Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

The Lublin protocol of the ovarian vein embolization in the management of pelvic venous disorders

Filip Szkodziak

filip.szkodziak@gmail.com

Medical University of Lublin

Sławomir Woźniak

Medical University of Lublin

Piotr Szkodziak

Medical University of Lublin

Maciej Paszkowski

Medical University of Lublin

Krzysztof Pyra

Medical University of Lublin

Michał Sojka

Medical University of Lublin

Tomasz Paszkowski

Medical University of Lublin

Research Article

Keywords:

Posted Date: August 28th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10372891/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Pelvic venous disorders (PeVD) constitute a significant and frequently under-recognised cause of chronic pelvic pain in women, with ovarian vein insufficiency representing the principal haemodynamic substrate in the majority of symptomatic cases. Despite advances in non-invasive imaging, pelvic venography remains the definitive diagnostic modality; however, its invasive nature underscores the need for rigorous patient selection and standardised pre-procedural evaluation. This manuscript presents the Lublin Protocol, a comprehensive, interdisciplinary framework of ovarian vein embolization (OVE) developed at the Independent Public Hospital Number 4 in Lublin, Poland, where more than 1000 procedures have been performed over fifteen years. The protocol integrates structured clinical assessment, validated transvaginal ultrasonographic criteria, and multidisciplinary qualification to ensure accurate diagnosis and optimal patient selection. It delineates a detailed embolization paradigm combining foam sclerotherapy of incompetent pelvic venous plexuses with coil occlusion of refluxing ovarian and internal iliac venous segments, emphasising distal-to-proximal treatment sequencing and technique-specific safeguards to minimise complications. Post-procedural management and follow-up are standardised, incorporating systematic clinical reassessment and ultrasonographic evaluation at three and six months to determine therapeutic efficacy and the need for re-intervention. Existing literature indicates that OVE provides meaningful symptomatic improvement for most patients, though heterogeneity in study design highlights the need for prospective, standardised research. The Lublin Protocol offers a reproducible, evidence-informed approach to the diagnosis and endovascular management of PeVD, aiming to enhance procedural safety, optimise clinical outcomes, and support future comparative studies in this evolving field.

Introduction

Pelvic venous disorders (PeVD) are increasingly recognised as an important aetiological contributor to chronic pelvic pain (CPP), a syndrome affecting as many as one quarter of women of reproductive age (1–6). PeVD represents a discrete clinical entity, characterised by the cooccurrence of CPP with venous varicosities localised in the pelvis and lower abdomen. Beyond the typical symptoms of CPP, PeVD is marked by persistent, non-cyclical pain localised in the suprapubic region, abdomen, back, hip, leg and/or vulva. The pain commonly worsens with prolonged orthostasis, sitting or ambulation and is typically ameliorated by rest or recumbency. Other distinguishing manifestations may include dyspareunia (most often presenting as postcoital pain), urinary urgency, vulval oedema and persistent genital arousal disorder. The preponderance of clinical manifestations reported by patients is attributable to the ovarian vein insufficiency (7–12).

Accurate diagnosis of PeVD is contingent upon a meticulous clinical assessment, incorporating a detailed medical history, a focused gynaecological examination and the judicious application of imaging investigations. Pelvic venography remains the diagnostic reference standard for definitive anatomical and haemodynamic characterisation. However, it is an invasive technique that carries a non-negligible risk of complications. Among the non-invasive modalities utilised in the evaluation of PeVD are magnetic

resonance imaging (MRI), computed tomography and ultrasonography. In routine gynaecological practice, transvaginal ultrasonography (TVUS) continues to serve as the principal diagnostic modality for patients presenting with symptoms suggestive of PeVD (8). At the centre at which the present protocol was devised, the diagnostic utility of TVUS for PeVD was assessed. PeVD was confirmed by pelvic venography in 94.5% of patients exhibiting a single positive sonographic parameter, 95.1% of those with two positive parameters, 96.4% with three positive parameters, and in al of patients demonstrating four positive ultrasound parameters (13).

Historically, therapeutic options of PeVD were predominantly surgical — chiefly hysterectomy (with or without oophorectomy) and resection or ligation of the ovarian vein. Contemporary management, however, has shifted towards minimally invasive modalities, principally pharmacotherapy and endovascular techniques, most notably ovarian vein embolization (OVE) (14–19) .

However, it should be borne in mind that PeVD secondary to ovarian vein insufficiency constitutes only a subset of patients with PeVD. In certain patient cohorts the condition may be appreciably more complex and may involve, inter alia, vulvar varices, perivesical plexus varicosities or atypical varicosities of the lower limbs. Moreover, the previously delineated constellation of symptoms may be secondary to a vascular lesion localised within the renal vein or the internal iliac vein. In the above-mentioned scenarios, or in the presence of any diagnostic uncertainty, it may be necessary to extend the diagnostic work-up to incorporate more advanced imaging modalities, for example MRI, transabdominal or intravascular ultrasound, prior to consideration for endovascular intervention (10, 15, 20).

Objective.

The purpose of this manuscript is to present the protocol of OVE in the management of PeVD, as implemented at the Independent Public Hospital Number 4 in Lublin, Poland. The present protocol is the product of close interdisciplinary collaboration between the Third Chair and Department of Gynaecology, the Department of Interventional Radiology and Neuroradiology, and the Department of Vascular Surgery of the Medical University of Lublin, all of which are situated within the Independent Public Hospital Number 4 in Lublin, Poland.

Results

Diagnostic work-up, including patient selection and risk assessment

All female patients scheduled for OVE undergo, prior to the planned intervention, a minimum three-month course of conservative management, encompassing venoactive therapy, graduated compression therapy, and lifestyle modification, including weight optimisation. Referral for specialist assessment of suitability for OVE is circumscribed to women:

- manifesting a clinical phenotype concordant with PeVD.

- who fulfil at least one validated TVUS criterion demonstrative of pelvic venous insufficiency.
- in whom alternative aetiologies of CPP are excluded through comprehensive diagnostic interrogation.
- who exhibit persistent symptomatology refractory to adequately administered conservative therapy.

Eligibility for referral remains further contingent upon the absence of absolute procedural contraindications. Absolute contraindications to OVE include pregnancy, active systemic infection, pelvic inflammatory disease, significant renal dysfunction and coagulation disorders. In patients with documented hypersensitivity to iodinated contrast media, a gadolinium-based contrast agent could be used as an alternative. Furthermore, the administration of all oral anticoagulant agents should be discontinued prior to the procedure (21, 22).

