

Successful retrograde endovascular reconstruction of chronic total occlusion of subclavian vein in a haemodialysis-dependent patient – a case report

Skuteczna wewnątrznaczyniowa rekonstrukcja przewlekłej całkowitej niedrożności żyły podobojczykowej u hemodializowanej chorej – opis przypadku

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Abstract

Unilateral arm swelling without thrombosis is rare. We report a case of significant right arm swelling due to chronic total occlusion of the right subclavian vein in a 62 year-old haemodialysis-dependent female patient. Endovascular reconstruction of the subclavian vein with a 16 × 80 mm Epic balloon-expanding stent (Boston Scientific, USA) was performed through the retrograde route for chronic total occlusion, in which a guidewire was passed from the right superior vena cava. On the following day, left arm swelling had improved. Nine months following the stent placement, the right arm swelling had not recurred.

Key words: chronic total occlusion, endovascular reconstruction, retrograde recanalisation, subclavian vein, unilateral arm swelling

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Introduction

Central venous stenosis and obstruction is a major concern in patients undergoing prolonged haemodialysis for end-stage renal disease. Central venous disease (CVD) has been defined as ≥ 50% stenosis involving the internal jugular, subclavian, or axillary veins [1]. The incidence of central venous stenosis is 25–40% [2]. The main causes of central venous stenosis in haemodialysis patients are prolonged central venous catheterisation and high-flow status in the arteriovenous fistula (AVF) or graft, causing intimal trauma or propagation of infection along the venous wall due to secondary infection subsequently leading to venous intimal hyperplasia and stenosis [2]. Clinically,

central venous stenosis manifests as ipsilateral arm or neck swelling, elevated venous pressure during haemodialysis, and failure of haemodialysis access. This initial phase is usually prolonged and asymptomatic, due to the simultaneous expansion of dense collateral veins around the obstruction that facilitate drainage of the upper extremity. Thrombotic occlusion eventually occurs due to stagnant and turbulent blood flow in the narrowed segment of the subclavian vein. At times, propagation and downstream extension of this thrombus into the axillary vein can then result in further obstruction of critical collateral veins, resulting in an acute clinical presentation. The aim of the treatment is to provide symptomatic relief to patients while preserving the function of the arterio-venous fistula.

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Case report

A 65 year-old woman, on haemodialysis (HD) for the past nine months due to end-stage renal disease, presented with gradual onset swelling of her right upper extremity (Figure 1A) which had been noted six months after the creation of a native brachial arteriovenous (AV) fistula for HD. Her symptoms gradually worsened with inefficient dialysis. Due to profound oedema, the veins could be accessed. Right femoral vein was accessed and 3,000 U (50 U/kg) of intravenous heparin was administered before the procedure. Venogram showed total occlusion of right subclavian vein (Figure 2C, D). Right superior vena cava was hooked by 6F Judkins right guiding catheter (Medtronic, USA). Proximal fibrous cap was penetrated with the help of a 0.014-inch Conquest Pro 12 guidewire (Asahi, Japan) over Finecross microcatheter support (Asahi, Japan) (Figure 3A, B). It was dilated with a 1 × 5 mm sapphire balloon (OrbusNeich, China). Further advancement of the wire was impossible. Therefore, we planned to go with an ipsilateral arterial injection to delineate the venous course. Right femoral artery was accessed and Judkins right diagnostic catheter was parked in the right brachial artery. On contrast injection, subclavian vein was profiled in delayed levophase showing near total narrowing of ostia of subclavian vein (Figure 4A,

B). Conquest wire along with finecross microcatheter was exchanged with a 0.035-inch extra stiff Terumo guidewire (Terumo, Japan) and the lesion was traversed (Figure 5A). Lesion was predilated with a 6 × 40 mm and an 8 × 40 mm Mustang semi-compliant balloon (Boston Scientific, USA) at 10 atm pressure for 1 minute (Figure 5B). Lesion was stented with a 16 × 80 mm balloon-expandable stent and both ends were flared using a high pressure non-compliant balloon (Figure 6). During deployment of the stent, slight traction was maintained in order to avoid any distal migration of the stent. A substantial improvement in her swelling was noted the following day and she was discharged with aspirin and clopidogrel, 75 mg each, along with atorvastatin 20 mg (Figure 1B). Nine months after the stent placement, the right arm swelling had not recurred with further improvement and with the fistula working quite well (Figure 1C).

