An unusual presentation of left ventricular assist device thrombus

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A 41-year-old man with non-ischaemic dilated cardiomyopathy and morbid obesity was hospitalized with shortness of breath, abdominal pain, and haematochezia. At the age of 39 years, he underwent a left ventricular assist device (LVAD) placement (HeartMate II; Thoratec Corporation, Pleasanton, CA) for destination therapy and tricuspid valve annuloplasty.

Initial evaluation revealed ischaemic colitis, elevated left heart filling pressures, and severe haemolysis. LVAD readings were not definitive but suggested a thrombus. Colour flow Doppler transesophageal echocardiography (TEE) demonstrated a normal flow in the left ventricular inflow (Panel A; see Supplementary data online, Movie S1) and outflow cannulae (inflow velocity, 1.0 m/s; outflow velocity, 1.7 m/s), with no thrombus visible at either inflow (Panel B; see Supplementary data online, Movie S2) or outflow cannulae. A real-time 3D TEE showed no thrombus at the LVAD inflow cannula orifice (Panel C; see Supplementary data online, Movie S3). The patient had a presumptive diagnosis of LVAD malfunction with marked haemolysis and a low output state and underwent an LVAD pump exchange. Intraoperatively, a circumferentially organized 2-cm-long thrombus was found partially obstructing the flow within the LVAD inlet stator and extending from the inflow housing connector to the proximal rotor bearing (Panels D–F). Postoperative TEE showed a normal flow in the LVAD inflow and outflow cannulae.

Our case illustrates that TEE is unlikely to show thrombus, especially a partial thrombus, within the inlet metallic housing because of acoustic shadowing. In addition, flow patterns at the LVAD inflow and outflow cannulae at rest may not be diagnostic of partial thrombus within the titanium portions of the LVAD. In retrospect, left ventricular size on TEE did not decrease with increments in pump rpm settings, a subtle clue to partial obstruction of the LVAD inlet or outlet flow paths due to thrombus. Thus, additional clinical parameters, particularly heart failure symptoms and haemolysis, as well as the assessment of dynamic changes in left ventricular size with a pump speed, are sometimes needed for the diagnosis of LVAD malfunction.

Panel A. Preoperative transesophageal echocardiography apical four-chamber view with colour flow Doppler showing a left ventricular assist device inflow cannula flow (arrow). LA, left atrium; LV, left ventricle; RA, right atrium; RV, right ventricle.

Panel B. Preoperative transesophageal echocardiography apical four-chamber view showing the absence of thrombus at the left ventricular assist device inflow cannula orifice (arrow). See Panel A legend for definitions of abbreviations.

Panel C. Preoperative real-time three-dimensional transesophageal echocardiography showing the absence of thrombus at the left ventricular assist device inflow cannula orifice (arrow). See Panel A legend for definitions of abbreviations.

Panel D. Diagram of the left ventricular assist device showing the extent of the thrombus (e). (Copyright Thoratec Corporation, used with permission.)

Panels E and F. Thrombus (arrow) visualized inside the orifice of the left ventricular assist device inflow. Supplementary data are available at European Heart Journal – Cardiovascular Imaging online.