Radiology Case Reports 15 (2020) 1168–1172

Available online at www.sciencedirect.com

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journal homepage: www.elsevier.com/locate/radcr

Case Report

Diathermy-assisted recanalization of chronic superior vena cava obstruction, case report ☆,☆☆

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ARTICLE INFO

Article history:
Received 25 April 2020
Revised 29 April 2020
Accepted 1 May 2020

Keywords:
Superior vena cava
Diathermy
Venous obstruction
Stenting

ABSTRACT

The number of cases of superior vena cava syndrome (SVCS) increased due to increased cardiac devices and central venous catheters. Management of benign SVCS is still controversial. A 51-year-old male known to have ischemic cardiomyopathy and chronic renal failure on regular hemodialysis. In the last 12 months, he had progressive shortness of breath and swelling of his upper part of the body. Examination revealed engorgement of the neck veins, facial puffiness, and pitting edema of both upper limbs. Venography showed occluded SVC. We applied a 50 Watt of energy via electrocautery pen to a Hi-Torque 0.014 Astato guidewire to cross the occluded segment retrogradely. We used 2 stents 39 mm, mounted on BIB 20/40 mm. Final angiography revealed full restoration of SVC flow. Diathermy use to cross a chronic total SVC obstruction is feasible and safe. Endovascular techniques are suitable as initial management of benign SVC syndrome.

Introduction

There is an increase in the number of cases of superior vena cava syndrome (SVCS) associated with chronic indwelling central venous catheters [1]. Fibrinolytic therapy may benefit in the presence of fresh thrombus with acute occlusion of SVC. Endovascular treatment is currently achieving a good result for relieving symptoms in chronic total occlusion of SVC. We present a challenging case of chronic SVC syndrome with chronic SVC occlusion where we used the diathermy to help the wire to pass the occluded segment.

Case presentation

A 51-year-old male had longstanding diabetes mellitus for 15 years. He had ischemic cardiomyopathy with left ventricular ejection fraction 30%. He had a chronic renal failure on

☆ Competing Interest: All authors have nothing to disclose.
☆☆ Acknowledgment: The authors want to acknowledge Dr. Ibraheem Alharbi for his support to produce this article.
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https://doi.org/10.1016/j.radcr.2020.05.002

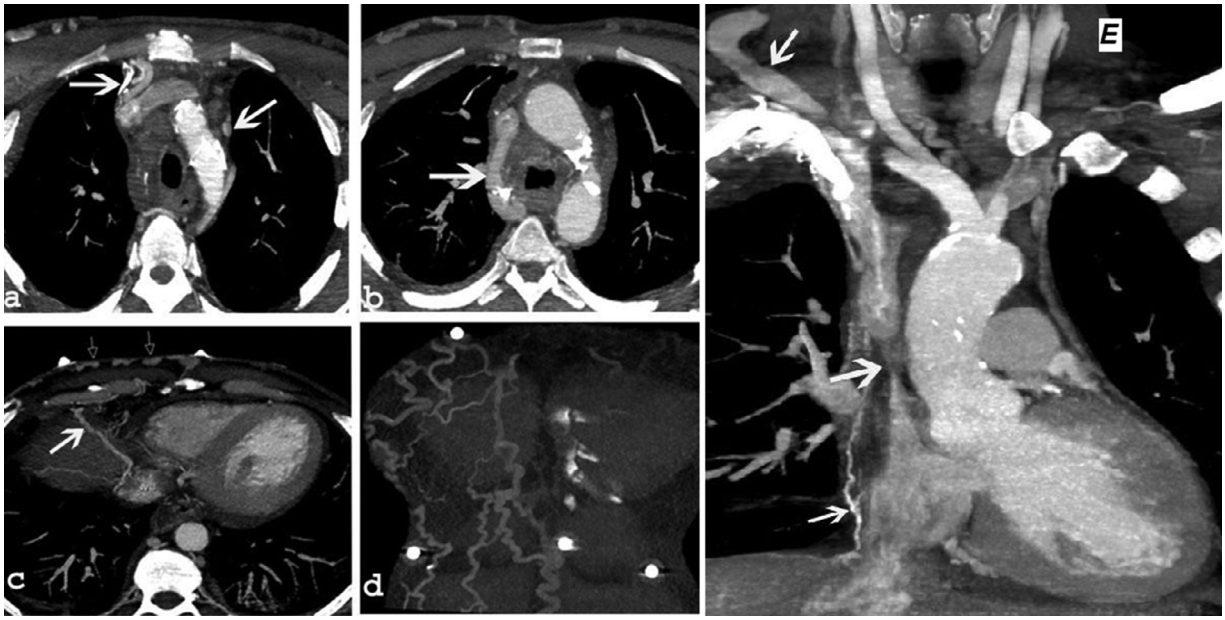

Fig. 1 – (A) Prominent right internal mammary vein and left superior intercostal vein. (B) Prominent azygous vein. (C) Collateral at diaphragmatic veins. (D) Anterior Superficial chest /abdominal walls venous anastomoses. (E) MDCT coronal-oblique reformatted image. Upper arrow pointed to the prominent right external jugular vein, the middle arrow is distal SVC obstruction at post azygous junction and the lower arrow is collateral at pericardophrenic vein with diaphragmatic veins.