Discussion

In recent years, as the number of surviving patients with end-stage renal disease has increased, so have the complications related to dialysis access. The development of central venous disease leads to an increase in arteriovenous pressure at the dialysis access site. The resultant



Figure 1. Swelling of right forearm: A. On presentation; B. Next day after stenting, C. At 9-months follow-up

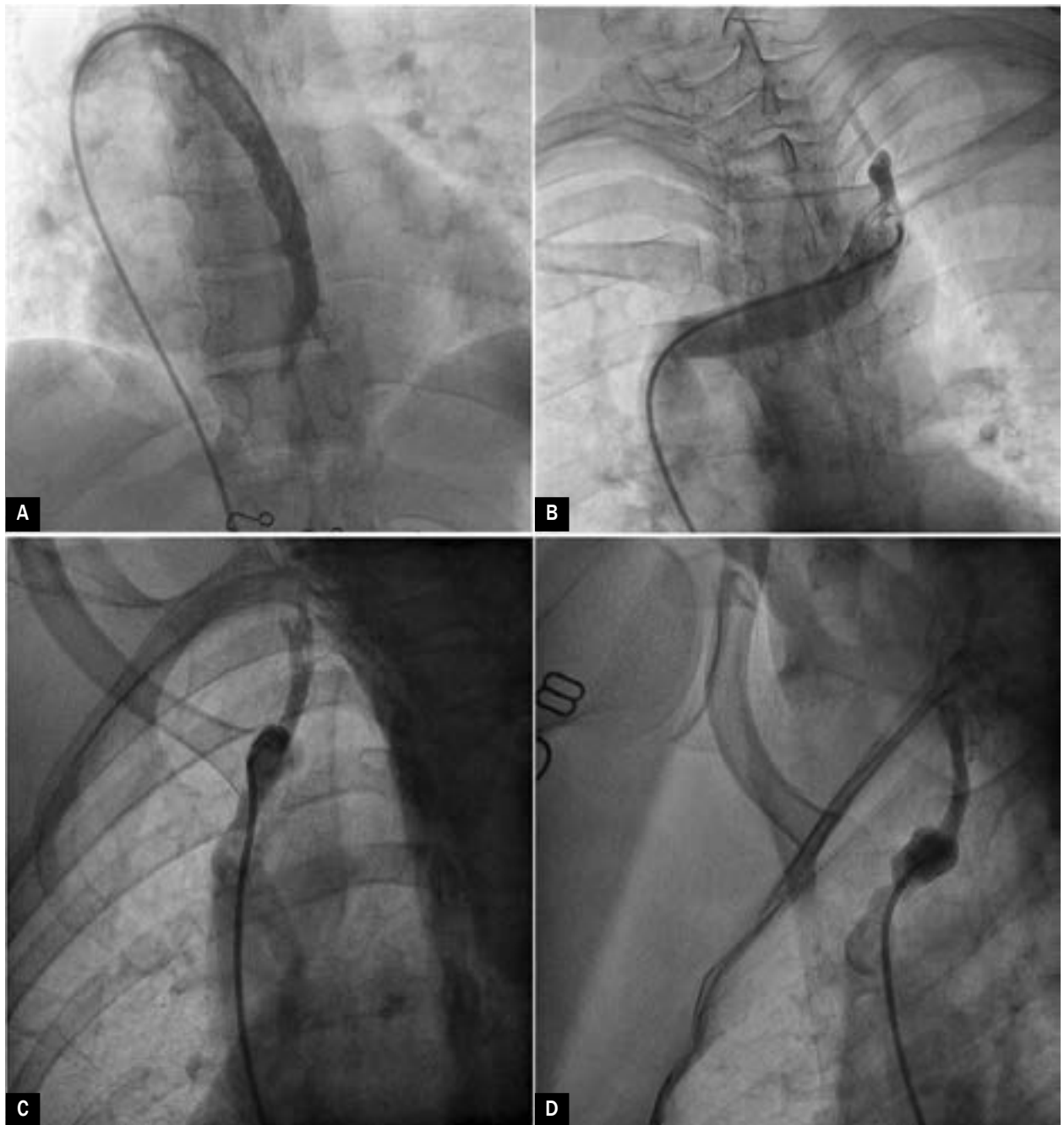


Figure 2. Venogram showing total occlusion of right subclavian vein (C, D); Hemiazygous vein (A); Left brachiocephalic vein (B)

venous hypertension causes significant local morbidity by causing extremity, neck, and chest swelling. The initial management strategies were either surgical ligation of the fistula followed by abandonment of the dialysis access site, or open surgical repair of the central veins, which is associated with high morbidity [3].

