

Idarucizumab (Praxbind) for Reversal of Pradaxa Prior to Emergent Repair of Contained Ruptured Transverse Arch Aneurysm

Abstract

Idarucizumab before cardiopulmonary bypass was used for the reversal of dabigatran during an emergent frozen elephant trunk repair of a transverse arch aneurysm. Reversal was successful and minimal not massive transfusion was required with no abnormal sequelae seen with use before cardiopulmonary bypass.

Keywords: Aneurysm; Dabigatran; Idarucizumab

Introduction

Dabigatran is a novel oral anticoagulant and direct thrombin inhibitor that has been approved for the prevention of stroke and nonvalvular atrial fibrillation since 2010.^[1] It came to market before the approval of any specific reversal agent to treat life-threatening bleeding or complications related to administration. Previous reports have documented some limited success to counter the effects of dabigatran with administration of recombinant factor VII (rFVII), prothrombin complex concentrate (PCC), or even hemodialysis to lessen the drugs' concentration.^[2-4] Each center likely has a protocol that one must follow when faced with this situation. Recent Food and Drug Administration approval of idarucizumab, a monoclonal antibody, which binds dabigatran to neutralize its effects, has become available.^[5-7] Little is known about its effects in cardiothoracic surgical patients who present needing emergent surgery and currently taking dabigatran. We present a case of a 72-year-old man who was airlifted to our hospital for emergent repair of contained ruptured transverse arch aneurysm with constant chest pain and pressure.

Case Report

The patient had a history of atrial fibrillation, hypertension, and chronic obstructive pulmonary disease and was

recently admitted to an outside hospital with a syncopal episode resulting in soft tissue injury to his right forearm. The patient reported that earlier in the day, he had sudden onset of diaphoresis and chest pain and he sought care when the pain would not subside. Computed tomography was completed and showed a 6.4 cm thoracic aorta pseudoaneurysm in the distal transverse arch which had contrast extravasation within the sac [Figure 1]. There was associated intramural hematoma of the ascending aorta and a concerning left pleural effusion [Figure 2].

An emergent repair of his transverse arch was required due to persistent pain likely representing contained rupture. His blood pressure was managed with a combination of labetalol and nicardipine infusions for anti-impulse control, and consent was obtained for emergent frozen elephant trunk arch debranching operation.

He reported that he had taken his dabigatran morning dose. His outside laboratory investigations were remarkable for hemoglobin of 9.6 g/dl, prothrombin time (PT) of 18.1 s, international normalized ratio (INR) of 1.5, and activated partial thromboplastin time (aPTT) of 40 s. Due to the patient's recent anticoagulant use and need for emergent surgery, a massive transfusion protocol was activated related to the expected intraoperative hematologic requirements. Our institution's previous protocol would have recommended rFVII or PCC to be available and used after

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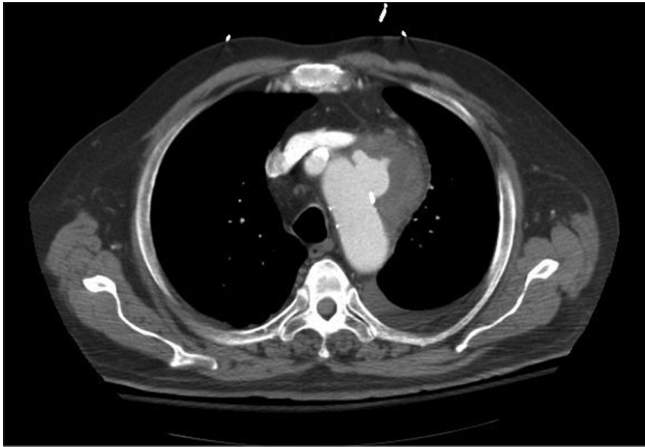


Figure 1: Axial computed tomography showing a contained rupture in the transverse aorta

separation for cardiopulmonary bypass along with any blood component needed to correct coagulopathy.

