Embolization for Pelvic Congestion Syndrome

The latest techniques in treating pelvic venous incompetence.

BY ANTHONY J. LOPEZ, BSc, MRCP, FRCR

Pelvic venous congestion syndrome is most commonly recognized as the persistence of noncyclical chronic pelvic pain for longer than 6 months in the absence of known pelvic pathology. In the presence of pelvic varices, it is associated with a myriad of nonspecific symptoms, such as bloating, backache, dysmenorrhea, dyspareunia, bladder instability, and an irritable bowel; these are not infrequently associated with lower limb varicosities and hemorrhoids.[1]

Noninvasive imaging has consistently revealed pelvic venous incompetence as the underlying etiology. Since the first reports of ovarian vein embolization in 1993,[2] numerous pelvic vein embolization procedures have been performed, typically treating the ovarian veins, but in recent years, greater emphasis has been placed on embolizing the internal iliac (hypogastric) veins, and more recently still, there has been a growing interest in sclerotherapy of pelvic varices.[3]

Notwithstanding the difficulty of making the diagnosis clinically and radiologically, outcomes are also difficult to assess (often anecdotal), and there remains a lack of level 1 evidence to robustly assess clinical efficacy. To date, there remains just a single randomized controlled trial comparing embolotherapy with pelvic surgery, where embolization was significantly more effective than the other treatment arms in reducing pelvic pain.[4]

Maleux et al treated ovarian vein reflux alone and reported "total relief" of pelvic venous congestion symptoms in 59% of patients up to 20 months later.[5] Kwon et al similarly embolized just the ovarian veins with coils and showed an 82% symptomatic improvement at longer follow-up of up to 6 years.[6] Venbrux et al[7] and Kim et al[8] used a more aggressive approach embolizing all refluxing ovarian and internal iliac vein branches, both achieving a 100% technical success rate. In the latter larger group, there was an 83% improvement in chronic pelvic pain on long-term follow-up.

This article assimilates many years of experience in treating pelvic venous congestion syndrome with and without associated lower limb varicosities, with medium- to long-term follow-up. It emphasizes the need to thoroughly understand the relevant radiological anatomy, adequately assess the incompetent veins noninvasively to direct therapy, and the need to consider using a combination of sclerotherapy and embolization with, in my opinion, occlusion of the entire refluxing vein. A meticulous technique will help avoid complications.

TIPS AND TRICKS

Clinical evaluation of the vulval and paravulval areas in association with a symptomatic history is inadequate to make the diagnosis. Transvaginal duplex sonography is recommended as the gold standard method of noninvasive imaging for the preprocedural assessment[9]; although transperineal Doppler, contrast-enhanced upright magnetic resonance venography, catheter venography, and CT are alternatives and are variably used by the majority of operators.

After excluding a nonthrombotic iliac vein lesion or acquired venous stenosis, a venous map accurately documenting the incompetent pelvic veins is mandatory. Any communication with refluxing leg veins should be recorded, but in most cases of pelvic venous congestion syndrome, the pudendal branches of the internal iliac veins and/or the broad ligament parametrial branches of the ovarian veins are most likely incompetent.

Until relatively recently, most of the reported series, including the first case study, have treated the ovarian veins alone. The transjugular venous approach not only offers reliable access, as it is highly visible and easy to access under ultrasound guidance, but also offers an antegrade approach (ie, essentially "downhill") to the most frequently affected veins, including aberrant branches. This technique reduces the requirement to reform "reverse curve" angiographic catheters where

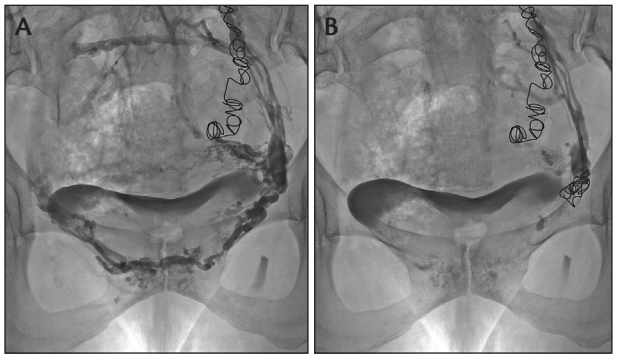

Figure 1. Vulval varices before (A) and after (B) foam sclerotherapy.

