

# A High-Echoic Layer Surrounding the Heart Suggesting Cardiac Tamponade by Clotting

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## Abstract

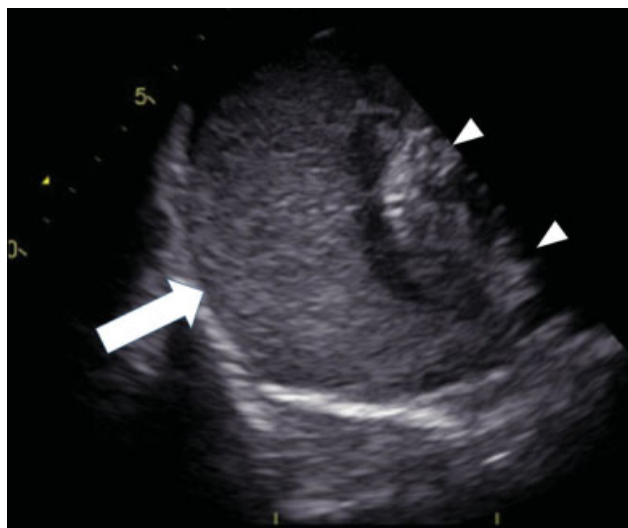
### Keywords

- aortic dissection
- tamponade
- Loeys–Dietz syndrome

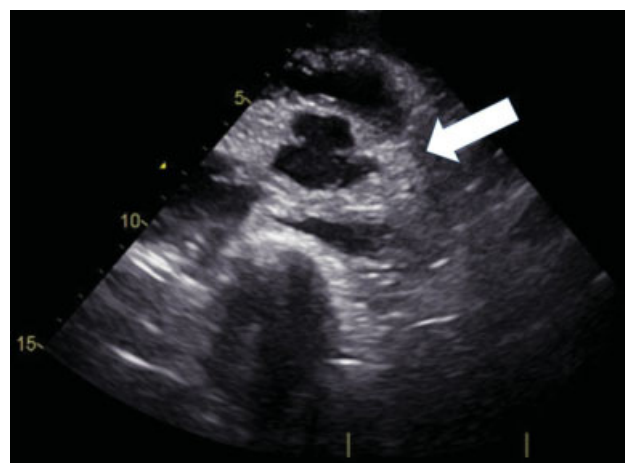
A 16-year-old boy experienced a sudden loss of consciousness. On arrival, he was in cardiac arrest. An ultrasound study revealed a high-echoic layer surrounding the heart. He received a diagnosis of clotting cardiac tamponade. Urgent thoracotomy with pericardiectomy was performed, but he failed to obtain return of spontaneous circulation. Physicians should focus on not only low-echoic but also high-echoic areas to accurately diagnose clotting, which can result in a critical condition if not managed properly.

A 16-year-old boy experienced a sudden loss of consciousness at home in front of his parents. On arrival, he was in cardiac arrest with pulseless electrical activity. An ultrasound study revealed a high-echoic layer surrounding the heart with a high-echoic layer surrounding the ascending aorta as well (►Figs. 1 and 2). He received a diagnosis of

clotting cardiac tamponade. Urgent thoracotomy with pericardiectomy was performed (►Fig. 3), but he failed to obtain return of spontaneous circulation. Autopsy imaging indicated residual pericardiac hematoma (►Fig. 4). Based on his features, he was suspected of having Loeys–Dietz or Marfan syndrome. We postulated that connective tissue disease had induced Type A aortic dissection with subsequent rupture that had resulted in cardiac tamponade and cardiac arrest.



**Fig. 1** The ultrasound study revealed a high-echoic layer (arrow) surrounding the heart (arrowheads) suggesting clotting cardiac tamponade.



**Fig. 2** The ultrasound study revealed a high-echoic layer (arrow) surrounding the ascending aorta, suggesting aortic dissection.

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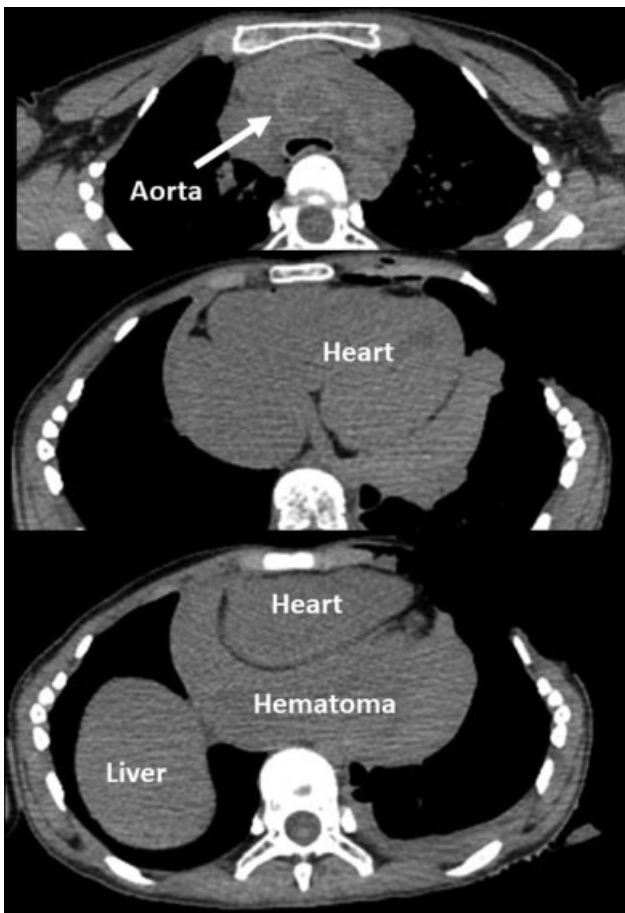
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**Fig. 3** Urgent thoracotomy with pericardiotomy revealed a clot weighing approximately 1 kg.



**Fig. 4** Autopsy imaging. Computed tomography indicated residual pericardiac hematoma.

Permission to perform a genetic analysis was not obtained from his parents.

In cases of hemorrhaging into a closed space, the blood forms a blood clot to achieve hemostasis. During this process, the whole blood separates into a blood clot and serum. When the serum accumulates in one space, it may be detected as fluid by ultrasound. However, it takes some time for the serum to accumulate. Accordingly, a focused assessment with sonography in trauma, which focuses on low-echoic areas to detect serum, is well known to have a high false-negative rate for the acute hemorrhaging state in traumatized patients.<sup>1</sup> Clots are scanned as high-echoic areas on ultrasound studies. If physicians focus not only on low-echoic but also high-echoic areas, the sensitivity for detecting clinically significant blood clots in the human body may be improved.

Unfortunately, the present patient failed to obtain a favorable outcome; however, the urgent resolution of cardiac tamponade by clotting and subsequent treatments might result in a favorable outcome in other patients.<sup>2,3</sup>

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#### Conflict of Interest

The authors declare no conflict of interest related to this article.

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#### References

- 1 Do WS, Chang R, Fox EE, Wade CE, Holcomb JB, Martin MJNCTH Study Group. Too fast, or not fast enough? The FAST exam in patients with non-compressible torso hemorrhage. *Am J Surg* 2019;217(05):882–886
- 2 Keiko T, Yanagawa Y, Isoda S. A successful treatment of cardiac tamponade due to an aortic dissection using open-chest massage. *Am J Emerg Med* 2012;30(04):634.e1–634.e2
- 3 Yatsu S, Yanagawa Y, Nagasawa H, Tambara K, Suwa S. Successful treatment of cardiac tamponade due to rupture of the heart using open-chest pericardiotomy. *Cureus* 2020;12(02):e7101