regular hemodialysis for the last 5 years. The hemodialysis started through the right subclavian permanent dialysis catheter for 1 year. The nephrology team removed the catheter due to low flow, and inserted another catheter many times in the right and left subclavian veins. The catheter again failed to perform efficient hemodialysis. They changed the dialysis route to the right femoral permanent catheter as the patient was not fit for arteriovenous fistula due to reduced left ventricular function [2]

In the last 12 months, he developed progressive shortness of breath with minimal effort and swelling of his upper part of the body. He had difficulty swallowing with alternating hoarseness of voice.

Examination revealed engorgement of the neck veins, facial puffiness, pitting edema of his both upper limbs, and numerous dilated veins on the chest and abdominal walls.

Laboratory results showed, hemoglobin 10.2 g/dL, creatinine 688 umol/L, and brain natriuretic peptide 9110 pg/mL. Chest computed tomography revealed prominent right internal mammary vein and left superior intercostal vein (Fig. 1A). Prominent azygous vein (Fig. 1B). Collateral at diaphragmatic veins (Fig. 1C). Anterior superficial chest and abdominal walls venous anastomoses (Fig. 1D). Multidetector computed tomography coronal-oblique reformatted image showed prominent right external jugular vein, distal SVC obstruction at post azygous junction, and collateral at pericardiophrenic vein with diaphragmatic veins (Fig. 1E). Venography showed occluded SVC (Fig. 2A and Video 1).

Procedure details

SVC obstruction recanalization using conventional wires failed due to an extensively long fibrosed segment of 21 mm of total obstruction with a mild degree of malalignment of upper and lower segments (Fig. 2B and Video 2). We established a left internal jugular vein (IJV) and a right femoral vein accesses to achieve venovenous rail after crossing the obstruction. Through a left IJV Fortress 6F/45 cm (Biotronik, Germany) supportive sheath and launcher multipurpose 6F (Medtronic, Ireland) guiding catheter, many wires tried to cross the SVC obstruction. We escalated the wires from 0.014 Astato wire (Asahi Intec, Japan), 0.014 win/200, 0.018 connect 200 (Abbott Medical), and 0.035 stiff Terumo (Terumo Japan)., We tried all these wires with regular drilling or knuckled ways but failed to cross the SVC obstruction. We decided to use “diathermy” with the aid of a regular electrocautery machine. We connected the Hi-Torque 0.014 Astato guidewire to the electrocautery pen. We applied a 50 Watt of energy with careful alignment of both anteroposterior and lateral projections to ensure keeping within the line of the obstructed segment. We applied an intermitted pulses of diathermy until the wire reached the outlet of the obstruction in the SVC above the azygos vein (Fig. 2C). We snared the wire from the left IJV access creating venovenous loop started at right femoral vein to IVC to the right atrium to SVC passing the obstruction to the innominate vein (Fig. 2D and Video 3). Incremental balloons were started with 2/30 mm coronary balloons up to Sterling balloon 7/40 mm (Boston Scientific).(Fig. 2E and Videos 4-7). We used 2 8-zig CP bare stents