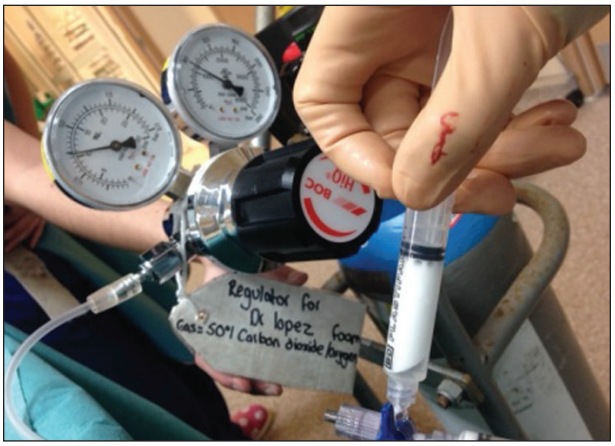

Figure 2. A combination of 50% carbon dioxide and 50% oxygen gas was used to create foam for sclerotherapy.

there is less control of embolic agents, as pushing a catheter from the groin cranially makes deployment "over the curve" inherently unstable. If the internal jugular vein is unavailable and antegrade deployment is desired, alternative access points include the external jugular, subclavian, or arm approach.

Although not essential, as the procedure is well tolerated, multiple venous treatments create a longer procedure than the equivalent testicular vein procedure, and the use of conscious sedation is considered helpful, yet doesn't preclude early detection of rare embolic phenomena with foam and/or early discharge home. It is also useful to prescribe a nonsteroidal anti-inflammatory drug after the procedure for up to 72 hours to ease any symptoms related to the inevitable mild phlebitis.

It is strongly advised to treat the most distal (and typically smallest) branches in the superficial and deeper pelvic venous plexuses first; even microcatheters cannot consistently and effectively access all of these branches. This can be achieved with sclerotherapy (Figure 1), where an agent is introduced directly into the vein lumen to cause endothelial damage, endoluminal fibrosis, and ultimately, vein closure. In contrast to liquid sclerosants, which are diluted by blood, reducing the concentration to the vein wall, foam displaces the blood, allowing direct and relatively prolonged contact with the endothelium.

Foam is typically created using the Tessari method,[10] with two syringes and a three-way tap employing a liquid-to-gas ratio of 1 to 4. The bubbles in the foam carry the tensioactive injurious agent (eg, 3% sodium tetradecyl sulphate or polidocanol), and it is advised that the foam should be created with the tap slightly "off cock" to generate microfoam with bubbles < 250 µm, which is more highly interactive. Recently, BTG International Inc. announced that the US Food and Drug Administration has approved Varithena (a low-nitrogen polidocanol endovenous microfoam), which is dispensed from a proprietary canister device.[11] Although this is not currently licensed for pelvic vein sclerotherapy, its use in this way may considerably improve the utility of its pelvic application.

For years, air from the operating room has been used as the gas with relatively few reported complications, such as visual disturbance and chest symptoms, but the advised dose limitation was only up to 10 mL.[12] However, I would recommend a 50/50 mixture of carbon dioxide (CO_2) and oxygen, as there is an extremely low risk of such embolic phenomena (Figure 2). CO_2 has been commonly used as a contrast agent in angiography and echocardiography for 50 years, and CO_2 is 50 times more diffusible than nitrogen through the capillary vein wall. Although CO_2 alone makes the foam less robust, adding oxygen (which has a lower diffusibility) stabilizes it; microbubbles can be optimally reduced by the gas mixture both in vitro[10] and in the blood.[13] The rapid solubility of "free gas" in blood (which is simply breathed out by the patient) enables a significantly greater volume of gas to be used.

