

Endovascular Treatment of Pelvic Congestion Syndrome

PCS remains underdiagnosed and undertreated, but recognizing this condition and providing endovascular treatment can benefit women with chronic pelvic pain.

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Chronic pelvic pain typically presents in young women in their 20s and 30s and may affect up to 40% of the female population during their lifetime.¹ Chronic pelvic pain lasts longer than 6 months, is not cyclical or related to intercourse, and is not relieved with narcotics. Pelvic congestion syndrome (PCS) results from ovarian, parauterine, or gluteal vein incompetence and remains an underdiagnosed cause of pelvic pain. It is estimated that 60% of women with ovarian vein incompetence will develop PCS.^{1,2} There are few high-quality scientific studies describing the diagnosis and treatment of PCS, and asymptomatic women may have pelvic varices on imaging, resulting in an uncertain relationship between pelvic vein incompetence and chronic pelvic pain. Many physicians are unfamiliar with the diagnosis, leading to missed opportunities to treat women who are in chronic pain.

The etiology of PCS is poorly understood and likely involves mechanical and hormonal factors.^{2,3} Reflux may involve the left or right ovarian or internal iliac veins and their tributaries. Ovarian vein valves may be absent or incompetent due to venous dilation, pelvic vein kinking, external compression, or secondary causes such as Nutcracker syndrome, May-Thurner syndrome, portal hypertension, and acquired inferior vena cava syndrome. PCS occurs more commonly in multigravid women and affects only premenopausal women, suggesting a hormonal effect. Estrogen may result in nitric oxide weakening of vein walls, and progesterone may weaken venous valves.³

CLINICAL EVALUATION

Symptoms are nonspecific, and physicians unfamiliar with the condition may not consider PCS during initial evaluation and treatment. Poor venous return results in dull, chronic pelvic pain or heaviness that is exacerbated by walking and postural changes. The condition can be cyclic with dysfunctional bleeding and dyspareunia and may be worse during the premenstrual period and pregnancy. Pain can worsen with coitus and may present with bladder irritability and frequency. Patients often experience increased anxiety, stress, and depression. Nonspecific symptoms include fullness in the legs, lethargy, depression, abdominal or pelvic tenderness, vaginal discharge, dysmenorrhea, swollen vulva, lumbosacral neuropathy, rectal discomfort, and nonspecific gastrointestinal discomfort.¹

Physical examination may reveal varicose veins along the vulva extending to the proximal medial thighs and in the suprapubic region. This can be associated with greater saphenous vein insufficiency and lower extremity symptoms. The cervix may be engorged with cervical motion tenderness. Ovarian point tenderness may be demonstrated. Family history and multiparity seem to be risk factors. Diagnosis is often clinical after other etiologies are excluded in patients with imaging findings suggestive of venous incompetence. The differential diagnosis is wide and includes endometriosis, pelvic inflammatory disease, interstitial cystitis, pelvic tumors, inflammatory bowel disease, and fibroids, as well as other gynecologic, musculoskeletal, urologic, gastrointestinal, and oncologic conditions.^{1,3}

DIAGNOSTIC IMAGING

Pelvic ultrasound provides the best initial imaging evaluation for PCS. Imaging in the standing position and during the Valsalva maneuver can accentuate venous filling. Diagnostic criteria include ovarian veins measuring > 6 mm, dilated periovarian and parauterine veins > 4 mm, and reflux during Valsalva on Doppler ultrasound.¹⁻³ Ultrasound may also reveal slow blood flow (< 3 cm/s), flow reversal in the ovarian veins, dilated arcuate veins in the myometrium communicating with bilateral pelvic varicosities, and polycystic changes of the ovaries.^{1,4} Complete ultrasound examination also evaluates for other etiologies of pelvic pain, such as adnexal mass and lymphadenopathy.

Cross-sectional imaging may be performed when ultrasound is nondiagnostic and patients have persistent unexplained symptoms. MRI is preferred because it avoids radiation and provides a detailed evaluation of pelvic pathology. Pelvic varicosities show a flow void on T1-weighted sequences and are often hyperintense on T2 sequences, although this may vary due to the velocity of blood flow.² Varices are hyperintense on gradient echo sequences. Enlarged tortuous varices may be seen near the ovaries, uterus, paravaginal plexus, and in the broad ligament. Time-resolved MRA techniques demonstrate the direction of blood flow and may provide the most accurate assessment.³

PCS is diagnosed on magnetic resonance venography with identification of at least four ipsilateral, tortuous parauterine veins with at least one vein measuring > 4 mm or an ovarian vein diameter > 8 mm.⁵ The findings remain nonspecific and a high level of suspicion should be maintained when interpreting the imaging results. The diagnosis may be missed or underdiagnosed due to imaging in the supine position when pelvic varicosities are less prominent. Normal imaging findings do not exclude the diagnosis of PCS. Imaging findings must be considered in conjunction with history and physical examination, as many patients with enlarged veins on imaging do not have symptoms of PCS.

