

# Superficialization of the outflow vein in case of a cubital fistula – always or sometimes?

Biser K. Borisov<sup>1</sup>, Sergey D. Iliev<sup>2</sup>

<sup>1</sup> Klinika Nefrologii i Dializoterapii Uniwersytetu Medycznego w Plewen, Bulgaria

<sup>2</sup> Klinika Chirurgii Uniwersytetu Medycznego w Plewen, Bulgaria

Article history: Received: 10.03.2019 Accepted: 20.02.2019 Published: 20.03.2019

## ABSTRACT:

**Introduction:** The hemodialysis treatment requires an outflow vein from an arterio-venous fistula which is easily accessible and suitable for multiple venepunctures. The increasing number of elderly patients, those overweight and those with diabetes mellitus, has led to increased number of primary cubital anastomoses. The purpose of this study was to show our attempt to superficialize the outflow vein (s) in patients with difficult venipuncture after a previously constructed native cubital fistula.

**Materials and method:** The data set is comprised of 442 arterio-venous anastomoses performed within a 5-year period (from 1st July 2011 until 30th June 2016) in the Clinic of Nephrology and Dialysis at Medical University, Pleven, Bulgaria. The primary cubital fistulas constitute 311 (70%) of all cases. Consecutive superficialization of the outflow vein was performed in 18 cases (6%).

**Results:** No case of complications was recorded – neither during the intervention, nor afterwards, when the fistula was used. One-year patency of the fistula was observed in 17 patients (94%). The surgery has been successful (comfortable access for puncture area) in 17 cases (94 %).

**Conclusions:** According to the data presented by us, the planned superfuidisation of the outflow vein(s) in cubital anastomoses shows good perioperative and one-year survival. It may be observed in patients with difficult-to-puncture veins and we recommend using it more often in practice. This intervention improves the quality of treatment in patients undergoing hemodialysis.

## KEYWORDS:

av fistula, superficialization, outflow vein

## INTRODUCTION

The increase in the number of patients undergoing hemodialysis with diabetes mellitus, obesity and at old age, provokes questions related to the technical aspects of the fistula construction – state of the vessels, possibilities for quality maturation and subsequent exploitation [1].

That is why the percentage of primary cubital arterio-venous anastomoses has increased in the recent years [2, 3, 4].

Superficialization of a deep vein segment was first described by F. Dagher in 1976 [5].

In 1983, Paul Koontz and Thomas Helling first described the superficialization of a brachial vein [6].

## MATERIALS AND METHOD

### Materials

In a 5-year period (from 1st July 2011 until 30th June 2016), 442 arteriovenous anastomoses were constructed in the Department of Nephrology and Dialysis. There were 311 (70%) primary cubital anastomoses, and subsequent superficialization of the outflow vein was performed in 18 of them (6%). Distribution of patients by sex shows that 13 (72%) men and 5 (28%) women were operated on at a mean age of 58 (+/- 12.3) years.

Operative intervention was performed at least 4 weeks after the construction of an anastomosis. The indications for conducting

the surgical procedure were: depth of outflow vein >10 mm and length >60 mm in the presence of one vein and >30 mm, with two outflow veins.

### Description of the method

After cleaning the operative field three times with povidone-iodine, local anaesthesia was induced with 1% lidocaine and a longitudinal incision was made immediately next to the outflow vein, starting at about 2–3 cm from the anastomosis zone. The vein was carefully removed and gripped with rubber grippers (Fig. 1. and 2.).

First, the vein was carefully released from the wrapping fascia, which may in some cases cause compression of the vessel. Afterwards, all branches of the vein were ligated. We used silk threads – 3/0 for ligatures, and the larger branches were further stitched with monofilament, non-resorbable, polypropylene threads – 6/0. These manipulations are usually followed by additional blood loading and elongation of the outflow vein.

After the vein was repaired at a sufficient length (at least 10 cm!), the real superficialization began. It was performed with layer-by-layer sewing of the tissues while the vein was elevated. We used 3/0 silk thread and an atraumatic needle to close the fat tissues and fascia. When lifting the vein, we considered leaving a space around the vein of about 1 cm with no folding of the vessel. In our opinion, this helps to avoid subsequent pressure from the surrounding tissues. Despite almost complete maturation of the vein, the procedure is always followed by further extension of the vein. In a lateral view, the superficialized vein looks like a trapezoidal contour whose base is the fatty tissue and fascia.



**Fig. 1. i. z.** Two examples of outflow vein removal.



**Fig. 3.** The operation is finished.



**Fig. 4.** Superficialized vein - suitable for multiple venepunctures.

When the vein is lifted from its original site, at least 2 cm of its length is lost on both sides. From the preformed 10-cm-long (at least) outflow vein, only 6 cm remain available for puncturing. Therefore, the vein before superfluidization should be as long as possible in patients with deeper venous vessels and more tender in those with obesity.

We use stitch threads and vertical or horizontal mattress sutures, which we believe will help better adjust the skin edges without rough scraps. The sutures are removed after the 15th post-operative day and the vein is immediately available for puncture (Fig. 3.).

We do not use pre- or post-operative antibiotic prophylaxis. Surgery has not required subsequent hospitalization in any of our cases.

## RESULTS

No complications were recorded – neither during the intervention, nor during fistula use (Fig. 4.).

One-year patency of the fistula was observed in 17 patients (94%).

The surgery was successful (comfortable access to puncture area) in 17 cases (94%).

In the common group, extra-early (up to the 7-th day) fistula patency was found in 95%, early (up to the 3rd month) – 80%, and one-year cumulative patency was 94%.