The pre-interventional assessment is predicated upon the elicitation of a comprehensive medical history. The history should systematically address the following domains:

- General medical and social history:
- Comorbid conditions, with particular attention to disorders that may underlie or contribute to CPP.
- Current regularly prescribed medications.
- Prior surgical procedures.
- Use of tobacco and alcohol.
- Level and type of habitual physical activity.
- Occupational history and work-related demands.
- Gynaecological and obstetric history:
- Menstrual history: regularity, duration, cycle interval, menstrual blood loss and presence and severity of dysmenorrhoea.
- Obstetric history: number of pregnancies and outcomes, including vaginal deliveries, caesarean sections and miscarriages.
- Current or prior use of hormonal contraception or hormonal replacement therapy.
- Previous PeVD treatment attempts.
- Pain symptomatology. Full characterisation of pain is required, encompassing:
- Subjective assessment of pain intensity according to the Likert Scale.
- Pain duration.
- Temporal pattern (continuous versus non-cyclical or cyclical; relationship to phases of the menstrual cycle).
- Type of pain (dull, stabbing, burning, throbbing, distending, pressure-like or constrictive).
- Radiation to the back, groins, thighs and/or buttocks.
- Aggravating and relieving factors.

- Occurrence of pain during or after sexual intercourse (dyspareunia/postcoital pain).
- Associated symptoms such as abdominal bloating.
- Lower urinary tract symptoms (frequency, urgency, haematuria, urinary incontinence).
- Bowel symptoms (diarrhoea or constipation).
- Use of analgesic medications for lower abdominal pain, specifying agents and doses used.
- Impact of lower abdominal pain on activities in daily living and functional status. For the purposes of eligibility assessment, validated, structured questionnaires were administered to patients to enable the self-reporting and quantification of activities of daily living and overall functional status.

Subsequent management incorporate a thorough physical assessment, with particular attention directed to lower-limb venous pathology — including varicosities and oedema — and to vulval or perianal varicosities. Of primary importance is a systematic gynaecological pelvic examination, comprising inspection of the external genitalia, speculum evaluation, bimanual palpation and, when clinically indicated, rectovaginal examination (23).

TVUS is performed as the final stage of patient selection, with examination specifically directed to identify sonographic features of PeVD while providing a comprehensive assessment of pelvic anatomy and excluding other causes of CPP (24).

The uterus and cervix are evaluated in three orthogonal planes - uterine orientation and contour irregularities are documented. The myometrium is carefully scrutinised. Any features suggestive of adenomyosis should be reported and characterised in accordance with the Morphological Uterus Sonographic Assessment criteria (25). Uterine fibroids must be described not only with respect to their size but also classified according to the FIGO leiomyoma classification system (26). The endometrium is assessed for homogeneity, thickness, the presence of free intraperitoneal fluid, an intrauterine device, and focal lesions such as cystic change or polyps. Ovaries are examined bilaterally and measured in three dimensions to permit calculation of ovarian volume. Attention should be paid to any ovarian pathology. The detection of any ovarian anomaly should prompt further diagnostic work-up. The urinary bladder is inspected and the presence of free fluid in the pouch of Douglas is recorded.

In the terminal phase of the TVUS examination, assessment of PeVD is undertaken. Patients are evaluated according to four objective anatomical and haemodynamic parameters:

- ovarian vein dilatation (threshold diameter ≥ 5 mm) (Fig. 1.A, Fig. 1.B)
- reduced ovarian venous blood-flow velocity (threshold ≤ 3 cm/s) (Fig. 2.A, Fig. 2.B)
- demonstrable ovarian venous reflux (threshold reflux duration ≥ 1 s) (Fig. 3.A, Fig. 3.B)
- dilatation of arcuate veins within the myometrium communicating with pelvic varicosities (Fig. 4.A, Fig. 4.B).

It is also important to note whether the examination provokes pain or tenderness for the patient. If so, the site should be precisely localised (13, 27–29).

In the presence of any diagnostic uncertainty, it is advisable that the diagnostic work-up be broadened to include further imaging modalities — for example, MRI — and/or that specialist consultation(s) be sought.

Final qualification to OVE is undertaken through a formalised multidisciplinary consensus, involving a gynaecologist, an interventional radiologist, and a vascular surgeon. Only patients who fulfil the above listed diagnostic criteria for PeVD are considered appropriate candidates for venographic assessment. In all instances, patients undergo comprehensive venographic assessment immediately prior to OVE, thereby permitting precise delineation of pelvic venous anatomy and real-time procedural planning.

Pre-procedural preparation

Immediately prior to the procedure a 12-lead electrocardiogram is obtained. Laboratory investigations include a complete blood count, assessment of the coagulation system (activated partial thromboplastin time, prothrombin time, and fibrinogen), serum electrolytes (sodium, potassium, chloride, calcium), serum creatinine, thyroid-stimulating hormone, C-reactive protein, ferritin, and urinalysis. Patients must also present a current cervical cytology report and provide blood-group (ABO) typing. Procedures are deferred when these investigations disclose clinically significant abnormalities until further evaluation and appropriate management have been completed.

Twelve hours preoperatively, a prophylactic dose of low-molecular-weight heparin (LMWH) is administered. On the day of the scheduled procedure, the patient remains nil per os. Immediately prior to the procedure, patients are hydrated intravenously with physiological saline.

Procedural conduction

The procedure is performed under local anaesthesia via percutaneous puncture of the right common femoral, brachial or internal jugular vein under ultrasound guidance. The choice of access site is dictated by operator preference and the target vessel for embolization. While the left ovarian vein can be catheterised readily from a caudal approach, the right ovarian vein may at times present technical challenges and necessitate the use of microcatheters or a planned cranial approach. That is why, the right internal jugular vein is often selected as the optimal and most direct route of access - it is well visualised and easily punctured under ultrasonographic guidance. Furthermore, it is less prone to spasm than the brachial vein and permits a “top-down” approach to all relevant pelvic veins. Clinical findings together with performed imaging investigations indicate the likely site of pathology and delineate which incompetent venous plexuses and veins should be embolised. Initially, venography is performed using a catheter sited in the left femoral vein to assess flow within the left iliac vein, followed by cannulation of the left renal vein to evaluate renal venous outflow and any compression of that vessel. In most of the cases renal vein venography also permits assessment of the direction of flow within, and the calibre of, the ovarian vein. In equivocal situations, where the left renal vein may be compressed and renal drainage

appears to be occurring via the ovarian vein, a balloon-occlusion catheter should be introduced into the ovarian vein and venography repeated to ascertain the true anatomy. Occasionally the ovarian vein provides the principal drainage pathway for the left kidney - consequently a full appraisal is essential. Where renal drainage is normal but there is significant reflux into the left ovarian vein, that vein should be catheterised distally and repeat venography performed, both at rest and during a Valsalva manoeuvre, to evaluate the extent of pelvic venous plexuses and collateral outflow pathways. Finally, venography of the right ovarian vein and of both iliac veins, including relevant branches, is undertaken, with vessel selection guided by ultrasound, MRI and the clinical presentation (Fig. 5.A, Fig. 5.B).

