Diagnostic and Interventional Imaging xxx (xxxx) xxx

Contents lists available at ScienceDirect

Diagnostic and Interventional Imaging

journal homepage: www.elsevier.com/locate/diii

Recommendations

Endovascular management of pelvic congestion syndrome: An expert consensus statement from the French Society of Cardiovascular Imaging (SFICV), Interventional Radiology Federation (FRI), College of French Radiology Teachers (CERF), and French Society of Women's Imaging (SIFEM)

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ARTICLE INFO

Keywords
Delphi consensus
Endovascular treatment
Expert consensus opinions
Pelvic congestion syndrome
Venous insufficiency

ABSTRACT

Purpose: Pelvic congestion syndrome (PCS) is a major cause of chronic pelvic pain in women of reproductive age. It is often associated with pelvic venous insufficiency and venous dilatation of the ovarian and uterine veins, resulting in a variety of symptoms exacerbated by venous hypertension. Despite its prevalence, PCS lacks standardized diagnostic and management protocols, making effective treatment challenging. The purpose of this expert consensus statement was to summarize the opinions of French radiologists and gynecologists regarding the diagnosis, imaging, treatment, and management of PCS.

Materials and methods: A working group of 14 expert radiologists and gynecologists from various French medical centers used a Delphi panel approach with several rounds of remote and face-to-face meetings to formulate and refine expert opinions based on the current literature and clinical expertise. These opinions were categorized according to diagnostic criteria, imaging techniques, therapeutic options, and follow-up protocols.

Abbreviations: CERF, Collège des Enseignants de Radiologie de France (College of French Radiology Teachers); CNGOF, French National College of Gynecologists and Obstetricians; CT, Computed tomography; FRI, Fédération de Radiologie Interventionnelle (Interventional Radiology Federation); MRI, Magnetic resonance imaging; PCS, Pelvic congestion syndrome; PVP, Pelvic venous pathology; SIFEM, Société d'Imagerie de la Femme (French Society of Women's Imaging); SFICV, Société Française d'Imagerie Cardio-Vasculaire (French Society of Cardiovascular Imaging); SVP, Symptoms-varices-pathophysiology.

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https://doi.org/10.1016/j.diii.2025.04.004
Received 5 December 2024; Received in revised form 7 April 2025; Accepted 9 April 2025

Results: The group formulated 72 initial opinions, and 65 were retained after rigorous evaluation for consensus. Key diagnostic tools include Doppler ultrasound for detection of venous reflux and magnetic resonance imaging for detailed assessment of venous anatomy. Endovascular embolization was highlighted as the primary treatment approach and recommended after thorough imaging evaluation. Noninvasive treatments and multidisciplinary care were also emphasized for comprehensive management. The expert opinion also included post-treatment follow-up to assess quality of life and symptom resolution.

Conclusion: This structured consensus approach helped develop standardized expert opinions on management of, providing clear guidelines for diagnosis, treatment, and follow-up. These guidelines should improve clinical practice and patient care in the management of PCS.

1. Introduction

Chronic pelvic pain has been defined as noncyclic pain lasting > 6 months [1]. Its prevalence in women of childbearing age, estimated at 14.7 % in the United States and 24 % in the United Kingdom, accounts for 10 % to 40 % of gynecologic consultations, 40 % of diagnostic laparoscopies, and 12 % of hysterectomies [2,3]. The diagnostic challenge is further complicated by the overlap of several conditions that cause pelvic pain, the common symptoms of which can obscure the underlying cause of discomfort, making accurate diagnosis particularly difficult [1]. Chronic pelvic venous congestion is the second most common cause of chronic pelvic pain after pelvic adhesions and has the same prevalence as endometriosis [4]. However, 35 to 40 % of women with chronic pelvic pain have no identifiable etiology [2]. Among this subgroup, approximately 30 % have pelvic venous insufficiency as the underlying cause of their symptoms [5,6]. Although there is an extensive literature on chronic pelvic pain of venous origin, pelvic congestion syndrome (PCS), and pelvic varices, there is still a lack of precise and reproducible criteria that would allow non-specialist physicians to make a clear diagnosis of pelvic venous pathology (PVP).

In 2019, a consensus group on pelvic venous pathologies, formed by the Society of Interventional Radiology Foundation, highlighted the challenge of conducting studies in homogeneous populations due to differences in clinical and/or pathophysiological definitions and management approaches [2]. This group identified several areas of research in PVP, including consensus on clinical and imaging criteria for PVP, a tool to categorize patients with PVP, and quality of life tools to assess the impact of PVP on women and its evolution after treatment [2]. In parallel, recent guidelines from the European Society for Vascular Surgery underline the need for multidisciplinary collaboration, standardized diagnostic criteria, and structured therapeutic approaches for the optimal management of patients with chronic venous disease, which could assumably be applied to patients with PVP [7].

In France, interventional radiologists are increasingly called upon to perform embolization for the management of patients with suspected PCS. To improve the care of these patients, the College of French Radiology Teachers (CERF), the Interventional Radiology Federation (FRI), the French Society of Cardiovascular Imaging (SFICV) and the French Society of Women's Imaging (SIFEM) requested an expert opinion to guide our practices in France. The purpose of this expert consensus statement was to provide a summary of French knowledge regarding the diagnosis, imaging, therapeutic options, and follow-up of patients with PCS.

2. Materials and methods

The development of clinical recommendations for the management of PCS involves a consensus-based approach combining practical experience, bibliographic data, and the use of the Delphi consensus method. The Delphi method was chosen for its structured approach to achieve consensus among experts, especially in clinical areas where high-quality evidence from randomized trials is limited or unavailable. This iterative process facilitates anonymous feedback, reduces potential biases associated with group dynamics, and allows for multiple rounds of evaluation, discussion, and refinement. Consequently, it provides robust and credible consensus opinions, even in the absence of high-level evidence, thereby ensuring the development of reliable and broadly supported clinical guidelines. The collaborative work was led by a group of radiologists representing SFICV, FRI, CERF, and SIFEM. Twelve radiologists experienced in PVP from 11 different medical centers were selected to participate in the consensus process. The panel included also two gynecologists appointed by the French National College of Gynecologists and Obstetricians (CNGOF) from its scientific council, both experienced in the lmanagement of pelvic pain associated with benign gynecological diseases and actively involved in the development of CNGOF clinical practice guidelines. The working group consisted of academic, hospital-based, and private practice radiologists who provided a wide range of perspectives and clinical experiences.

