

Angiographic appearance of the HeartMate 3™

Angiograficzny wygląd urządzenia HeartMate 3™

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The use of left ventricular assist devices (LVADs) has substantially increased in recent years, being a valid therapeutic option for a growing population of patients with advanced heart failure. LVADs can be used as a bridge to a heart transplant or as a destination therapy. A 54-year-old male had had a HeartMate 3™ implanted in a prepericardiac location due to end-stage congestive heart failure. The patient underwent invasive investigation of the system a year later to confirm its actual clinical necessity. A 6-Fr pig-tail catheter was placed in the left ventricular cavity at its apex site, near the location of the surgically inserted device's outflow (Fig. 1A; "*"). A ventriculography of the left heart was performed. The wall motion analysis indicated a severely enlarged left ventricle (LV), with significantly impaired systolic function (LVEDV = 278 mL, LVESV = 239 mL, LVEF% = 14%; Fig. 1A). It also clearly revealed a 2-cm-long conduit ("1"), i.e. half the length of its counterpart from previous HeartMate™ generations. The conduit was surgically implanted through the apex site into the LV cavity, facing the mitral inflow directly, and allowing the entire output delivered to the LV from the pulmonary circulation to be pumped through the device with its maximal output of 10 L/min. A second ventriculography, done in the left lateral and cranial view (Fig. 1B), clearly documented the compact arrangement of the inflow and outflow sites of the HeartMate 3™ ("1" and "2", respectively). Interestingly, the outflow part was located outside the cardiac structure and was connected to the aorta with a Dacron graft of 12 mm Ø. It was clearly visualised that the contrast medium, after being injected into the left ventricular cavity ("*"), flowed through the conduit into the device chamber ("1"), where the blades of the spinning rotor ("4") ejected the blood volume in a pulsating manner into the Dacron graft ("3", Fig. 1B, D with magnified view). Then, a 6-Fr pig-tail catheter was positioned inside the lumen of the Dacron graft, near the site of its connection with the device's outflow (Fig. 1C, "*"). Subsequently performed angiography showed that the graft securely connected the device chamber with the ascending aorta, and that it was of uniform 12.0-mm diameter along its entire length with an unobstructed graft-aorta anastomosis ("3") (Fig. 1C, "‡"). The system controller was located outside the thorax and connected to the pump through a cable ("5"), allowing for power supplementation and direct control of the device's functions. In conclusion, given that LVAD is becoming a treatment option of growing usage in an increasing population of patients with end-stage heart failure, it is crucial to be aware of its overall arrangement and angiographic appearance.

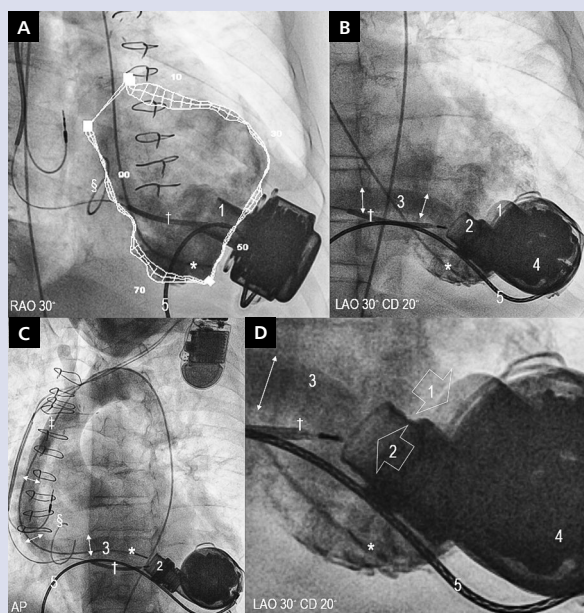


Figure 1. Displayed are two ventriculographies (A, B) and an angiography of the graft (C), allowing thorough insight into the HeartMate 3™ arrangement; (†) indicates the implantable cardioverter-defibrillator's right ventricle pacing lead, (D) shows the magnified view of the device. Other footnotes are described in the text (the patient had a history of tricuspid valvuloplasty with implantation of a ring: "§")

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Conflict of interest: none declared

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