The embolization paradigm is similar for each affected vein. The fundamental principle entails filling incompetent veins or venous plexuses with an obliterative agent in the form of foam together with occlusion of the abnormal inflow pathway using coils. It is recommended that treatment commence distally, addressing the most distal branches of the superficial and deep pelvic venous plexuses first. This is achieved by sclerotherapy, involving direct instillation of the sclerosant into the venous lumen, which produces endothelial injury, subsequent luminal fibrosis and eventual occlusion (Fig. 6).

Unlike liquid sclerosants, which are diluted by blood and thus have reduced concentration at the vessel wall, foam sclerosants displace blood and thereby permit direct and relatively prolonged contact with the endothelium.

The most commonly applied obliterative agents are Polidocanol and 3% Sodium Tetradecyl Sulphate mixed with air. Foam is typically prepared by the Tessari technique, using two syringes and a three-way stopcock with a liquid-to-gas ratio of 1:4. The bubbles within the foam serve to deliver the surface-active sclerosant to the endothelium. Carbon dioxide may be used in place of air. Although Carbon dioxide alone produces a less stable foam, mixing Carbon dioxide with oxygen in a 50:50 ratio imparts stability. The use of Carbon dioxide is theoretically associated with a lower risk of pulmonary complications. It should be borne in mind that foam is radiolucent on fluoroscopy. Therefore, the vein is initially filled with iodinated contrast medium, and, under fluoroscopic control, this contrast is subsequently displaced by the foam. Complete displacement of the contrast indicates that the foam has reached the terminal venous branches.

Embolic coils exhibit heterogeneity in design and composition according to manufacturer. They are typically manufactured from non-ferromagnetic materials and are therefore compatible with MRI. Unlike arterial embolization, coils deployed within the venous system need not be packed as densely. Nevertheless, appropriate device oversizing relative to the vessel calibre is essential to reduce the risk of coil migration. It is important to achieve occlusion of the entire target vein, and where practicable to include its tributaries, in order to prevent the development of collateral circulation. Placement of coils below the inguinal ligament within the submucosal tissues of the perineum or the perianal region should be avoided, as implanted devices may be palpable in the groin, vagina or rectum.

Where feasible, it is essential to flush blood from the venous trunk with a contrast medium and subsequently instil foam between the coils. This manoeuvre mitigates adverse phenomena that may

occur during intraluminal thrombus formation.

High-quality pre-procedural imaging is paramount - not merely to exclude non-thrombotic venous pathology within the iliac veins but, principally, to direct therapy appropriately. Embolization of isolated ovarian veins should be reserved for a discrete subset of patients - a substantial proportion require a more comprehensive approach. It is increasingly recognised that effective management should also address the pudendal branches of the internal iliac veins, including their most distal offshoots, and that occlusion of the entire refluxing venous segment together with its distal tributaries is likely necessary.

Post-procedural care

Immediately following the procedure, patient is maintained in the supine position, with a compression dressing applied to the vascular access site for a duration of three hours. Basic analgesia, if required, comprises paracetamol and nonsteroidal anti-inflammatory drugs. Twelve hours after the procedure the patient receives a further prophylactic dose of LMWH. Prophylactic LMWH is ordinarily continued for seven days after discharge unless other comorbidities necessitate prolongation of this period. In the absence of any complications, discharge occurs on the day of the procedure. The Lublin protocol for ovarian vein embolisation is predicated on the principle that the entire procedural pathway should be managed with completion within a single-day hospital admission.

Discharge instructions, as noted above, include continuation of prophylactic LMWH for seven days, continuation of venoactive therapy, and use of graduated compression stockings until the first outpatient review. For the two weeks following the procedure, patients are advised to adopt an activity-conserving regimen and to refrain from strenuous physical exertion, unless the scope of the procedure or other circumstances necessitate a longer recovery period.

Follow up assesment

Follow-up after OVE is scheduled at three and six months. At these visits a detailed medical history is obtained with particular emphasis on pain attributable to PeVD: the degree and nature of symptomatic improvement are assessed and the impact of pain on everyday functioning is documented. A thorough physical examination is then performed, with particular attention to lower-limb venous pathology (including varicosities and oedema) and to vulval or perianal varicosities. Of primary importance is a systematic gynaecological pelvic examination. The final investigative step is TVUS, carried out in accordance with the protocol described above. The post-procedural ultrasonographic findings are compared with the pre-procedural study. The TVUS should ascertain whether pelvic veins previously identified as incompetent remain so following the procedure.

Finally, after collation of all subjective, objective and ultrasonographic data within the six-month post-procedural interval, an assessment is made as to the necessity for re-embolization. If re-embolization is deemed necessary, the patient should be referred for further intervention. In the event

of technical success of the intervention and absence of additional incompetent venous segments, yet with persistence of pelvic pain, venoactive therapy should be continued, pre- and post-intervention symptom profiles compared, and, where appropriate, further differential diagnostic work-up undertaken to localise an alternative potential source of the CPP.

Discussion

OVE has emerged as the favoured management strategy for PeVD in patients who fail to respond to conservative pharmacological therapy. Its minimally invasive nature, no need for general anaesthesia, short inpatient stays and more rapid convalescence compared with open or laparoscopic surgical approaches make it an attractive therapeutic option in appropriate candidates.

Published series report that a majority of patients derive symptomatic benefit from OVE, although the magnitude of effect varies between cohorts. In retrospective analyses, reported rates of pain reduction range from 58% to 83% (30–34). These data indicate that OVE provides meaningful pain relief for the majority of treated patients, though a non-trivial minority experience no change or worsening of symptoms.

However, interpretation of these outcome data is limited by heterogeneity across studies in design, sample size, patient selection, embolization technique/materials, concomitant therapies, outcome definitions, and duration of follow-up. Most series are retrospective and single-centre, employing subjective outcome measures (patient-reported pain, Visual Analogue Scale), and using variable thresholds for defining “improvement” or “resolution.” Such heterogeneity likely contributes to the observed range in efficacy estimates and underscores the need for standardised reporting and prospective comparative trials to establish the true magnitude and durability of treatment effect.

