Treatment of Symptomatic High-Flow Female Varicocele with Balloon-occluded Retrograde Transvenous Foam Sclerotherapy (B-ORTFS) Using Sodium-tetradecyl-sulphate Foam

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Purpose

We present our experience in 12 patients with PCS presenting high-flow pelvic varices treated by balloon-occlude retrograde transvenous foam sclerotherapy (B-ORTFS) using a 3% sodium-tetradecyl-sulphate (STS) - air foam.
Methods and Materials

Patients

A retrospective study was conducted in 12 consecutive patients (mean age: 35.2 years; range: 23-46) with PCS with atypical high-flow venous collaterals demonstrated during ovarian venography, treated at our Department by B-ORTFS between June 2005 and May 2008. Full approval and waiver of informed consent for our retrospective study was obtained by our institutional review board. Each patient gave written informed consent prior to the procedure.

Patient population

Patients were referred for treatment by gynecologists after a diagnosis of PCS had been made by physical and color-Doppler US examination and no previous surgical treatment attempts had been performed. High-flow venous collateral vessels were detected in all patients at the preliminary selective ovarian venography preceding trans-catheter foam sclerotherapy (TCFS), as previously described (4).

According to the different anatomical situations that can be observed, we classified high-flow pelvic varicoceles in:

I. non cross-pelvic varicoceles with flow through the ipsilateral hypogastric vein
II. cross-pelvic varicocele:
   a. flow through the contralateral hypogastric vein
   b. flow through both hypogastric veins
   c. flow through the contralateral ovarian vein
   d. flow through all the above venous branches

Type I high-flow venous collaterals were present in 4 (33.3%) patients, type IIa in 3 (25.0%) patients, type IIb in 4 (33.3%), type IIc in 1 (8.3%) and type IId in 2 (16.7%). Ten (83.3%) patients presented continuous pain and dyspareunia, while 2 (16.7%) patient presented urinary urgency. A worsening of pain during menstruation was present in 5 (41.7%) patients and the coexistence of lower limb varices was observed in 5 (41.7%) patients. Two (16.7%) patients were multiparous, 3 (25.0%) were biparous, 6 (50.0%) were uniparous and one (8.3%) was nulliparous (Table 1).

As previously described, quantitative measure of symptom perception before the procedure was performed in all patients using a Symptom Severity Score (SSS) evaluating the intensity of each specific symptom (pelvic pain, dyspareunia, urinary urgency and menstrual pain) on a 0 (absence) to 10 (maximum intensity) scale (4). The majority of the patients occasionally took analgesics to reduce pelvic pain.

Pelvic varicocele B-ORTFS
Treatment was performed in a Day Hospital setting. As previously described, a percutaneous access was gained puncturing the right antecubital vein using a 18 Gauge needle, after a local anesthesia had been performed with 2 ml of lidocaine (4). After dilation with a 5 Fr 25-cm-long introducer sheath (Introducer II; Terumo Japan) placed over a 0.035" J tipped 180-cm-long hydrophilic guidewire (Radiofocus, Terumo, Tokyo, Japan), a 4 Fr Simmons 2 (Radiofocus Glidecath; Terumo, Tokyo, Japan) diagnostic catheter was used to selectively catheterize the left ovarian vein. A retrograde venography was then executed by an energetic hand injection of contrast medium to demonstrate the anatomy of the pelvic varices. In order to assess the eventual presence of right ovarian varices, a contralateral selective ovarian venography was also performed using a 4 Fr Multipurpose catheter (Torcon NB Advantage; William Cook Europe ApS, Bjaeverskov, Denmark).

During venography, in each patient, a rapid wash-out of contrast medium from the pelvic varices through atypical high-flow branches tributary to either the hypogastric or ovarian veins was observed.

In cases of type I high-flow pelvic varicoceles, a contralateral percutaneous common femoral vein access was gained using a 7 Fr introducer sheath (Introducer II; Terumo Japan), whereas in case of type IIa high-flow pelvic varicoceles, an ipsilateral common femoral vein access was gained. Type IIc high-flow pelvic varicoceles required a contralateral antecubital venous access as described above.

