Abstract. – Purpose: To evaluate the safety and feasibility of supra-pubic percutaneous sclero-embolization (SE) in the treatment of symptomatic female pelvic varicocele (FPV), performed under local anesthesia.

Materials and Methods: The authors selected 28 patients screened by transabdominal and transvaginal ultrasound, with venous Doppler signal. Clinicians performed SE by transfemoral catheterization, under local anesthesia, using of a mix of 2 ml of lauromacrogol 400 (Atossiscerol 3%, Chemische F. Kreussler, Wiesbaden, Germany) and 2 ml of air, in a mixed foam fashion.

Results: The total operative time for SE was 7.6±2.1 min. Intra-surgical blood loss was 40±14 ml. No migration of sclerosant material occurred and postoperative analgesic request during a 48 hr period occurred in 6 patients. Technical success was 100%. The Authors embolized 8 women bilaterally (28.5%), 18 on the left ovarian vein (OV) (64.2%) and 2 only in the right OV (7.1%): 7 women complained of transitory flank pain (25%), which disappeared in few minutes. The major complications in 10 days after SE were: fever (>38°C for two days) in 2 patients (7.1%) and pelvic pain for 3 days in eight patients (28.5%). After 30 days only 6 women suffered of FPV lower symptoms which disappeared in 180 days. A substantial reduction in size of pelvic varicosities was noted in all patients.

Conclusions: SE is a safe and feasible procedure. It reduces significantly the mean time of scopies, the intensity of radiation emission, and it is performed under local anaesthesia. This minimally invasive procedure could be proposed to all women with supra-pubic FPV for its reproducibility and feasibility.

Introduction

Female pelvic varicocele (FPV) is defined as a pelvic venous insufficiency. Initially described by Taylor et al in 1949, it is less known than the male varicocele1. When the FPV is associated with chronic pelvic pain, it is defined as pelvic congestion syndrome (PCS)2. The prevalence of PCS is closely related to the frequency of ovarian varices, which occur in 10% of the general population of women2. First described by Richet in 1857, the symptoms of chronic dull pelvic pain, pressure, and heaviness are often a result of dilated, tortuous, and congested veins3, produced by retrograde flow through incompetent valves in the ovarian veins4, called FPV.

According to the degree of severity of FPV, patients can report a deep, prolonged dull ache, often associated with movement, posture, and activities that increase abdominal pressure. Pain may be unilateral or bilateral and it is often
There are three diagnostic criteria for establishing the diagnosis of FPV with PCS:

1. A tortuous pelvic vein with a diameter greater than 4 mm;
2. Slow blood flow (about 3 cm/s);
3. A dilated arcuate vein in the myometrium that communicates between bilateral pelvic varicose veins.

The set-up procedure in hospitalization required a number of key points for an appropriate informed consent. In the pre-assessment phase, the patient must fill in the clinical examination consensus for the iodated contrast medium, with the routine determination of creatinine, protein electrophoresis, electrocardiogram, chest X-ray. The appropriate informed consent for the iodated contrast medium must always be required because of the risk of an anaphylactic shock.

Any allergies to contrast media or to local topical anaesthetic needed to be reported in order to prepare a “short term” anti-allergic drug. Occasionally, anxious women required a short dose of benzodiazepines, such as midazolam, prior to SE. Moreover, clinicians prescribed prophylaxis medications for deep vein thrombosis, i.e. recommending 4000 units subcutaneous (SC) of unfractionated heparin (UFH) in the morning before embolization, and 2000 units SC for two subsequent days after the procedure, adding gastro-protection one day before the procedure and 5-7 days after it. As to antibiotic therapy, the Authors suggested erythromycin per os, 1 g twice a day, from the day before the procedure to 4 days after it, or alternatively, ceftriaxone 1 g/day for 4 days. The SE procedure was subsequently performed. Authors used a standard sterile angiographic kit [Med-Italia Biomedica Srl, Medolla (MO), Italy]. Once the patient was in the operat-
Suprapubic percutaneous sclero-embolization of symptomatic FPV under local anesthesia