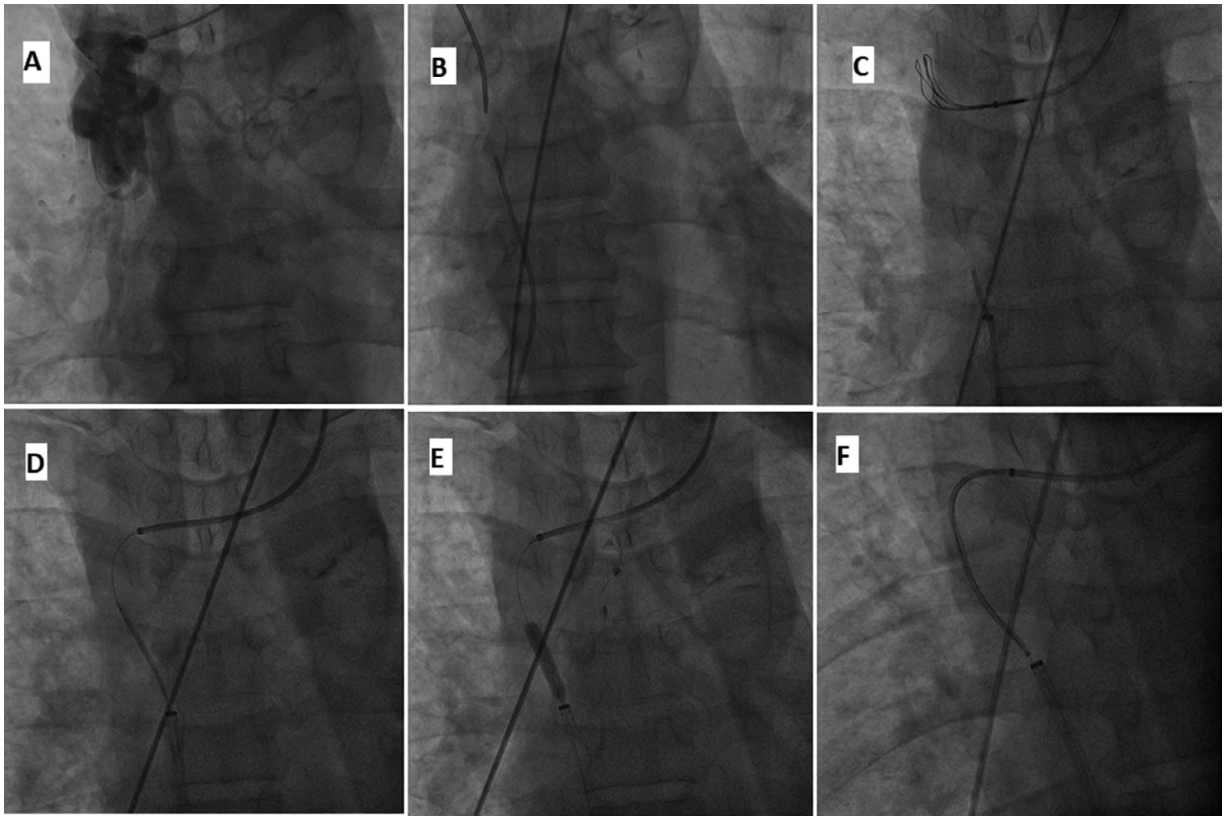

Fig. 2 – (A) SVC injection showed a total obstruction. (B) Extensively fibrosed and long segment of 21 mm of total obstruction. (C) Intermitted pulses of diathermy applied till the outlet of the obstruction in the SVC crossed. (D) The wire was snared from the left IJV access, exteriorized creating a venovenous loop. (E) Incremental balloons started with coronary 2-mm balloons. (F) Catheter crossed after many balloons' dilations.

39 mm, mounted on BIB 20/40 mm (NuMed, Canada) (Fig. 3 A–E, and Videos 8,9). Final angiography revealed good flow and no residual stenosis and no gradient across the SVC and right atrium (Fig. 3 F and Video 10). The procedure was successful, and the patient improved dramatically with complete resolution of his SVC obstruction symptoms and was discharged on the second day postprocedure in a good condition. At 1 month follow-up, the patient resumed his normal activities with no recurrence of SVC syndrome symptoms.

Discussion

When the SVC is obstructed, blood flows through the venous collaterals that dilate to accommodate blood flow. This results in superficial blue vessels on the skin surface. The obstruction can increase edema in the luminal diameter of the pharynx and larynx, which causes stridor or hoarseness of voice [3]

Plain radiography, computed tomography, and venography are used for confirmation of the diagnosis of SVCS [4] Cancer causes 95% of SVCS; the other 5% of the SVCS could be related to thrombosis of SVC. Yellin et al. reported the management of 63 patients with SVCS over 16 years. He concluded that SVCS per se should not be feared as symptomatic relief is the rule, accurate diagnosis can be achieved with minimal morbidity, and the versatile underlying etiology dictates the outcome that can be improved with appropriate therapy [5]. Baltayiannis et al. reported the treatment of 17 patients with cancer-induced SVCS with an endovenous stent. He concluded that percutaneous venous wall stent placement in the SVC is a simple, safe, and effective technique to relieve SVC syndrome caused by malignant diseases rapidly [6]. Optimal treatment guidelines for benign SVC syndrome are not yet established, and they may vary from those for malignant cases. Patients with benign SVC syndrome are generally younger and have longer life expectancies than those with malignant obstructions, making long-term patency of utmost importance [7]. Hooker et al. reviewed 145 cases of benign SVCS in 10 series (average follow-up time, 24 months), 96% of patients experienced symptomatic relief after endovascular management [8]. Only 5.2% of the patients had a complication, and most were minor; they included access-site hematoma, asymptomatic stent migration, and SVC perforation did occur in rare cases [8]. Greenwell et al. presented a case of esophageal varices as a complication of dialysis catheter-induced SVC stenosis resolved with percutaneous angioplasty and stenting of the SVC stricture [9]. Although few data exist to compare open surgical and endovascular techniques directly, both approaches appear to produce similar rates of patency. Both