Under road mapping, the major venous vessels (hypogastric or ovarian veins) to which the high-flow collaterals were tributary were selectively catheterized using a 4 Fr Cobra 1 diagnostic catheter (Radiofocus Glidecath; Terumo, Tokyo, Japan) advanced over a 0.035" J tipped 180-cm-long hydrophilic guidewire (Radiofocus, Terumo, Tokyo, Japan). The catheter was exchanged with a 10 mm diameter balloon-catheter which was then inflated to occlude the vessel. A venographic control was then performed through the balloon catheter to confirm the retrograde opacification of the pelvic varices and to exclude the presence of other atypical high-flow venous collaterals requiring balloon-occlusion.

STS foam was prepared, as previously described, by connecting through a three-way stopcock two 10 ml Luer Lok™ syringes containing respectively 2 ml of 3% STS (Fibrovein, STD Pharmaceuticals) and 8 ml of air and by mixing their contents together until a homogeneous foam was obtained.

After balloon-occlusion and the complete filling of the pelvic varices with contrast media, the patient was asked to perform Valsalva's maneuver while 20-40 ml of 3% STS foam were injected until the contrast media present in the pelvic varices was completely washed-out. The absence of contrast media in the pelvic varices indicated their complete filling with 3% STS foam (figure 1).

In case of complete stagnation of contrast medium after balloon-occlusion, one of the balloon catheters was deflated creating an obliged outflow route and then re-inflated immediately after (figure 2).

The balloon-occlusion of the major veins to which the high-flow collaterals were tributary was kept for 30 minutes. After this period a control venography was performed to demonstrate the complete occlusion of the pelvic varices.
Patients were discharged 4 hours after the procedure. A 3-day oral anti-inflammatory (200 mg/day nimesulide) and a 5-day oral antibiotic (1 g/day amoxicillin) drug therapy were prescribed.

Follow-up

Physical examination, a pelvic and transvaginal color-Doppler US examination and a questionnaire-based assessment of pain using the SSS was performed at 1, 3, 6 and 12 months after the procedure. The SSS evaluated the presence and the entity of the specific symptoms (pelvic pain, dyspareunia, urinary urgency and menstrual pain) during the four weeks preceding the follow-up visit.

Study Endpoints and Statistical Analysis

Study endpoints were rates of technical success and recurrence of PCS during a 12-month follow-up period. Technical success was defined as the complete occlusion of pelvic varices at post-procedural venography with no evidence of venous flow observed at color-Doppler US. The appearance of pelvic varices and/or return of SSS to baseline values was considered as a recurrence of PCS. All data are given as means ± SD. Categorical data are expressed as percentages. The paired Student's t test was used to assess statistical significance of differences before and after treatment (P value < 0.05). All statistical analyses were performed using the Epi Info 3.5.1 software (CDC, Atlanta USA).
Table 1: Patient population

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<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pelvic Pain</td>
<td>12 (100)</td>
</tr>
<tr>
<td>Dyspareunia</td>
<td>10 (83.3)</td>
</tr>
<tr>
<td>Urinary Urgency</td>
<td>2 (16.7)</td>
</tr>
<tr>
<td>Menstrual Pain</td>
<td></td>
</tr>
<tr>
<td>Nulliparous</td>
<td>1 (8.3)</td>
</tr>
<tr>
<td>Uniparous</td>
<td>6 (50.0)</td>
</tr>
<tr>
<td>Biparous</td>
<td>3 (25.0)</td>
</tr>
<tr>
<td>Multiparous</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>4 (33.3)</td>
</tr>
<tr>
<td>IIa</td>
<td>3 (25.0)</td>
</tr>
<tr>
<td>IIb</td>
<td>4 (33.3)</td>
</tr>
<tr>
<td>IIc</td>
<td>1 (8.3)</td>
</tr>
<tr>
<td>IIId</td>
<td>2 (16.7)</td>
</tr>
</tbody>
</table>

