Recurrent complications in the central vein in the HD setting – the role of DCB

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Disclosures

Speaker name: TANG Tjun Yip MD FRCS(Gen)

I have the following potential conflicts of interest to report:

- [ ] Consulting
- [ ] Employment in industry
- [ ] Stockholder of a healthcare company
- [ ] Owner of a healthcare company
- [ ] Other(s)

- [ ] I do not have any potential conflict of interest
Central Vein Stenosis (CVS)

Asymptomatic

Symptomatic

Swelling/edema/pain/erythema

Dilated veins

Upper limb, face, chest, breast

AVF/AVG dysfunction

High Vp, recirculation, decrease flow, thrombosis
Risk Factors for CVS

• Prior CV Catheter insertions
  • Risk increases with
    • Multiple insertions, long dwell time
    • Subclavian vein vs IJ vein access
    • Left IJ vs Right IJ access

• Pacemaker/Defibrillator wires, PICC, Portacaths increasingly more common

• Usually asymptomatic until HD access created in ipsilateral arm
You see a CV stenosis or occlusion in a patient with hemodialysis access…

You treat it, right?

Wrong!

Left forearm AV fistula, no symptoms, unchanged for years
Asymptomatic CVS
Common, esp with fistulae
Collaterals provide decompression
Treating asx patients can worsen CVS
No untreated pts progressed
8% of treated asx worsened or escalated

Asymptomatic Central Venous Stenosis in Hemodialysis Patients

Radiology: Volume 238: Number 3—March 2006

Rebecca D. Levit, BA
Raphael M. Cohen, MD
Andrew Kwak, MD
Richard D. Shlansky-Goldberg, MD
Timothy W. I. Clark, MD
Aalpen A. Patel, MD
S. William Stavropoulos, MD
Jeffrey I. Mondschein, MD
Jeffrey A. Solomon, MD
Catherine M. Tuite, MD
Scott O. Trerotola, MD
Rethinking
Avoiding the oculotherapeutic reflex
Refining what we know about demographics of CVS
Understanding relationship of CVS to access function
New use of old tools
Doing the right thing
Treatment Options

NKF-KDOQI Clinical Practice Guidelines:

**GUIDELINE 20**

Treatment of Central Vein Stenosis

Percutaneous intervention with transluminal angioplasty is the preferred treatment for central vein stenosis.

Stent placement combined with angioplasty is indicated in elastic central vein stenoses or if a stenosis recurs within a 3-month period.

12x40mm CQ
12x80mm Wallstent
10x60mm Viabahn
PTA Results

- Technical success: 70-100%
  - Lower in total occlusions (50-70%)
  - Elastic recoil (23%)
- 6 month primary patency: 23-63%
- 12 month primary patency: 12-50%
- 6 month secondary patency: 55-100%
- 12 month secondary patency: 46-100%
- Multiple repeated interventions are required to maintain patency and prevent occlusion
Bare Metal Stenting Results

Patency rates not superior to PTA and does not add to the longevity of HD access (Bakken et al, JVS 2007)

- 6 mth primary patency: BMS vs PTA = 54% vs 25%
- 6 mth secondary patency: BMS vs PTA = 62% vs 72%

Stenting has significantly lower primary patency than PTA

(Ozyer et al, AJR 2009)
Florid neo-intimal hyperplasia causing severe in-stent stenosis

In-stent re-stenosis

Post stenting venogram
14x40 mm Memotherm
Covered Stent Results

Few studies
Jones et al JVIR 2011

30 patients
100% technical and clinical success
Favourable primary and assisted primary patencies

<table>
<thead>
<tr>
<th>Follow-up (mo)</th>
<th>No. of Pts</th>
<th>Primary Patency (%)</th>
<th>Primary Assisted Patency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>29</td>
<td>97 (3.3)</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>25</td>
<td>81 (7.6)</td>
<td>100</td>
</tr>
<tr>
<td>9</td>
<td>20</td>
<td>77 (8.3)</td>
<td>95</td>
</tr>
<tr>
<td>12</td>
<td>19</td>
<td>67 (9.7)</td>
<td>94</td>
</tr>
<tr>
<td>18</td>
<td>13</td>
<td>51 (11)</td>
<td>92</td>
</tr>
<tr>
<td>24</td>
<td>12</td>
<td>45 (11)</td>
<td>91</td>
</tr>
</tbody>
</table>

Viabahn
A Systematic Review and Meta-Analysis of Drug-Coated Balloon versus Conventional Balloon Angioplasty for Dialysis Access Stenosis

IJY Wee¹, HY Yap², HTL Tay², QWS Lee², TY Tang², TT Chong²

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²Department of Vascular Surgery, Singapore General Hospital, Singapore

JVS (in press)
A total of 17 studies were included after full-text review, comprising 8 randomized controlled trials, 6 retrospective, and 3 prospective cohort studies.