Although some protection against reflux of foam is offered by using balloon occlusion catheters, they are expensive and laborious to use because they track poorly when used distally and are probably unnecessary when using foam without operating room air injected slowly into the patient while in the Trendelenburg position. A useful tip is to initially inject contrast into the target veins, and using fluoroscopic screening alone, displace the "positive" contrast foam with the "negative" contrast foam. When all of the iodinated contrast is "displaced," the foam has reached its terminal target venous branches.

The refluxing trunks are then embolized using MRI-compatible platinum coils with diameters guided by the luminal diameter on catheter venography. Pushable

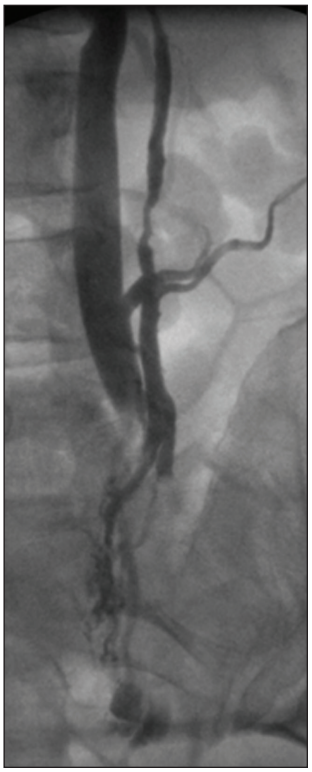

Figure 3. Rich interconnections between the duplicated left ovarian vein and retroperitoneal branches.

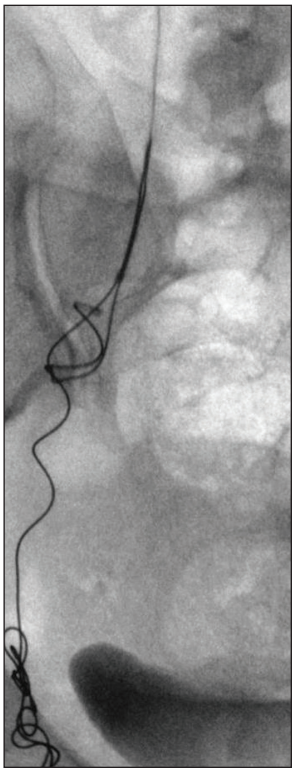

Figure 4. A snared, misplaced Nester coil (Cook Medical) can be retrieved intact through the guiding catheter.

or detachable fibered coils are available, but the latter are relatively expensive; although anecdotal, it is strongly recommended that the entire length of the refluxing vein trunk is covered to prevent new collateralization, because there are often tiny intercommunications between parallel trunks and retroperitoneal branches (Figure 3). Experience from "incomplete" treatment of varicose veins supports this approach. It is important to recognize that otherwise-competent main truncal ovarian veins can be rendered "functionally incompetent" by large incompetent perirenal or retroperitoneal veins.[3] There is no need to pack the coils tightly; this also ensures economical usage. If an associated nonthrombotic iliac vein lesion or "abdominal nutcracker" phenomenon is identified, these should also be treated.[14,15]

It is mandatory to maintain as low an ionizing radiation dose as is achievable for the patient and staff. This necessitates using modern fluoroscopic equipment with image intensification, low milliamperage screening, minimum formal exposures, maximum collimation, and reducing the distance between the radiation source and patient.[3]

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PITFALLS AND COMPLICATIONS

Ultrasound-guided puncture of the internal jugular vein is recommended to eliminate any risk of pneumothorax or other access-related complications, such as inadvertent carotid puncture.