Table 1: Patient population

<table>
<thead>
<tr>
<th>Follow-up (months)</th>
<th>Pelvic Pain</th>
<th>Dyspareunia</th>
<th>Urinary urgency</th>
<th>Menstrual Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8.2 ± 0.7</td>
<td>6.3 ± 1.7</td>
<td>1.1 ± 2.4</td>
<td>2.9 ± 3.3</td>
</tr>
<tr>
<td>1</td>
<td>4.2 ± 1.1†</td>
<td>2.1 ± 1.3†</td>
<td>0.4 ± 0.9†</td>
<td>0.8 ± 1.1†</td>
</tr>
<tr>
<td>3</td>
<td>3.3 ± 1.3†</td>
<td>1.5 ± 1.4†</td>
<td>0.2 ± 0.6†</td>
<td>0.6 ± 1.2†</td>
</tr>
<tr>
<td>6</td>
<td>2.9 ± 0.9†</td>
<td>1.4 ± 1.6†</td>
<td>0.2 ± 0.4†</td>
<td>0.5 ± 0.9†</td>
</tr>
<tr>
<td>12</td>
<td>2.8 ± 1.0†</td>
<td>1.4 ± 1.5†</td>
<td>0.3 ± 0.7†</td>
<td>0.6 ± 1.1†</td>
</tr>
</tbody>
</table>

Symptom Severity Score
Table 2: Symptom Severity Score changes during the 12 month post-procedural follow-up period. †: Statistically significant changes from baseline values (Student’s t test P

Fig. 1: Selectively left ovarian venography demonstrating a type II d pelvic varicocele (a). Selective catheterization and balloon-occlusion of the ipsilateral and contralateral hypogastric veins (b-d). Left ovarian venography after injection of 3% STS foam showing complete occlusion of the pelvic varices (e, f).
Fig. 2: Right ovarian venography demonstrating a type IIa pelvic varicocele (a).Selective catheterization and balloon-occlusion of the ipsilateral hypogastric vein (b-c). Right ovarian venography showing a high-flow venous collateral to the contralateral hypogastric vein (type II b pelvic varicocele) (d). Selective catheterization and balloon-occlusion of the contralateral hypogastric vein (e-g). Right ovarian venography demonstrating a rapid outflow of contrast medium through the right ovarian vein (h). Balloon-occlusion of the right ovarian vein and control right ovarian venography showing no further high-flow venous collateral vessels with stagnation of contrast-medium in the pelvic varices (i, j). Injection of 3% STS foam during temporary deflation of the balloon-catheter in the right ovarian vein to create an obliged contrast-medium out-flow route (k). Left ovarian venography showing complete occlusion of the pelvic varices (l).
Fig. 3: Selectively left ovarian venography demonstrating a type I high-flow pelvic varicocele (a). Selective catheterization and balloon-occlusion of the ipsilateral hypogastric vein (b, c) and control venography demonstrating a type II b high-flow pelvic varicocele (d). Selective catheterization and balloon-occlusion also of the contralateral hypogastric veins (e). Left ovarian venography after injection of 3% STS foam showing complete occlusion of the pelvic varices (f).
Results

Pelvic varicocele B-ORTFS

A technical success was achieved in all patients. A colic-like pain occurred after the injection of sclerosing agent with spontaneous resolution after 5 minutes in two (40%) patients. No other complications were observed. Mean fluoroscopy time was 23.4 minutes ± 3.91.

Follow-up

No recurrences of PCS were observed during the 12 month follow-up period. A substantial reduction in size of the pelvic varices with no signs of blood flow was observed at the 3, 6 and 12-month control color-Doppler US. SSS assessed at 1, 3, 6 and 12 months revealed a significant improvement of symptoms (Student's t test P<0.01). (Table 2).
Conclusion

Our preliminary results need to be confirmed by studies including larger patient populations.
Treatment of PCS with high-flow venous collaterals by B-ORTFS is a safe and effective and should be taken in consideration as an alternative to other endovascular and surgical options.
References