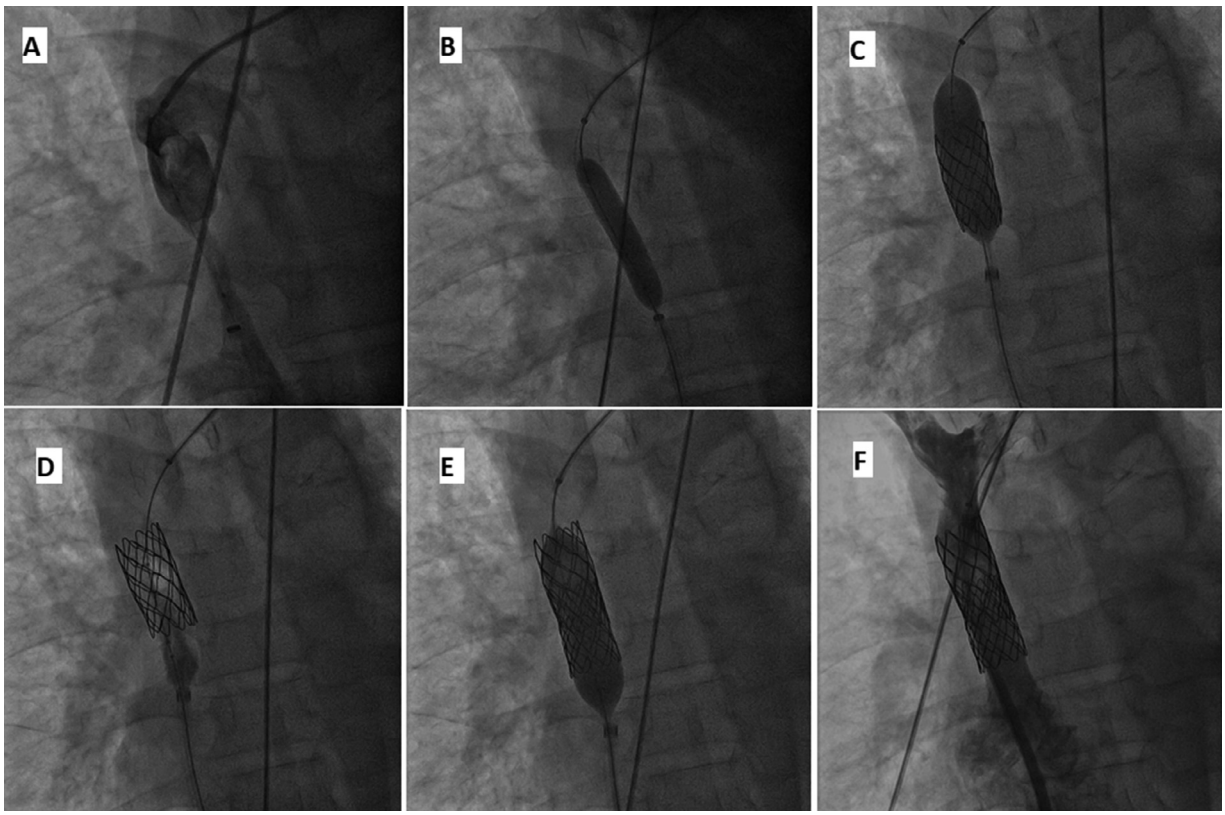

Fig. 3 – (A) The blood flow started to appear in SVC. (B) Larger balloon dilation. (C and D) First 39-mm CP (NuMed, Canada) bare stent. (E) Second 39mm CP (NuMed, Canada) bare stent. (F) Final result with full restoration of SVC flow.

approaches frequently necessitate secondary intervention to maintain patency, but endovascular management is associated with fewer complications [10]. In this case, we succeeded to open a chronic SVC obstruction using diathermy to facilitate wire crossing. The SVCS symptoms disappeared. There was one report of using diathermy to open an occluded innominate vein for pacemaker lead placement [11]. Therefore, we agree with other reports that endovascular techniques are suitable for the initial management of benign SVC syndrome, and that open surgery should be reserved for lesions that are refractory to endovascular techniques.

Conclusion

Diathermy use to cross a chronic total SVC obstruction is feasible and safe Endovascular techniques are suitable as initial management of benign SVC syndrome.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2020.05.002.

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