

FAST Ultrasound

More Information: FAST Pericardial Findings (subcostal)

The subcostal window will provide a four-chamber view of the heart. The hyperechoic pericardium will be seen surrounding the heart. Some fluid may be present in normal individuals, but if there is fluid present in a nondependent area, it is definitely abnormal. The presence of hemopericardium will be demonstrated by separation of the visceral and parietal pericardial layers with anechoic or echogenic fluid (Figure 14). Normally, there is only one hyperechoic line seen surrounding the heart, which represents both layers of the pericardium. If two hyperechoic lines are seen surrounding the heart without the presence of anechoic fluid between the lines, the presence of an isoechoic or echogenic fluid collection should be suspected (Figure 15). Acute hemorrhage will usually be anechoic, however the presence of clotting may result in the appearance of echoes within the fluid collection. By 48 hours, a well-localized collection will have an echogenic appearance that may closely resemble the echogenicity of the surrounding parenchyma. In cases where bleeding occurs rapidly and is well-localized, an echogenic appearance may be noted during the acute phase.

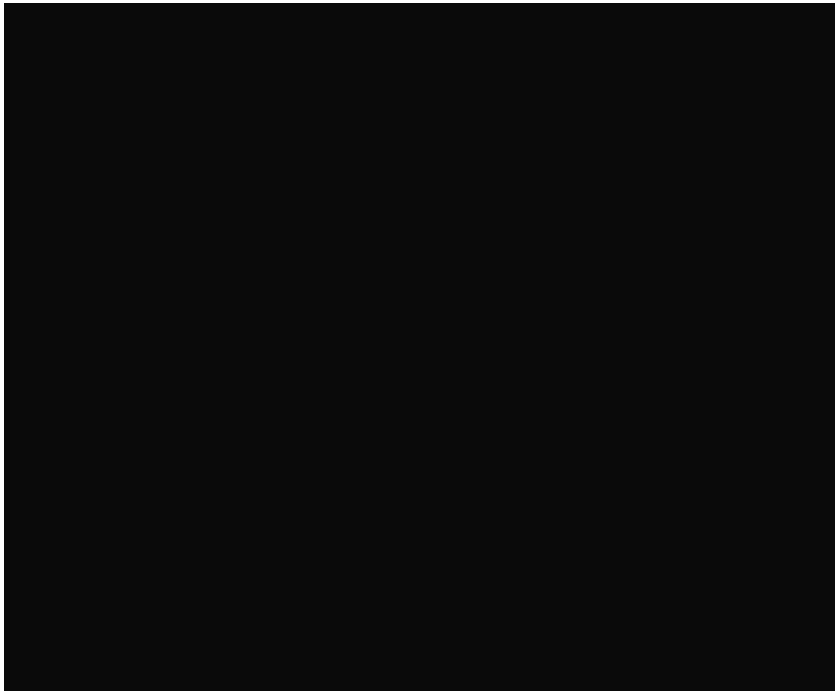


Figure 14. Subcostal window with a small amount of anechoic fluid in the pericardial space.



Figure 15. Echogenic pericardial fluid collection (hemopericardium). The pericardial fluid collection is located between the arrows.

The presence of pericardial tamponade will be demonstrated sonographically as a circumferential fluid collection with early diastolic collapse of the right ventricle or late diastolic or early systolic collapse of the right atrium (Figure 16 – see next page).⁷² Isolated left atrial or left ventricular collapse may occur in cases of localized left-sided compression or in patients with severe pulmonary hypertension.⁷³



Figure 16. Subcostal window in a patient with pericardial tamponade. Note the diastolic collapse of the right ventricle (arrow).

Other sonographic findings of pericardial tamponade include a swinging heart, dilated IVC with lack of inspiratory collapse, abnormal mitral valve motion, and abnormal septal motion.⁷² Pericardial tamponade develops secondary to increasing pericardial contents, leading to raised intrapericardial pressure with progressive limitation of ventricular diastolic filling and subsequent reduction of stroke volume and cardiac output. The cardiac effects of the fluid collection are more important than the thickness of the pericardial fluid collection or the absolute amount of fluid present. As little as 50cc of fluid that accumulates quickly could cause significant hemodynamic compromise, so do not judge the significance of the fluid collection based on its thickness (Figures 18A and 18B). Echocardiographic detection of pericardial tamponade frequently precedes overt clinical findings.⁷²

