FRESENIUS MEDICAL CARE

Timely referral to angioplasty due to arteriovenous fistula maturation failure

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Presentation outline

Introduction

Arteriovenous Fistula Maturation

Clinical maturation is a dynamic process in which vascular remodeling is facilitated by release of nitrous oxide and breakdown of elastin to permit enlargement of the draining vein.[1]

Blood flow through the anastomosing artery increases dramatically and the vein wall thickens to allow regular cannulation. [2]

Adaptation of veins to the arterial environment, including the different hemodynamic conditions and increased oxygen tension, is characterized by venous wall dilation and thickening as an integration of the underlying processes of cellular migration and proliferation, as well as extracellular matrix deposition and remodeling. [3]

1 - Riella MC, Roy-Chaudhury P. (2013) Vascular access in haemodialysis:Strengthening the Achilles' heel. Nat Rev Nephrol 9: 348–357.
2 - Oliver M. The Science of Fistula Maturation. (2108) JASN November 2018, 29 (11) 2607-2609; DOI: https://doi.org/10.1681/ASN.2018090922.
3 - Lu, D. Y., Chen, E. Y., Wong, D. J., et al (2014). Vein graft adaptation and fistula maturation in the arterial environment. *The Journal of surgical research*, *188*(1), 162–173. doi:10.1016/j.jss.2014.01.042.

Introduction

Arteriovenous Fistula Maturation Failure

The definition of failed maturation includes a combination of:

- **Early thrombosis;**
- **Low blood flow (Qa);**
- **Inadequate clearance;**

Resulting in an unreliable use of arteriovenous fistula (AVF).[2]

Studies report a wide range of successful maturation rates between 40% to 80%.[4]

2 - Oliver M. The Science of Fistula Maturation. (2108) JASN November 2018, 29 (11) 2607-2609; DOI: https://doi.org/10.1681/ASN.2018090922.
4 - Carney C, Christian O, Steven K. (2018) Prognostic Factors for Arteriovenous Fistula Maturation. Ann Vasc Surg 2018: 1–4 https://doi.org/10.1016/j.avsg.2018.01.069.

Introduction

Arteriovenous Fistula Maturation Failure

Timely angioplasty can safely and effectively improve the lifetime of the immature arteriovenous fistula with success.[5,6,7,8]

Physical examination (PE) is determinant to identify arteriovenous fistula maturation, and if that has not occurred within six weeks, some procedure must be done to confirm the diagnosis and correct malfunction.[9]

5 - Shin L, Gyeong J, Byungmo L, et al. (2018) Endovascular management in immature arteriovenous fistula for hemodialysis. Medicine (2018) 97:36; http://dx.doi.org/10.1097/MD.0000000000012211.

6 - DerDerian T, Hingorani A, Ascher E, et al. (2013) To BAM or not to BAM?: a closer look at bal- loon-assisted maturation. Ann Vasc Surg 2013;27:104-9.

7 - Liang, HL., Fu, JH., Wang, PC. et al. Cardiovasc Intervent Radiol (2014) 37: 671. https://doi.org/10.1007/s00270-014-0856-7.

8 - Kim, Y., Chung, B. H., Choi, B. et al (2018). Outcome of endovascular salvage of immature hemodialysis arteriovenous fistulas. The Journal of Vascular Access. https://doi.org/10.1177/1129729818810115.

9 - Schmidli J, Widmer M, Basile C, et al (2018) - Vascular access: 2018 Clinical Practice Guidelines of the European Society for Vascular Surgery (ESVS). European Journal of Vascular and Endovascular Surgery. 2018 Jun 30;55(6):757-818. DOI: 10.1016/j.ejvs.2018.02.001.

Objectives

To assess if a timely referral to angioplasty due to arteriovenous fistula maturation failure improves AVF patency.

Methods

A correlational, descriptive and retrospective analysis, registry-based, including all patients referred to our vascular access centre due to AVF maturation failure from January 1st 2016 to December 31, 2017.