The consensus process was initiated by conducting a structured literature review to provide a robust and evidence-based foundation for subsequent discussions. A systematic search of PubMed, Embase, and Cochrane databases was conducted using the following search terms: "pelvic congestion syndrome", "pelvic venous insufficiency", "chronic pelvic pain", "endovascular treatment", "venous embolization", and "diagnostic imaging". Articles published in English or French, in peer-reviewed journals, between January 2000 and December 2023 were included. This initial search yielded a total of 279 articles. These articles were screened independently by two reviewers using titles and abstracts, resulting in the exclusion of duplicates and clearly irrelevant studies. However, during the literature search, it became clear that there were no randomized or comparative studies of sufficient quality to formulate robust evidence-based recommendations. A full-text evaluation of 80 potentially eligible articles was then conducted, from which five key references were identified by the working group as the most relevant based on their quality, methodological rigor, and clinical relevance [2,13–16]. The selection criteria prioritized comprehensive reviews, consensus statements, meta-analyses, and studies with robust clinical data that provided significant guidance on the diagnosis, imaging, and treatment of PCS (Fig. 1).

For the sake of clarity, the working group limited its focus to the most common pelvic venous pathology, pelvic venous congestion (PevD S2 R according to the symptoms-varices-pathophysiology [SVP] classification [8]). The five selected articles served as foundational references to initiate and guide the consensus discussions, providing a baseline of established expert knowledge. To ensure thoroughness, this process was supplemented by additional targeted searches of articles referenced in these initial five papers, as well as expert input to identify complementary evidence.

The working group was divided into three subgroups of two radiologists each and two subgroups of three radiologists each to develop and draft recommendations on the diagnostic criteria for PCS (V. L.P., F. T., F. D.), imaging (P.-A. B., Y. L.B., A. G.), therapeutics (M. B., J. F., and C. M., P. C.), and patient follow-up (Q. S., T. M.). Seventy-two expert opinions were proposed based on the available bibliographic data and the clinical expertise of the working group. The opinions drafted by the radiologists were rigorously reviewed and refined by two expert gynecologists (J.-L. B., H .M.) to increase external validity and acceptability, and to ensure that the guidelines were comprehensive and reflected a

multidisciplinary consensus. A Delphi consensus approach, involving multiple rounds of remote and face-to-face meetings, was then used to formulate, refine, and validate the expert opinions presented in this document.

The first round of remote voting involved individual anonymous evaluations of 72 expert opinions. Each expert assigned a rating from 0 (strongly disagree) to 9 (strongly agree) to each recommendation, accompanied by explanations for ratings of ≤ 6. To ensure the highest level of consensus and reliability, a stringent approach was adopted, in which any recommendation receiving even a single score below six was subject to revision. This rigorous standard was intended to enhance the clarity and strength of the guidelines, ensuring that they reflect broad agreement among all participating experts. Recommendations with at least one rating ≤ 6 (16/72) were reviewed by a designated moderator (V.L.P.) who considered the explanations and feedback. The revised expert opinions were then subjected to a second round of remote voting. Similar to the first vote, the group anonymously rated each expert's opinion and provided comments for ratings of ≤ 6. Following this second round, the group agreed to hold a face-to-face meeting to review, discuss, and refine the recommendations that again received a rating of ≤ 6. The refined set of 72 expert opinions was subjected to a final round of remote voting. Opinions that received at least one rating of ≤ 6 (7/72) were excluded due to a lack of consensus. The remaining 65 opinions were classified based on the distribution of votes. Opinions with a first quartile of distribution ≥ 8 (57/65) were classified as "Class A" (strong consensus), and expert opinions < 8 (8/65) were classified as "Class B" (moderate consensus) (Fig. 2).

To improve the clarity and usability of these expert opinions for clinical practice, the original 65 detailed opinions have been consolidated and restructured into a more coherent and reader-friendly format. The revised structure groups the expert opinions under thematic headings, providing a clearer overview and facilitating easier navigation through the guidelines.

Each section now begins with an introduction that outlines key concepts and is followed by concise expert opinions, thus improving the accessibility and applicability of the information for clinical practitioners.

3. Results

3.1. Definitions of pelvic venous pathologies

3.1.1. Anatomy and classification

The complex anatomy of the pelvic venous system is critical to understanding pelvic venous pathologies. This system includes the ovarian veins, the internal iliac veins, and their extensive network of tributaries that connect to the perineal and lower extremity veins, and the visceral and parietal venous plexuses. Correct identification and classification of these anatomical features using SVP classification is essential for accurate diagnosis and treatment [8].

Recommendation (Class A): Adopt the symptoms-varices-pathophysiology classification to standardize the diagnosis of pelvic venous pathologies [8].

Recommendation (Class A): Acknowledge that the highly interconnected anatomy of three systems (ovarian veins, internal iliac veins and venous plexuses) is central to the pathophysiology of these conditions [2].

3.1.2. Mechanism of disease

Venous reflux, which results in increased venous pressure and subsequent venous dilatation, is primarily caused by congenital or acquired valve insufficiency. Less commonly, it may also be caused by obstructive pathologies such as compression of the left renal or common iliac veins [2,9]. Understanding these mechanisms is fundamental othe correct identification and management of pelvic venous disorders.

Recommendation (Class A): Recognize that venous reflux and dilation are mainly due to valve insufficiencies and sometimes due to obstructive pathologies like vein compression.