In the operating theatre, she was prepped and draped in sterile fashion (Figure 2). Local anesthesia was given with a mixture of lidocaine 2% diluted in 10 cc of saline. The procedure began with the cannulation of the right common femoral vein with an 18 gauge (18 G) needle, placing and a 45-cm venous 6F plastic-coated introducer. A hydrophilic guidewire (Cordis Corporation, Warren, NJ, USA) was used in order to introduce the catheter into the vena cava. Then the clinicians placed the catheter (Cook Medical, Winston Salem, NC, USA) either to the left renal vein in order to reach the left ovarian vein, or, directly, on the right ovarian vein through the vena cava. Afterward, the operators generally performed ovarian flebography by contrast medium (Iomeron 350, Bracco, Italy), to show the entire pathological district of gonadal (Figure 3) and ovarian veins (Figure 4), and the possible anatomical variants (double or triple ovarian veins, ovarian-pelvic anastomosis, pathological anastomosis with branches of hypogastric vein, sacral veins, or mesenteric district). Once the pathological venous district was selected, clinicians performed a catheterization of the dilated ovarian vein, using a 5F angiographic catheter (Cook Medical, Winston Salem, NC, USA). Subsequently, using coaxial 3-F T3 Teflon catheter (Cook Medical, Winston Salem, NC, USA), to reach the pathological gonadal venous district (Figure 5) they injected 2 ml of Lauromacrogol 400 (Atossisclerol 3%, Chemische Fabrik Kreussler, Wiesbaden, Germany) and 2 ml of air, in a mixed foam, resulting in immediate occlusion and sclerosis of the pathological veins. This injection obtained an immediate occlusion and sclerosis of the distressed gonadal venous district, using coaxial 2.7 F coaxial catheter (Progreat; Terumo, Tokyo, Japan). Authors performed unilateral or bilateral sclero-embolization in the same setting. The injection of the iodinated contrast medium into the micro-catheter displayed stagnation, as a sign of sclerosis. Lastly, the enlarged pelvic veins where sclerosed with “foam” injection (Figure 6), up to the portion below the origin of the renal vein (5-10 cm). To confirm the final results, a pelvic phlebography is performed showing occlusion of the involved varicocele (Figure 7). The catheters were removed 5-10 min after sclerosis. At the end of the procedure it was not necessary to apply stitches to the entry site, since there was no surgical incision or exposure of anatomical structures, except the minimal incision of 1 mm, by percutaneous puncture in the right femoral vein. With reference to pain during SE, a drip with ke-
torolac or tramadol was used during procedure. After SE, the women were generally advised to recuperate at home for two days and then return to their normal lives, avoiding sports and hard physical activities for 3 weeks after the procedure.

Any postoperative pain management was successfully standardized for the first 3-5 days after patient’s discharge. Post-procedure analgesia included paracetamol, 1g four times/day, alternating with NSAIDs, 500 mg three times/day.

Scheduled follow-up was at 10 days, 30 days and 180 days; it included clinical evaluation with Visual Analog Scales (VAS) and questionnaires (to measure pain perception levels) as well as and echo color Doppler TV-US.

Results

The baseline clinical characteristics of the patients, all Caucasians, were similar. The mean age of the women was 51 (43-59 years), multiparae on average (2.1), with an average body mass index (BMI) of 23.4. The average time for FPV diagnosis was 1.9 years.

The pre-operative mean diameter (±SD) of the left pelvic varices was 6.9±2.1 mm, while the mean diameter of the right pelvic varices was 5.1±1.4 mm.

On average, the total operative time for sclerotherapy was 7.6 ± 2.1 min (starting from the cannulation of the right common femoral vein). The intra-surgical blood loss was 40 ± 14 ml (measured by weight of swabs in millilitres). No migration of sclerosant material was recorded and the post-operative analgesic request for 48 h, was recorded only in 6 patients (21.4%). A technical success of 100% was achieved during the procedure, with no migration of sclerosant and no cases of basilic vein or ovarian vein spasm into the pelvic retro-peritoneum. Eight women were embolized bilaterally (28.5%), 18 on the left ovarian vein (64.2%) and 2 only in the right ovarian vein (7.1%).

The post-operative course, scored by VAS and questioner, was favorable, with immediate dis-
missal and a prompt return to work even after only 24h from the procedure. Seven women complained of transitory flank pain (25%) arising immediately after sclerosant injection, which disappeared in minutes without the need of drugs.

