MANAGEMENT OF UPPER LIMB VENOUS HYPERTENSION FOLLOWING VASCULAR ACCESS IN PATIENTS ON REGULAR HAEMODIALYSIS

Essay

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Contents

List of Tables

List of Figures

List of abbreviations

AVF :arterio-venous fistula.

AVG: arterio-venous graft.

BMSs:bare metal stents.

BPG:bypass graft.

CVOD: Central Venous Occlusive Disease.

CVD:central venous disease.

CVC: Central venous catheter.

CKD: chronic kidney disease.

CVO: central vein occlusion.

CVS: Central venous stenosis.

CSs: covered stents.

ESRD**:** End stage renal disease.

FVt: femoral vein transposition .

HD :haemodialysis.

HeRO device: the Hemodialysis Reliable Outflow vascular access device.

inn vein: innominate vein.

IJV: internal jugular vein.

IVC: inferior vena cava.

ID: inner diameter.

NKF: National Kidney Foundation.

NO: nitric oxide.

NH: Neointimal hyperplasia.

OV: outflow vein.

Occl: occlusion.

OD: outer diameter.

PTA: percutaneous transluminal angioplasty.

PDGF:platelet derived growth factor.

PTFE: polytetraflouroethylene.

PVR: peripheral vascular resistance

RA: right atrium .

SVC: superior vena cava.

SCV: subclavian vein.

Sten: stenosis .

TDC: tunneled dialysis cather.

UE: upper extremity .

US: ultrasound.

VH: venous hypertension.

VA: venous anastomosis.

WSS: wall shear stress.

INTRODUCTION

The functional ability and patency of arteriovenous haemodialysis access have a major impact on survival and quality of life for patients with chronic renal failure and the vital importance of vascular access for optimal delivery of haemodialysis is well recognized. Timely creation and meticulous maintanence of these "lifelines' are crucial for the care of haemodialysis patients,according to National Kidney Foundation-Kidney Diseases Outcome Quality Initiative **(Bacchini G et al.,2009).**

Haemodialysis vascular access should meet three criteria. First, it should be suitable for repetitive circulatory access. Second, it should allow for a blood flow suitable to conduct modern high-efficiency dialysis. Third, the complication rate should be minimal. Currently three types of haemodialysis vascular access:

1) Native arteriovenous fistulas : (radiocephalic, brachiocephalic and transposed brachiobasilic)
2) Arteriovenous grafts
3) Central Venous catheters **(Shwab S et al., 1999).**

Vascular remodeling and adaptation to high-flow conditions as well as the effects of repeated cannulation play a pivotal role in the development of complications **(Konner K et al., 2003).**

Venous hypertension after access construction is due to central venous stenosis or occlusion.The exact incidence of central venous lesions in the dialysis population is unknown. It is estimated that between 5% and 20% of dialysis patients develop central venous stenosis. The incidence of significant (>50%) central venous stenosis following subclavian vein catheter placement is 42% to 50%; it is 10% in patients with internal jugular catheters. Several factors have an impact on the development of central venous lesions, including longer catheter indwelling times, multiple catheterizations **(Dosluoglu HH and Harris LM., 2010).**

With the presence of central venous stenosis and ipsilateral dialysis access creation, the patient may remain asymptomatic owing to good collateral development, the access may thrombose owing to poor outflow, or the patient may experience a rapid onset of venous hypertension, with arm swelling and pain. The arm swelling can lead to cyanosis and even ulcerations in extreme cases. Distended collateral vessels may be visible in the shoulder and chest **(Davis RP et al., 1985).**

Duplex is the preferred diagnostic method for early-onset edema following autogenous access placement vein.ultrasound examination helps confirm extravasation and hematoma or infiltration, as well as stricture or stenosis of the venous outflow tract **(Malik J et al., 2002).**

Patients with extremity edema that persists more than 2 weeks after graft placement should undergo angiography via the graft to evaluate patency of the central veins **(NKF-DOQI clinical practice., 1997).**

For treatment, there are a variety of potentially feasible options, including access sacrifice, endovascular treatments [angioplasty, stenting, and covered stent placement] and venovenous bypass **(Dosluoglu HH and Harris LM., 2010).**

Endovascular treatment of central vein stenosis or occlusion is a simple and safe technique, which can be performed on a day case basis. The procedure effectively improves the symptoms of venous hypertension and preserves the function of arteriovenous fistula. It also reduces morbidity and allows early return to normal activity including dialysis **(Abou-Elnaga A et al., 2005).**

