The First Case Using Synthetic Vein for Jugular to Iliac Vein Bypass to Treat Superior Vena Cava Obstruction: Clinical Dilemma and Literature Review

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Abstract

Chronic refractory venous hypertension is a common complication following repeated central venous cannulation performed as a temporary vascular access for dialysis in patients with chronic renal failure. The symptoms of venous hypertension may diverge from being asymptomatic to severe edema, ulceration, headaches, bloating, and blackouts, especially if the patient has a surgical arteriovenous fistula for dialysis in any of his upper limbs. Treatment options for such patients are mainly directed toward endovascular management via balloon angioplasty and possibly stenting of the stenosed vein. Resistant lesions or cases with total venous occlusion coerce surgeons to consider surgical bypass. We present a case of a 43-year-old patient with history of renal impairment and repeated bilateral central venous cannulation for dialysis. The patient experienced superior vena cava syndrome with bilateral total occlusion of the internal jugular veins and both subclavian veins (with an occluded previously inserted stent) along with the superior vena cava. An extra-anatomical bypass was done from the left internal jugular vein to the left external iliac vein using a synthetic silver Dacron ringed graft. The procedure was successful and resulted in relief of the patient's symptoms and a dramatic improvement of the patient's quality of life. Superior vena cava syndrome represents 1 of the most challenging complications for patients with chronic renal impairment and repeated central venous cannulation. The endovascular approach is currently gaining popularity as the first line of treatment for such patients. However, surgical management is sometimes the only available option when the endovascular approach is not technically feasible. Our case, along with others, shows that an extra-anatomical synthetic graft bypass can be a reliable, less invasive option for the management of superior vena cava syndrome once surgical intervention is inevitable.

Keywords: *superior vena cava syndrome, venous hypertension, complications of central venous cannulation, jugular to iliac vein bypass*

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http://dx.doi.org/10.1016/j.java.2015.01.004

Introduction

Patients with chronic renal failure undergo repeated attempts for central venous access for dialysis on a temporary basis. Unfortunately these attempts lead to the inevitable fibrosis and thrombosis of the central veins, and subsequently, venous hypertension. Thrombosis is a well recognized complication of central venous catheterization and its overall incidence is up to 13%.[1]

The symptoms of venous hypertension include severe edema, ulceration, headaches, bloating, and blackouts. This mainly depends on the abundance and development of a collateral venous circulation to bypass the stenosis and occlusion. Moreover, the symptoms are markedly exacerbated with the presence of a surgical arteriovenous fistula in either of the upper limbs causing an increase in blood velocity, volume, and pressure loads flowing through the venous system. Five percent of patients with surgical arteriovenous fistulae present with symptoms of venous hypertension.[2] Diagnosis is mainly suspected by the clinical picture and confirmed by examination, which may show puffiness of the eyelids, facial plethora, dilated neck veins, and the presence of engorged collaterals along the neck and anterior chest wall. On examination, patients may also exhibit a positive Pemberton sign, which is marked facial plethora and some cyanosis within 30 seconds after a patient raises both arms simultaneously (Pemberton maneuver).[3] Investigations include duplex ultrasound and computed tomography venography to accurately delineate the exact site of stenosis or occlusion. It is reported that duplex ultrasound scanning finding of a peak vein velocity ratio of > 2.5 across the stenosis is the best criterion to use for the presence of a pressure gradient of ≥ 3 mm Hg.[4] Treatment options for such cases are mainly directed toward endovascular management via balloon angioplasty and possibly stenting of the stenosed vein. Resistant lesions or cases with total venous occlusion coerce surgeons to consider surgical bypass.

Patient Course and Management

A 43-year-old male renal transplantation patient with past history of hypertension, meningitis, and chronic renal failure presented to our clinic with disabling pain, bilateral upper limb swelling, and fullness in his head and neck along with plethora and congestion, which increased on leaning forward to the extent that "he can no longer tie his own shoes." The patient had received regular hemodialysis through a left brachiocephalic arteriovenous fistula, had a history of several bilateral central venous cannulation with double lumen catheters for dialysis, underwent renal transplantation 5 years ago, and had the fistula defunctioned after the transplant. Venography showed a right subclavian vein stenosis and a left subclavian and internal jugular vein total occlusion. Subsequently, the patient underwent balloon angioplasty and a stent was placed from the left subclavian vein to the superior vena cava 4 years ago. Two years later, the patient's symptoms started to reappear and another venogram showed total occlusion of the left internal jugular vein from the midneck, along with occlusion

Figure 1. **Conventional venography showing bilateral total occlusion of both internal jugular veins proximally and subclavian veins along with collateral flow through the internal thoracic vein (B) and the occluded left subclavian vein stent (A).**

of the previously placed stent (Figures 1, 2, 3, and 4). Attempts of redo endovascular management failed due to inability to pass the guide wire through the occluded stent. An original surgical plan was devised to bypass the occluded segments

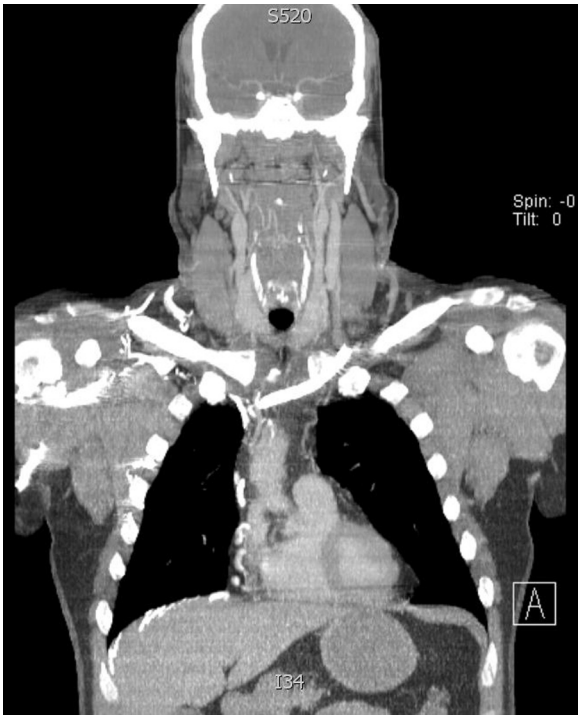

Figure 2. **Computed tomography venography showing bilateral total occlusion of both internal jugular veins and subclavian veins along with the occluded stent.**