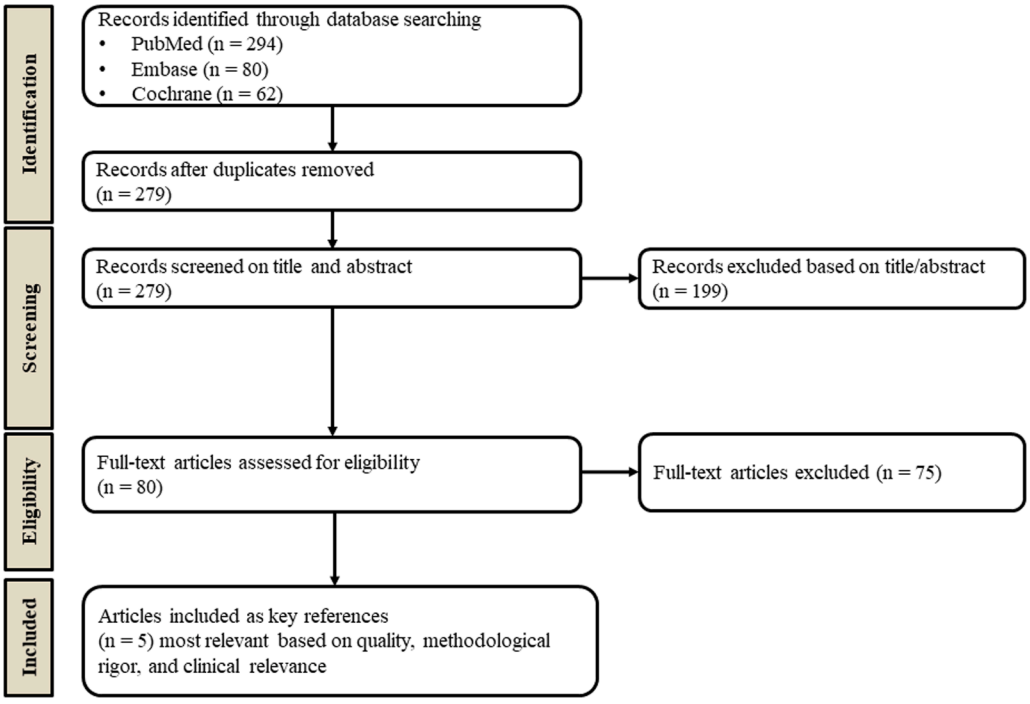

Fig. 1. PRISMA flow diagram illustrates the literature review process.
A total of 279 articles were identified through systematic searches in PubMed, Embase, and Cochrane databases. After removing duplicates and screening titles and abstracts, 80 articles were reviewed in full. Five key references were selected for their methodological quality and clinical relevance to guide the development of expert consensus on Pelvic Congestion Syndrome.

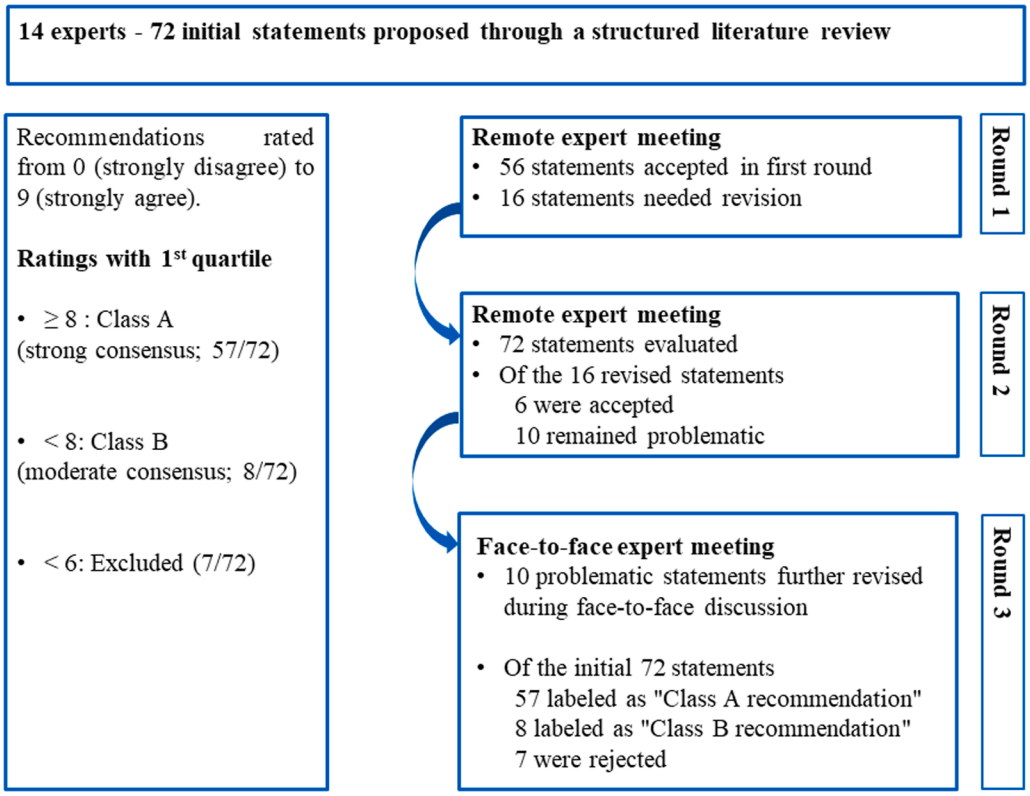

Fig. 2. Flowchart summarizes the Delphi consensus process that includes expert panel formation, identification of key issues, iterative rounds of voting with predefined scoring, analysis of responses, and final recommendations.

3.1.3. Clinical impact

Genito-pelvic-perineal venous insufficiency can present with different clinical forms and predominantly affects multiparous women of reproductive age [9–11]. It is essential to differentiate between asymptomatic venous insufficiency, anatomically characterized by dilated veins, which is common in women but not associated with pelvic pain symptoms, and pathological venous insufficiency, which is associated with marked pelvic pain. This distinction is essential for the accurate diagnosis, appropriate management, and avoidance of unnecessary treatment in individuals without clinically relevant symptoms. This includes recognizing both symptomatic and asymptomatic presentations, and their impact on patient quality of life. Chronic pelvic pain associated with venous patterns is an important manifestation of genito-pelvic-perineal venous insufficiency, commonly referred to as PCS in clinical practice [12]. This term is widely used for effective communication among healthcare providers, and emphasizes the venous origin of the chronic pain observed in these patients.

Recommendation (Class A): Define genito-pelvic-perineal venous insufficiency as the presence of reflux in pelvic drainage veins, categorized as "R" in the symptoms-varices-pathophysiology classification [8].

Recommendation (Class A): Document the demographic predominance of genito-pelvic-perineal venous insufficiency in multiparous women and its diverse clinical manifestations including pelvic, perineal, and lower extremity varicosities. Document the demographic predominance of genito-pelvic-perineal venous insufficiency in multiparous women and its diverse clinical manifestations including pelvic, perineal, and lower limb varicosities.

Recommendation (Class A): Identify chronic pelvic pain lasting more than six months with a venous pattern as pelvic congestion syndrome to facilitate clear communication and targeted treatment approaches.

3.2. Clinical assessment of pelvic congestion syndrome

Both diagnostic and interventional radiologists play a pivotal role when patients with suspected PCS are referred for embolization. Accurate initial assessment is critical to determine whether the chronic pelvic pain is venous in origin. This evaluation requires a thorough understanding of the complex pelvic venous anatomy and the ability to interpret the diverse and nonspecific nature of the symptoms, which can vary widely from patient to patient.

Recommendation (Class A): Seek consultation with a specialist involved in the management of chronic pelvic pain to confirm its venous origin and to rule out gynecologic disease.

Recommendation (Class B): Recognize that pelvic symptoms due to venous problems vary widely in location, timing, description, and intensity.

