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“Ripples in Water” Effect Detected by Ultrasound During Internal Jugular Catheterization



To the Editor:

Herein, I describe an interesting “ripples in water” effect in the right internal jugular vein using ultrasound guidance before its catheterization. A 54-year-old male with severe mitral stenosis, tricuspid regurgitation, pulmonary artery hypertension, and atrial fibrillation, was scheduled for mitral valve replacement. After the induction of anesthesia, the patient was positioned and prepared for a right internal jugular vein catheterization under ultrasound guidance. An ultrasound assessment revealed stasis of blood in the vessel and a “ripples in water” effect in a cross-

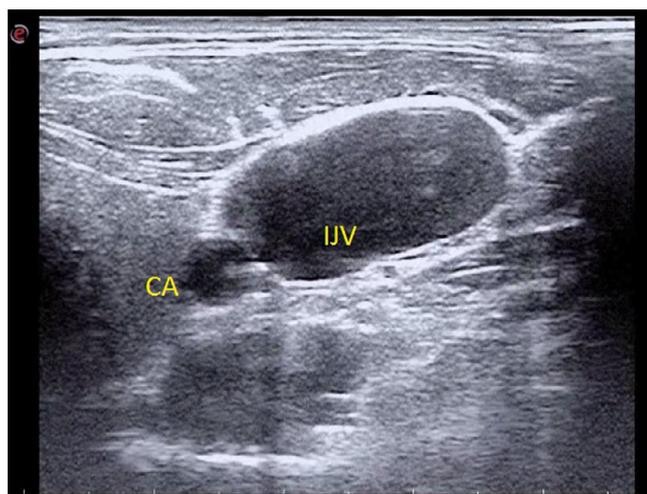


Fig 1. Ultrasound in a cross-sectional view showing venous stasis in the right internal jugular vein. CA, carotid artery; IJV, internal jugular vein.

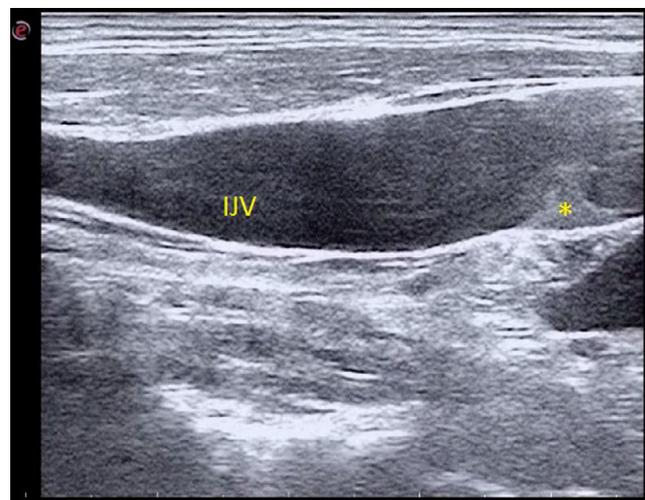


Fig 2. Ultrasound in a longitudinal view showing a valve with thrombus (*) in the right internal jugular vein. IJV, internal jugular vein.

sectional view (Fig 1; Video 1). Interrogation in a longitudinal view revealed the presence of a valve with thrombus, located more caudad (Fig 2; Video 2). This valve appeared to be fluttering because of the backward flow of blood into the vein from the right atrium due to elevation of the right ventricle end-diastolic pressure and a severe tricuspid regurgitant jet.¹

Conflict of Interest

None.

Supplementary materials

Supplementary material associated with this article can be found in the online version at [doi:10.1053/j.jvca.2022.06.034](https://doi.org/10.1053/j.jvca.2022.06.034).

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Andexanet Alfa-Induced Heparin Resistance Missing From SCA Blood Management in Cardiac Surgery Guidelines



To the Editor:

Current 2021 Society of Cardiovascular Anesthesiologists (SCA) guidelines recommend giving novel oral anticoagulant-

reversal agent to patients who recently ingested them and require emergent cardiac surgery.^{1,2} These guidelines specifically recommend giving andexanet alfa to patients who have taken rivaroxaban or apixaban. Andexanet alfa has a structure that mimics endogenous factor Xa and acts as a decoy that sequesters rivaroxaban and apixaban. This prevents factor Xa inhibitors from interacting with endogenous factor Xa, thus reversing anticoagulation. However, andexanet alfa may be associated with heparin resistance in cardiac surgery patients.³⁻⁵ Emergent cardiac surgeries usually require heparinization for cardiopulmonary bypass, and, currently, the manufacturer of andexanet alfa recommends against heparin use for systemic anticoagulation because of the concern for heparin resistance. The current 2021 SCA guidelines do not address this phenomenon, how to best achieve systemic anticoagulation, or how to best monitor coagulation status in patients who have received andexanet alfa.

The mechanism of action for heparin resistance due to andexanet alfa is unclear. Some studies suggested it is related to antithrombin III deficiency.⁶⁻⁸ A few case reports described successful treatment of heparin resistance resulting from andexanet alfa with antithrombin III administration.⁵ Monitoring anticoagulation status is challenging because of the different effects of andexanet alfa on unfractionated heparin depending on the coagulation test and assays used. In activated partial thrombin time and thrombin time tests, the effect of unfractionated heparin was reversed nearly completely by andexanet alfa. In contrast, andexanet alfa demonstrated only a modest reversal of unfractionated heparin action in the chromogenic anti-Xa and anti-IIa assays.⁸ Novel oral anticoagulants are becoming more popular for stroke prevention, nonvalvular atrial fibrillation, and deep vein thrombosis therapy. The likelihood that cardiac anesthesiologists will encounter patients treated with novel oral anticoagulants requiring emergent cardiac surgery is increasing.

There is a conflict between SCA guidelines and drug manufacturer recommendations regarding andexanet alfa-induced heparin resistance. The most recent SCA guidelines recommend administration of antithrombin III, but manufacturer prescribing information recommends use of an alternate anticoagulant.⁹ In addition to the risk of heparin resistance, andexanet alfa also has a high risk of thrombosis. In the ANNEXA-4 trial, 18% of patients had thrombotic events during the 30-day follow-up period.¹⁰ As such, the risks and benefits of andexanet alfa warrant a thorough discussion among the anesthesiologist, cardiac surgeon, and perfusionist. Management algorithms have been proposed that recommend against reversal of andexanet alfa before bypass and to administer the drug only after bypass after full protamine dose is given.¹¹

In our opinion, andexanet alfa should not be given to reverse novel oral anticoagulants for patients presenting for emergent cardiac surgery requiring cardiopulmonary bypass. The risk of andexanet alfa-related heparin resistance is potentially dangerous, especially when emergent bypass initiation may be necessary. During the next revision of SCA Clinical Practice Guidelines for Patient Blood Management, andexanet alfa-related heparin resistance should be discussed and addressed

as a separate etiology from antithrombin III deficiency-related heparin resistance.

Conflict of Interest

None

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Preoperative Preparation With Valsartan/ Sacubitril in a Patient With Cardiac Paraganglioma and Catecholamine-Induced Cardiomyopathy



To the Editor:

The perioperative management of patients with catecholamine-induced cardiomyopathy is challenging. Medical