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POINT OF TECHNIQUE
ORIGINAL ARTICLE

Minimally invasive basilic vein transposition in the arm or forearm for autogenous haemodialysis access: A less morbid alternative to the conventional technique

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KEYWORDS

Basilic vein;
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Minimally invasive;
Fistula;
Transposition

ABBREVIATIONS

AVF, arteriovenous fistula;
BVT, basilic vein transposition;
KDOQI, Kidney Disease Outcome Quality Initiative;
s.c., subcutaneous;
US, ultrasonography

Abstract ***Objective:*** To devise a minimally invasive, less morbid yet effective alternative technique for basilic vein transposition (BVT) in the arm/forearm and to compare perioperative outcomes with the conventional technique.

Patients and methods: Patients undergoing BVT in the last two years (June 2013 to June 2015) were included in the study and the results were analysed. All patients were preoperatively evaluated using colour Doppler ultrasonography performed by the operating surgeon himself. For minimally invasive BVT, two or three small 1–2 cm incisions were made to completely mobilise the basilic vein, transposed in an anterolateral arm/forearm tunnel, and then anastomosed to the brachial or radial artery in the forearm and arm, respectively. The incision in the conventional technique was along the full length of the basilic vein, with the rest of the procedure remaining the same. Complications, pain, analgesic use, maturation and primary patency rates were compared between the techniques.

Results: In all, 30 patients underwent minimally invasive BVT and 34 patients underwent conventional BVT, with mean age of 52 and 55 years, respectively. The complications of wound haematoma (one vs four) and wound infection/dehiscence (two vs six) were less common in the minimally invasive BVT group compared to the conventional group. The analgesic requirement and visual analogue scale pain

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score was significantly less in the minimally invasive BVT group. All other variables assessed, such as maturation and primary patency rate at 1 year, were not significantly different between the groups.

Conclusion: Minimally invasive dissection of the basilic vein for vascular access transposition is a safe, reliable procedure with patency and functional outcomes comparable with those of conventional BVT.

Introduction

For patients with end-stage renal disease, the Kidney Disease Outcome Quality Initiative (KDOQI) guidelines recommend autogenous Brescia-Cimino (radiocephalic) or brachiocephalic fistula as the preferred type of vascular access [1]. But in patients where the cephalic vein is poorly developed, not patent, thrombosed, or if such access fails, the fistula of choice is basilic vein transposition (BVT) before switching onto complicated vascular graft surgery, as is suggested by KDOQI guidelines in 2006 [2]. The first description of BVT was in 1976 and since then it has been progressively accepted as a feasible option for failed cases of vascular access [3]. Using a videoendoscopic technique to dissect the basilic vein encouraged us to devise a minimally invasive procedure to perform BVT, with results comparable to the conventional technique but with less complications as a result of limiting the dissection. We previously described a minimally invasive BVT technique in 2010 [4]. Since then the technique has been modified and now has become more refined maintaining the functional outcome while further decreasing the related complications. The obvious disadvantages of the minimally invasive procedure are the longer operative time and that it is technically more demanding than the conventional technique. In the present study, we present a more refined and standardised minimally invasive technique and compare this new method with the traditional technique to perform BVT for perioperative outcomes.

Patients and methods

All patients in the last two years (from June 2013 to June 2015) undergoing BVT fistula, after preoperative evaluation by coloured Doppler ultrasonography (US), were included in the study. All these patients had either failed radiocephalic, in the case of forearm transposition, failed radiocephalic and brachiocephalic fistula in case of BVT. Also, if on Doppler US there was a poorly developed/absent cephalic vein then BVT was planned. Coloured Doppler US in our institute is routinely performed by the trained surgeon himself. Based on our own Doppler US experience and extensive review of the literature, we have devised a minimum diameter/-maximal depth of brachial artery and basilic vein for optimal results (Fig. 1a and b) [3,5], as this helps immensely in planning and prognostication. On table Doppler US is repeated to map the artery and vein, which minimises the need for extensive dissection (Fig. 1c and d).

Technique

The procedure is performed either with a brachial (upper limb) block with local anaesthesia or under general anaesthesia as determined by the anaesthesiologist.

Minimally invasive BVT in arm

After appropriate mapping of the artery and vein, a 2-cm incision is made in the medial aspect of the arm at the level of the cubital fossa along the length of the mapped vein. The basilic vein is identified and dissected. The superficial investing fascia layer is incised longitudinally along the length of the vein to achieve a maximum working space with a minimum length of incision. The proximal, distil end of the vein is 'slinged' and lifted up (Fig. 2a). The vein is freed from the perivenous tissue using cautery (monopolar) (Fig. 2a). Larger tributaries of the vein are tied, while smaller ones are coagulated (bipolar cautery) (Fig. 2b). Once it is felt that further dissection is not possible from this incision, a small artery forceps is inserted under vision along the length of vein underneath the skin to mark the site of the start of the next incision (skip incisions) (Fig. 2c). The vein underlying the undivided skin is also freed in a similar manner. Hook/right-angle retractors (Fig. 2d and e) enable proper skin lifting thus facilitating in freeing the vein present underneath the skin tunnel. Dissection of the basilic vein proceeds proximally up to the deltopectoral groove in a similar fashion (Fig. 2f), until the whole length of the vein becomes free. The basilic vein is then divided near its confluence in the cubital fossa and delivered out from the most proximal incision (Fig. 3a and b). At this point, an infant feeding tube (5–7 F) is inserted into the vein and flushed with saline and back flow checked. This is done to check the patency of the vein lumen (Fig. 3c). A bulldog clamp is applied at the proximal end of the dissected vein (Fig. 3d) and saline is again flushed through the infant feeding tube into the vein lumen. This results in hydrodistention of the