Outcome and Feasibility of Angioplasty In Management Of Failing and Failed Hemodialysis ArterioVenous Fistula

Thesis

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بسم الله الرحمن الرحيم

﴿وَمَا بِكُمْ مِنْ نِعْمَةٍ فَمِنَ اللَّهِ ثُمَّ إِذَا مَسَّكُمُ الضُّرُّ فَإِلَيْهِ تَجْأَرُونَ﴾

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Mohamed Sabry

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AA : Axillo-axillary

AAVS : the American Association for Vascular surgery

ADMA : Asymmetrical Dimethyl Arginine

AJ : Axillary-Internal jugular

AVF : ArterioVenous fistula

BAM : Balloon Assisted Maturation

BBT : Brachical-Basilic transposition

bFGF : basic fibroblast growth factor

BJ : brachial-jugular

CDUS : Color Doppler Ultra Sonograghy

CE-MRA : Contrast-enhanced magnetic resonance angiography

DM : diabetes mellitus

DOQI : Dialysis Outcome Quality Initiative guidelines

DRIL : Distal revascularization with interval ligation procedure

DSA : Digital Subtraction Angiography

DVP : dynamic venous pressure

EMDA : Endovascular Management of the thrombosed or Dysfunctional hemodialysis Access

EPC : Endothelial Progenitor Cells

ESRD : *end stage renal disease*

FA-L : forearm loop

FA-S : forearm straight

FIT : Far infrared therapy

IMN : ischemic monomelic neuropathy

ISS : ischemic steal syndrome

MCP1 : Monocyte chemotactic protein

MMP : Matrix Metalloprotinases

MSCTA : Multi-Slice Computed Tomographic Angiography

NKF : National Kidney Foundation

PDGF : platelet-derived growth factor

PSV : peak systolic velocity

PTA : percutaneous transluminal angioplasty

PTFE : polytetrafluoethylene

QBA : The blood flow rate of the brachial

RCDA : radial- cephalic direct AV access

SBDA : snuffbox radial-cephalic direct AV access

SCVIR : The society of cardiovascular and interventional radiology.

SMAT : shape memory alloy recoverable technology

TGFβ : *Transforming growth factor beta*

UA : upper arm

VF : Volume flow

vWf : von Willebrand factor

Abstract

Autologous A-V fistulae are the recommended access for long term dialysis in chronic renal failure patients. However, the rate of failure still significant. The present study aimed at salvaging fistulas using Percutaneous Transluminal balloon Angioplasty (PTA).

Patients and Methods:

One hundred patients were presented with failing or failed fistulas were included, to which they were subjected to PTA to assess the success rate in restoring the fistulae's patency and function.

Results:

The salvage rate reach 93% in which the fistulas regain their usability for hemodialysis, primary patency rates after angioplasty at 3,6,912,18 and 24months were 96.7%,90.3%,80.6%,77.4%,65.5% and 51.6% respectively.

Conclusion:

Confirming endovascular approach is a feasible modality to salvage failed or failing AVF with good outcome as regarding primary and secondary patency.

Keywords:

Access dysfunction, PTA.

CHAPTER 1

Basics of Hemodialysis Access Placement

Methods of vascular access for chronic hemodialysis:

Patients with End Stage Renal Disease (ESRD) need regular clearance of the blood from the metabolic waste products as excess acids, potassium, water and nitrogenous compounds. To achieve that, the blood should be passed through a successive chemical and mechanical filters and then back to the patient in a closed circuit. All of that need a good, sufficient blood flow which is not provided by the superficial veins. Thus the idea of transferring the highly pressured arterial flow to the superficial veins through an arteriovenous communication has been emerged ***(Tzanakis et al,2002).***

Vascular access for hemodialysis can be obtained mainly by three ways: 1) placement of temporary or permanent double lumen central venous catheter, 2) creation of an autogenous arteriovenous (AV) access, or 3) Placement of synthetic AV bridge graft .Each way has advantages and disadvantages as shown in table 1.

Table 1:demonstrate the advantages and disadvantages of different dialysis ways:

Method	***Advantages***	***Disadvantages***
Dialysis catheters	• Easily inserted and removed • Immediately available for use • Hemodynamic effects of AV shunt don't occur • Placement possible in nearly all patients	• Highest risk for infection • Incites central venous thrombosis and stenosis that may preclude use of extremities for AV access creation • Inconsistently provides blood flow rates adequate for optimum dialysis.

Method	*Advantages*	*Disadvantages*
Autogenous AV access	• Fewer secondary procedures required to maintain equivalent patency • Resistant to infection	• More difficult to cannulate • Early failure rates higher compared to bridge grafts • Required prolonged maturation period • Hemodynamic effects may occur • Anatomy may preclude procedure in some patients

Site and type selection for AV access:

Proper selection of the site and type of the AV access depends on many facts:

1. The hemodialysis central venous catheter should never be a substitute to the autogenous AV access but may be used as a bridge until maturation of the access.
2. The autogenous AV access is preferred over the synthetic grafts as it carries a less incidence of infection and has better long-term patency rates and requires fewer interventions to maintain patency than nonautogenous AV access.
3. The upper extremity is preferred over the lower extremity for the placement of AV access as the blood flow is better (arterial and venous) and the infectious complications are less frequent.
4. The major determent of autogenous AV access success and reaching maturation is the diameter of the artery and vein; quality of the arterial inflow and venous outflow, and the presence of a peripheral vein segment of suitable length and accessibility for future hemodialysis. The venous outflow is assessed by clinical and radiological evaluation of the size and quality of the superficial