3.2.1. Symptom patterns and clinical signs

Common clinical signs and symptom patterns provide important clues in the diagnosis of PCS. Symptoms often have a "venous" pattern, characterized by specific exacerbations and relief that help distinguish PCS from other conditions. They include worsening of symptoms with prolonged static positions (standing or sitting), evening exacerbation, or in a warm environment, and relief of symptoms with rest in the lying down position, in the Trendelenburg position, or after raising the legs [8].

Varices may also extend beyond the pelvis, presenting as visible perineal, vulvar, gluteal, or lower extremity varicosities, which should prompt further evaluation for pelvic venous insufficiency through targeted imaging (Fig. 3).

PCS may coexist with or mimic other conditions such as endometriosis, ovulatory dysfunction, pelvic adhesions, pelvic inflammatory disease, neuropathic pain, or neuralgia. Recognizing the complexity of chronic pelvic pain and its potential overlap with other gynecologic

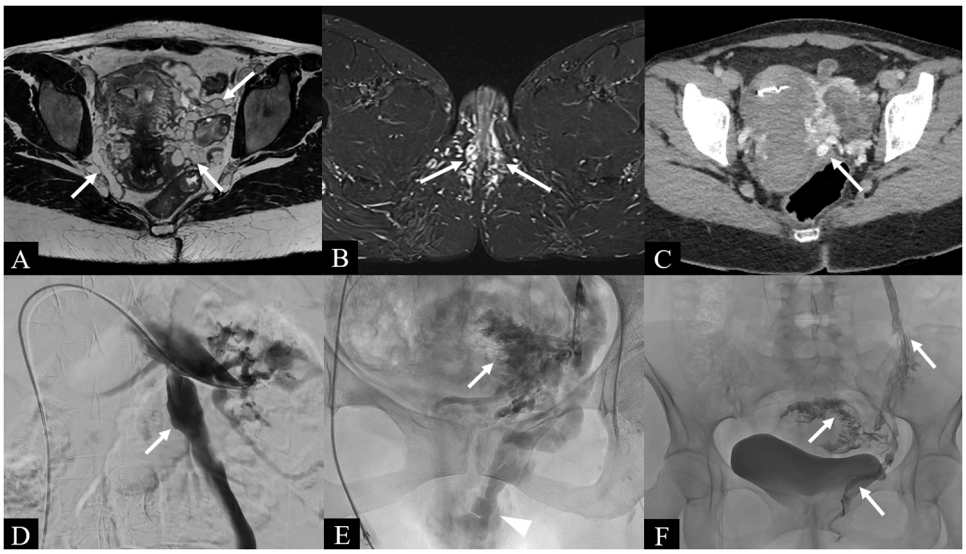

Fig. 3. Imaging features of pelvic congestion syndrome. A 37-year-old woman with a hormonal intrauterine device, gravida 4, para 4, experiences increased pelvic pain with prolonged standing and sitting, accompanied by dyspareunia and post-coital pain, with clinically evident left vulvar varicosities. **A**, T2-weighted MR image of the pelvis in the axial plane reveals bilateral pelvic varices (arrows). **B**, At a lower level of slice, short-TI inversion recovery MR image that nulls the signal of the fat to enhance vascular structures, reveals bilateral vulvar varices (arrows). **C**, Previous abdominopelvic CT examination performed to elucidate the cause of pelvic pain, shows reflux of contrast material into the left ovarian vein with early opacification of the left lateral ovarian and uterine varices (arrow). **D**, Pretherapeutic phlebogram with injection of contrast material into the left renal vein shows spontaneous reflux into the dilated, refluxing left ovarian vein (arrow). **E**, Pelvic-focused phlebogram during a Valsalva maneuver reveals extensive plexiform dilated veins of the pelvic floor (arrow) with reflux into the left vulvar varicose vein (arrowhead). **F**, Control fluoroscopic image obtained after venous embolization using a liquid embolic agent (ethylene vinyl alcohol copolymer) targeting pelvic floor varicosities and left vulvar varix shows successfully exclusion of all abnormal dilated veins (arrows). The patient reported significant improvement in symptoms at six months, with sustained clinical improvement at 12 months.

conditions is critical to a comprehensive diagnostic approach and to ensuring that differential diagnoses are considered. All patients presenting with pelvic pain that suggests a gynecologic origin must be evaluated by a gynecologist or a gynecologic specialist. The specialist's role is to rule out or identify differential diagnoses, focusing primarily on conditions, such as endometriosis and potential chronic infections. This evaluation also included the assessment of PCS.

Recommendation (Class A): Document and evaluate common clinical signs of pelvic congestion syndrome, including pelvic heaviness, delayed and persistent deep dyspareunia, worsening in static positions, and symptom variations related to hormonal changes. Additionally, ensure that all patients undergo a gynecologic examination to exclude conditions requiring specific preoperative management.

Recommendation (Class A): Systematically evaluate symptoms and the presence of varices in the lumbar, perineal, and lower extremity areas to aid in the diagnosis of pelvic congestion syndrome.

Recommendation (Class A): Consider hypersensitivity and psychological factors as potential exacerbating elements in the clinical presentation of chronic pelvic pain.

Recommendation (Class B): Recognize that venous pain elicited by palpation or ultrasound suggests the possibility of pelvic congestion syndrome as well as endometriosis.

3.2.2. Multidisciplinary approach

Chronic pelvic pain due to PCS can have a significant impact on a patient's overall health and quality of life. In the case of complex pelvic pain, after evaluation by a radiologist and a gynecologist, a multidisciplinary approach is suggested to ensure that all aspects of the patient's health, including psychological effects, are adequately addressed.

Recommendation (Class A): Evaluate patients within a multidisciplinary care pathway to address all aspects of health affected by chronic pelvic pain, to ensure comprehensive care and support.

Recommendation (Class A): Depending on the available medical resources, this multidisciplinary care pathway should include a gynecologist, a radiologist, a Doppler ultrasound specialist, and a pain specialist.