Caution is advised in using liquid embolics or foam made with air in the ovarian vein trunks, not only because of intergonadal communicating vein branches and communications between the ovarian veins and the paravertebral veins, but also specifically between the left ovarian and splenic, ureteric, and inferior mesenteric veins.[2,7]

Embolizing the most cranial segments of either the ovarian veins or internal iliac venous branches requires careful release to avoid inadvertent embolization of the ipsilateral renal vein or risk of displacement, resulting in unexpected pulmonary coil embolization. The use of a detachable coil for the proximal deployment would reduce these risks considerably.

Although only a 5-F vascular sheath is required to access and treat all relevant veins (typically with just a 5-F multipurpose catheter and a 0.035-inch standard guidewire), coils are occasionally misplaced and require snaring and retrieval, typically necessitating a snare, usually requiring 6-F access for the typically large-diameter macrocoils used in this procedure. Although the requirement for snaring is unusual, it may be opportune to insert a 6-F sheath at commencement. Of course, it is noted that the transjugular approach for coil retrieval necessitates withdrawing the coil through the right atrium, but most coils, even with an unconstrained diameter of up to 12 mm, can be retracted into the catheter itself from the groin (Figure 4).

Understanding the behavior of a snared coil is essential. For example, some coils (eg, the Spirale coil [Balt Extrusion]) are "double wound" and after snaring, can unwind into thin, fragile wire (Figure 5) and can snap in the pelvis, which, on subsequent removal of the guiding catheter, would potentially leave wire between the jugular vein and pelvis, including across the right atrium. These coils are better retrieved from the groin after a second puncture.

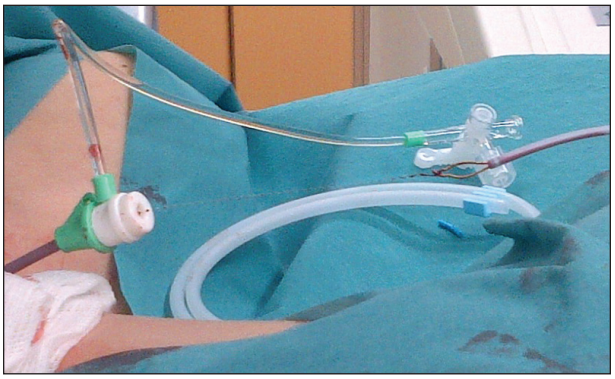

Figure 5. After snaring, some coils may become unwound to form a dangerous wire.

It is advisable to avoid placing coils below the inguinal ligament in the perineal or perianal submucosal tissues, as they may be palpable (Figure 6) in the groin, vagina, or anus.

CONCLUSION

The treatment of pelvic congestion syndrome is well established, but there remains a lack of quality clinical evidence. Good preprocedural noninvasive imaging is essential, not only to exclude nonthrombotic iliac vein lesions, but particularly to "direct" treatment, appropriately reducing time, cost, and radiation dose. It is increasingly being recognized that the pudendal branches of the internal iliac veins, including their most distal branches, must be adequately treated, and occluding the entire venous segment of the refluxing trunk and its distal branches is probably essential. Bland embolization of simply the ovarian veins (or just the internal iliac venous branches) with poor imaging or without imaging is not recommended.

The transjugular route is recommended because it offers an antegrade approach to all target vessels, which is safer for coil deployment, although any displaced coils would effectively need to be retrieved across the right atrium, and for some coils, this is not without risk. Foam provides excellent coverage for sclerotherapy and should ideally not be prepared with air to reduce risky embolic phenomena.

For the most proximal coil placement, detachable coils should be considered, although these are relatively expensive, and displaced pushable coils are generally easily retrieved.

The technique is evolving, but higher-level evidence from a randomized controlled trial is essential stratified between no treatment, sclerotherapy, or coils alone and together, after an agreed standard of preprocedural imaging and a standardized follow-up, probably using repeat transvaginal duplex sonography as well as visual analogue scale scores. ■

Figure 6. Too-low placement of coils within vulval soft tissues.

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