Endovascular treatment of superior vena cava thrombosis: A challenging case and an alternative technique

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A 73-year-old female presented to the emergency department with facial and neck swelling, severe dyspnea, persistent cough, and generalized weakness. Her oxygen saturation was 85%, and physical examination showed orthopnea, facial and neck edema, and redness. She had a history of colon cancer and a chemotherapy port removal from the jugular vein 2 months prior. A computed tomography scan and venography confirmed superior vena cava (SVC) syndrome with a complete right SVC occlusion extending into the distal axillary vein (Figure 1A–C; Supplementary material, *Video S1*). Despite anticoagulation therapy, her symptoms persisted, necessitating an endovascular intervention. Initial attempts to navigate the thrombosed SVC *via* the right common femoral vein were unsuccessful. Consequently, a right brachial venous access with a 6 F sheath was pursued. A reverse controlled antegrade and retrograde tracking (CART) technique was employed, utilizing a 4 × 40 mm diameter balloon catheter (Powerflex Pro, Cordis, US) on the anterograde wire and a 0.035-inch angled hydrophilic guidewire (Roadrunner, Cook, US) *via* the retrograde. Following balloon inflation and deflation, the hydrophilic guidewire successfully traversed the right subclavian vein (SV) into the right axillary vein (Figure 1D; Supplementary material, *Video S2*). Over-the-wire balloons, with dimensions of 4 × 40 mm and 5 × 60 mm (Powerflex Pro, Cordis, US), were introduced *via* the femoral vein and inflated to 8 atm to dilate the thrombosed segment of the SVC. Subsequently, self-expandable (Epic, Boston Scientific, US) and balloon-expandable graft stents (Advanta V12, Getinge, US) of 8.0 × 40 mm and 8 × 59 mm dimensions were deployed in the SV and SVC, respectively (Figure 1E; Supplementary material, *Video S2*). Post-stent implantation, blood flow was successfully restored in the venous bed of the upper extremity (Figure 1F). The patient experienced a remarkable regression of symptoms post-procedure and was discharged on the sixth day, receiving acetylsalicylic acid and clopidogrel treatment without any complications.

SVC syndrome is particularly challenging in end-stage cancer patients [1]. Management depends on the cause of obstruction, initially focusing on supportive care such as head elevation, fluid restriction, and diuretics [1–3]. Subsequent treatments vary based on symptom severity and patient prognosis [2, 3]. Chemotherapy often rapidly alleviates symptoms in lymphoma, small-cell lung cancer, and germ cell tumor patients. Radiotherapy can relieve obstructions caused by sensitive tumors like lymphoma [1–3]. Surgical options include venous bypass or pericardial grafts, while anticoagulation and thrombolytic drugs are used for thrombus cases [1, 3]. Since the first report of SVC stenting in 1986, endovascular treatment has become a viable option, particularly for chronic or recurrent SVC obstruction and acute severe malignant cases [4]. Stenting, often successful even in complete obstruction or thrombosis, boasts a technical success rate exceeding 95% and a symptom remission rate up to 80% [5]. Complications are rare but can include stent fracture, migration, pulmonary embolism, and hematoma, with some fatal cases reported [4, 5]. In this case, a combination of self-expandable and balloon-expandable stents was used in the SV and SVC with the reverse CART technique. The procedure was successful, leading to

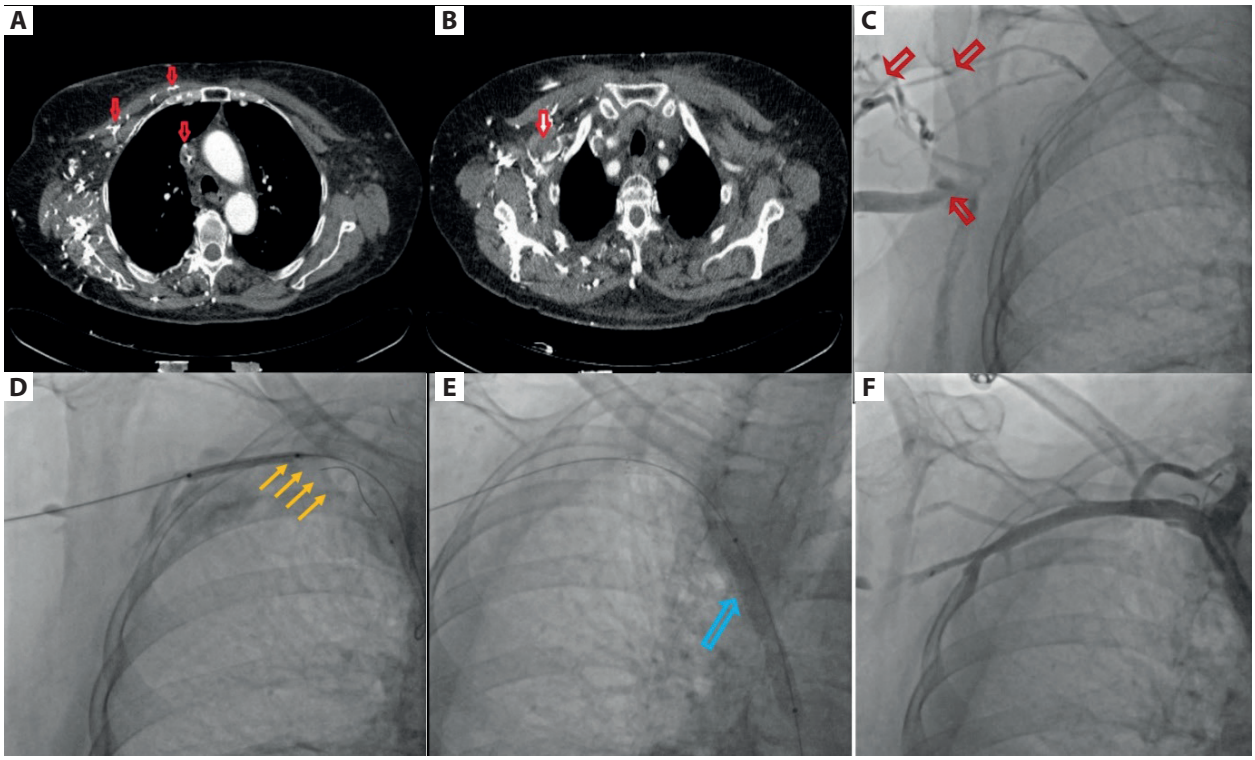


Figure 1. Computed tomography scan, conventional venography and endovascular treatment of the superior vena cava and subclavian vein. **A. B. C.** Total occlusion from the right superior vena cava extending to the distal axillary vein and collateral vessels developed in the chest wall (red arrows). **D.** Advancing of the hydrophilic guidewire with reverse controlled antegrade and retrograde tracking technique (yellow arrows). **E.** Implantation of self-expandable balloon expandable graft stents (blue arrow). **F.** Restoration of flow in the venous bed

rapid symptom improvement. This is the first reported case using the reverse CART technique for stent placement in malignant SVC syndrome.

Supplementary material

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

Article information

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