3.3. Diagnostic imaging criteria for pelvic congestion syndrome

Pelvic varices, which are often deep and undetectable through physical examination, require specialized imaging techniques for accurate assessment. Imaging plays a pivotal role in evaluating pelvic venous pathologies and provides crucial visual evidence necessary for an accurate diagnosis. The diameter and appearance of venous structures can be significantly influenced by various physiological factors such as respiration, body position, and hydration status. These factors must be accurately interpreted for correct assessment of venous caliber and compression in imaging studies. Determining the dilation of veins based on their diameter may be challenging because of the lack of consensus in the literature. This uncertainty requires a cautious approach when using specific diameter measurements to identify venous abnormalities [9–11]. Although uterine vein dilatation is common, it is essential to report this finding to prevent misdiagnosis of unexplained pelvic pain. Proper documentation and awareness of this condition can guide further investigation and help avoid errors, ensuring that patients receive the most appropriate care based on their specific symptoms. Compression of venous structures, such as the left renal vein and left common iliac vein, is occasionally observed in both symptomatic and asymptomatic individuals, representing a rare but common phenomenon. Recognizing the prevalence of this compression is essential to differentiate pathologic findings from normal anatomic variations [13–16]. Although imaging is essential for visualizing venous structures, it is not the sole criterion for diagnosing PCS. A comprehensive diagnostic approach must integrate imaging results with detailed patient history and clinical data.

Recommendation (Class A): Use imaging as part of a holistic diagnostic approach, ensuring that it is complemented by the patient's history and clinical data to confirm or rule out pelvic congestion syndrome.

Recommendation (Class A): Use dedicated imaging modalities to accurately assess deep pelvic varices (Doppler ultrasound as the first-line modality).

Recommendation (Class A): Ensure a comprehensive diagnostic approach by examining related anatomical areas to increase the diagnostic accuracy (lumbar [S1], perineal [S3, V3], lower limbs [S4, V4] from the symptoms-varices-pathophysiology classification [8]).

Recommendation (Class A): Interpret venous calibers and compression aspects with caution, considering the influence of physiological variables.

Recommendation (Class B): Be aware that there is no widely accepted diameter criterion for defining a dilated vein.

Recommendation (Class B): Recognize that compression of the left renal vein and left common iliac vein, as well as the presence of pelvic varices on imaging, are relatively common in the general population.

3.3.1. *Ultrasound and Doppler ultrasound*

Ultrasound, particularly color Doppler ultrasound, is an essential imaging modality for the evaluation of chronic pelvic pain associated with pelvic venous pathology. It remains the first-line imaging modality due to its accessibility and low cost. It provides a detailed visualization of venous dilatation, reflux, and other abnormalities within the pelvic venous system. The effectiveness of pelvic ultrasound in diagnosing venous pathologies depends on the skills and knowledge of the operator. Proper training is essential to accurately interpret the complex venous anatomy and detect subtle abnormalities. Doppler ultrasound can be performed by different operators (*i.e.*, radiologists, gynecologists, or vascular specialists) depending on local expertise and is used to detect dilatation and reflux in gonadal, lateral uterine, uterine-myometrial, utero-vaginal, vesico-vaginal, pudendal, and/or obturator veins [2,17–19]. Doppler ultrasound is invaluable for post-treatment monitoring, particularly after embolization. It helps identify residual or recurrent problems that may contribute to ongoing symptoms [20].

Recommendation (Class A): Ensure that operators performing pelvic ultrasound are thoroughly trained and knowledgeable in pelvic venous pathology to maximize diagnostic accuracy.

Recommendation (Class A): Use Doppler ultrasound to look for reversal of flow in the internal iliac and ovarian veins, a hallmark of pelvic congestion syndrome.

Recommendation (Class A): Use Doppler ultrasound to detect spontaneous or Valsalva-induced reflux.

Recommendation (Class A): Use pulsed Doppler to rule out arteriovenous fistulas and ensure that any abnormalities observed are related to venous insufficiency.

Recommendation (Class A): In more complex or equivocal cases, Doppler ultrasound may be used to further evaluate the extent and nature of pelvic venous insufficiency, including its effect on the lower limbs and pelvic floor.

Recommendation (Class A): In patients with symptoms extending to the pelvic floor or lower limbs, use Doppler ultrasound to identify varices and leakage points in these regions, and supplement the examination with maneuvers such as compression of muscular masses and Valsalva maneuvers performed in the upright position.

Recommendation (Class B): Use Doppler ultrasound after embolization to monitor for residual venous leakage or thrombosis, especially if symptoms persist, to ensure thorough follow-up and possible adjustment of treatment plans.

3.3.2. *Magnetic resonance imaging*

Magnetic resonance imaging (MRI) is a superior diagnostic tool for visualizing venous structures and for assessing chronic pelvic pain. It is particularly valuable for its detailed imaging capabilities, which are crucial, not only for identifying venous morphology associated with PCS, but also for excluding differential diagnoses, such as endometriosis, which often shares similar symptoms [21–23]. Specific MRI sequences enhance the visibility of the venous structures. T2-weighted fat-suppressed spin-echo images are particularly effective for delineating the anatomy of venous dilatation from the diaphragm to the perineum [21,22]. Therefore, it is recommended to use a dedicated endometriosis protocol when using MRI to ensure comprehensive assessment. Dynamic contrast-enhanced MRI can provide additional insights into venous behavior and pathologies, particularly by visualizing the blood flow and vessel integrity. However, there is currently no consensus on the specific protocols for its use in pelvic venous pathology, highlighting the need for cautious interpretation and tailored imaging strategies.

Recommendation (Class A): Use MRI as the primary cross-sectional imaging means to assess venous morphology and identify associated or differential diagnoses.

Recommendation (Class A): Use a T2-weighted fat-suppressed spin-echo sequence to assess venous dilatations within the abdomen and pelvis in detail.

Recommendation (Class A): Combine this sequence with the standard protocol for evaluating chronic pelvic pain to optimize detection of varicose veins.

Recommendation (Class B): Be aware that there are no formal recommendations for the use of MR angiography with intravenous administration of contrast material specifically for pelvic venous pathology due to insufficient evidence in the literature.

3.3.3. *Phlebography*

With phlebography, pelvic venous pathologies can be characterized and classified in detail [8,10]. Phlebography is an essential step prior to any endovascular treatment to ensure accurate mapping and strategic planning. It can be performed as a standalone procedure or may be integrated into the initial phase of embolization. The effectiveness of phlebography is particularly dependent on the expertise of the interventional radiologists, who requires specialized skills in venous catheterization and accurate interpretation of hemodynamic data that include evaluation of venous reflux, flow changes during provocative maneuvers (such as the Valsalva maneuver), detection of venous stasis, identification of incompetent valves, and potential compression syndromes, along with the quality of the initial imaging assessment, including ultrasound, MRI, and potentially computed tomography (CT). Phlebography should be used selectively in symptomatic patients, as a complement to MRI, particularly considering its invasiveness and the specificity of the information it provides. Phlebography must be carefully planned and performed to maximize patient safety and diagnostic efficacy.