The safety profile of OVE is generally favourable but not without risk. The most commonly reported adverse event is post-embolization syndrome, characterised by pain localised to the embolised venous territory which may be accompanied by pelvic discomfort, fever, nausea and fatigue. This syndrome is usually self-limited but may require analgesia and short-term supportive care. Other reported complications include pelvic vein thrombosis, access-site haematoma, allergic reactions to contrast or embolic materials, and coil protrusion. Less frequently described events include coil migration, wound infection or pulmonary embolism. Although serious complications appear uncommon, clinicians should counsel patients about these risks, monitor for early signs of thrombotic or infectious complications, and adopt technique-specific measures to minimise these complications (30, 35).

Given the current evidence base, OVE can be considered an effective minimally invasive option for symptomatic relief in selected patients with PeVD refractory to pharmacological therapy. Future research priorities include prospective, ideally randomised, studies comparing OVE with conservative management and alternative interventions, standardized outcome measures incorporating validated pain and quality-of-life instruments, longer follow-up and investigation of procedural variables (embolization materials, adjunctive therapies) that may improve outcomes and safety profile. Such data will be

essential to define guidelines for the management of PeVD. A comprehensive investigation into the aforementioned aspects is presently being undertaken by the authors of this protocol.

Conclusion

The protocol described herein provides a structured approach to the management of CPP attributable to PeVD at the Independent Public Hospital Number 4 in Lublin affiliated to Medical University of Lublin. Key elements of the protocol include a standardised patient-selection pathway, pre- and post-procedural care, embolization technique and post-intervention follow-up. The protocol was formulated on the basis of a comprehensive review of current literature and guidelines, combined with the centre's accumulated clinical experience - OVE has been performed at this institution for approximately fifteen years, thereby accounting for more than 1000 successfully completed procedures.

Declarations

Conflicts of interest.

The authors have no competing interests.

Funding.

The research has been supported by a grant from the Medical University of Lublin (DS 329).

Ethics approval and consent to participate.

The study protocol was approved by the Local Bioethics Committee of the Medical University of Lublin (KB-0024/156/11/2024). All procedures were conducted in accordance with institutional, national, and international guidelines for research integrity. Informed consent was obtained when applicable.

Consent for publication.

Consent for publication was obtained from all relevant participants or data providers, where applicable.

Competing interests.

The authors declare that they have no competing interests.

Author Contribution

F.S. conceived the study, developed the protocol and wrote the main manuscript. S.W. contributed to study design and manuscript revision. P.S. assisted in data collection and manuscript editing. M.P. contributed to diagnostic workflow development and manuscript review. K.P. provided interventional radiology expertise and revised the technical sections. M.S. contributed to vascular surgery consultation

and manuscript review. T.P. provided senior oversight and critically revised the manuscript.All authors reviewed and approved the final manuscript.

Acknowledgement

The authors thank the clinical and administrative staff of the Independent Public Hospital Number 4 in Lublin for their assistance in coordinating patient care and procedural logistics during the development of this protocol. The authors also acknowledge the support of the Medical University of Lublin for providing institutional resources that facilitated this work.

References

1. Latthe P, Latthe M, Say L, Gülmezoglu M, Khan KS. WHO systematic review of prevalence of chronic pelvic pain: a neglected reproductive health morbidity. BMC Public Health. 2006;6:177. 10.1186/1471-2458-6-177. . PMID: 16824213; PMCID: PMC1550236.
2. Zondervan KT, et al. The community prevalence of chronic pelvic pain in women and associated illness behaviour. Br J Gen Pract. 2001;51(468):541–7. PMID: 11462313; PMCID: PMC1314045.
3. García-Pérez H, Harlow SD, Erdmann CA, Denman C. Pelvic pain and associated characteristics among women in northern Mexico. Int Perspect Sex Reprod Health. 2010;36(2):90 – 8. 10.1363/ipsrh.36.090.10. PMID: 20663745.
4. Grace VM, Zondervan KT. Chronic pelvic pain in New Zealand: prevalence, pain severity, diagnoses and use of the health services. Aust N Z J Public Health. 2004;28(4):369 – 75. 10.1111/j.1467-842x.2004.tb00446.x. PMID: 15704703.
5. Ayorinde AA, Macfarlane GJ, Saraswat L, Bhattacharya S. Chronic pelvic pain in women: an epidemiological perspective. Womens Health (Lond). 2015;11(6):851–64. 10.2217/whe.15.30. . Epub 2015 Oct 9. PMID: 26450216.
6. Ayorinde AA, Bhattacharya S, Druce KL, Jones GT, Macfarlane GJ. Chronic pelvic pain in women of reproductive and post-reproductive age: a population-based study. Eur J Pain. 2017;21(3):445–55. 10.1002/ejp.938. . Epub 2016 Sep 15. PMID: 27634190.
7. Phillips D, Deipolyi AR, Hesketh RL, Midia M, Oklu R. Pelvic congestion syndrome: etiology of pain, diagnosis, and clinical management. J Vasc Interv Radiol. 2014;25(5):725 – 33. 10.1016/j.jvir.2014.01.030. PMID: 24745902.
8. Szkodziak F, Wozniak S, Szkodziak PR, Pyra K, Paszkowski T. Noninvasive diagnostic imaging of pelvic venous disorders. Ultraschall Med. 2024;45(6):597–603. 10.1055/a-2263-7193. . Epub 2024 Feb 7. PMID: 38325406; PMCID: PMC11634453.
9. Dydyk AM, Gupta N, Chronic Pelvic P. 2023 Apr 1. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 32119472.