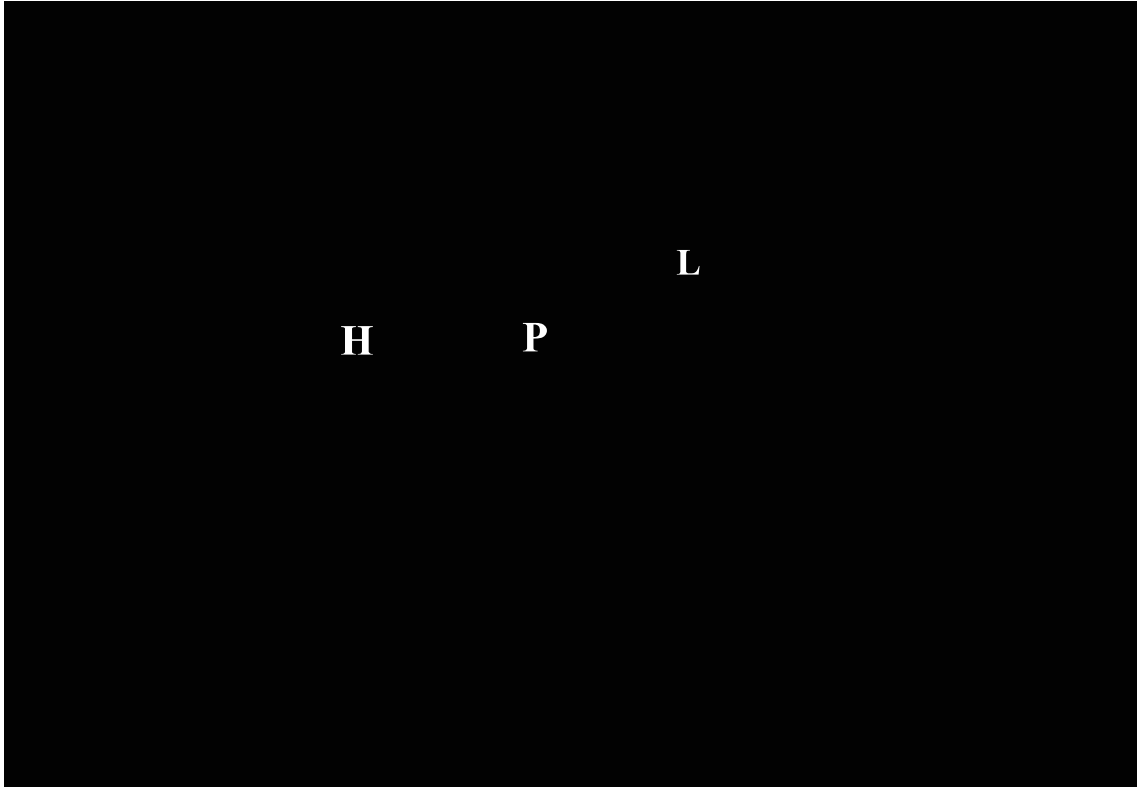


Figure 17A. Sagittal, subcostal window with anechoic fluid noted between apex of heart and pericardium. H=heart, L=liver, and P=pericardial fluid.