Recommendation (Class A): Ensure that phlebography is performed by interventional radiologists with specialized skills in selective venous catheterization and interpretation of hemodynamic data.

Recommendation (Class A): Avoid phlebography in asymptomatic patients with pelvic varices, as it provides no diagnostic or therapeutic benefit.

Recommendation (Class A): Perform phlebography under local anesthesia via peripheral venous access, typically the femoral route, when not associated with therapeutic interventions.

Recommendation (Class A): Do not routinely require hospitalization or extensive coagulation testing for phlebography unless clinically indicated.

Recommendation (Class A): Tailor phlebography to each patient's clinical presentation, including detailed evaluation of relevant pelvic veins (left renal vein, left common iliac vein, ovarian veins), assessing valve competence, reflux, venous stasis, leakage points, or venous compression.

Recommendation (Class B): Use phlebography to provide a detailed hemodynamic and anatomical assessment, facilitating accurate classification of pelvic venous pathology according to the symptoms-varices-pathophysiology classification [8].

3.3.4. Computed tomography

CT is not the primary diagnostic tool for pelvic venous pathology because of its limited ability to directly show venous insufficiency and radiation issues, particularly in young women. However, CT may be useful in certain diagnostic pathways, particularly when other imaging tests are inconclusive or unavailable [8,12,16]. CT can reveal certain venous abnormalities, such as dilated ovarian veins and periuterine varices. While the timing of scan acquisition after contrast injection is critical to effectively visualize the features of PCS, it is essential to emphasize that there is currently no strong consensus in the literature regarding the efficacy of this approach. Furthermore, although the Valsalva maneuver may improve the depiction of venous abnormalities, further studies are needed to establish clear recommendations for using CT in this context.

Recommendation (Class A): Do not use computed tomography as the first-line examination for the etiologic assessment of chronic pelvic pain due to venous pathology.

Recommendation (Class A): Review any available CT examination obtained after intravenous administration of contrast material in the patient's medical history to correlate observed venous abnormalities with current symptoms.

Recommendation (Class B): Be aware that periuterine varices and ovarian vein dilatation can sometimes be visualized on CT. Early opacification of the left ovarian vein, indicative of valvular insufficiency, may be seen if the scan is properly timed between the arterial and corticomedullary phases (20–30 s after injection).

3.3.5. Key imaging features of PCS

In the assessment of PCS, imaging is essential for identifying both the presence and severity of pelvic varices. Doppler ultrasound is often the first-line modality, allowing visualization of dilated gonadal (ovarian), internal iliac, and uterine veins, frequently exceeding 5 mm in diameter. Reflux during Valsalva maneuvers and prolonged venous flow reversal are hallmarks.

MRI, especially T2-weighted and T2-weighted fat-suppressed images, provides a more comprehensive assessment by revealing extensive varicosities from the diaphragm to the perineum while simultaneously excluding differential diagnoses (*e.g.*, endometriosis).

Although invasive, phlebography remains the gold standard for mapping venous anatomy and hemodynamics, confirming valvular incompetence, and delineating specific leakage points prior to possible endovascular intervention.

When interpreting findings, whether on ultrasound, MRI, or phlebography, physiologic factors such as respiratory variation, body position, and hydration status must be considere.d

Clinicians should be aware that asymptomatic dilatation of the left renal vein, left common iliac vein, or even prominent pelvic veins may occur in healthy individuals. Ttherefore careful correlation with clinical symptoms and standardized imaging protocols is paramount to avoid overdiagnosis.

3.4. Treatment

3.4.1. Endovascular treatment

Endovascular treatment, primarily by embolization, is the cornerstone in the management of symptomatic PCS [2,5,12–15,27–29]. Embolization is the first-line treatment for PCS, supported by thorough radio-clinical correlation and tailored to specific venous pathologies classified by the SVP system. Endovascular treatment requires detailed planning, including pre-interventional imaging and counseling to inform patients of the benefits and risks. The complexity of endovascular treatment for PCS requires specialized venous catheterization skills and a thorough understanding of embolic agents by an experienced interventional radiologist. The choice of embolic agent should be based on the familiarity of the radiology team and the specific requirements of the venous pathology being treated. The use of liquid embolic agents (cyanoacrylate or ethylene vinyl alcohol copolymer) is most commonly recommended [20,24]. Other agents, such as chitosan hydrogel, although not currently widely used, are promising alternatives under evaluation [25–27]. Successful endovascular treatment is primarily judged by clinical resolution of symptoms, which may be partial. The second criterion for effective treatment is the disappearance of reflux, reservoirs, and leakage points on follow-up imaging. Endovascular treatment can be safely proposed to all symptomatic patients, including those with current or future pregnancy plans, as there is currently no evidence to suggest a negative impact on fertility or pregnancy outcomes [5,6,28]. Effective pain management in the immediate postoperative period is essential to prevent complications and ensure patient comfort. This involves using a combination of nonsteroidal anti-inflammatory drugs and other pain management strategies tailored to the severity of the patient's pain and possibly opioids over a short period.

Further embolization may be required based on clinical reassessment and follow-up imaging. If symptoms persist despite initial treatment, it may indicate the presence of remaining refluxing venous territories or new pathological findings. In such situations, additional embolization sessions may be considered to better manage the patient's complex pathology. If uncertainty remains, it is recommended that the treatment plan be revised based on a follow-up Dopler ultrasound or phlebogram.

Recommendation (Class A): Use embolization as the primary treatment mode for pelvic congestion syndrome, after ensuring its validation through appropriate diagnostic correlations.

Recommendation (Class A): Conduct detailed imaging studies (ultrasound, MRI or phlebography) and hold at least one consultation session before embolization to provide comprehensive information and obtain informed consent.

Recommendation (Class A): Integrate endovascular treatment with a multidisciplinary management approach to address various etiologies of chronic pelvic pain effectively.

Recommendation (Class A): Ensure that the interventional radiologist performing the procedure has extensive clinical expertise in pelvic pain syndromes and pelvic vein imaging.

Recommendation (Class A): Tailor pain management strategies to individual patient needs, which may include local anesthesia, intravenous analgesics, or general anesthesia, depending on the complexity of procedures and patient tolerance.

Recommendation (Class A): Select the embolization materials the team is most familiar with, such as liquid cyanoacrylate glue, ethylene vinyl alcohol copolymer, or coils, potentially combined with sclerosing agents.

Recommendation (Class A): Address all pathological venous territories during embolization, ensuring comprehensive treatment of refluxing veins, venous reservoirs, and any communications correlating with clinical signs.