10. Meissner MH, Lymphatic Society International Working Group on Pelvic Venous Disorders. The Symptoms-Varices-Pathophysiology classification of pelvic venous disorders: A report of the American Vein &. J Vasc Surg Venous Lymphat Disord. 2021;9(3):568–84. Epub 2021 Jan 30. PMID: 33529720.
11. Khilnani NM, Winokur RS, Scherer KL, Meissner MH. Clinical Presentation and Evaluation of Pelvic Venous Disorders in Women. Tech Vasc Interv Radiol. 2021;24(1):100730. 10.1016/j.tvir.2021.100730. Epub 2021 Apr 16. PMID: 34147196.
12. Beard RW, Highman JH, Pearce S, Reginald PW. Diagnosis of pelvic varicosities in women with chronic pelvic pain. Lancet. 1984;2(8409):946-9. 10.1016/s0140-6736(84)91165-6. PMID: 6149342.
13. Szkodziak F, et al. The usefulness of transvaginal ultrasonography in the diagnosis of pelvic venous disorders. Sci Rep. 2025;15(1):24776. 10.1038/s41598-025-10311-8. . PMID: 40634644; PMCID: PMC12241503.
14. Marcelin C, Le Bras Y, Molina Andreo I, Jambon E, Grenier N. Diagnosis and Management of Pelvic Venous Disorders in Females. Diagnostics (Basel). 2022;12(10):2337. 10.3390/diagnostics12102337. . PMID: 36292025; PMCID: PMC9600975.
15. Clark MR, Taylor AC. Pelvic Venous Disorders: An Update in Terminology, Diagnosis, and Treatment. Semin Intervent Radiol. 2023;40(4):362–71. 10.1055/s-0043-1771041. . PMID: 37575340; PMCID: PMC10415053.
16. Cheong YC, Smotra G, Williams AC. Non-surgical interventions for the management of chronic pelvic pain. Cochrane Database Syst Rev. 2014;2014(3):CD008797. 10.1002/14651858.CD008797.pub2. . PMID: 24595586; PMCID: PMC10981791.
17. Rundqvist E, Sandholm LE, Larsson G. Treatment of pelvic varicosities causing lower abdominal pain with extraperitoneal resection of the left ovarian vein. Ann Chir Gynaecol. 1984;73(6):339–41. PMID: 6529137.
18. Gargiulo T, Mais V, Brokaj L, Cossu E, Melis GB. Bilateral laparoscopic transperitoneal ligation of ovarian veins for treatment of pelvic congestion syndrome. J Am Assoc Gynecol Laparosc. 2003;10(4):501-4. 10.1016/s1074-3804(05)60156-9. PMID: 14738638.
19. Czeczelewska E, Szkodziak F, Rogowska-Malicka P, Pyra K, Wozniak S, Paszkowski T. Embolization of pelvic varicose veins - what do we know after over 30 years of experience? Ginekol Pol. 2026;97(4):339–43. 10.5603/gpl.105029. . Epub 2026 Feb 13. PMID: 41685741.
20. Meneses L et al. Embolization of incompetent pelvic veins for the treatment of recurrent varicose veins in lower limbs and pelvic congestion syndrome. Cardiovasc Intervent Radiol. 2013;36(1):128 – 32. doi: 10.1007/s00270-012-0389-x. Epub 2012 May 1. Erratum in: Cardiovasc Intervent Radiol. 2013;36(2):565. Irarrazabal, Pablo [corrected to Irarrazaval, Pablo]. PMID: 22547030.
21. Tanaka ME, Kutsenko O, Salazar G. Choosing the Most Appropriate Treatment Option for Pelvic Venous Disease: Stenting versus Embolization. Semin Intervent Radiol. 2021;38(2):182–8. 10.1055/s-0041-1727104. . Epub 2021 Jun 3. PMID: 34108804; PMCID: PMC8175116.

22. Gora KB, Wozniak S. Evaluation of effectiveness of pharmacological treatment in pelvic congestion syndrome. Ginekol Pol. 2023 Aug 7. 10.5603/GP.a2023.0078. Epub ahead of print. PMID: 37548496.
23. Mikes BA, Wray AA, Gynecologic Pelvic E. 2024 Feb 25. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 30480956.
24. Nahlawi S, Gari N. Sonography Transvaginal Assessment, Protocols, and Interpretation. 2022 Sep 16. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 34283450.
25. Harmsen MJ, et al. Consensus on revised definitions of Morphological Uterus Sonographic Assessment (MUSA) features of adenomyosis: results of modified Delphi procedure. Ultrasound Obstet Gynecol. 2022;60(1):118–31. 10.1002/uog.24786. . PMID: 34587658; PMCID: PMC9328356.
26. Munro MG, Critchley HO, Broder MS, Fraser IS, FIGO Working Group on Menstrual Disorders. FIGO classification system (PALM-COEIN) for causes of abnormal uterine bleeding in nongravid women of reproductive age. Int J Gynaecol Obstet. 2011;113(1):3–13. Epub 2011 Feb 22. PMID: 21345435.
27. Labropoulos N, Jasinski PT, Adrahtas D, Gasparis AP, Meissner MH. A standardized ultrasound approach to pelvic congestion syndrome. Phlebology. 2017;32(9):608–19. 10.1177/0268355516677135. . Epub 2016 Oct 31. PMID: 27799418.
28. Topper SR, Winokur RS. Imaging of Pelvic Venous Disorders (PeVD); Should Every Patient Get an MRI? Tech Vasc Interv Radiol. 2021;24(1):100731. 10.1016/j.tvir.2021.100731. Epub 2021 Apr 16. PMID: 34147189.
29. Valero I, et al. Identification of Pelvic Congestion Syndrome Using Transvaginal Ultrasonography. A Useful Tool. Tomography. 2022;8(1):89–99. 10.3390/tomography8010008. . PMID: 35076614; PMCID: PMC8788446.
30. Gavrilov SG, Mishakina NY, Efremova OI, Kirsanov KV. Complications and Adverse Events of Gonadal Vein Embolization with Coils. J Pers Med. 2022;12(11):1933. 10.3390/jpm12111933. . PMID: 36422109; PMCID: PMC9698320.
31. Kwon SH, Oh JH, Ko KR, Park HC, Huh JY. Transcatheter ovarian vein embolization using coils for the treatment of pelvic congestion syndrome. Cardiovasc Intervent Radiol. 2007 Jul-Aug;30(4):655–61. 10.1007/s00270-007-9040-7. Epub 2007 Apr 28. PMID: 17468903.
32. Kim HS, Malhotra AD, Rowe PC, Lee JM, Venbrux AC. Embolotherapy for pelvic congestion syndrome: long-term results. J Vasc Interv Radiol. 2006;17(2 Pt 1):289 – 97. doi: 10.1097/01.RVI.0000194870.11980.F8. PMID: 16517774.
33. Maleux G, Stockx L, Wilms G, Marchal G. Ovarian vein embolization for the treatment of pelvic congestion syndrome: long-term technical and clinical results. J Vasc Interv Radiol. 2000 Jul-Aug;11(7):859 – 64. 10.1016/s1051-0443(07)61801-6. PMID: 10928522.
34. Venbrux AC et al. Pelvic congestion syndrome (pelvic venous incompetence): impact of ovarian and internal iliac vein embolotherapy on menstrual cycle and chronic pelvic pain. J Vasc Interv Radiol. 2002;13(2 Pt 1):171-8. 10.1016/s1051-0443(07)61935-6. PMID: 11830623.

