Role of Interventional Radiology In The Management of The Complicated Hemodialysis Shunt

Essay

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بسم الله الرحمن الرحيم

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم الحكيم

صدق الله العظيم

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Abdulrahman Mohamed Ibrahim
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Abbreviations	
AAVS	American association for vascular surgery
ACT	Activated coagulation time
ANP	Atrial natriuretic peptide
ASA	Acetyl salicylate acid
AVF	Arterio-venous fistula
AVG	Arterio-venous graft
BNP	Brain natriuretic peptide
CDC	Centers for disease control and prevention
CHF	Congestive heart failure
dl	Deciliter
DOQI	Dialysis outcomes quality initiative

ECG	Electrocardiography
ESRD	End stage renal disease
Fr	French
G	Gauge
GP	Glycoprotein
HD	Hemodialysis
Hg	Mercury
IMN	Ischemic mononeuropathy
LSA	Left subclavian artery
mg	Milligram
NH	Neointimal hyperplasia
NO	Nitric oxide
PT	Prothrombin time
PTFE	Polytetrafluoroethylene

PTT	Partial thromboplastin time
RSA	Right subclavian artery
SVC	Superior vena cava
SVS	Society for vascular surgery
V-HTN	Venous hypertension
vWF	Von Willebrand factor
WK	Week

Introduction

The prevalence of complications of arteriovenous fistula (AVF) is high and greater attention should be paid to the prevention of these complications. Early diagnosis and appropriate treatment is essential to improve the quality of life in patients on hemodialysis (HD) **(Derakhshanfar; et al.,2009).**

There has been a paradigm shift in the management of fistula thrombosis, with interventional radiology assuming a lead role in initial salvage procedures **(Bent; et al.,2010).**

The most important complications of fistulae for HD are lymphedema, infection, aneurysm, stenosis, congestive heart failure, steal syndrome, ischemic neuropathy and thrombosis. In HD patients, the most Ihyperplasia. It is important to gain information about early clinical symptoms of AVF dysfunction in order to prevent and adequately treat potential complications **(Stolic,2013).**

Radiologists can play a critical role in the diagnosis and treatment of AVFs. Digital angiography is helpful in elaborating a vascular map for endovascular treatment **(Gonzalez; et al.,2009).**

Catheter-based interventions have improved the quality of life for hemodialysis patients by reducing the need for temporary hemodialysis catheters and have prolonged total survival time by preserving existing access sites and by saving venous segments for future access creation **(Bittl,2010).**

Overall balloon angioplasty as compared with surgical revision was associated with longer patency (5.5 vs 3.2 months), shorter surgical time (43.9 vs 64.5 minutes), shorter length of hospital stay (less than one day vs one day or more), and fewer complications (12% vs 30% of the patients) **(McCutcheon; et al.,2003).**

Endovascular management of hemodialysis access prosthetic grafts and autogenous fistulae is an alternative treatment to surgical thrombectomy .It applies to accesses that have never matured, accesses that have thrombosed, accesses that have blood flow insufficient to allow hemodialysis, accesses with clinical symptoms or noninvasive assessments that indicate the access is at increased risk of thrombosis, and access complications such as pseudoaneurysm or steal **(Gray; et al.,2011).**

As the percentage of fistulae increases in the

general dialysis population, radiologists expect to see the demand for percutaneous declotting increase **(Zaleski, 2004).**

Prophylactic angioplasty of dysfunctional hemodialysis shunts is a common and relatively straightforward procedure. If left untreated, many stenotic lesions progress to ultimately incite thrombosis and access failure. Angioplasty improves access patency and helps avert thrombosis that can reduce overall access life **(Funaki, 2007).**

Endovascular management results in reduced morbidity compared to standard surgical therapy with less postprocedure pain and wound edema. Endovascular management of the thrombosed or dysfunctional hemodialysis access (EMDA) is usually performed on an outpatient basis with the patient returning home or to the dialysis unit for treatment **(Gray; et al., 2011).**

The leading cause of failure of a prosthetic arteriovenous hemodialysis-access graft is venous anastomotic stenosis. Balloon angioplasty, the first-line therapy, has a tendency to lead to subsequent recoil and restenosis; however, no other therapies have yet proved to be more effective **(Haskal; et al.,**

2010).

The catheter-based treatment of thrombosed and failing hemodialysis accesses achieves success in more than 80% of cases and allows patients to undergo immediate hemodialysis without the need for placement of temporary dialysis catheters or surgical consumption of additional venous conduits **(Bittl, 2010).**

Aim of the work

This essay aims to highlight the role of interventional radiology in the management of the complicated hemodialysis shunt for the end stage renal disease patients.

I)Vascular supply of the upper limb

Knowledge of vascular anatomy in the upper limbs is important for clinical examination, medical procedures and diagnosis of diseases. The limb vasculature can be divided into arterial and venous systems; only major vessels will be discussed here.

I) Arterial supply of upper limb

(A) Subclavian Artery

Origin

•Right subclavian artery (RSA) is one of the terminal branches of the brachiocephalic artery.

•Left subclavian artery (LSA) arises as the third branch of the aortic arch after the left common carotid artery.

Course

The subclavian artery course above the cervical pleura toward the superior thoracic aperture between the anterior and middle scalene muscles before passing between the first rib and clavicle. At the lateral border of the first rib it continues as the axillary artery **(Churchill et al., 2011).**

Parts

The vessel can be split into three parts (first, second, third) depending on the position of the vessel in relation to scalenus anterior:

- **First part**: from its origin to the medial border of scalenus anterior
- **Second part:** posterior to scalenus anterior
- **Third part:** from the lateral border of scalenus anterior to the lateral border of the first rib

Branches

The vessel branches relate to the part of the vessel:

- **First part**
    - Vertebral artery
    - Internal thoracic artery
    - Thyrocervical trunk
- **Second part**

Costo-cervical trunk arises behind the anterior scalene muscle and divides into two main branches:

- The superior intercostal
- Dorsal scapular artery