

## Invited Review

# Pelvic escape points: Bottom- up is the way to go!

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## Abstract

Varicose veins (VVs) of pelvic origin are one of the clinical presentations of pelvic venous disorders (PeVD) and are increasingly being diagnosed in patients in phlebological offices these days. To investigate VVs potentially resulting from pelvic vein incompetence (PVI), a usual full duplex ultrasonography (DUS) of lower extremity veins in the upright position is recommended as well as DUS for evaluation of pelvic escape points (PELVs). Seven PELVs have been described, connecting the pelvic veins to the veins of the genital region and/or legs. There are two possible treatment options for pelvic origin VVs, top-down treatment such as pelvic vein embolization or treatment of iliac/renal vein compression if it is the cause of PVI and bottom-up treatment of PELVs and related VVs. The idea of the latter approach is to treat the causes of the external pelvic VVs in the genital region and VVs in the legs without having to treat asymptomatic pelvic veins within the pelvis. The most common methods of bottom- up treatment are sclerotherapy, surgical ligation and miniphlebectomy. The efficacy of such treatment approach for VVs of pelvic origin has been reported in the literature, whereas studies have failed to demonstrate good results of top- down treatment in the context of eliminating VVs of pelvic origin as well as minimizing the risk of VVs recurrence. Bottom-up treatment is a useful option to avoid unnecessary and more expensive pelvic vein embolization and should be considered as an initial therapeutic approach. Only if bottom-up treatment fails, if the VVs recur rapidly, or if the patient develops pelvic symptoms due to PVI, pelvic veins embolization can be considered.

**Keywords:** Varicose veins of pelvic origin, pelvic escape points, bottom- up treatment, ultrasound guided foam sclerotherapy

## INTRODUCTION

Varicose veins (VVs) of pelvic origin are one of the clinical presentations of pelvic venous disorders (PeVD). They result from pelvic venous incompetence (PVI) and venous hypertension which is transmitted through the pelvic floor escape points (PELV) causing either atypical lower extremity VVs, vulvar or scrotal VVs, or more typical saphenous truncal incompetence and related VVs [1].

Studies have shown that 16.7% of VVs in women and 3.3% in men are caused by PVI [2,3]. Vulvar VVs are found in up to 22% of pregnant women and 10% of nonpregnant women [4]. They can be associated with dyspareunia, vulvodynia, and also venous thromboembolic events. It is often difficult to reliably estimate the incidence of vulvar VVs, as they remain undiagnosed in most

patients due to their unusual location and the patients' personal reluctance to be consulted [5]. The prevalence of scrotal VVs is also not well established in the literature. In a large study of patients with symptoms and signs of chronic venous disease (CVD) in 835 limbs, the frequency of non- saphenous reflux according to duplex ultrasonography (DUS) was 10% and in one third of the latter group this was a result of PVI, which results in an estimated frequency of 3.4% [6]. Another study has found that this prevalence may be as high as 25.6% in patients with recurrent VVs [7].

Based on the literature, among patients presenting with pelvic origin VVs, less than 10% have been reported to have pelvic symptoms due to PVI, as the pelvic venous hypertension is transmitted from pelvis to the further zone [8]. In a study by Gibson et al., only 7% of patients with VVs of pelvic origin

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complained of symptoms consistent with PeVD, such as pain or heaviness in the pelvis [9].

**Diagnostic**

Based on the 2022 ESVS guidelines, to investigate VVs potentially resulting from PVI, a usual full DUS of lower extremity veins in the upright position is recommended (Class I, Level B), as well as DUS for evaluation of PELVs (Class I, Level C) [1].