ANATOMY OF UPPER LIMB VEINS

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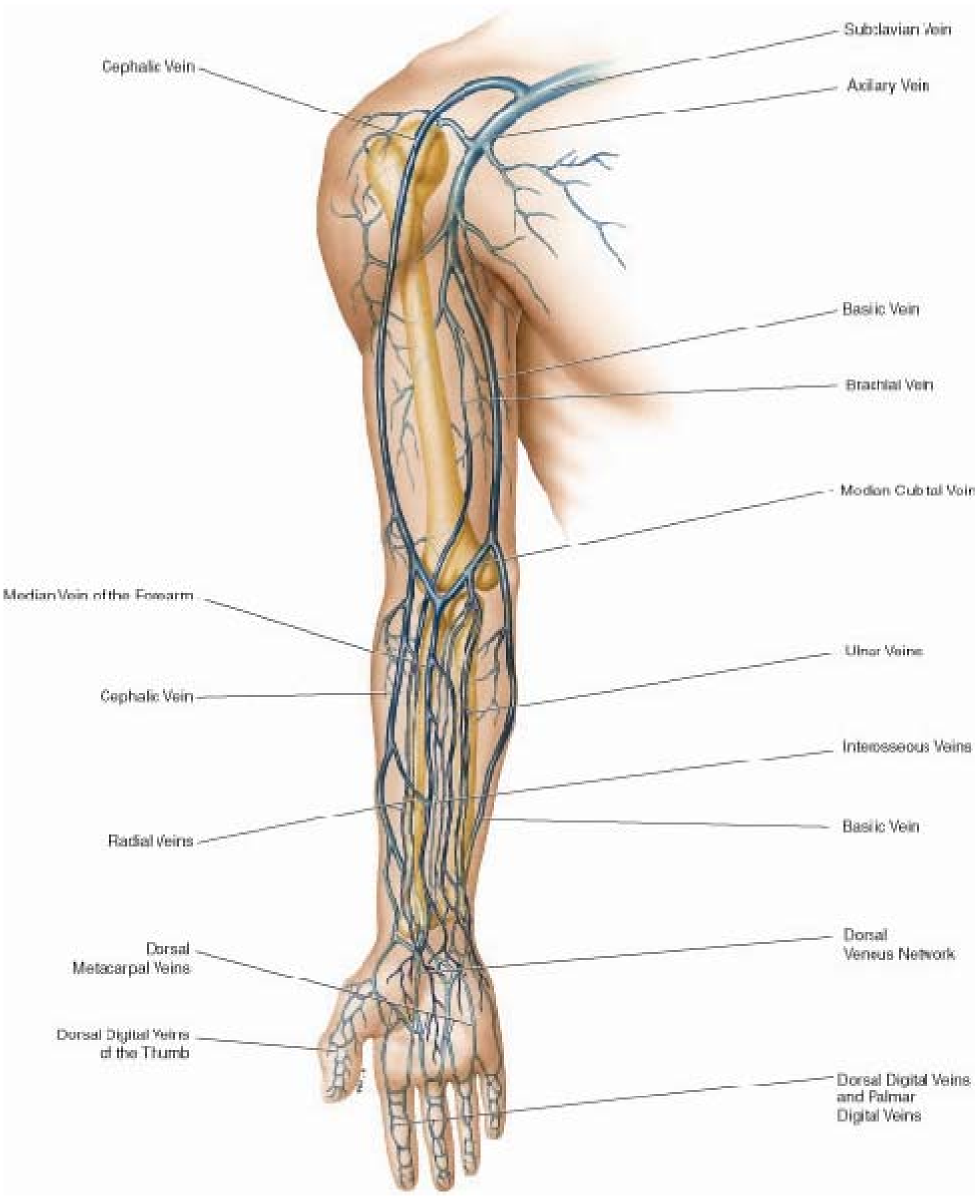

Fig.1. Venous anatomy of the right upper extremity **(Renan Uflacker,2007).**

Superior Vena Cava

The superior vena cava returns blood to the heart from the tissues above the diaphragm. It is approximately 7 cm in length, and is formed by the junction of the brachiocephalic veins behind the lower border of the first right costal cartilage near the sternum. It descends vertically behind the first and second intercostal spaces, and ends in the upper right atrium behind the third right costal cartilage. Its inferior half is within the fibrous pericardium.It is Covered anterolaterally by serous pericardium.it is slightly convex to the right . The superior vena cava has no valves **(Standring S., 2008).**

Relations

The anterior margins of the right lung and pleura are anterior and the pericardium intervenes below: these structures separate the superior vena cava from the internal thoracic artery, first and second intercostal spaces, and second and third costal cartilages. The trachea and right vagus are posteromedial, the right lung and pleura are posterolateral, and the right pulmonary hilum is posterior. The right phrenic nerve and pleura are right lateral and the brachiocephalic artery and ascending aorta are left lateral, the aorta overlapping the superior vena cava **(Standring S., 2008).**

Variations

The brachiocephalic veins may enter the right atrium separately, the right vein descending like a normal superior vena cava. A left superior vena cava may have a slender connection with the right and then cross the left side of