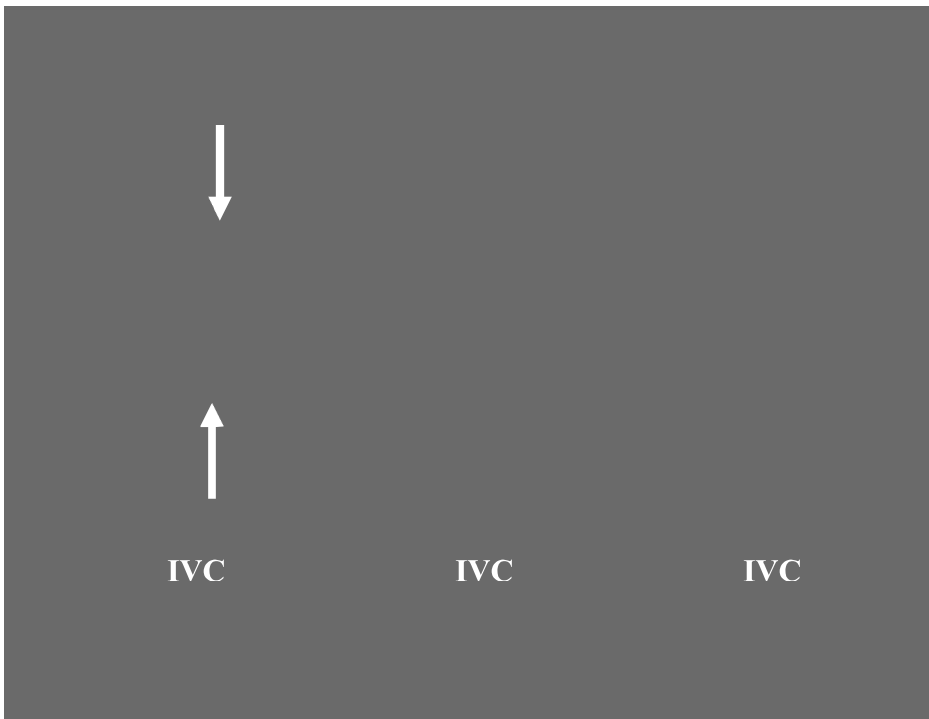


Figure 17B. M-mode image of figure 17A depicts the swinging of the heart (arrows) and the lack of diastolic collapse of the IVC with sniffing, which is consistent with pericardial tamponade.



Figure 18A. Thin rim of pericardial fluid is noted in a trauma patient who clinically deteriorated shortly after FAST exam was performed and on ED thoracotomy was found to have pericardial sac completely filled with blood.

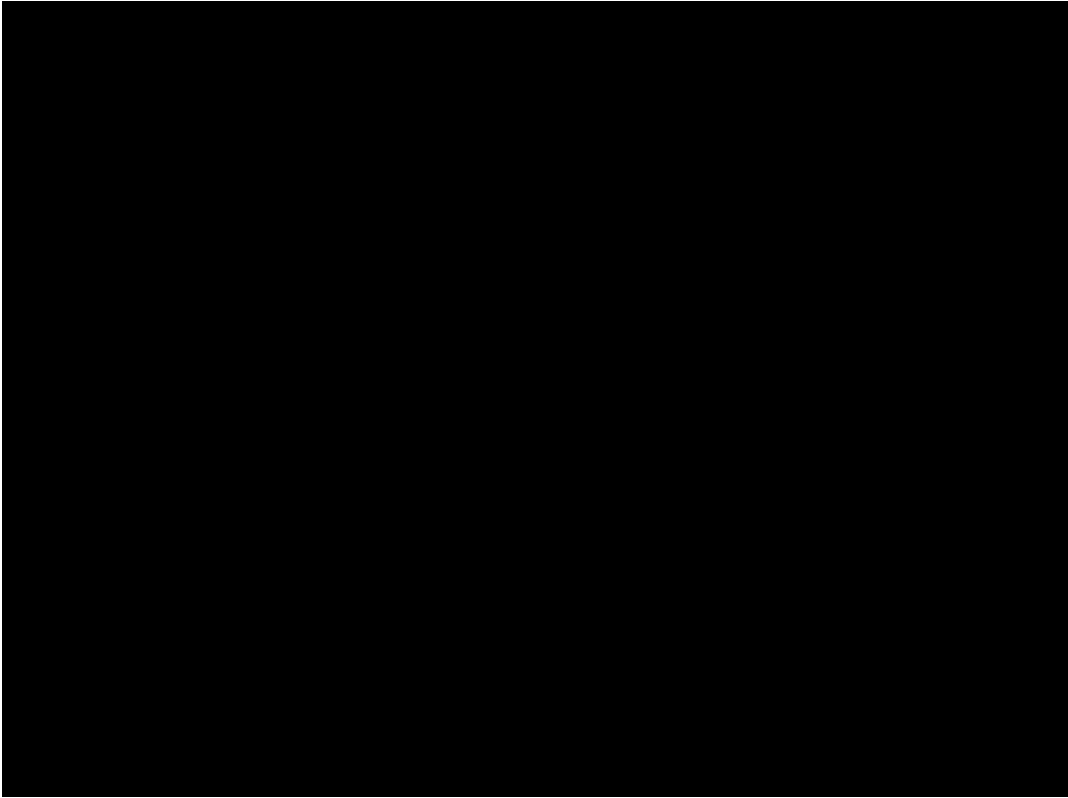


Figure 18B. Cancer patient with moderate pericardial effusion. This patient had no clinical or sonographic evidence of pericardial tamponade.

References:

72. Tsang, T.S., et al., *Diagnostic value of echocardiography in cardiac tamponade.* Herz, 2000. **25**(8): p. 734-40.
73. Fusman, B., et al., *Isolated collapse of left-sided heart chambers in cardiac tamponade: demonstration by two-dimensional echocardiography.* Am Heart J, 1991. **121**(2 Pt 1): p. 613-6.