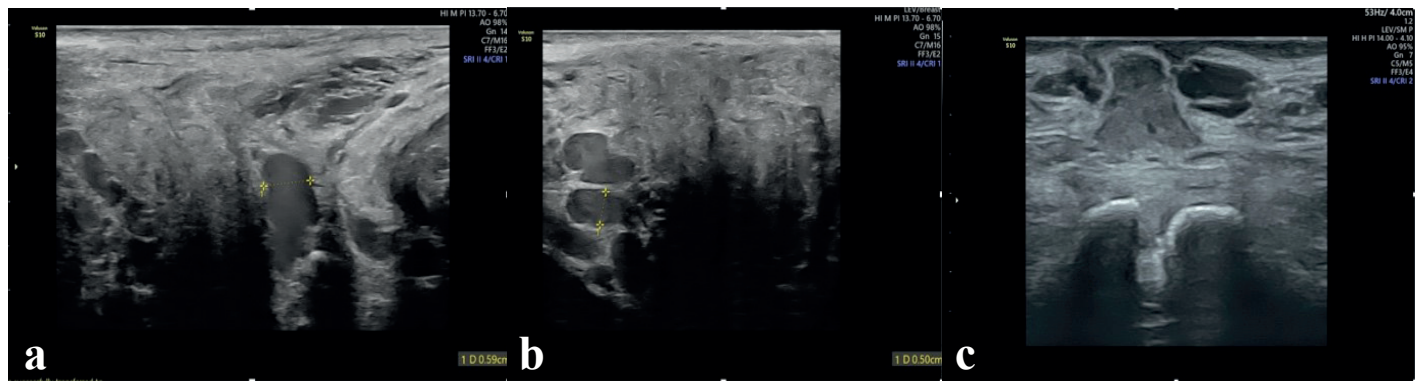
**Assessment of PELVs**

Seven PELVs have been described, connecting the pelvic veins to the veins of the genital region and/or lower extremity. The most common are pudendal PELVs, which are found in 60-70% of women with VVs of pelvic origin [10,11]. Pudendal PELVs relate to the internal pudendal vein, which runs in the pudendal canal (Alcock's canal) along the inferior ischial ramus. Venous reflux is transmitted through the internal pudendal vein tributaries, the perineal vein (labial posterior veins), the vestibular bulb vein

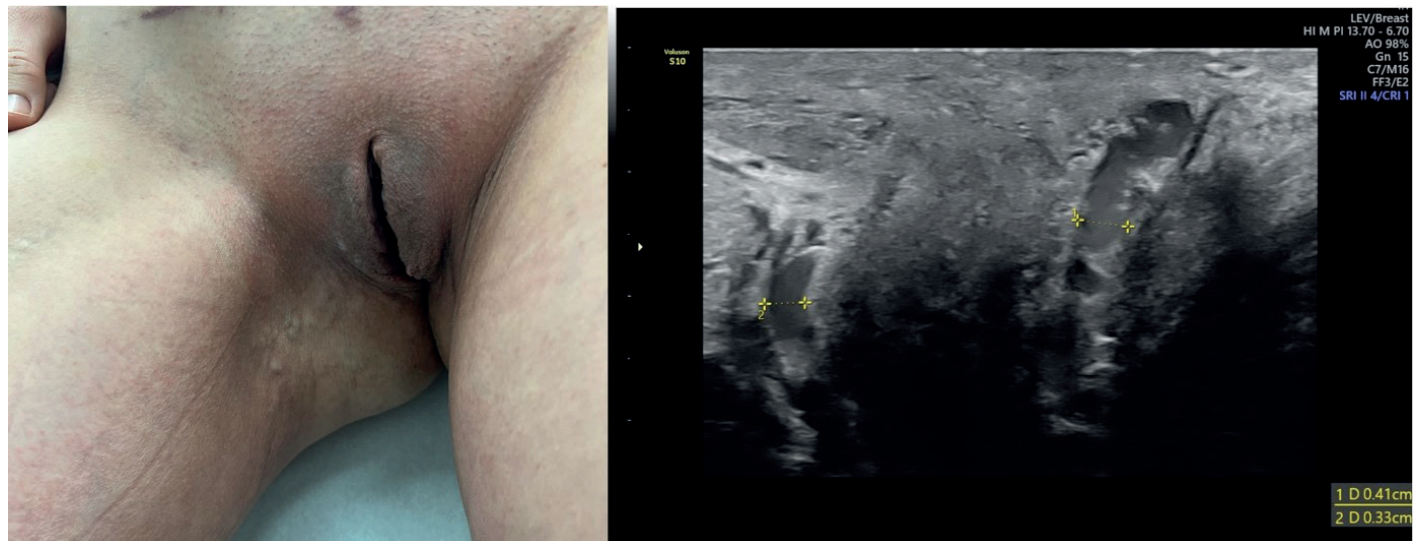
(intermediate labial veins), and the deep vein of clitoris, hence there are three pudendal PELVs: the perineal posterior PELV located in the distal third of the labia majora (Figure 1a), the intermediate labial PELV in the mid- labia majora (Figure 1b), and the clitoral PELV on the either side of clitoris (Figure 1c) [10] The pudendal PELVs, in addition to vulvar VVs, are the most common cause of atypical VVs of the lower limbs, especially at the medial and posterior aspect of the thigh (Figure 2). Clitoral PELV is connected to external pudendal vein and may cause VVs at the mons pubis and the anterior aspect of the thigh (Figure 3).

