

Endovascular treatment of vena cava superior syndrome caused by COVID-19 infection using AngioJet thrombectomy

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Occlusion of the superior vena cava (SVC) due to malignant tumor compression is the most common cause of SVC syndrome (SVCS) [1]. COVID-19 disease has been associated with many hematological disorders, often presenting with venous and arterial thromboembolism [2, 3]. We demonstrated successful endovascular treatment of SVCS syndrome caused by COVID-19.

A 36-year-old male patient who had COVID-19 15 days earlier was referred to our cardiology department with the diagnosis of SVCS. The patient had no past medical history except the infection. Thrombophilia tests, rheumatological panel, and cancer markers of the patient were normal; the D-dimer level was elevated (5.49 mg/l FEU). Computed tomography angiography demonstrated that SVC is obstructed with a large thrombus, there was no mass or compressing lesion (Supplementary material, *Figure S1*). Considering the non-malignant etiology of SVCS, endovascular intervention was the initial treatment.

The procedure began with inserting a venous cannula into the antecubital venous area, and the brachial venous plexus was demonstrated *via* contrast material injection under fluoroscopy. The right basilic vein was used for the venous puncture and a 6 Fr sheath was inserted into the right basilic vein. A Judkins right diagnostic catheter was advanced to the right subclavian vein over a 0.035" hydrophilic wire, and venography was performed. Multiple huge thrombi were seen in the right internal jugular vein, the right brachiocephalic vein, and the SVC (*Figure 1A*; Supplementary material, *Video S1*). The hydrophilic wire and the catheter were advanced to the inferior vena cava through the lesion and the right atrium. The Judkins catheter was replaced with an 8 Fr sheathless

catheter and delivered to the lesion. Balloon dilatation with a 6.0 × 60 mm Mustang peripheral balloon (Boston Scientific, Marlborough, MA, US) was performed (*Figure 1B*). Due to excessive thrombi formation, thrombus aspiration was needed (Supplementary material, *Video S2*). The extensive thrombus structure persisted after balloon dilatation and aspiration (*Figure 1C*); therefore, we decided to perform catheter-directed thrombectomy by the AngioJet rheolytic thrombectomy system (Boston Scientific) (*Figure 1D*). We advanced the hydrophilic wire to the right femoral vein through the inferior vena cava and externalized the wire using a snare from an 8 Fr sheath previously placed into the right femoral vein. The hydrophilic wire was replaced with Meier wire (Boston Scientific) to support the AngioJet thrombectomy system. After AngioJet thrombectomy, a venous angiogram through the upper limb catheter demonstrated residual obstruction in the SVC (*Figure 1E*; Supplementary material *Video S3*). A 39 mm AndraStent XXL aortic stent (AndraMed GmbH, Reutlingen, Germany) was implanted and post dilated with a 3.0 × 25 mm balloon using a Mullins X catheter (NuMED, Canada) (*Figure 1F*). The final venous angiogram demonstrated a complete expansion in the SVC (Supplementary material, *Video S4*). Clinical signs and symptoms of the patient regressed after successful percutaneous treatment (Supplementary material, *Figure S2*), and the patient was discharged on oral anticoagulation and clopidogrel.

SVCS in COVID-19 has only been reported as an iatrogenic device-related event in one patient during veno-venous extracorporeal membrane oxygenation therapy [4]; therefore, it could not be considered directly related to the disease itself. SVCS after a SARS-CoV-2

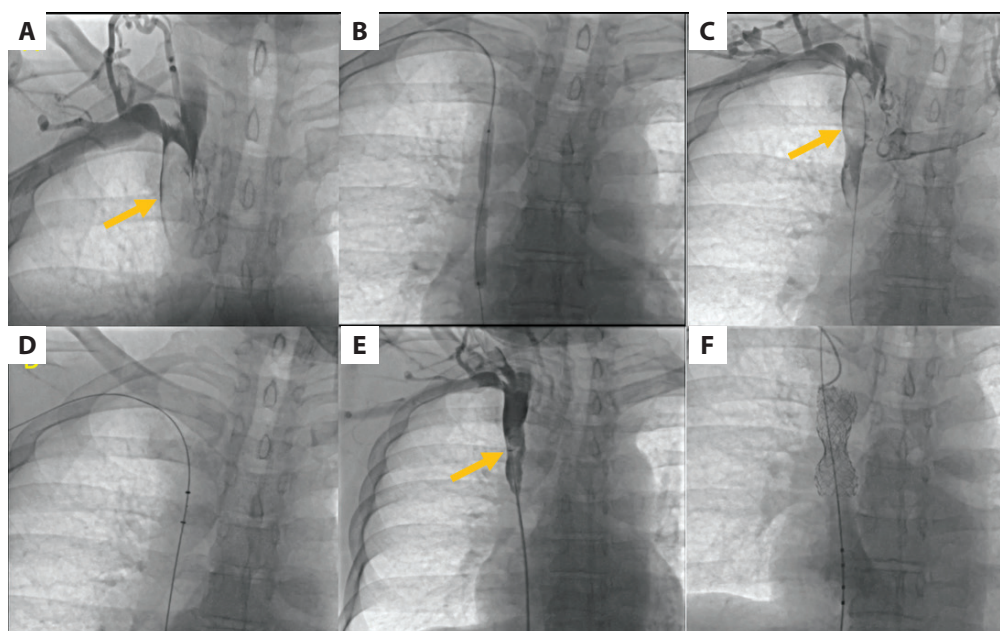


Figure 1. **A.** Massive thrombus seen in the superior vena cava by the venography (the arrow). **B.** Balloon dilatation performed with a 6.0 × 60 mm Mustang peripheral balloon (Boston Scientific). **C.** Thrombus persisting after balloon dilatation (the arrow). **D.** Performing catheter-directed thrombectomy using the AngioJet rheolytic thrombectomy system. **E.** Persisting obstruction after catheter-directed thrombectomy (the arrow). **F.** Implantation of an aortic stent to the lesion

infection has not been previously reported; therefore, the treatment strategy remains unclear. We demonstrated successful endovascular treatment of SVCS syndrome caused by COVID-19.

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/kardiologia_polska.

Article information

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