We decided to attempt reversal of his dabigatran with idarucizumab which comes in 2.5 mg/50 ml vials to be given over 15 min for a total dose of 5 mg. This is presumably to monitor for any reaction with the first dose since it is a monoclonal antibody and they may cause hypersensitivity reactions. The activity of the antibody complex is expected to last clinically up to 24 h.^[6] The full dose was completed during preparation for general anesthesia, and the patient underwent right axillary cannulation, followed by median sternotomy with preparation for moderate hypothermic circulatory arrest. Heparinization was achieved with 30,000 units and adequate activated clotting time was assured to be >480 s. Standard two-stage venous drainage via the right atrium with combination of antegrade and retrograde cardioplegia was employed. Once adequate cooling to 28°C, the aorta was cross-clamped and cardioplegia was administered. Selective clamping of the innominate and left common carotid was completed for antegrade cerebral perfusion, and the aorta was opened to the level of the descending aorta. Standard frozen elephant trunk was performed with deployment of antegrade thoracic endovascular aortic repair device and resumption of flow to the body through a side branch graft in the Dacron graft sewn to the device. Rewarming was commenced, and the ascending aorta was replaced, followed by cross-clamp removal. Sequential debranching of arch vessels was completed, and the patient was prepared for separation from cardiopulmonary bypass. Once cardiopulmonary bypass was ended, heparin was reversed with the standard protamine sulfate dose. Administration of blood component therapy was initiated. The patient received three packed red blood cells, three units of fresh frozen plasma, three packs of pooled platelets, and two units of cryoprecipitate. Upon completion and during chest closure, it was noted that firm

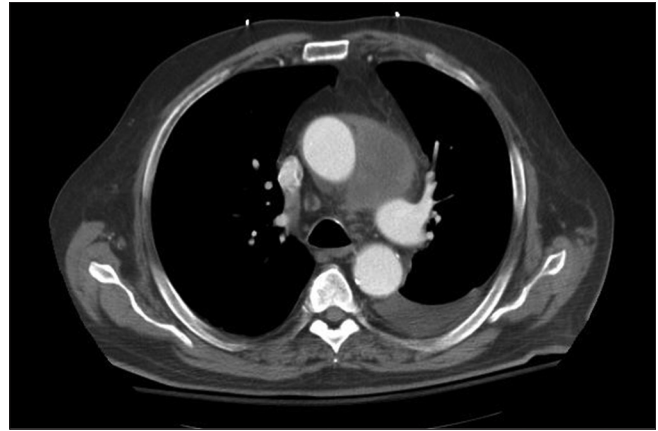


Figure 2: Axial computed tomography of the ascending aorta showing extensive intramural hematoma and left pleural effusion

clot was forming within the pericardial well. Postoperative PT was 16.1 s, INR of 1.3, and aPTT of 32 s. He was extubated within 24 h, discharged on postoperative day 7, and required no further blood transfusion or additional doses of idarucizumab.

Comment

The most feared complication of using novel anticoagulants was the limited availability of a reversal agent and the need for an emergent operation. Occasionally, patients we encountered requiring emergent cardiothoracic surgery on dabigatran required massive transfusion and the use of expensive rFVII and PCC. In our experience, blood component utilization is often two to three times the amount we used in the case presented even with only moderate hypothermia. Idarucizumab binds dabigatran and its active metabolites to reverse its anticoagulant effects immediately and is useful for emergency surgery.^[6] To the best of our knowledge, this is the first report of an emergent ruptured aneurysm repair and the use of idarucizumab before initiation of cardiopulmonary bypass. No abnormal sequelae were seen in the conduct of the operation or performance of extracorporeal perfusion. Further study of this novel antibody is needed with anticoagulation parameters, especially thrombin bleeding times, measured both before and after a period on cardiopulmonary bypass.

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Conflicts of interest

There are no conflicts of interest.

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