Endovascular Management Of Central venous Hypertension post vascular Access For Hemodialysis

Thesis
Submitted for partial fulfillment of M.D degree in vascular surgery

Micheal Samueal Ayad Girgis

M.B.BCh., M.Sc of general surgery

Supervised by

Prof. Ahmad Mahmoud Saadeldin

Professor of vascular surgery
Faculty of medicine-Ain Shams University

Prof. Mostafa Nagy Ahmad El-Sanadiky

Professor of Vascular Surgery
Faculty of medicine-Minia University

Prof. Amro Hamdy Helmy

Professor of Vascular Surgery
Faculty of medicine-Minia University

Dr. Adbulrahman Mohamed Ahmed Abdulrahman

Lecturer of Vascular Surgery
Faculty of medicine-Ain Shams University

2015

Acknowledgement

First and above all, thanks given to **ALLAH** who entered me in this faculty and chose this branch to me to serve many patients who suffer from end stage renal disease & asking **ALLAH** to support me in serving them honestly, making me a small reason in their recovery.

No words can express my deepest appreciation , gratitude and great thanks to my dear Nobel **Professor** / **Ahmad Mahmoud Saadeldin** for his generous supervision, great support and continuous guidance, I really feel a great pleasure for acting under his kind supervision

I have the greatest pleasure my cordial gratitude to my dear **prof/ Mostafa Nagy Ahmad Elsanadiky,** for his stimulating criticism, observation, suggestions and valuable advice continuous guide and valuable advice throughout this work, I really feel a great pleasure for acting under his kind supervision

I'd like to express my deepest appreciation to my dear **prof.Amro Hamdy Helmy**, for his continuous advice and encouragement, his observation, suggestions and valuable advice. I really feel a great pleasure for acting under his kind supervision.

I'd like to express my deepest appreciation to my dear **prof. Adbulrahman Mohamed Ahmed Abdulrahman** , for his continuous advice and encouragement, his observation, suggestions and valuable advice. I really feel a great pleasure for acting under his kind supervision

My deep thanks to **my family**, being a part of it and all the **staff members** in my department, for their help and loyal services.

My deep thanks to all patients who included in our research for their cooperation and regular attendance

Michael Samueal
2015

List Of Contents

List Of Figures

	access for hemodialysis
Fig (19)	Thick-walled capillaries with extravasated erythrocytes hemosiderin deposits, and interstitial mononuclear inflammatory infiltrate in the dermis (H&E stain, 200X
Fig (20)	Venous ulcer post arteriovenous access
Fig (21)	Hyperpigmentation of upper limb
Fig (22)	superficial skin necrosis of the fingers and interdigital cleft spaces with superadded infection
Fig (23)	Breast enlargement after arterio venous access
Fig (24)	Upper extremity venous duplex examination.
Fig(25)	Venography show Chronic thrombosis of the superior vena cava
Fig(26)	Venography Acute thrombosis of the left brachial vein
Fig(27)	CT Venography
Fig(28)	Coronal 3D MR angiogram showing a normal right subclavian vein with the patient's arm lowered. **B,** Coronal 3D MR angiogram showing occlusion of the subclavian vein near the junction with the axillary vein
Fig(29)	Schematic illustration of the bypass graft from the axillary vein to the right atrium
Fig(30)	Intraoperative photograph of ring PTFE graft (G) in an endto- side anastomosis to the contralateral axillary vein (AV) for innominate vein occlusion.
Fig(31)	Internal jugular to internal jugular bypass with ring PTFE graft. Open arrows indicate sites of anastomoses

Fig(32)	Axillary femoral bypass
Fig(33)	Types of stenosis
Fig(34)	Equipment
Fig(35)	(A) Hemodialysis patient with a brachiobasilic fistula presentswith recurrent arm swelling due to restenosis within a stent inthe right subclavian vein. (B) After angioplasty, there is no residualstenosis and a reduction in collateral venous flow
Fig(36)	Patient with high flow (2,414 cc/minute) right upper arm fistula presented with severe arm swelling without resolution following subclavian vein stenting
Fig(37)	Imaging following angioplasty with a 12 mm _ 4 cm high-pressure balloon.
Fig(38)	Difficulties may be encountered while trying to cross a stenotic lesion.
Fig(39)	The angioplasty balloon may slip off the site of stenosis during inflation
Fig(40)	Persistent “waist” at maximal pressure inflation.
Fig(41)	(a) Stenotic lesion at the graft vein junction “recoiled” after balloon angioplasty.(b)A stent was placed to maintain the patency of the AVG
Fig (42)	(a) Extravasation of contrast after angioplasty of