The second most common PELV is the inguinal PELV, which is diagnosed in 21-36% of patients with VVs of pelvic origin [10,11]. Reflux from the pelvic veins is transmitted through the inguinal canal via the round ligament vein and may be responsible for VVs at the mons pubis, vulva, and lower limb.

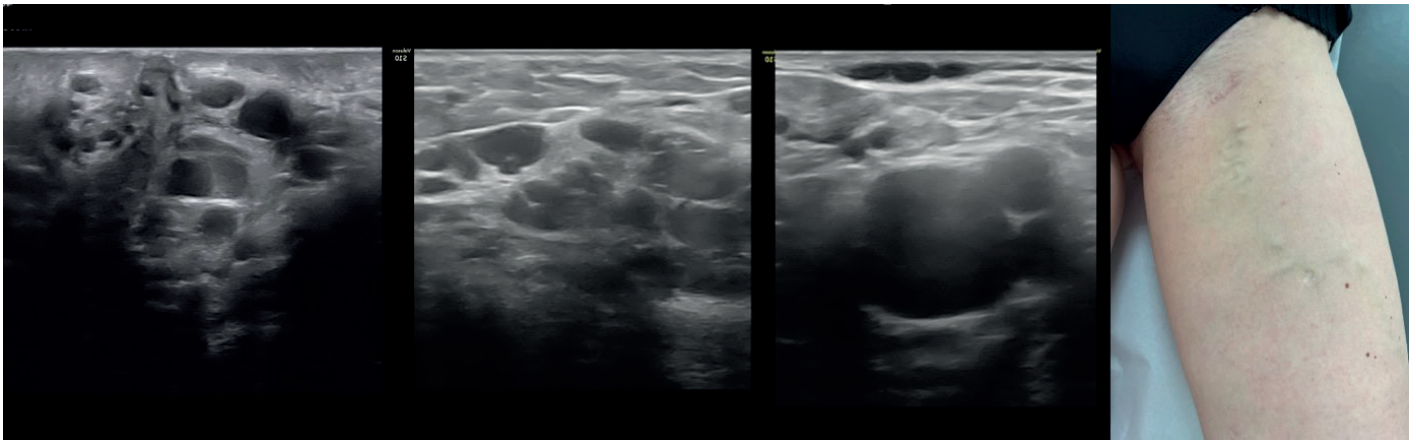
Due to the existence of anastomoses and subcutaneous plexuses these PELVs can cause both the ipsilateral and contralateral VVs at genital region and/or lower limb.



**Figure 1.** Pudendal pelvic escape points (PELVs): **1a.** the perineal posterior PELV located in the distal third of the labia majora, **1b.** the intermediate labial PELV located in the mid- labia majora, **1c.** the clitoral PELVs located on the either side of clitoris



**Figure 2.** The pudendal PELVs (intermediate labial PELV and perineal posterior PELV) causing vulvar VVs and atypical VVs at the medial aspect of the thigh



**Figure 3.** Clitoral PELV connected to external pudendal vein and causing VVs at the mons pubis and the anterior aspect of the thigh

There are two gluteal PELVs: inferior and superior PELVs. The inferior gluteal PELV is the cause of VVs of pelvic origin in 3.7% of patients [11]. The inferior gluteal vein enters the pelvis through the greater sciatic foramen, below the piriformis muscle. The superior gluteal PELV is responsible for 1.6% of pelvic origin VVs. The superior gluteal vein enters the pelvis through the greater sciatic foramen over the piriformis muscle. Reflux in these PELV can cause VVs at the buttock and posterior surface of the thigh, along the sciatic nerve.

The obturator PELV is responsible for 3.2% of VVs of pelvic origin [11]. The obturator vein enters the pelvis through the upper part of the obturator foramen in the obturator canal. Reflux from the pelvic veins is transmitted through the obturator vein to the veins of the adductor muscles of the thigh, leading to the development of VVs in this area.

### Evaluation of Pelvic Veins

Based on 2022 ESVS guidelines, whenever PeVD are suspected, abdominal and/or transvaginal DUS should be considered to confirm the presence of venous pathology (Class IIa, Level B) [1]. There is a difference between European and American guidelines. The 2023 SVS, AVF, AVLS guidelines state that in patients with medial thigh or vulvar VVs evaluation of pelvic venous pathology with DUS or other imaging studies is not indicated if they have no pelvic symptoms of PeVD, so in more than 90% of patients with VVs of pelvic origin [8,12]

### Treatment Strategy

There are two possible treatment options for pelvic origin VVs. Some authors suggest top-down treatment such as pelvic vein embolization or treatment of iliac/renal vein compression if it is the cause of PVI. The others propose bottom-up treatment of PELVs and related VVs. The idea of this approach is to treat the causes of the external pelvic varicosities in the genital region and VVs in the legs without having to treat asymptomatic pelvic veins within the pelvis. This approach has its advantages in terms

of simplicity and cost.

