abdomen.

Fig. 2. A 45-year-old woman with combined rheumatic aortic and mitral valvular lesions. Upper Two Tracings. Pericardial effusion present. Note decrease in sounds and murmurs on change of position from back to stomach. Lower Two Tracings. No effusion. Sounds and murmurs now increase with position change.
with position. It is postulated that with the more moderate amounts of effusion, coincident with change in patient’s position from flat to the abdomen, more fluid is interposed between the heart and the stethoscope, thereby decreasing sounds and murmurs. On the other hand, with the larger effusions already greatly distending the pericardial sac, there may be little change, and in fact in some instances even an increase has been noted in such cases. However, the diagnosis with the largest effusions present no diagnostic problem. Here both heart sounds are faint in both positions, and the electrocardiogram shows voltage on the lower side of normal. Likewise, with smaller effusions there may be little change in intensity of the murmur coincident with change in position. A false positive sign is elicited in the presence of pleural fluid which, if present, may in some cases cause a decrease in intensity of heart sounds when the patient is lying on his stomach.

SYSTOLIC SOUND WITH VENTRICULAR ANEURYSM

In many cases postinfarctional ventricular aneurysm is overlooked and the diagnosis is made only at post mortem examination. It has been stated that there are no constant and characteristic auscultatory findings of ventricular aneurysm, although a “weak” or “muffled” first heart sound, gallop rhythm, systolic or diastolic murmurs, or both, have been described. More commonly, an impulse on palpation coincident with systole has been mentioned.

Figure 3 represents a woman with proven ventricular aneurysm as a result of previous myocardial infarction. On auscultation the striking feature in this case was the presence of an apical systolic sound occurring in the first third of systole coincident with a prominent systolic impulse which was readily palpated in a localized spot over the apex. This patient, likewise, had electrocardiographic changes as well as fluoroscopic and x-ray evidence of aneurysm of the left ventricle. She underwent surgery for ventricular aneurysm, and although it was not excised, the weakened area was reinforced by the surgeon.

This systolic sound has been observed in other cases of ventricular aneurysm. This sound in systole corresponding to a localized palpable systolic impulse occurring in a patient with a history of coronary artery disease or old myocardial infarction, may be a valuable auscultatory clue. The sound is most likely produced by the paradoxical systolic bulge (or expansion) of the localized aneurysmal area striking against the chest wall. As to whether this systolic sound will be present or not, will depend naturally upon the location of the aneurysm and the extent of involvement.

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