CONSERVATIVE MANAGEMENT

Medical therapy may be most appropriate in patients with isolated dilation of the pelvic venous plexus and unaffected gonadal veins. Medical therapy consists of nonsteroidal anti-inflammatory drugs, ergot alkaloids, venoprotective agents, hormone treatment, and psychotropic agents. Psychotherapy may be used in conjunction with medical therapies. It is proposed that nearly 70% of patients experience some degree of improvement with conservative treatments.⁶

There is little research on the varying medical therapies to determine their efficacy and side effects.

Venoprotective agents are venotonic, anti-inflammatory, and analgesic. Pain relief and a reduction in pelvic vein size has been reported with micronized purified flavonoid fraction. Dihydroergotamine is a vasoconstrictor that may reduce the size of parauterine veins.⁶ Randomized trials evaluating medroxyprogesterone acetate showed increased venous contraction and reduced pain in 65% to 85% of women, but results may be transient.^{2,6} Due to the limited available evidence, medical therapy is not standard for PCS but may be useful in select cases.

ENDOVASCULAR TREATMENT

Transcatheter venous embolization for PCS was first introduced by Edwards et al in 1993.⁷ The technique has surpassed surgical therapies, which are now reserved for patients who fail medical or endovascular treatment. Surgical techniques include uterus repositioning, extra-peritoneal resection of the ovarian veins, laparoscopic vein ligation, and hysterectomy.² Cases of incomplete ligation, and even hysterectomy, have been reported with varying effectiveness and a high recurrence rate.⁸ Surgical techniques may result in severe complications, such as deep vein thrombosis, retroperitoneal hematoma, and ileus and are associated with prolonged hospital stay and recovery time.¹ Endovascular treatment is a well-tolerated outpatient procedure with comparable efficacy, fewer risks, no reported menstrual cycle changes, and easier recovery than surgical management.

Treatment Technique

Venography is considered the gold standard for diagnosing PCS and may be performed when imaging is inconclusive.¹ Venous reflux can be directly visualized as well as contralateral venous filling and involvement of the internal iliac veins. Criteria for diagnosis on venography include ovarian vein diameter > 10 mm, uterine venous engorgement, congestion of the ovarian venous plexus, filling of pelvic veins across the midline, and filling vulvovaginal and thigh varicosities.^{2,3}

The procedure may be performed from a jugular or femoral vein approach under moderate conscious sedation. After obtaining venous access, the left renal vein is selected with a Cobra 2 or similar angiographic catheter. Hand-injection venography is performed in the semierect position with the Valsalva maneuver to best demonstrate venous distension and reflux (Figure 1). The ovarian vein is then selected with a hydrophilic wire, the primary catheter or a microcatheter is advanced, and venography is repeated to assess the pelvic veins for reflux, cross-pelvic collaterals, and thigh or vulvar varices. The catheter is then advanced distally near the