The effectiveness of pelvic vein embolization in case of pelvic symptoms related to PVI has been proven in the literature [1,8]. However, pelvic symptoms have been reported in only less than 10% of patients presenting with VVs of pelvic origin [8]. Therefore, most patients with VVs of pelvic origin do not require any pelvic vein treatment at all and minimally invasive procedures from below are usually sufficient. Based on 2022 ESVS guidelines, for patients with VVs of pelvic origin without pelvic symptoms requiring treatment, local procedures for VVs and related PELVs should be considered, as initial therapeutic approach (Class IIa, Level C) and pelvic vein embolization as initial treatment should not be performed (Class III, Level C). For patients with VVs of pelvic origin with pelvic symptoms requiring treatment, pelvic vein embolization should be considered to reduce pelvic symptoms (Class IIa, Level B) [1].

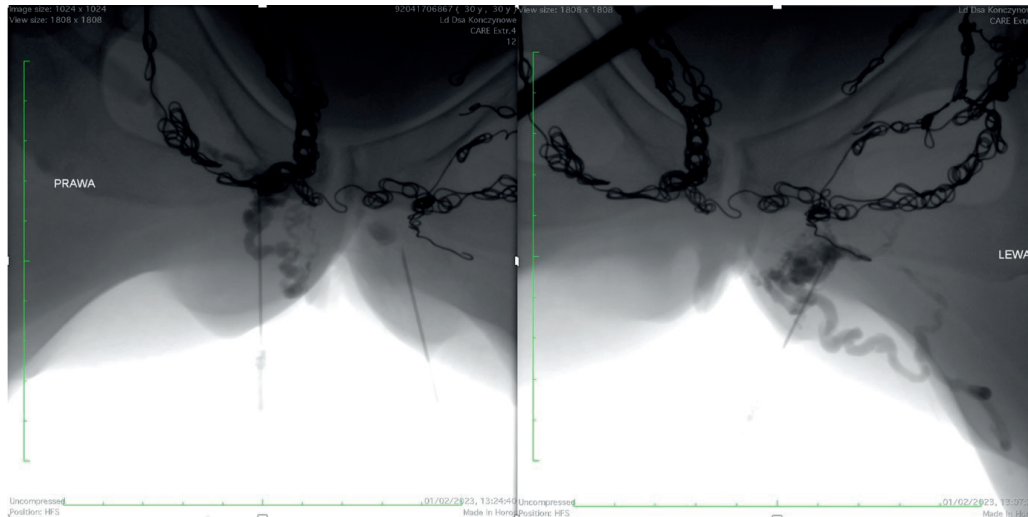
The efficacy of bottom-up treatment of VVs of pelvic origin has been reported in the literature. First reported a 24-month prospective follow-up of seven patients undergoing sclerotherapy for vulvar VVs has shown no recurrences of VVs after such treatment. The procedure was not associated with significant complications, with only one patient experiencing transient redness of the vulva [13]. Another prospective study included 59 patients with VVs of pelvic origin in the inguinal region (30.5%), vulva (20.3%), perineum (25.5%) and buttocks (23.7%). Sclerotherapy provided excellent results in 32.6% of patients, good results in 46.1% of patients, and satisfactory results in 19.1% of those included in the study. Unsatisfactory results were found in only 2.2% of patients [14]. Gavrillov conducted a prospective study of 44 patients with vulvar VVs of pelvic origin who underwent one of two bottom-up treatment techniques. Sclerotherapy was performed in 12 patients and miniphlebectomy in 32 patients. At 1-year follow-up, a consistent therapeutic and cosmetic effect was found in 83% of patients after sclerotherapy. Two patients had recurrence of VVs 2 and 3 months after the procedure, what was due to another pregnancy. The follow-up period of

patients after miniphlebectomy was extended to 3-8 years and no recurrence of vulvar VVs was observed in any of the patients. Neither sclerotherapy nor miniphlebectomy for vulvar VVs was associated with complications. No patient who underwent local treatment for VVs of pelvic origin developed or worsened PVI-related pelvic symptoms [4]. Another prospective study included 273 patients with VVs of pelvic origin who underwent PELVs ligation. At 1-year follow-up, VVs recurrence was found in only 2.2% of patients. There were no significant complications related to the procedure, such as deep vein thrombosis, pulmonary embolism, haemorrhage, superficial vein thrombosis, wound infection, or neuralgia. One patient experienced bleeding in the groin, which required immediate surgical treatment and led to a modification of the surgical technique [15]. The retrospective study on 785 patients has noted the improvement of pelvic origin VVs in 78.7% of patients after sclerotherapy at mean follow-up of  $4.1 \pm 1.4$  years [11].

