Hemodialysis associated left innominate vein compression syndrome

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No Disclosure
Central venous stenosis and obstruction (CVD) is still a challenge in hemodialysis patients

- real mechanism is still unknown
- most commonly associated with the injury of the previous hemodialysis catheterization or others: pacemakers, defibrillators, PICC

- Unrelated to intravascular device high flow of vascular access anatomical factor thoracic outlet syndrome
Fistulography showed the left innominate vein (LIV) stenosis always located in front of the trachea where LIV crossed over aorta behind sternum.

Is there an anatomical factor like the iliac vein compression syndrome in this region?
Extrinsic compression of the left innominate vein

- 21 of 48 (44%) by fistulography

- 7 of 8 (87.5%) by MDCT
Left innominate vein compression syndrome

a 65-year old woman complained of left anterior chest wall edema

Data from Shanghai Renji Hospital

- From July 2006 to July 2013
- 19 cases of left innominate vein stenosis or obstruction lesions in hemodialysis patients with ipsilateral vascular access accompanied with venous hypertension
- 16 cases (84.2%, 16/19) of left innominate vein compression syndrome confirmed by CT
Clinical features

- 9 males and 7 females
- mean age: $61.63 \pm 13.12$ yrs (31~78 yrs)
- without ipsilateral catheterization history
- vascular access type
  - left Brescia–Cimino AVF: 12
  - left elbow AVF: 1
  - left forearm AVG: 3
- mean access creation time
  - $41.94 \pm 42.59$ months (3-156 months)
Symptoms

- arm swelling (n=16)
- ipsilateral face and chest swelling (n=11)
- eye pain (n=2)
- visible collateral veins around shoulder and upper chest (n=14)
- arm pigmentation (n=1)
- arm ulceration (n=1)

mean course of symptom: $4.28 \pm 5.40$ months (1 week-18 months)

duration of the vascular access from the time of creation to the first onset of symptom: $37.66 \pm 41.02$ months (0-153 months)
Venography and CT

**Type I (n=3):** mild symptom

left innominate vein compression section was flattened, partial opacification fades with jugular reflux
**Type II**: short segment (<3cm) of left innominate vein stenosis or obstruction

Type II a, stenosis (n=7); Type II b, obstruction (n=2)
**Type III**: long segment (>3cm) of left innominate vein obstruction (n=4)
CT

• mean diameter of the left innominate vein:
  \[2.09 \pm 1.11\text{mm}\]

• mean space between the aorta and the sternum:
  \[3.98 \pm 1.37\text{mm}\]

• compressed by the aortic arch
  10 cases

• compressed by the brachiocephalic artery
  6 cases

• aortic calcification
  5 cases
Management

- Follow-up 3
- Closure the vascular access 5
- Interventional therapy 8
  - Technique failure 1
  - PTA 2
  - Stent 5
PTA
Stent
the stent was not fully opened, but symptoms were resolved
Intravascular Ultrasound

IVUS image showed the stent was compressed by the pulsation of the aorta with intimal hyperplasia 11 months later.
<table>
<thead>
<tr>
<th>Sex</th>
<th>Age</th>
<th>Type</th>
<th>Procedure</th>
<th>Follow-up (months)</th>
<th>Primary patency (months)</th>
<th>Number of reintervention</th>
<th>Outcome during the follow-up</th>
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</tbody>
</table>
Conclusions

hemodialysis associated left innominate compression syndrome

- The left innominate vein compression syndrome was the main cause of the left innominate vein stenosis and had clinical significance in hemodialysis patients.

- According to the venography, it could be divided into three types.

- MDCT was the first choice for diagnosis.

- Stent placement is the first choice for management.
Thank You

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