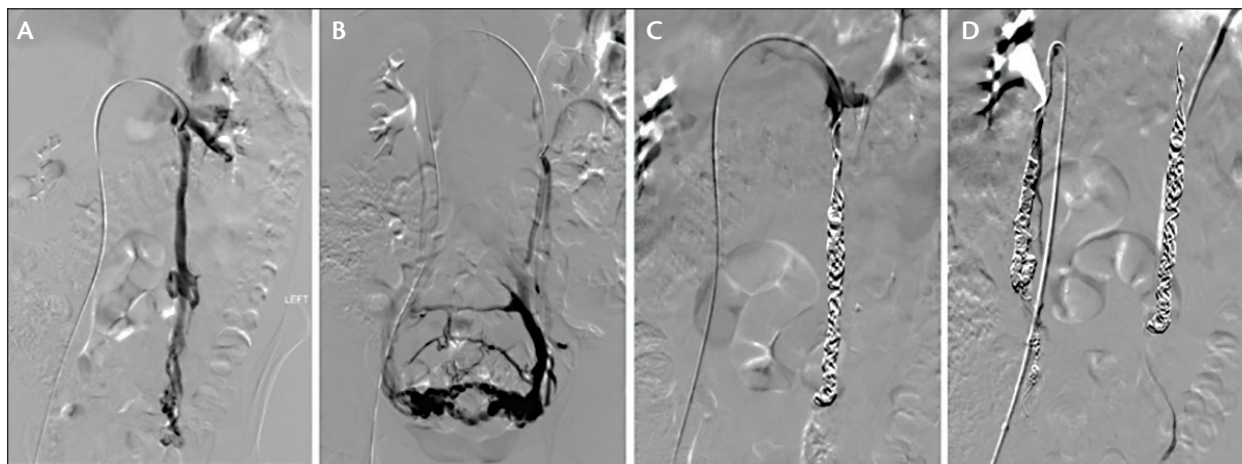


Figure 1. A 44-year-old woman with pelvic pain demonstrating enlarged ovarian veins and reflux on MRI. A left renal venogram showing reflux of contrast in the left ovarian vein extending to the pelvis (A). A left ovarian venogram showing reflux into large pelvic veins with cross-pelvic collaterals (B). The left ovarian vein was embolized with a sclerosant and gelatin slurry followed by metallic coils (C). A reverse curve catheter was used to select the right ovarian vein, and embolization was performed (D).

paraovarian varicosities, and embolization is performed with sclerosants, coils, or vascular plugs. Treatment technique varies depending on operator preference, but in general, the entire length of the ovarian vein is treated to prevent collateralization with retroperitoneal veins and recanalization. If multiple venous tracts are identified, they should each be embolized to reduce recurrence (Figure 2). The right ovarian vein is then selected from the inferior vena cava, and the procedure is repeated to assess and treat the right ovarian vein if reflux is identified. A Simmons 1 or similar reverse curve catheter may be utilized.

Internal iliac vein incompetence often contributes to pelvic varicosities. The internal iliac veins may be investigated as part of the initial procedure or several weeks after ovarian vein embolization. Some operators treat the internal iliac veins in all cases, whereas others perform secondary internal iliac vein embolization for patients who experience persistent pain after the primary ovarian vein embolization.

The internal iliac veins are commonly assessed with balloon occlusion venography with the Valsalva maneuver. Internal iliac vein reflux may improve after ovarian vein embolization and treatment may not be necessary. Embolization is performed if abnormal varicose veins or communication with the ovarian veins are identified (Figure 3). This may be done in a selective manner, treating specific tributaries, or from the proximal internal iliac vein. If sclerotherapy is used, the volume of sclerosant is estimated with a contrast venogram. The solution is injected, and the balloon is inflated for 5 to 10 minutes.

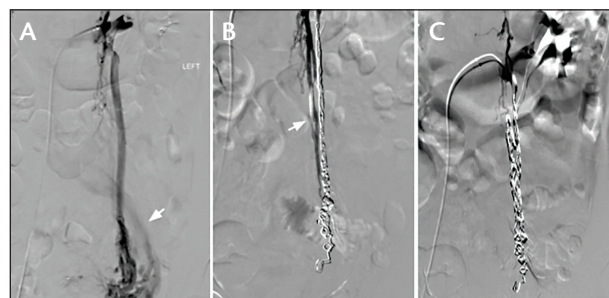


Figure 2. A 38-year-old woman with pelvic pain demonstrating ovarian vein reflux on ultrasound. A left renal venogram showing reflux into enlarged pelvic veins communicating with the left internal iliac vein (arrow) (A). A microcatheter was advanced into the distal ovarian vein and coil embolization was performed. A second venous channel was identified after embolization (arrow) (B). The second vein was selected and embolized to prevent recanalization and persistent symptoms (C).

This may be followed by coil embolization, or coils may be used as the primary treatment. Generous oversizing is required to reduce the risk of coil migration and embolization to the lungs.

Embolic Agents

Successful embolization has been reported with various combinations of sclerosants, glue, coils, and vascular plugs. There are few studies directly comparing treatments with the various embolic agents. Furthermore, no controlled studies have demonstrated a difference

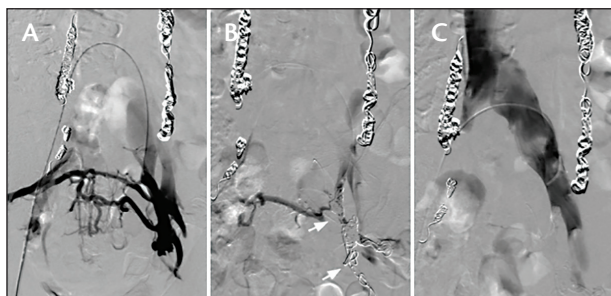


Figure 3. A 44-year-old woman with persistent pelvic pain returns for internal iliac vein embolization 8 weeks after ovarian vein embolization. A left internal iliac venogram demonstrating reflux into large cross-pelvic collateral veins (A). The left internal iliac vein was treated with coil embolization (arrows) (B). A venogram after embolization no longer shows reflux into the left internal iliac vein branches (C).

between unilateral and bilateral ovarian vein embolization.¹ The choice of embolic agent and the decision to treat the ovarian veins alone or in conjunction with the internal iliac veins remains operator preference, with several small studies demonstrating clinical success with varying techniques.