Results

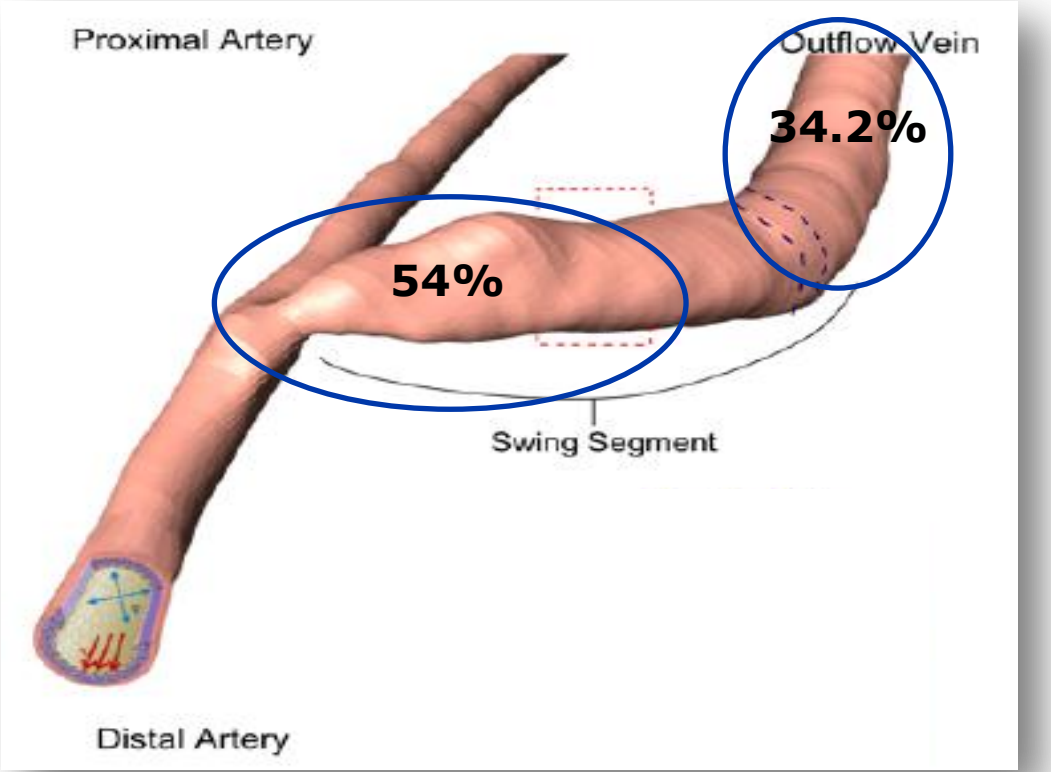
76 patients where referred to angioplasty due to AVF maturation failure;

- **55.3% (n=42) male;**
- **48.7% (n=37) diabetics;**
- **60.5% (n=46) with proximal arteriovenous fistula.**

- **56.6% (n=43) where submitted to angioplasty;**
- **74.4% (n=32) with an improvement in AVF usability;**
- **13.2% (n=10) after angiography where referred to surgery.**

Culprit stenosis location:

- **VA inflow (artery, anastomosis, or swing segment) in 54.0% (n=41);**
- **Along the VA itself in 34.2% (n=26).**



Results

- **Mean interval between arteriovenous fistula creation and referral to angiography was 236.93 days±283.75.**
- **Low correlation between referral time and the successful use of AVF after angioplasty (r=0.151; p>0.05).**

Conclusions

- **We bellieve that late referral to angioplasty justifies these results.**
- **It is important to establish a systematic approach to improve nursing PE (performing evaluation every week);**
- **Promote early patients´ referral with AVF maturation failure to angioplasty.**

9 - Schmidli J, Widmer M, Basile C, et al (2018) - Vascular access: 2018 Clinical Practice Guidelines of the European Society for Vascular Surgery (ESVS). European Journal of Vascular and Endovascular Surgery. 2018 Jun 30;55(6):757-818. DOI: 10.1016/j.ejvs.2018.02.001.

Conclusions

Mature AVF for Dialysis:

- **Appropriate for cannulation with minimal complications;**
- **Deliver the prescribed blood flow throughout the HD procedure;**
- **Arteriovenous fistulas should be considered for cannulation 4 a 6 weeks after creation.**

AVF Maturated

- **Presence of an adequate venous diameter with or without a proximal tourniquet in place;**
- **Soft easily compressible vein, a continuous audible bruit;**
- **Palpable thrill near the anastomosis extending along the vein for a varying distance;**
- **Adequate length and superficial enough to be punctured with two needles.**

9 - Schmidli J, Widmer M, Basile C, et al (2018) - Vascular access: 2018 Clinical Practice Guidelines of the European Society for Vascular Surgery (ESVS). European Journal of Vascular and Endovascular Surgery. 2018 Jun 30;55(6):757-818. DOI: 10.1016/j.ejvs.2018.02.001.

Conclusions

Rule of 6's to define maturation:

- **6 mm vein diameter;**
- **600 mL/min flow;**
- **Less than 6 mm vein depth.**

Diameter less than 4 mm and fistula flow of less than 500 mL/min indicates a fistula that is unlikely to mature.

9 - Schmidli J, Widmer M, Basile C, et al (2018) - Vascular access: 2018 Clinical Practice Guidelines of the European Society for Vascular Surgery (ESVS). European Journal of Vascular and Endovascular Surgery. 2018 Jun 30;55(6):757-818. DOI: 10.1016/j.ejvs.2018.02.001.

Thank You Very Much for Your Attention!

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