Recommendation (Class A): Regularly reassess clinical symptoms and perform follow-up imaging (Doppler ultrasound) as necessary, to evaluate the effectiveness of treatment, including the disappearance of reflux, reservoirs, and leakage points.

Recommendation (Class A): Consider multiple embolization sessions based on clinical reassessment and imaging findings to achieve optimal outcomes.

Recommendation (Class A): Do not contraindicate endovascular treatment for nulliparous or multiparous patients desiring pregnancy, as there is currently no evidence to suggest that it adversely affects fertility.

Recommendation (Class A): Administer nonsteroidal anti-inflammatory drugs combined with a gastric protector for 5 to 10 days post-procedure to manage pain effectively. Consider adding short-term opioids if the severity of pain warrants it (visual analog scale $\geq$ 6).

Recommendation (Class A): Manage pain both through outpatient settings and hospital stays as required, with oral or intravenous medication, depending on patient needs and progress.

3.4.2. Non-endovascular treatment and multidisciplinary care

Although endovascular treatment remains the primary intervention for PCS, non-endovascular management plays as essential role, especially in comprehensive patient care. In patients with PCS, pelvic hypersensitivity can complicate symptom interpretation and prolong recovery times. Pelvic hypersensitivity refers to a condition in which patients experience heightened pain responses to stimuli that would not normally be painful, or a pain that is disproportionate to the identified lesions. This is why the management of PCS often requires input from several (gynecologists, pain physicians, anesthesiologists, vascular physicians, and physiotherapists) [29]. This collaborative approach ensures that all aspects of the patient's health are considered, from physical symptoms to the psychological impact of chronic pain [30].

Recommendation (Class A): Perform an upstream assessment for multidisciplinary care, that includes collaboration with gynecologists, pain specialists, anesthesiologists, vascular specialists, and physical therapists. Organize this care pathway early, especially with local health care networks, to facilitate comprehensive management.

Recommendation (Class A): Regularly consult with a vascular physician to manage symptoms related to venous insufficiency of the lower extremities.

Recommendation (Class A): Discuss the timing and strategy for managing pelvic and lower extremity varicose veins in a multidisciplinary setting to ensure that all facets of venous insufficiency are addressed[31,32].

Recommendation (Class A): Provide comprehensive, holistic management when pelvic hypersensitivity syndrome is suspected. This management should include not only pain specialists and gynecologists, but also a broader multidisciplinary team tailored to the specific needs of the patient and prepared to manage prolonged healing and persistent pain.

Recommendation (Class B): Offer specialized physiotherapy care, either preoperatively or postoperatively, focusing on abdominopelvic and pelvic-perineal rehabilitation for pain relief.

3.5. Patient follow-up after pelvic vein embolization

3.5.1. Regular follow up

Follow-up care is a critical component in the treatment of pelvic venous pathologies, ensuring long-term effectiveness, and addressing any residual post-intervention issues. Regular follow-up is essential to monitor the effectiveness of the intervention, manage any emerging complications, and ensure patient satisfaction with their quality of life [10,30]. Follow-up imaging is not performed systematically unless symptoms persist to detect residual reflux [33].

Recommendation (Class A): Make an initial assessment of pain and quality of life both before and after the intervention to gauge its success and to guide further treatment plans.

Recommendation (Class A): Schedule routine follow-up consultations within the first 1 to 6 months after embolization, with additional follow-up as required. Ideally, a longer-term consultation at 12–18 months should also be considered to ensure continued patient well-being and treatment efficacy [34].

Recommendation (Class A): During follow-up visits, regularly check to ensure there are no residual symptoms and that the recommended therapies are being adhered to. These sessions also serve as opportunities to reinforce ongoing care strategies, including hygienic practices, dietary rules, and physical activity, particularly the use of compression stockings for lower limb venous insufficiency [35].

Recommendation (Class A): Perform additional imaging if clinical evolution after intervention suggests complications or the presence of non-embolized refluxing venous territories that could explain persistent or recurrent symptoms.

Recommendation (Class B): Avoid routine follow-up imaging in the absence of residual symptoms to minimize unnecessary exposure and cost.

3.5.2. Fertility and pregnancy considerations

Concerns regarding the effects of pelvic vein embolization on fertility and pregnancy are common in women of reproductive age. The literature is sparse, but no studies have shown a reduction in fertility [5,12,36].

Recommendation (Class A): Reassure patients that pelvic vein embolization has no negative effect on ovarian reserve, fertility, or pregnancy outcomes. Hormonal evaluation is generally not required before or after the embolization.

Recommendation (Class A): Confirm that there are no contraindications to pregnancy after endovascular treatment, so that patients can plan theirfamilies without undue concern or postoperative delay.

3.5.3. Managing persistent symptoms

In some patients, symptoms may persist after successful embolization, requiring further evaluation and additional interventions. Although high-quality controlled trials are lacking, a recent meta-analysis suggested that 0 % to 40 % of women may not experience long-term improvement [6]. This variability may be due in part to non-standardized methods of clinical and imaging assessment of PCS, underscoring the need for our consensus to provide structured guidelines for physicians to effectively manage and evaluate patients. This situation underscores the importance of an initial comprehensive evaluation to identify the interrelated etiologies of pelvic pain at the outset. Patients should be made aware that embolization, while beneficial, may not resolve all types of pelvic pain. A multidisciplinary evaluation involving gynecologists, pain specialists, and other relevant specialists is essential to effectively treat multiple underlying causes [1].

Recommendation (Class A): If symptoms persist after complete embolization, perform a multidisciplinary case review involving specialists such as gynecologists and pain management experts to determine next steps.

Recommendation (Class A): Investigate any residual venous abnormalities on imaging that may explain persistent symptoms and may lead to additional endovascular treatments.

Recommendation (Class A): Consider the possibility of a non-thrombotic compressive syndrome in the differential diagnosis if clinical symptoms persist after exclusion of all identified pelvic venous reflux and reservoirs.

4. Conclusion

The Delphi consensus process, in which experts collaborated both remotely and face-to-face, provided a structured framework for developing expert opinions on the management of PCS. The resulting expert opinions reflect the collective expertise and consensus of the expert panel and have been further enhanced by external validation by gynecologists specializing in pelvic pain. This collaborative effort has contributed to the advancement of clinical practice in the field of PCS. In addition, the consensus process has produced a decision tree that provides a practical and structured approach to patient management and serves as a basic tool for clinicians to navigate the complexities of PCS care (Fig. 4).

Human rights

Not relevant to position statement papers/guidelines.

Informed consent and patient details

Not relevant to position statement papers/guidelines.

