Surgical Treatment of Cephalic Arch Stenosis through Rotation of the External Jugular Vein

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The percutaneous transluminal balloon angioplasty or cephalic vein transposition is the treatment for cephalic arch stenosis. In some cases, rotation of the external jugular vein may be a good option for the cephalic arch problems. We describe a new technique to treat cephalic arch stenosis. The technique enables the cephalic arch and subclavian vein to be bypassed altogether through the rotation of the external jugular vein. It consists of 3 small incisions, thus causing minimal surgical damage.

INTRODUCTION

Proximal arteriovenous fistulas (AVFs) raise more problems and complications than distal AVFs. The anatomical feature of the end of the cephalic vein, when arterialized by the AVF, tends to cause stenosis on the junction with the subclavian vein due to the shear stress induced by the fistula on the cephalic arch.

Cephalic arch stenosis (CAS) is a complication that can occur when the cephalic vein has outflow problems, especially in brachiocephalic fistulas (BCFs). In some series, CAS has been reported in 39–77% of dysfunctional BCFs, with only 2–20% in lower arm fistulas.[1,2]

CAS can lead to thrombosis and to high incidence in cannulation aneurysms or increase the diameter of the entire cephalic vein. It may be treated by percutaneous transluminal balloon angioplasty (PTA) or cephalic vein transposition (CVT). The treatment with PTA has good results, but it does not last long because the hemodynamic problem is not solved with this procedure. To maintain the AVF patency, recurrent PTAs are required.[3] CTV corrects the CAS problem but is not free of complications. This treatment can achieve a better long-term patency with fewer reinterventions.[3,4]

PTA or CTV is the treatment of CAS mentioned in every paper. In this article, we describe a new technique to treat CAS. The technique which enables the cephalic arch and subclavian vein to be bypassed altogether through the rotation of the external jugular vein (EJV) is described next.

TECHNICAL NOTE

The surgical technique of rotation of the EJV was carried out with 3 short skip incisions (around 2 cm). The procedure was performed with local sedation in an outpatient setting.

The first incision (2 cm) was made above the clavicle where the cephalic vein turns inwardly toward the subclavian vein. The cephalic vein was isolated at this level.

The second incision (1 cm) was made in the neck, beneath the mandibular bone, in order to isolate and free the EJV superiorly. In order to entirely

Conflict of interest statement: The authors do not have any conflict of interest and were not funded.

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Ann Vasc Surg 2019; 61: 459–460
https://doi.org/10.1016/j.avsg.2019.04.046

Manuscript received: March 18, 2019; manuscript accepted: April 28, 2019; published online: 31 July 2019

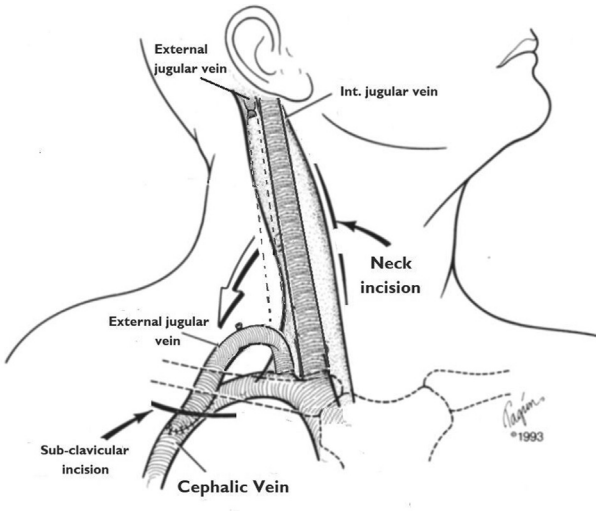

Fig. 1. Technique of rotation of the external jugular vein with 3 small incisions.

release the vein at this level, the skin was lifted with small retractors (Fig. 1) which were located and ligated one by one.

The third incision (1 cm) was made in the juxtaclavicular area of the neck, completing the isolation and release of the EJV from above. Following the EJV release, vein was then reintroduced subcutaneously to the first incision in order to reach the cephalic vein. The exposed cephalic vein was clamped and the EJV was anastomosed with a longitudinal venotomy of length 8 mm using 6/0 polypropylene in an end-to-side manner.

The thrill and the disappearance of the pulse on the cephalic vein were checked before the incisions were closed. The fistula could be cannulated on the first postoperative day.

DISCUSSION

BCFs are prone to persistent stenosis and occlusion events caused by shear stress induced by the fistula because of the anatomic termination of the cephalic vein at the point where it meets the subclavian vein at a right angle. The most common and often initial treatment is balloon angioplasty which dilates the stenosis but does not treat the cause and thus requires repeated interventions thereafter.

When stenosis reappears in less than 3 months, we commonly perform cephalic turn down to the axillary vein. Such elaborate procedure is technically demanding and is not free of complications.

As an alternative, following careful ultrasound mapping, we decided to use the EJV as a drainage outlet for the cephalic vein. We did this by rotating it toward the shoulder which allowed the cephalic arch and subclavian vein to be bypassed altogether. According to our experience, the average operative time of this technique is 60 ± 15 min, and without hospitalization. Learning how to perform the technique is challenging because it requires to identify and ligate the collateral veins. This is the procedure's main disadvantage but it allows the creation of a new exit drainage, decreasing the effects caused by CAS.

We did not find any article in the literature reporting the use of the EJV as a solution to resolve CAS. Jacobson and Hairmov[5] reported in 1977 the surgical treatment of subclavian vein thrombosis by the internal jugular vein (in 3 cases). Puskas and Gertler,[6] published in 1994 the use of the internal jugular vein as a solution to solve the subclavian vein thrombosis and the symptoms of venous hypertension exacerbated in a BC-AVF. These authors used the internal jugular vein due to thrombosis problems in the subclavian vein.

This technique may be less challenging than the cephalic curve for the axillary vein, but might be a good solution for CAS problems. As a conclusion, our experience shows that this technique is a good option to provide an extra drainage capacity in the AVF, reducing the shear stress effect in the cephalic arch. This technique does not preclude any other procedure (PTA or CVT) in case of failure. We are currently undertaking a prospective study to investigate the patency, rate of thrombosis, and surgical complications resulting from the use of our technique.

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