15 were included in meta-analysis (Figure 1).

1,113 stenotic dialysis accesses were included, of which 54.7% underwent drug-coated balloon (DCB) angioplasty whilst 45.3% underwent conventional balloon angioplasty (CBA).

Wee IJY et al 2019 (JVS in press)
The 6-month cumulative patency in the DCB and CBA groups were 71.0% and 49.2% respectively.

12-month primary patency was significantly better in the DCB group (44.2% vs 20.6%) in comparison to the CBA group.
Subgroup analysis: Central venous stenosis in HD patients

- **Superior 6-month** primary patency in the DCB group (60.3%) in comparison to the CBA group (22.1%)
- The DCB group (41.2%) demonstrated **superior 12-month** primary patency in comparison to the CBA group (10.3%)
Paclitaxel-Coated Balloons for the Treatment of Symptomatic Central Venous Stenosis in Dialysis Access: Results from a Randomized Controlled Trial

(Kitrou et al 2017 JVIR)

- Prospective single center RCT DCB vs POBA in symptomatic CVS in HD access (40 patients)
- Primary endpoint - clinically-assessed intervention-free period of the treated segment at 6 months
- **DCB group: 179 days, vs POBA group: 124.5 days, \( P = .026 \)).
- No difference between AVGs and AVFs (\( P = .17 \)),
- No difference treatment of de novo vs restenotic lesions (\( P = .33 \)), or prior presence of catheter insertion (\( P = .21 \)).
- No complications were observed.
- In restenotic lesions in DCB group, longitudinal comparison between treatments also showed a significant difference in favor of DCB treatment (median IFP in DCB group 177 vs 91 days in POBA group; \( P = .01 \)).
Use of the Bard BD 12mm Lutonix™ Drug Eluting Balloon to Improve Central Vein Patency for Haemodialysis Access Circuits – Does It Work?

TT Chong¹, HY Yap¹, CS Tan², SL Chan³, IJY Wee⁴, TY Tang¹

¹Department of Vascular Surgery, Singapore General Hospital, Singapore
²Department of Interventional Nephrology, Singapore General Hospital, Singapore
³Health Services Research Center, SingHealth, Singapore
⁴Yong Loo Lin School of Medicine, National University of Singapore
Feb 2017 to March 2018
30 patients
Median Age: 62yo
Median number of prev interventions: 4

<table>
<thead>
<tr>
<th>Types of Access</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Arteriovenous fistula</td>
<td>23 (76.6)</td>
</tr>
<tr>
<td>-Arteriovenous graft</td>
<td>7 (23.3)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Configuration of Access</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Radio-cephalic</td>
<td>3 (10.0)</td>
</tr>
<tr>
<td>-Brachio-cephalic</td>
<td>11 (36.7)</td>
</tr>
<tr>
<td>-Brachio-basilic</td>
<td>13 (43.3)</td>
</tr>
<tr>
<td>-Brachio-axillary</td>
<td>3 (10.0)</td>
</tr>
<tr>
<td>Symptoms of Central vein stenosis</td>
<td>N (%)</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Symptomatic</td>
<td>19 (63.3)</td>
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<tr>
<td>Asymptomatic</td>
<td>11 (36.7)</td>
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<tr>
<td>Previous Central vein interventions</td>
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<tr>
<td>Balloon angioplasty</td>
<td>26 (86.7)</td>
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<tr>
<td>Balloon angioplasty and stenting</td>
<td>3 (10.0)</td>
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<tr>
<td>Types of lesion</td>
<td></td>
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<tr>
<td>Stenosis</td>
<td>19 (63.3)</td>
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<tr>
<td>Total Occlusions</td>
<td>11 (36.7)</td>
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<tr>
<td>Site of lesion</td>
<td></td>
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<tr>
<td>BCV</td>
<td>11 (36.7)</td>
</tr>
<tr>
<td>SCV</td>
<td>12 (40.0)</td>
</tr>
<tr>
<td>BCV + SCV</td>
<td>7 (23.3)</td>
</tr>
</tbody>
</table>
Results

Primary Patency Post DEB : 164 DAYS

No significant difference when compared to patient’s prev intervention with POBA (164 vs 140 days, p=0.257)
Possible Reasons

Small sample size
DEB diameter not large enough
Implantation technique - different users
Only 1 piece 40mm DEB used → may not be long enough to cover entire lesion
Conclusions

• CVS is a common problem in HD patients
• Growing consensus for non intervention for asymptomatic CVS
• Symptomatic lesions easily treated with PTA +/- stenting but patency is poor requiring repeated interventions to maintain patency
• Promising role for DCBs
Recurrent complications in the central vein in the HD setting – the role of DCB

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