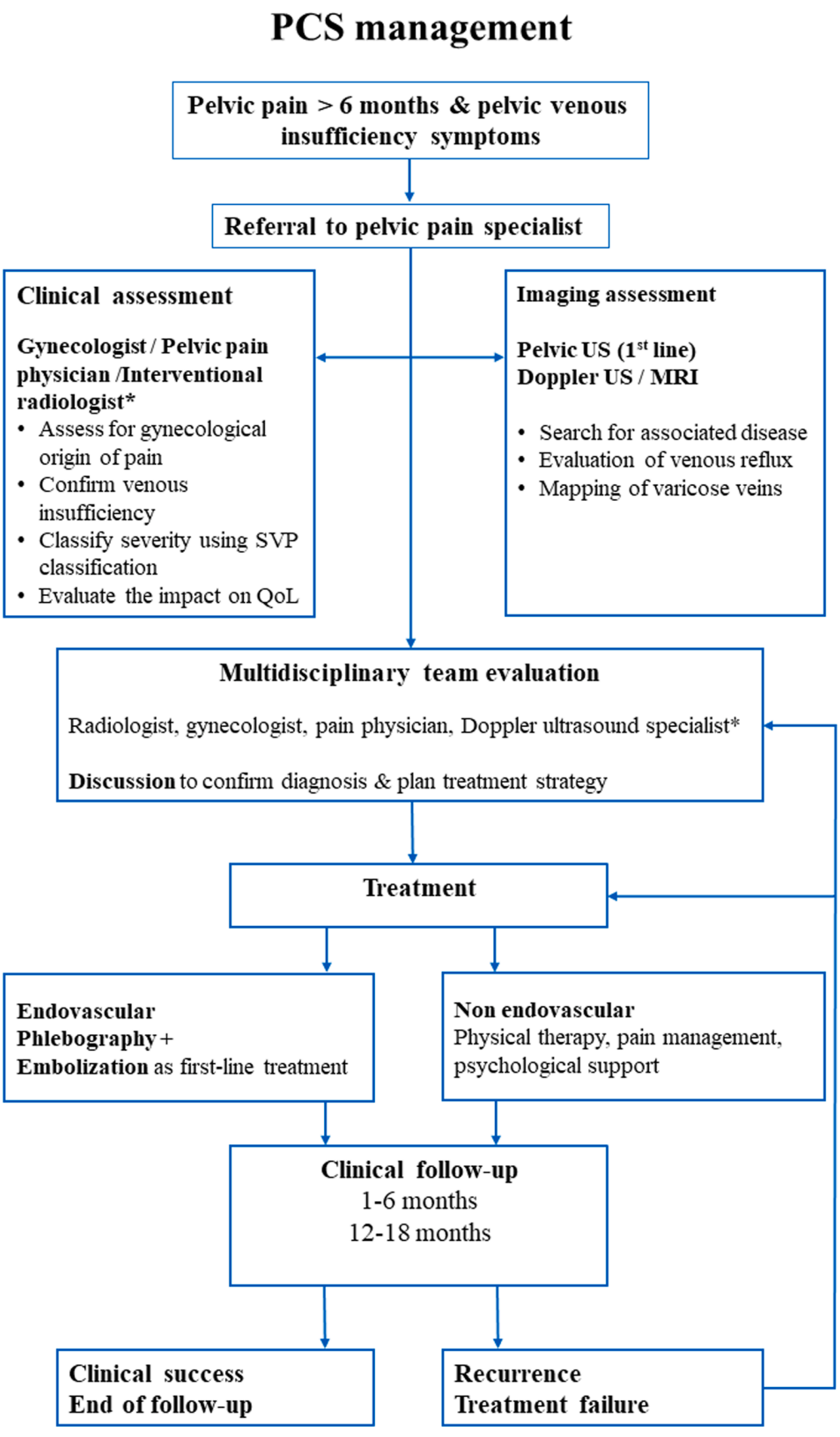

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Fig. 4. Decision tree for clinical management of suspected pelvic congestion syndrome (PCS). This algorithm outlines a stepwise approach from initial clinical suspicion of venous origin in chronic pelvic pain to therapeutic management. It integrates clinical assessment, imaging studies (ultrasound, MRI, and selective phlebography), multidisciplinary consultation, and criteria for embolization or alternative management strategies.
*depending on the locally available medical resources.
SVP indicates symptoms-varices-pathophysiology; QoL indicates quality of life.

Authors contributions

All authors attest that they meet the current International Committee of Medical Journal Editors (ICMJE) criteria for Authorship.

Funding

This work did not receive any grant from funding agencies in the public, commercial, or not-for-profit sectors.

CRediT authorship contribution statement

Vincent Le Pennec: Conceptualization, Project administration; Methodology; Investigation; Formal analysis, Visualization; Data curation; Validation; Supervision; Writing: Original Draft; Writing: Review & Editing. **Frédéric Douane**: Validation; Data Curation; Conceptualization; Methodology; Investigation; Visualization; Writing: Original Draft; Writing: Review & Editing. **Jean Luc Brun**: Validation; Investigation; Writing: Review & Editing. **Francine Thouveny**: Validation; Methodology; Investigation; Writing: Review & Editing. **Thomas Martinelli**: Validation; Investigation; Writing: Review & Editing. **Marine Bravetti**: Validation; Methodology; Investigation; Writing: Review & Editing. **Charles Mastier**: Validation; Investigation; Writing: Review & Editing. **Yan Le Bras**: Validation; Investigation; Writing: Review & Editing. **André Rogopoulos**: Validation; Investigation; Writing: Review & Editing. **Pierre-Antoine Barral**: Validation; Investigation; Writing: Review & Editing. **Henri Marret**: Validation; Investigation; Writing: Review & Editing. **Pascal Chabrot**: Validation; Investigation; Writing: Review & Editing. **Alexis Jacquier**: Validation; Conceptualization; Methodology; Investigation; Writing: Review & Editing. **Quentin Senechal**: Validation; Conceptualization; Methodology; Investigation; Writing: Review & Editing. **Gary Doppelt**: Validation; Formal analysis; Data Curation; Writing: Review & Editing. **Julien Frandon**: Conceptualization, Project administration; Methodology; Investigation; Formal analysis, Visualization; Data curation; Validation; Supervision; Writing: Original Draft; Writing: Review & Editing.

Declaration of competing interest

The authors declare that they have no known competing financial or personal relationships that could be viewed as influencing the work reported in this paper.

Acknowledgements

The authors wish to thank Teresa Sawyers, Medical Writer at the BESPIM, Nîmes University Hospital, for their expert editorial assistance.

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