	the cephalic arch. (b) The angioplasty balloon was gently re-inflated at lower pressure to tamponade the site of bleeding for3–5 min. (c) Extravasation of contrast material stopped. (d) Venous rupture after balloon angioplastyof the graft vein junction of a left upper arm BB AVG. (e) Covered stents were deployed to control the bleeding. (f) Extravasation of contrast material stopped after stent deployment
Fig(43)	C-arm
Fig(44)	The monitor
Fig(45)	Equipment
Fig(46)	Anasthetia of the skin of access site
Fig(47)	Hold the needle in position while pushing the wire
Fig(48)	Sheath insertion
Fig(49)	Ballon over the wire denoting tight stenosis of right subclavian vein and another ballon over wire in the right jugular vein

Fig(50)	Dilatation of the lesion
Fig(51)	Stenting of right subclavian and innominate veins
Fig(52)	Complete dilatation of lesions confirmed by continuous flow
Fig(53)	a. sheath within A-V graft b. 2nd day post stenting c. 3rd day d. 4th day dorsal aspect e. 4th day palmar aspect
Fig(54)	a)Upper limb odema b) upper limb 2ND day postdilataion
Fig(55)	A)Dilated vein on anterior chest walland neck B) After dilatation

List of Tables

List of Abbreviations

Abbreviation	Meaning
CKD	Chronic kidney disease
ESRD	End stage renal disease
NKF-KDOQI	National Kidney Foundation–Kidney Dialysis Outcomes Quality Initiative
A-V access	Arterio venous access
SVC	Superior vena cava
DVT	Deep vein thrombosis
IVC	Inferior vena cava
CVC	Central vein catheterization
NIDDK	National institute of diabetic ,digestive &kidney disease
MCP	Monocyte chemotactic protein
MMP	Matrix metalloproteinase
VSMCS	Vascular smooth muscle cells
PCNA	Proliferating cell nuclear antigen
TOS	Thoracic outlet syndrom
IJV	Internal jugular vein
RA	Right atrium
SVCS	Superior vena cava syndrome
DUS	Duplex ultrasound
COVD	Chronic obstructive venous disease

Abbreviation	Meaning
HD	Hemodialysis
ID	Internal diameter
RI	Resistance index
BF	Blood flow
CTV	Computed tomography venography
MRV	Magnetic resonance venography
MRA	Magnetic resonance arteriography
IVUS	Intra vascular ultrasound
PTFE	Poly tetra flouro ethylene graft
AVG	Arterio venous graft
PTA	Percutaneous transluminal angioplasty
JA	Juxta -anastomotic
CVS	Central venous stenosis
CVO	Central venous occlusion
PAOD	Peripheral arterial occlusive disease
CVSO	Central vein stenosis or obstruction

Introduction

As the population ages and the incidence of diabetes rises, chronic kidney disease (CKD) and end-stage renal disease (ESRD) are becoming increasingly common diagnoses in the United States. **(liao et al.,2012)**

The National Kidney Foundation–Kidney Dialysis Outcomes Quality Initiative (NKF-KDOQI) has published guidelines (updated in 2006) for optimal clinical practices aimed at improving dialysis outcome and patient survival , These standards recognize eight categories of complications from the creation or use of hemodialysis access: thrombosis and failure to mature , bleeding, infection, aneurysm and pseudo aneurysm, , ischemia or steal syndrome, venous hypertension, and neuropathy**(Robyn et al., ,2010)**.

Venous hypertension after access construction is due to central venous stenosis or occlusion or valvular incompetence in the more peripheral arm veins with retrograde flow, 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**(Chemla et al.,2005)** .

The first reports of an association between central venous catheters and central venous stenosis appeared in the late 1970s and early 1980s **(Bambauer et al.,1994).**

Several factors have an impact on the development of central venous lesions, including longer catheter indwelling times, multiple catheterizations, and longer functioning ipsilateral AV access after ipsilateral catheter placement.. Identification of ipsilateral central stenosis is important, even when not clinically symptomatic, because it may lead to increased venous pressures and an increased risk of access failure .**(Oguzkurtet al.,2005).**

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.**(Surowiec et al.,2004).**