The endovascular approach, which started in the 1980s, for treating central venous stenosis, is now the treatment of choice. The various endovascular methods

used are balloon angioplasty, stenting, and, more recently, cutting balloon angioplasty, but the optimal management strategy is still not clear. Primary stenting has been advocated by some for the treatment of CVD [4, 5], while others have advocated balloon angioplasty as the primary treatment, reserving stenting for treatment failure or restenosis [6–9]. The most commonly used stents for central venous stenosis or occlusion are self-expandable stents. On the other hand, balloon-expandable stents are

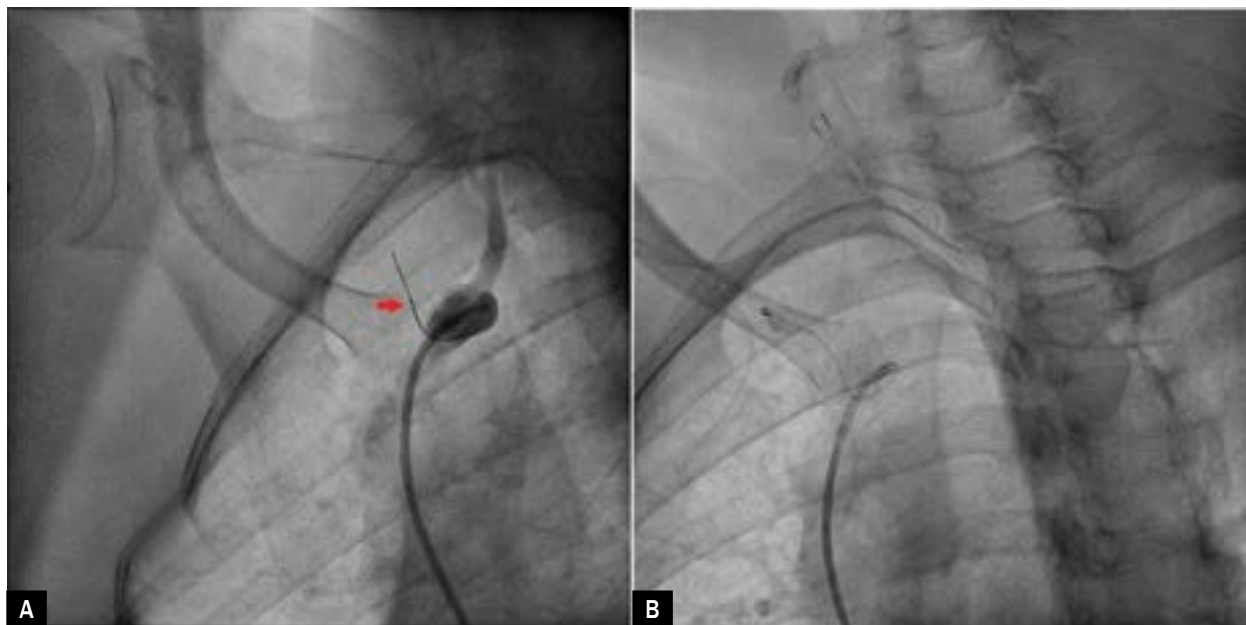


Figure 3A, B. Proximal fibrous cap was penetrated with help of Conquest Pro 12 guidewire over Finecross microcatheter support (red arrow – tip of microcatheter)

