Successful removal of a perforating ventricular lead after idarucizumab administration

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Title: Successful removal of a perforating ventricular lead after idarucizumab administration

Short title: Lead removal after idarucizumab administration

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Patients on direct oral anticoagulants requiring urgent interventions pose a challenge for clinicians.

An 89-year-old man was admitted due to syncopal attacks and dyspnea at rest since few days. The single chamber pacemaker was implanted one month before in another hospital, due to symptomatic atrial fibrillation with complete atrioventricular block. No perioperative complications were reported.

Transthoracic echocardiography (TTE) revealed right ventricle (RV) apex perforation with the pacing lead and fluid accumulation in the pericardium over 10 mm with additional echoes between. Pacemaker interrogation demonstrated high ventricular pacing threshold (>5.5 V) and decreased QRS amplitude (3.0 mV), with normal impedance (680 Ω). Patient was on dabigatran 110 mg orally twice a day, with the last intake six hours before admission. He had high thromboembolic risk and high bleeding risk (CHA2DS2-VASc score - 6 points, HASBLED score - 4 points) with previous bleedings. His baseline dabigatran concentration was high - 367 ng/ml (normal range: 30–200 ng/ml). Laboratory tests demonstrated also elongated thrombin time (TT) - 196 s (normal range: 18-22 s); elongated activated partial thromboplastin time (APTT) - 66.4 s (normal range: 27-34 s), elongated prothrombin time (PT) - 15.6 s (normal range: 9.7-11.8 s), increased serum creatinine concentration- 276 μmol/l (normal range: 53-115 μmol/l) and significantly decreased glomerular filtration rate (eGFR) - 15 ml/min./m² (normal range >90 ml/min./m²).

It was decided to neutralize dabigatran activity and to perform urgent transvenous lead explantation with cardiosurgical, backup support. The patient received rapid idarucizumab intravenous infusion (two vials of 2.5 g/50 ml each) without adverse events. Lab tests repeated immediately after, showed dabigatran concentration below detection limit and coagulation parameters within normal range (TT-21 s; APTT-32.4 s, PT-11.8 s).
Thirty minutes after idarucizumab administration the perforating electrode was successfully explanted by direct traction technique and the new one was inserted and connected with the pacemaker. The procedure went without any complications.

Follow-up TTE did not reveal any increase of pericardial fluid or thrombi. Device interrogation demonstrated stable pacing and sensing thresholds in RV. On six-weeks and one-year follow-up patient was free of symptoms.

Dabigatran is a direct, reversible inhibitor of both free and clot-bound thrombin. The time needed for reversal of dabigatran anticoagulation effect to perform invasive procedures should be based on patients characteristics including age, weight, renal function, time from the last dose intake, interactions with concomitantly administered drugs, and the risk of bleeding associated with the procedure [1,2]. However, for emergent interventions or life-threatening bleeding, immediate neutralization of anticoagulation is indispensable.

Idarucizumab, a monoclonal antibody fragment is the first available targeted reversal agent specific for dabigatran that binds it with a high affinity [3]. Nevertheless, experience with the idarucizumab in patients with severe kidney failure (GFR<30 mL/min) is limited. The idarucizumab half-time is prolonged in patients with renal failure, however greater idarucizumab exposure seems to be favorable, because these patients have also elevated plasma dabigatran concentrations [4,5]. In presented case, idarucizumab allowed to successfully neutralize dabigatran activity and enable transvenous lead explantation without excess bleeding despite coexistent severe kidney failure.
References


**Figure 1**

A. Electrocardiogram at admission.

B. Echocardiographic image showing the tip of the right ventricular pacemaker lead penetrating the right ventricular wall at the apex (arrow).

C. Electrocardiogram after procedure.

D. Echocardiographic image showing successful new lead placement in the right ventricle (arrow).