The Importance of the Stent Selection on PTA for Left Brachiocephalic Venous Lesions with Chronic Hemodialysis Patients: Choice of Self-expandable and Balloon-expandable Stent.

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The upper arm swelling and venous hypertension on arteriovenous fistula site, and insufficiency of hemodialysis condition are induced by the central venous stenosis or totally occlusion (CTO) with chronic hemodialysis patients. The percutaneous transluminal angioplasty (PTA) for these central venous lesions has been first choice of the treatment.

* Japanese Society for Dialysis Therapy Guidelines
  J Jpn Soc Dial Ther 38: 1532-1539, 2005
* European Best Practice Guideline (EBPG)
  NDT 22(Supple 2): ii88-117, 2007
We reported,

The volume overload after PTA for central venous stenosis or occluded lesions in chronic hemodialysis patients, resulted in increased RA and RV diameter. These changes were transient and completely recovered by the following day.

PTA for central venous lesions in patients with normal ejection fraction can be performed without clinical cardiac problems.

Y Horita, et al: Serial cardiac influence of volume overload induced by interventional therapy for central venous stenosis or occlusion in chronic hemodialysis patients.

J Cardiology, 57, 316-324, 2011
The stenosis or occlusion of left brachiocephalic vein (innominate vein) with hemodialysis patients are induced by

1. Organic lesions of intimal hyperplasia
2. Functional or anatomical oppression between aortic arch, right brachiocephalic artery and sternum

It is necessary to choose the self-expandable or balloon-expandable stents according to the etiology of these lesions, when we implant the stent for left brachiocephalic lesions.
【Purpose】

We presented the 4 cases implanted the stents for left brachiocephalic lesions with chronic hemodialysis patients, and explain the selection of self-expandable and balloon-expandable stents.
Case-1, Long lesion: 85y.o. Male.

This patient was introduced to hemodialysis by chronic glomerulonephritis. His AV-fistula was produced on his left upper arm and he was introduced to our hospital by the upper arm swelling and increasing of the return-pressure on routine hemodialysis.

VR image

MIP image

Severe stenosis and occlusion of left brachiocephalic vein.

64 row-MDCT: venous phase
Bi-directional angiography

Bi-directional approach:
Lt basilic vein & rt femoral approach
IVUS findings presented the severe stenosis by the intimal hyperplasia.
To avoid the risk of venous perforation following the initial dilatation by the large-sized balloon, we performed the lesion dilatation by the small-sized balloons.
The occluded lesion was completely dilated by the self-expandable stent.
Case-2, Short lesion: 47y.o. Male

This patient was introduced to hemodialysis by nephrosclerosis before 8 years. His AV-fistula was produced in his left forearm and his left upper-arm swelling has been gradually increased since 4 years before. He was introduced to our hospital for performing the PTA of left brachiocephalic occluded lesion.

Bi-directional approach
Impossible passage of 0.035-Radifocus GW

The 0.018-inch Treasure GW inserted from rt. femoral vein could be crossed the lesion.

After predilatation by the 2.0mm-balloon, the intimal hyperplasia of the lesion was confirmed by IVUS.

The lesion was dilated by the 4.0mm-balloon.
The bilateral edge of delivered stent was additionally dilated such as dog-bone configuration by the 10mm-sized balloon with low pressure (3 atm.) to avoid the dislocation of the delivered stent.
The occluded lesion was completely dilated by the balloon-expandable stent and the pressure gradient was significantly decreased.

Pressure gradient: 28mmHg ⇒ 0mmHg
Case-3, Short lesion: 73y.o. Female

The basal disease of this patient was hypertension and nephrosclerosis with chronic hemodialysis. He has received the routine hemodialysis since 20 years before. His access was produced in his left forearm.

His left upper arm swelling and return-pressure on routine hemodialysis have been gradually increased since 1.5 years before. He was introduced to our hospital.
The angiography was performed by the 4F-catheter advanced in the subclavian vein from AV-fistula in lt. forearm.

The 0.014 Dejavu GW was crossed the lesion and IVUS was performed.

The lesion presented severe stenosis and the lesion was compressed from the outside without intimal hyperplasia.
5.0mm-POBA
Dilatation with 4atm.

The lesion was recoiled and impossible to dilate by the balloon.
5F-sheath was exchanged to 6F-sheath. Self-expandable stent (Lumminexx: 12 × 30mm) was delivered.
Post-dilatation by 10.0mm-balloon with 6 atm.
The lesion was not dilated enough by the self-expandable stent (Luminexx) and the delivered stent was slightly dislocated. So, we implanted the balloon-expandable stent (Express: 9x25mm) into the Luminexx stent to fasten and dilate completely.
We exchanged the 6F-sheath to 8F-sheath, and the stent-edge was dilated such as dog-bone configuration by the 12mm-Balloon.
Final angiography
The Luminexx & Express stent were compressed by the rt. brachiocephalic artery on the MDCT-findings at following day.
Case-4, Short lesion: 46y.o. Male

This patient with hemodialysis by diabetic nephropathy before 10 years, was introduced to our hospital for stenting. His AV-fistula was produced on his left forearm and his upper arm swelling and the return-pressure on routine hemodialysis was gradually increased since 1 year before. He was treated the balloon angioplasty for left brachiocephalic venous stenosis in other hospital, but the result was incomplete dilatation, and he had the severe aortic valve insufficiency.
IVUS findings of the left brachiocephalic vein

Compression

4.0mm
Post dilatation at bilateral stent edge by 12mm-balloon with 4 atm.
Stent-edge were dilated such as dog-bone configuration

Mean pressure gradient: 11mmHg ⇒ 1mmHg
This lesion implanted stent was compressed by the bifurcation of aorta and right brachiocephalic artery.
【Conclusion】

The stenosis or chronic totally occluded lesions caused by the organic stenosis in left brachiocephalic vein with chronic hemodialysis patients, can be dilated by the self or balloon-expandable stent.

But the lesions caused by the anatomical oppression of aorta, right brachiocephalic artery and sternum have to be treated by the balloon-expandable stents.

The IVUS and MDCT are useful to evaluate the cause of left brachiocephalic venous lesions in pre and post-PTA.