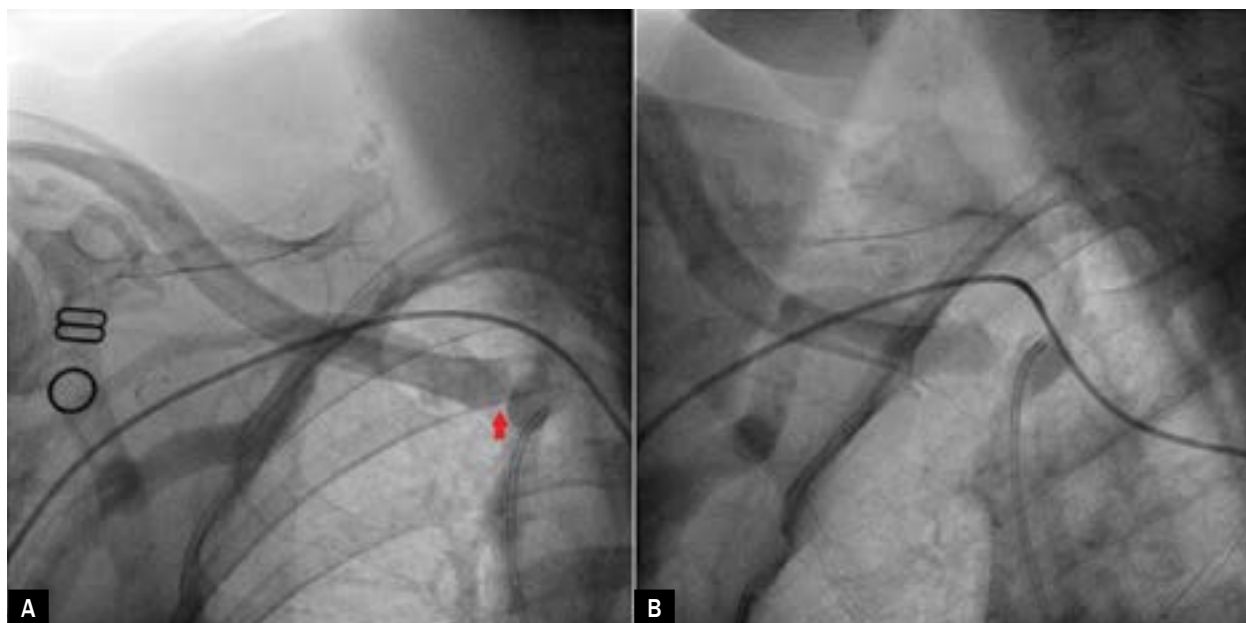


Figure 4A, B. On contrast injection, subclavian vein was profiled in delayed levophase showing near total narrowing of ostia of subclavian vein (red arrow)

used only when the stenosis is short and the diameter is large [10]. Although there has been the disadvantage that a balloon-expandable stent may have developed compression or deformation after deployment [10], we decided to use a balloon-expandable stent because the subclavian

vein was larger than the self-expandable stent available in India, with commercial sizes up to 12 mm.

The National Kidney Foundation Disease Outcomes Quality Initiative guidelines (NKDOQI) have recommended angioplasty as the preferred treatment for CVD, with or

