A 45-year-old woman with no significant past history developed gradual onset of shortness of breath and cough over 1 week. She presented to the emergency department. Her initial chest x-ray showed an enlarged heart and bilateral pulmonary edema. The patient became progressively hypotensive and hypoxic and was intubated. Transthoracic echocardiography is shown below (Figure 1).

Figure 1. Static image from transthoracic echocardiogram in the para-sternal long axis view of the heart.

What **intra-cardiac device** in the left ventricle is pictured on the image?

1. Amplatz closure device of atrial septal defect
2. Extracorporeal membrane oxygenator (ECMO) cannula
3. Impella device
4. Intra-aortic balloon pump
5. Pacemaker lead
3. Impella device

Note that the Impella device crosses the aortic valve and terminates in the left ventricle (LV) (Figure 2).

Figure 2. Transthoracic echocardiogram of the para-sternal long axis view of the heart demonstrating an Impella device crossing the aortic valve from the aorta to the left ventricle (down-pointing arrow). Incidentally the shadowing from a Swan-Ganz catheter is also noted in the RV (up-pointing arrow).

It is placed percutaneously trough a peripheral arterial sheath into the heart. The pump for the device resides outside of the patient. Blood is removed continuously from the LV and ejected into the aortic root. This size Impella device (2.5) can eject up to 2.5 l/min of cardiac output (1). As well, the left ventricular systolic function is severely reduced. In figure 3, the image is presented with color Doppler map, allowing visualization of the turbulent flow created by the Impella.

Figure 3. Static image from the transthoracic echocardiogram in the para-sternal long axis view with color Doppler map over the left ventricular outflow tract and aorta demonstrating flow through the Impella device.
This patient developed progressive cardiogenic shock in spite of this therapy. ECMO was initiated and arterial and venous cannulas were placed. In figure 4, the image demonstrates the patient’s venous cannula sitting in the inferior vena cava.

Figure 4. Subcostal echocardiogram demonstrating a large ECMO venous cannula within the inferior vena cava (arrow).

While generally it is expected the examiner will be aware of the presence of these devices prior to the echocardiogram, it is important to be aware of their echocardiographic appearance to confirm their proper position and function, and to not confuse them with other pathology.

Reference