35. O'Brien MT, Gillespie DL. Diagnosis and treatment of the pelvic congestion syndrome. J Vasc Surg Venous Lymphat Disord. 2015;3(1):96–106. 10.1016/j.jvsv.2014.05.007. . Epub 2014 Jun 25. PMID: 26993690.

Figures

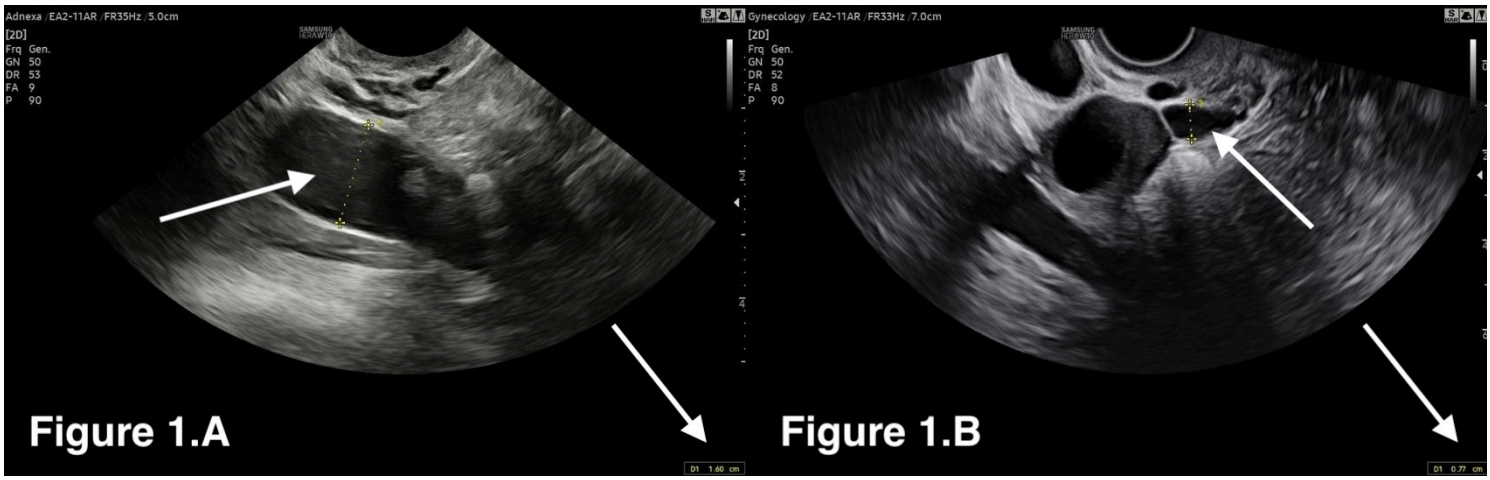


Figure 1

A – Dilated left ovarian vein with a diameter of 16.0 mm in the TVUS examination.

B – Dilated right ovarian vein with a diameter of 7.7 mm in the TVUS examination.

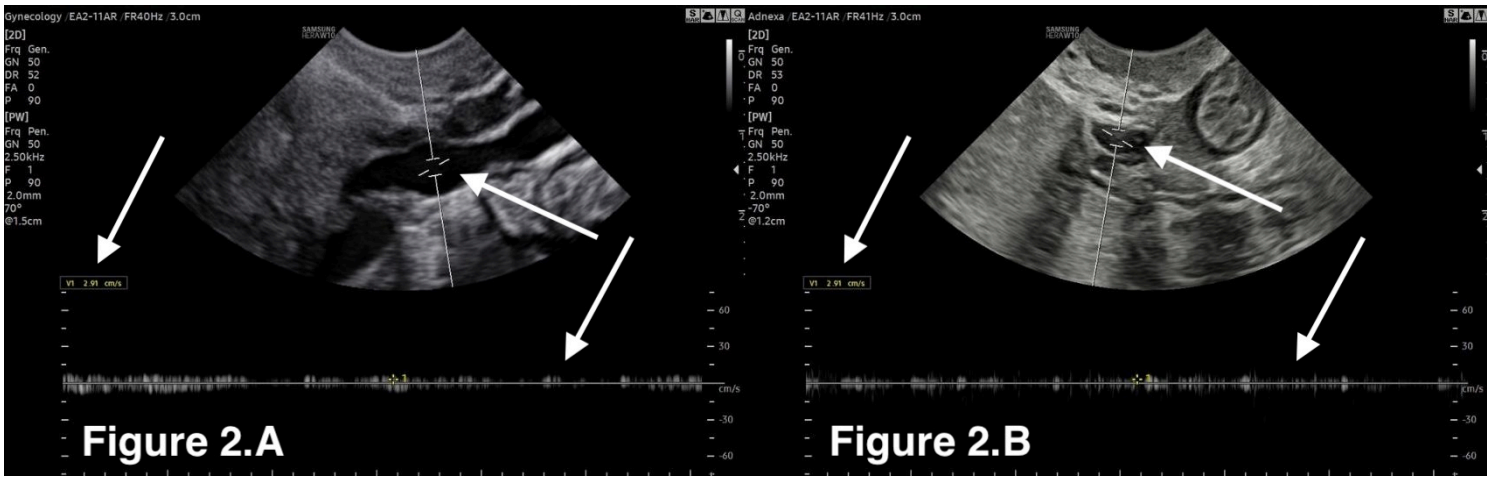


Figure 2

A - Reduced blood flow in the right ovarian vein (2.91 cm/s) in the TVUS examination.

B - Reduced blood flow in the left ovarian vein (2.91 cm/s) in the TVUS examination.