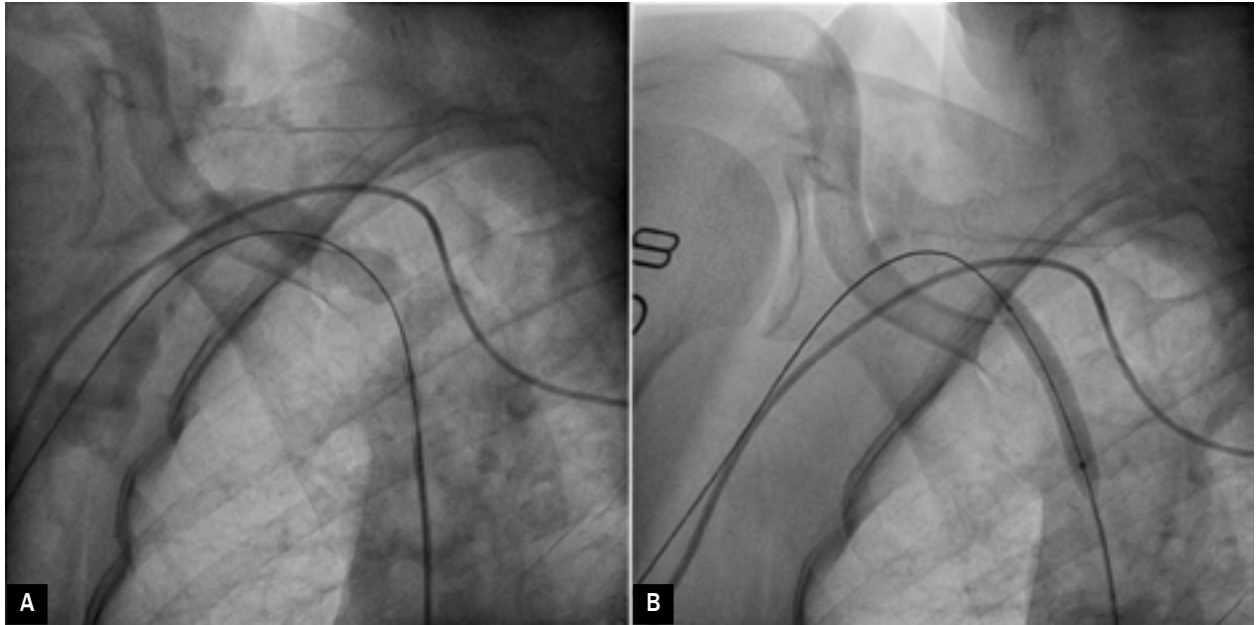


Figure 5. Lesion crossed with Terumo wire (A); Lesion being predilated with Mustang semicompliant balloon (B)

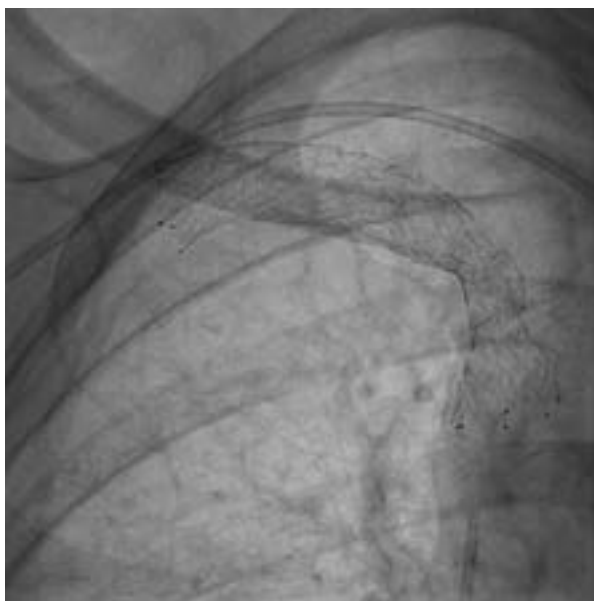


Figure 6. Well deployed balloon-expandable stent after flaring with post deployment high pressure dilation by non-compliant balloon

without stent placement [11]. The diameter of the stent should be the same as the adjacent normal vein. Like coronary stenting, an appropriate geographical match may sometimes not be achieved, and should be better left as such because they remodel themselves with time.

More recently, covered stents have also been utilised for the treatment of central venous stenosis. A high technical success rate with favourable outcomes have been reported in the limited literature available on the efficacy of covered stents [12]. Thus, covered stents appear to be an effective endovascular treatment option. However, their cost remains the limiting factor and a cost/benefit analysis should be taken into consideration as well. With a bare metal stent, primary patency rates at 3, 6 and 12 months are 63–100%, 42–89%, and 14–73% respectively, as reported in the literature. Cumulative patency rates are 72–100%, 55–100%, and 31–97% at 3, 6, and 12 months respectively [13].

Conflict(s) of interest

The authors declare no conflict of interest.

Streszczenie

Rzadko obserwuje się jednostronny obrzęk kończyny górnej niespowodowany zakrzepicą. Autorzy opisują przypadek znacznego obrzęku prawej ręki z powodu przewlekłej całkowitej niedrożności prawej żyły podobojczykowej u 62-letniej hemodializowanej chorej. U pacjentki wykonano zabieg wewnątrznaczyniowej rekonstrukcji żyły podobojczykowej za pomocą stentu rozprężanego na balonie Epic 16 × 80 mm (Boston Scientific, Stany Zjednoczone), w którym wprowadzono prowadnik do miejsca zwężenia przez prawą żyłę główną górną, wsuwając go w kierunku przeciwnym do przepływu krwi. Następnego dnia po zabiegu stwierdzono zmniejszenie obrzęku kończyny. W ciągu 9 miesięcy po wszczępieniu stentu nie obserwowano ponownego obrzęku prawej kończyny górnej.

Słowa kluczowe: przewlekła całkowita niedrożność, rekonstrukcja wewnątrznaczyniowa, rekanalizacja wsteczna, żyła podobojczykowa, jednostronny obrzęk kończyny górnej

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