Stainless steel and platinum fibered coils are commonly used for embolization. Kwon et al used 5- to 15-mm coils to embolize the ovarian veins. On average, 5.8 coils were required for treatment.⁹ Eighty-two percent of patients reported complete absence or significant reduction in pain, but 3% experienced coil migration. Laborda et al used coils to treat ovarian and internal iliac veins in 202 patients and demonstrated 94% clinical success with 1.9% risk of coil migration.¹⁰

Sodium tetradecyl sulfate and sodium morrhuate are commonly used for sclerotherapy. Sclerosants may be injected as liquid, foam, or in combination with gelatin. Sclerotherapy may be performed alone or with metallic coils.¹¹ Success has also been reported with liquid embolic agents. Maleux et al treated ovarian veins in 41 patients with 2 mL of a glue/ethiodized oil mixture.¹² Total or partial symptom relief was achieved in 68.3% of patients. No significant difference was detected between patients undergoing bilateral versus unilateral embolization. Glue migrated to the pulmonary system in two patients.

A recent randomized trial compared fibered coils to vascular plugs in 100 patients.¹³ Both ovarian and internal iliac veins were treated. Fewer devices were used in the vascular plug group (four vs 18), but overall costs were higher. Fluoroscopy time was higher in the coil group. Clinical success was approximately 90% at 1 year, and results were not significantly different between the

groups. There were four major complications consisting of device migration—one vascular plug and three coils. All migrations were asymptomatic, and the devices were removed endoscopically.

Treatment Outcomes

High-quality controlled studies have not been performed to assess treatment outcomes. A literature review published in 2016 analyzed 20 studies involving 1,081 total patients. Coils were used in eight studies, coils and foam in four studies, foam alone in four studies, glue in one study, and glue and coils in three studies. At 1- to 3-month follow-up, 88.1% of patients reported moderate to significant relief, and 86.6% reported relief of symptoms in late follow-up.³

A second literature review analyzed 20 case series that included 1,308 women.¹⁴ Sclerosant was used in 229 cases, coils in 660 cases, and a combination of both in 405 cases. Early reports of complete symptom relief varied from 33% to 80%. Early substantial relief from pain was reported in 75% of women, with low rates of repeat interventions. Transient pain and fever were common after foam embolization. The risk of coil migration was < 2%, and all migrated coils were successfully removed with a snare. No trend was identified between symptomatic improvement and the use of metal coils or sclerosant.

Procedural complications are rarely reported. The risk of coil migration when embolizing the internal iliac veins can be mitigated by aggressive coil oversizing at least 30% to 50%. The risk is increased in large-caliber (> 12 mm) veins.¹ Minor complications include perforation of the ovarian vein, flank pain, postprocedural fever, thrombophlebitis, recurrent varices, and hematoma. No long-term negative effects have been demonstrated regarding the menstrual cycle or fertility.

The decision to treat both ovarian veins depends on the severity of symptoms, anatomy of varicosities, degree of reflux, and operator preference. Results may be improved with internal iliac vein embolization after ovarian vein treatment, but evidence is sparse.¹¹ Internal iliac vein embolization may be performed selectively if there is communication between the ovarian venous plexus and internal iliac vein tributaries, in cases demonstrating internal iliac vein reflux, or in all cases to treat a presumed communication between the pelvic venous plexus. For example, Kim et al treated the ovarian veins in 127 patients followed by interval internal iliac vein embolization with a sclerotherapy/gelatin slurry in 85% of cases. Eighty-three percent of patients showed clinical improvement 45 months after treatment, with no significant long-term complications.⁸

CONCLUSION

PCS is an underrecognized cause of debilitating pelvic pain in young women. Diagnosis depends on vigilant evaluation of symptoms and careful attention to imaging results. Transcatheter embolization is a safe and effective treatment that yields pain relief with few complications. There are few high-quality studies and various treatment techniques have been adopted. The choice of embolic agent, as well as the decision to treat both ovarian veins with or without internal iliac vein embolization, remains primarily operator preference. ■

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