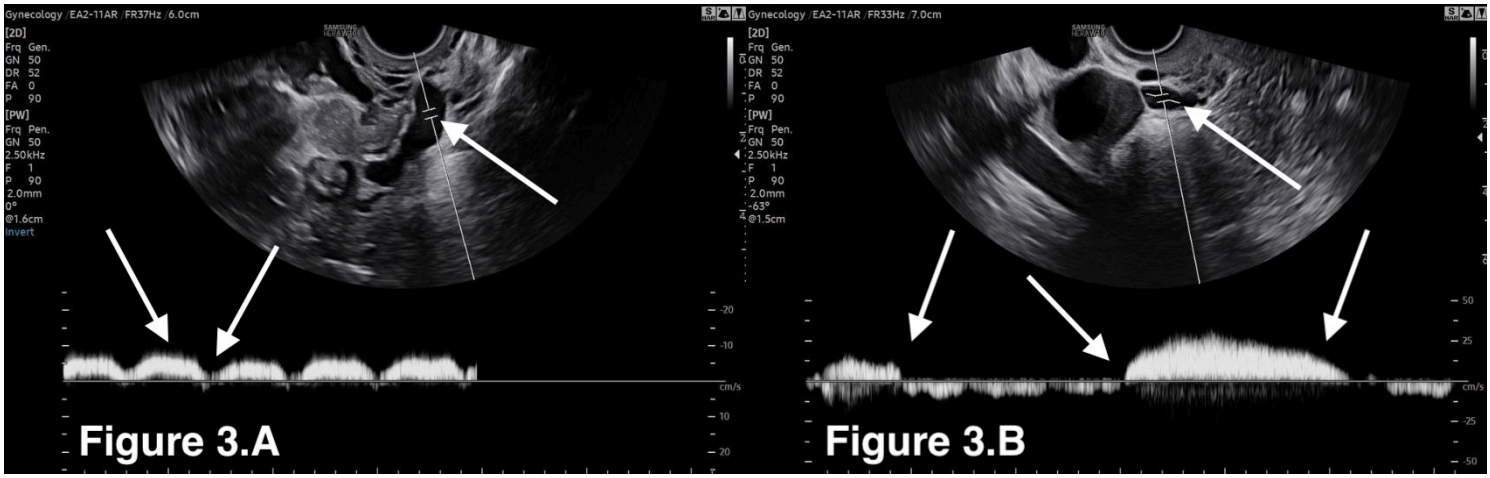


Figure 3

A - Retrograde flow (reflux) demonstrated in the left ovarian vein in the TVUS examination.

B - Retrograde flow (reflux) demonstrated in the right ovarian vein in the TVUS examination.

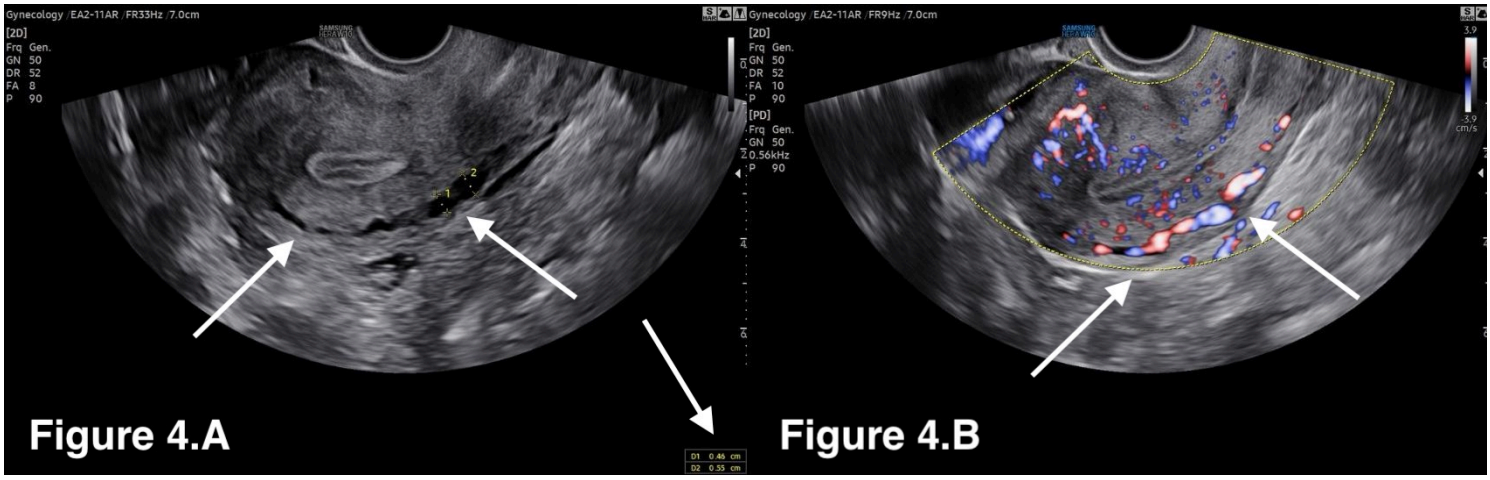


Figure 4

A - Dilatation of arcuate veins within the myometrium communicating with pelvic varicosities in the TVUS examination.

B - Dilatation of arcuate veins within the myometrium communicating with pelvic varicosities with enhanced blood flow in power Doppler option in the TVUS examination.