In the follow-up course, the major complications observed after 48 h were: fever (>38°C for two days) in 2 women (7.1%) and moderate pelvic pain for four days in eight patients (28.5%), in the first 10 days after embolization. After 30 days of follow-up, only 6 patients (21.4%) suffered from FPV lower symptoms, which disappeared completely in 180 days, with a substantial reduction in the size of pelvic varicosities in all patients, with a mean diameter <4.5 mm.

Sexual activity was generally resumed after one week and, as reported by a confidential interview during follow-up, it was no longer painful and quite satisfactory in 25 women (89.2%).

**Discussion**

The aim of the treatment of FPV is to stop venous blood flow into dilated ovarian veins. This block can be done by surgical ligation of the relevant ovarian veins or by the interruption of the intravenous flow by means of a vein occlusion, performed injecting sclerotizing substances. The percutaneous minimally invasive treatment of FPV is defined as a non-surgical procedure.

Generally, surgical ligation of FPV is performed with a laparotomic access to the abdominal cavity under general anaesthesia, with subsequent direct ovarian vein ligation. However, this procedure has been currently replaced by laparoscopic approach: the small intestine is usually mobilized to better identify the mesenteric duodenal area. It can be done on right or on left ovarian veins. The right ovarian vein is approached by cutting the posterior peritoneum covering the inferior vena cava 2 cm below the mesenteric-parietal zone. The right ureter is identified and displaced laterally, the ovarian vein is clamped, to release the retro peritoneal areolar tissue, with 2 or 3 clips placed near the origin of the vein, next to the inferior vena cava. The left ovarian vein may also be approached at the ovarian level. It can be dissected from the retro-peritoneal tissue, proceeding distally to the left renal vein. Alternatively, the left ovarian vein can be intercepted by releasing the posterior peritoneum covering the abdominal aorta, 2 cm below the duodenal fold. After identifying the left ureter, the inferior mesenteric artery and vein, the left ovarian vein is identified by pulling with atraumatic forceps the relevant ovary. Once the left ovarian vein has been intercepted, it can be closed by placing 2 or 3 clips at the origin of the ovarian vein, near the left renal vein; it may be done also by coagulation and section of the ovarian veins.

Ovarian vein embolization has been used for many years as a treatment for symptomatic FPV resistant to medical therapy. Coil embolization, first described in 1993, and now percutaneous chemical sclerotherapy with sodium tetradecyl-sulphate or Gelfoam can be offered on an outpatient basis as a less invasive options than surgery. Short-term success from embolization therapy is estimated at 80-98%. Longer-term efficacy, as observed in PCS, also appears promising in our investigation. Technical success rates from embolotherapy for the treatment of varices in PCS have been measured at 98-100%, and follow-up at 12 months has shown a mean reduction in pain scores of 65%. Side-effects of embolization include thrombophlebitis, recurrent disease, and embolic material occluding non-targeted veins.

Revisiting the recent literature, clinicians reported many successful experiences: generally, the functional restitution of the ovarian vein flow involved in FPV is immediate, due to robust collateral pelvic circulation, without alteration of its hormonal function. Cases of ovarian malfunction or menopause induction after pelvic embolization in patients of reproductive age, have been rarely reported.

Kim et al. studied 131 consecutive patients from 1998 to 2003 because of a high degree of clinical suspicion of pelvic and ovarian varices; percutaneous transfemoral venography confirmed the presence of varicose ovarian veins in 127 patients (97.0%). 108 women of 127 (85.0%) were treated with embolotherapy of the internal iliac vein. Ninety-seven patients completed long-term clinical follow-up (mean 45 ± 18 months). The mean pelvic pain level had decreased significantly from 7.6±1.8 before embolotherapy to 2.9±2.8 after embolotherapy. Overall, 83% of the patients exhibited clinical improvement at long-term follow-up, 13% had no significant change, and 4% exhibited worsened condition. No significant change was noted in hormone levels after embolotherapy. Two successful pregnancies were reported after ovarian and pelvic vein embolotherapy.

Pieri et al. studied, between 1996 and 2001, 33 women who had undergone percutaneous...
treatment for PCS. All the women had chronic pelvic pain. All of the patients underwent percutaneous treatment of PCS by trans-brachial approach, after receiving local anesthesia: sclerosis was performed with 3% sodium tetradecyl sulfate. Follow-up consisted of a questionnaire at one month and gynecological and ultrasound examinations at 6/12 months. At the one-month follow-up, chronic pelvic pain was present in 13 patients (39%); the pain was continuous in three and intermittent in ten women. At the follow-up after 6/12 months, the symptoms were unchanged. Ultrasound revealed a reduction in periovarian varicosities, recording a mean diameter of 3.19 mm on the right and 4.5 mm on the left. Symptoms persisted in women with pelvic varicosities measuring over 5 mm at ultrasound.