## DISCUSSION

The goal of hemodialysis AV fistula creation is to achieve a functioning dialysis access. A matured AVF, as defined by K/DOQI, follows the rule of 6s: 6 mm in diameter, 6 mm in depth, with a blood flow of 600 mL/min, and a 6–10-cm-long segment with straight course for easy cannulation with 2 needles [7]. Nonmaturing AVF should be evaluated and referred for salvage procedures. The success rate of salvage procedures remains high [7, 8].

In the past two decades, there has been an increase in the number of patients with different co-morbidities such as diabetes, heart failure, chronic vascular problems, overweight or in the number of the elderly. In a large number of these cases, primary cubital fistulas are performed. After their establishment, the use of the av fistula is often difficult due to the short section of the outflow vein accessible for puncture.

The superficialization of the outflow vein(s) is not a new procedure, although most articles report a small number of patients [9, 10].

There have also been reports of more recent variations associated with reduced procedural invasiveness, such as liposuction and lipectomy [9, 10]. S. El-Mallah (1998) reported better postoperative results in cases where superficialization was performed as a second procedure following the initial construction of a native fistula [11].

Similar results are reported by other authors [12, 13]. Even in cases of elbow fistulas the superficialization is also possible in the case of distal anastomoses in obese patients [14].

Our experience confirms the good patency of the anastomosis and easy operation. This raises the question of whether the methodology should be used extensively in practice since it provides a sufficiently long, wide and superficial segment accessible for multiple venipunctures. In our opinion, it is more appropriate to carry out the superfluidization of the outflow vein in the second stage. This

will first allow us to evaluate the quality of the constructed fistula, to work on an anatomically modified vein and ultimately to prevent some mistakes like allowing for inadequate space around a vein that is still undiluted and elongated.

Extended use of the technique would allow for reduced use of central venous catheters and vascular prostheses in the hemodialysis compartments.

## CONCLUSION

Our experience demonstrates that the planned superficialization of the outflow vein(s) is beneficial and highly advisable. It is a technically easy to perform method that does not require hospitalization. It also improves the quality of hospital treatment of hemodialysis patients.

## REFERENCES:

1. Palmes D. et al.: Perforating vein fistula is superior to forearm fistula in elderly haemodialysis patients with diabetes and arterial hypertension. *Nephrol Dial Transplant.*, 2011; 26(10): 3309–3314.
2. Konner K.: Primary vascular access in diabetic patients: an audit. *Nephrol Dial Transplant.*, 2000; 15(9): 1317–1325.
3. Allon M. et al.: Factors associated with the prevalence of arteriovenous fistulas in hemodialysis patients in the HEMO study. Hemodialysis (HEMO) Study Group. *Kidney Int.*, 2000; 58(5): 2178–2185.
4. Lomonte C., Basile C.: On the phenomenology of the perforating vein of the elbow. *Semin Dial.*, 2009; 22(3): 300–303.
5. Dagher F., Gelber R., Ramos E. et al.: Basilic vein to brachial artery fistula: a new access for chronic hemodialysis. *South Med. J.*, 1976; 69(11): 1438–1440.
6. Koontz P., Helling T.: Subcutaneous brachial vein arteriovenous fistula for chronic hemodialysis. *World J. Surg.*, 1983; 7(5): 672–674.
7. Vascular Access Work Group. Clinical practice guidelines for vascular access. Guideline 3. Cannulation of; 48 Suppl fistulae and grafts and accession of hemodialysis catheters and port catheter systems. *Am J Kidney Dis.*, 2006; 48: S176–S247.
8. Beathard G.A.: We refuse to give up on nonmaturing fistulas. *Semin Dial.*, 2016; 29(4): 284–286.
9. Bourquelot P. et al.: Lipectomy as a new approach to secondary procedure superficialization of direct autogenous forearm radial-cephalic arteriovenous accesses for hemodialysis. *J Vasc Surg.*, 2009; 50(2): 369–374.
10. Gausey M.W., Quan R., Hamawy A., Singh N.: Superficialization of arteriovenous fistulae employing minimally invasive liposuction. *J Vasc Surg.*, 2010; 52(5): 1397–1400.
11. El-Mallah S.: Staged basilic vein transposition for dialysis angioaccess. *Int Angiol.*, 1998; 17(2): 65–68.
12. Tomoteru K., Masato T., Tomoyuki S. et al.: An arteriovenous fistula utilizing brachial artery and brachial vein with superficial repositioning. *J Jap Soc Dial-Ther.*, 2003; 36(5): 311–315.
13. Pantea St. et al.: Brachial vein superficialization: a special method of vascular access for hemodialysis. *TMJ*, 2008; 58(3–4): 149–154.
14. Weyde W., Krajewska M., Letachowicz W., Klinger M.: Superficialization of the wrist native arteriovenous fistula for effective hemodialysis vascular access construction. *Kidney Int.*, 2002; 61(3): 1170–1173.

Word count: 1640

Page count: 4

Tables: –

Figures: 4

References: 14

DOI: 10.5604/01.3001.0013.1027

Table of content: <https://ppch.pl/issue/11974>

Copyright: Copyright © 2019 Fundacja Polski Przegląd Chirurgiczny. Published by Index Copernicus Sp. z o. o. All rights reserved.

Competing interests: The authors declare that they have no competing interests.



The content of the journal „Polish Journal of Surgery” is circulated on the basis of the Open Access which means free and limitless access to scientific data.



This material is available under the Creative Commons – Attribution 4.0 GB. The full terms of this license are available on: <http://creativecommons.org/licenses/by-nc-sa/4.0/legalcode>

Corresponding author: Biser Borisov; Department of Nephrology and Dialysis, Medical University, Plevna, Bulgaria; E-mail: biserugo@abv.bg

Cite this article as: Borisov B., K., Iliev S., D.: Superficialization of the outflow vein in case of a cubital fistula – always or sometimes?; *Pol Przegl Chir* 2019; 91 (3): 6–9

