DEBATE: Gonadal Vein Transposition is the “Ideal” Treatment for Nutcracker Syndrome

Cynthia K. Shortell, M.D
Duke University Medical Center
VEITH Symposium
November 2016

“Ideal”??
- Doesn’t exist…
- With one exception:

Pathophysiology of NCS:
- Pathologic compression of LRV:
  - Venous hypertension
  - Venous congestion of left flank and pelvis (pain)
  - Diffusion of RBCs and proteins into glomerular filtrate (hematuria and orthostatic proteinuria)

Treatment:
- All treatment options are directed to reduce venous hypertension
- Treatment modalities
  - Conservative
  - Surgical
  - Endovascular
  - Hybrid

There are 3 types of NCS
1. Anterior
2. Posterior
3. Anomalous
**Types of NCS:**

- **Anterior NCS** (most common type):
  - Aorta
  - LRV
  - The LRV is compressed as it passes between the aorta and the SMA.

- **Posterior NCS:**
  - Vertebrae
  - The LRV is retro-aortic and is compressed between the abdominal aorta and the vertebral column.

- **Atypical** (associated with truncular vascular malformation (left IVC))
  - Aorta
  - IVC/LRV
  - The LRV and IVC are compressed as they pass between the aorta and the SMA.

**Gonadal Vein Transposition Technique:**

- MINI laparotomy
- The gonadal vein is transected and reimplanted into the IVC to:
  - Decrease pelvic congestion
  - Decompress the LRV without putting the renal vein at risk

**Gonadal Vein Transposition:**

- Isolation of IVC and Mobilization of Gonadal Vein
- Anastomosis
- Clamps Released
- The gonadal vein is approached in the retroperitoneum followed by division of all tributaries. The gonadal vein is marked to prevent twisting and transected distally. The gonadal vein is reimplanted onto IVC.
Comparing Treatment Outcomes for NCS: Retrospective Case Series Review

Stenting: associated with significant incidence stent migration and failure to improve symptoms (up to 10% for each).

Renal vein transposition had excellent clinical results, but high incidence of bleeding complications.

None of these studies evaluated GVT specifically and a very small total number of GVT cases.

The benefits of GVT over other options

Gonadal vein transposition
- Is as effective as other surgical modalities in the treatment of NCS
- Does not require an incision in the leg
- Does not put left renal vein at risk
- Is durable for the life of the patient

Gonadal vein transposition

• OR time, mean: 107 min vs 220 min (non-GVT)
• EBL, mean: 125 mL vs 450 mL (non-GVT)
• No ICU stay

<table>
<thead>
<tr>
<th>Technique</th>
<th>ASA</th>
<th>OR time (min)</th>
<th>Intra-op urine output (mL)</th>
<th>Estimated blood loss (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autotransplantation</td>
<td>3</td>
<td>358</td>
<td>1540</td>
<td>800</td>
</tr>
<tr>
<td>LRV transposition</td>
<td>2</td>
<td>122</td>
<td>560</td>
<td>180</td>
</tr>
<tr>
<td>Endovascular</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technique</th>
<th>ASA</th>
<th>OR time (min)</th>
<th>Intra-op urine output (mL)</th>
<th>Estimated blood loss (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endovascular</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
How about in patients with complex anatomy?

20 yo female with:
- Intermittent hematuria
- Left flank pain
- Desire to join ATF

In this case LRV transposition and endovascular therapy are not an option.

Patient was treated with RIGHT GVT, remains symptom free at 24 mos, and has joined the ATF.

Posterior NCS

Compression of the LRV between the aorta and spine

Renal vein transposition much more difficult

Venography confirms reflux into a dilated left ovarian vein.
Patient successfully treated with left GVT transposition, symptom free

IN PATIENTS WITH COMPLEX ANATOMY, GVT MAY BE THE ONLY REASONABLE OPTION

Summary:
• GVT can be performed safely, and with excellent clinical outcomes
• It offers the benefit of shorter operative times, decreased blood loss, avoids putting the renal vein in harms way, eliminates need for vein harvest, and may be the only option for PCS and NCS associated with left sided IVC

Thank you