Kwon SH et al20 evaluated the therapeutic effectiveness of ovarian vein embolization using coils. Evaluation after coil embolization was performed within 3-6 months, 6 months to 1 year, 1 to 6 years. Among a total of 67 patients, 55 (82%) experienced pain reduction after coil embolization, and did not pursue any further treatment. 12 women (18%) responded that their pain level had not changed, or had become more severe. Among them, 9 patients were treated surgically and the remaining 3 patients remained under continuous drug therapy.

Ratnam et al21 treated 218 women. The left ovarian vein was embolized in 78%, the right internal iliac in 56.4%, and the right ovarian vein in 42.2% of patients. At follow-up by TV-US, mild reflux only was seen in 16, marked persistent reflux in 6, and new reflux in 3 patients. The latter 9 women underwent successful repeat embolization. Two patients experienced pulmonary embolization of the coils, of whom one was asymptomatic and the other was successfully retrieved. One patient had a misplaced coil protruding into the common femoral vein; and one patient had perineal thrombophlebitis. The results of this study showed that pelvic venous embolization by way of a transjugular approach was a safe and effective technique in the treatment of pelvic vein insufficiency.

Gandini et al22 used the transcatheter foam sclerotherapy (TCFS) in pelvic varicocele using sodium-tetradecyl-sulfate foam (STSF) in 38 patients with PCS treated in 5 years. TCFS was performed in all patients, using 3% STSF. Follow-up was performed by physical examination, pelvic and Doppler TV-US examination and by a questionnaire-based assessment of pain at 1, 3, 6, and 12 months after the procedure. Technical success was achieved in all patients (100%). In 3 patients a pelvic colic-like pain occurred immediately after sclerotic agent injection, disappearing spontaneously after a few minutes. No recurrent varicoceles were observed during a 12-month follow-up. Based on these recent literature reports, ovarian vein SE is safe, less expensive than surgery, effective, minimally invasive and capable of restoring patients to normal function.

The limitations of our study include a restricted number of women treated, the amount of sclerosant decided upon in each case (currently standardized in our series) and a pre-surgical standard decision to occlude by means of sclerosis of the pathological venous district (done directly during procedure in our investigation). The average time of X-ray fluoroscopic exposure ranged between 50 seconds to 10 minutes for each patient, including the more complex cases, averaging 3-4 minutes per patient23.

In 7-10% of cases it is not possible to cannulate the ovarian vein24. Generally, the literature quotes an SE failure rate of 10%13,14.

In the case of ectasic veins it is possible to perform a fast venogram wash-out of contrast agent into the contra-lateral ovarian veins. In this case, it is possible to utilize a magnetic coil “Tornado platinum coils” (Cook Group Company, Bloomington, IN, USA). A preventive display of the ovarian vein by means of angio-MRI can reduce to zero the possibility of SE failures, detecting pelvic anastomosis of ovarian veins with mesenteric or iliac veins (anatomical variants of pelvic vascularization), generally identified during phlebography.

Relapses of FPVs after one year from SE are rare, even exceptional, however theoretically possible even 10-20 years after treatment25. Moreover, after the fertile period, possible but improbable recurrences have minimal symptoms, since menopause itself significantly reduces FPV symptoms23-25.

Based on these evidences, we have selected the ambulatory transfemoral approach under local anesthesia as the treatment of choice for symptomatic FPV and PCS.

Conclusions

The retrograde SE of FPV is a fast and feasible technique to apply in women affected by PCS. It is a minimally invasive procedure sparing major postoperative surgical complications. Most importantly, women can be treated under
local anaesthesia. According to our multi-institutional report, this procedure was considerably welcome by many of the patients. Thus downgrading to obsolete any other therapeutic invasive alternative therapy. In expert hands, it becomes one of the many options of modern treatments. The benefits of this procedure should be validated with larger studies involving more women in fertile and postmenopausal age, to best detail the limitations and future directions of this technique.

References