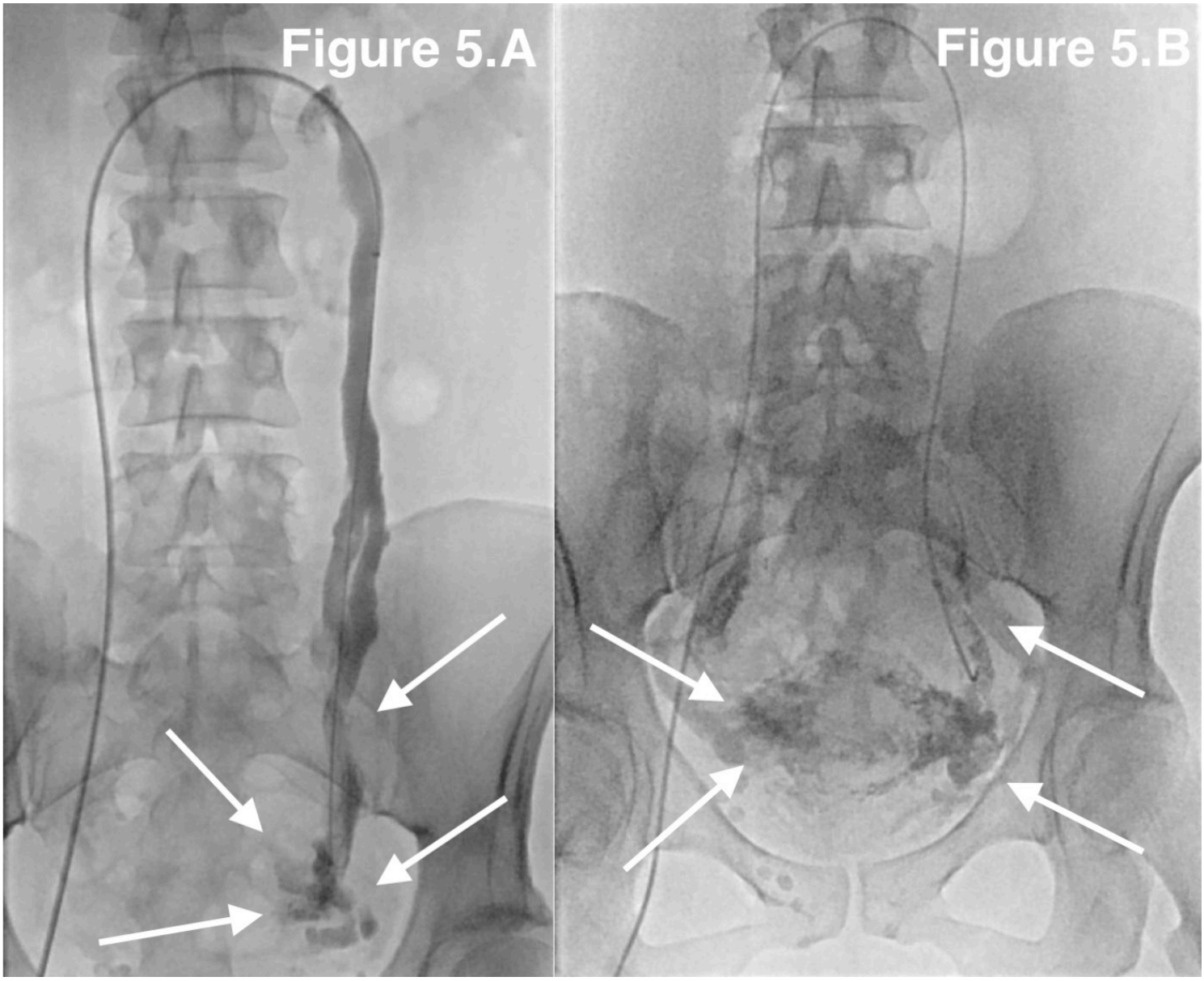


Figure 5

A - Left ovarian vein venography demostrating a significantly dilated ovarian vein with reflux and retrograde contrast opacification propagating into the parauterine venous plexuses.

B - Venography performed with the catheter positioned distally within the left ovarian vein demonstrating bilateral stasis of contrast medium within the parauterine venous plexuses.

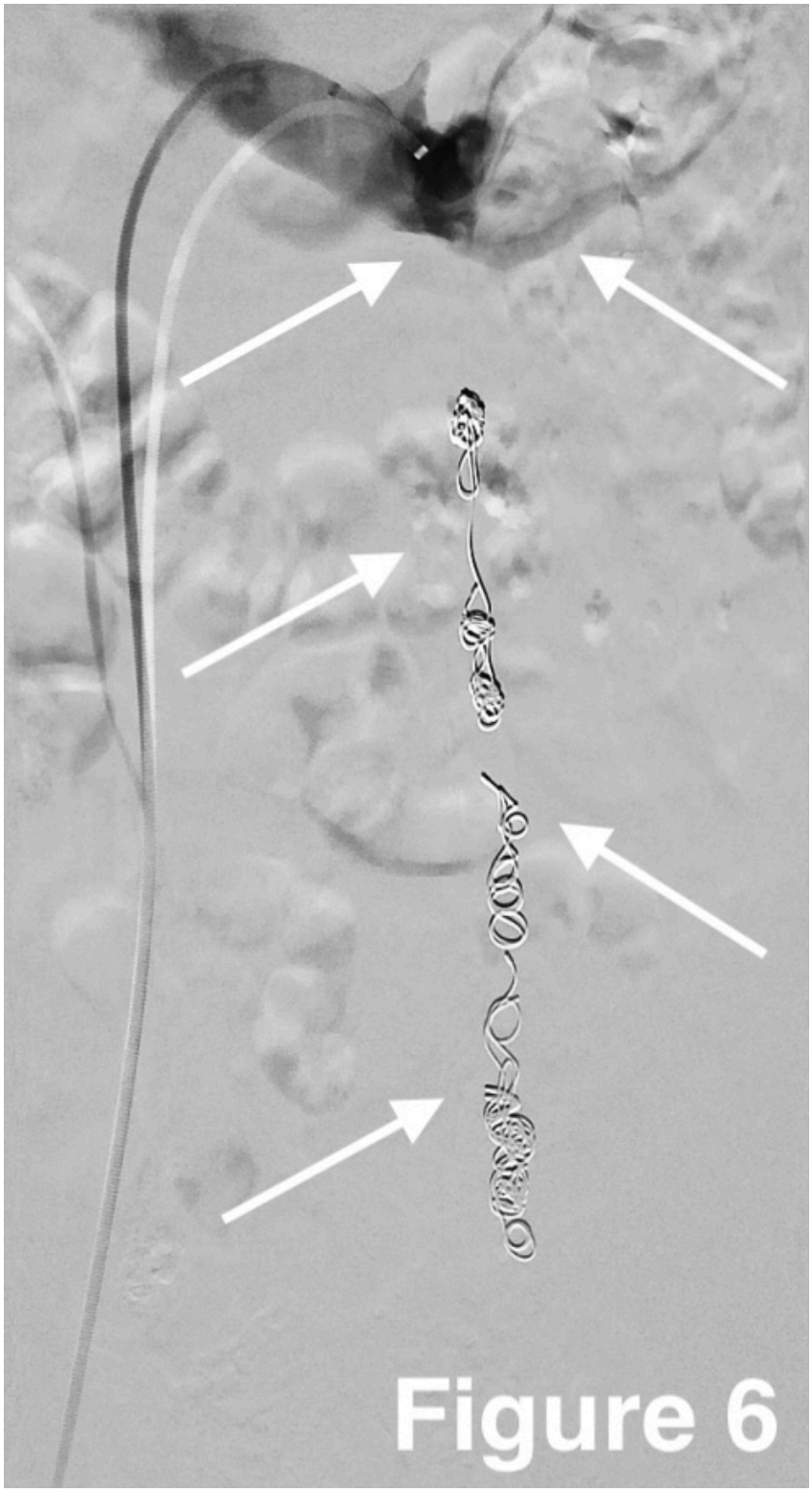


Figure 6

Left renal vein venography following embolization showing the implanted coils within the left ovarian vein and complete abolition of reflux into the ovarian vein and the parauterine venous plexuses.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Graphicalabstract.pdf