The need for routine treatment of PVI in patients with VVs of pelvic origin has not been confirmed in the literature. 1 Published studies have failed to demonstrate significant improvement in pelvic origin VVs after top-down treatment [16,17]. A prospective study on 102 patients has showed mild to moderate improvement of VVs of pelvic origin in only 51% of patients after pelvic vein embolization. None of the patient had a significant improvement

and up to 82% of patients required additional bottom-up treatment [17]. Another prospective study involving 47 patients who underwent embolization of pelvic veins has shown that only 12% of patients didn't require any further treatment for pelvic origin VVs. Good treatment results were obtained only in patients with vulvar VVs, achieving remission of VVs in 88% of patients [18]. A recently published retrospective study including 243 patients has shown that 80% of patients after pelvic vein embolization required further bottom-up treatment to eliminate VVs of pelvic origin [19]. Figure 4 shows a venography of PELVs of a patient after coil embolization and top-down sclerotherapy of incompetent pelvic veins.

It has also not been proven that performing pelvic vein embolization prevents recurrence of lower limb VVs. Creton et al. conducted a prospective follow-up of 24 patients who underwent embolization of incompetent pelvic veins with simultaneous miniphlebectomy of VVs of pelvic origin. At 3-year follow-up, the recurrence of lower limb VVs was observed in 54.4 % of patients, despite the pelvic vein embolization [16]. Greiner et al. performed pelvic vein embolization, followed by miniphlebectomy of the lower limb VVs in 24 patients with recurrent VVs of pelvic origin. At 4-year follow-up, recurrence of lower limb VVs was found in 4.16%, and reticular veins and telangiectasias in 58.33% of patients [20].



**Figure 4.** A venography of PELVs of a patient after coil embolization and top-down sclerotherapy of incompetent pelvic veins. The top-down treatment didn't eliminate PELVs and related VVs

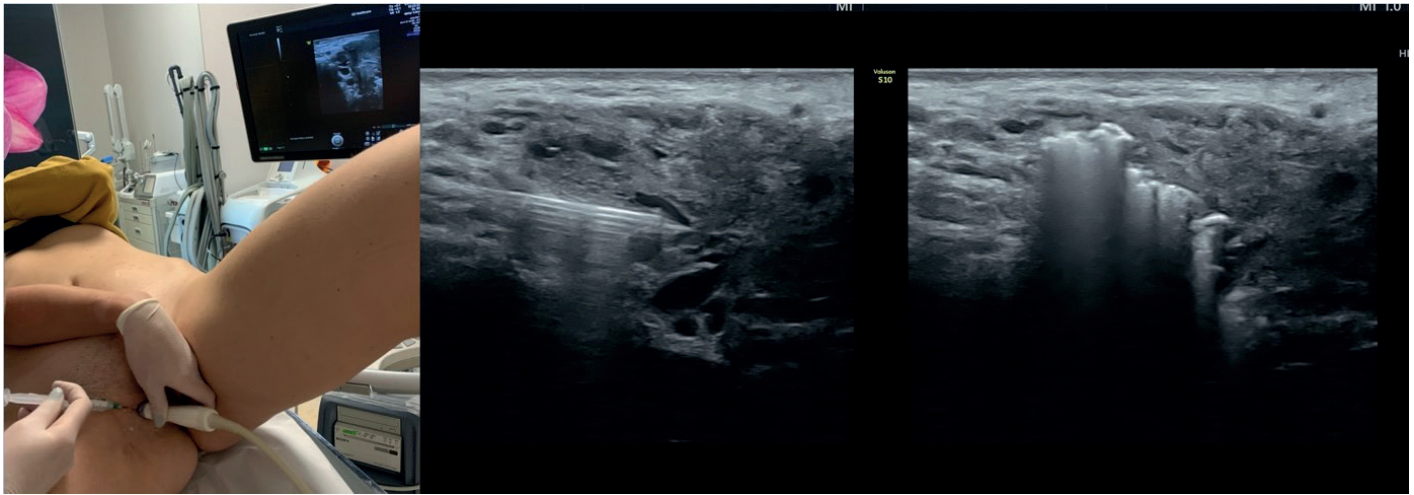
### Bottom- up Treatment Techniques

The most common methods of bottom-up treatment for pelvic origin VVs are sclerotherapy, surgical ligation and miniphlebectomy.

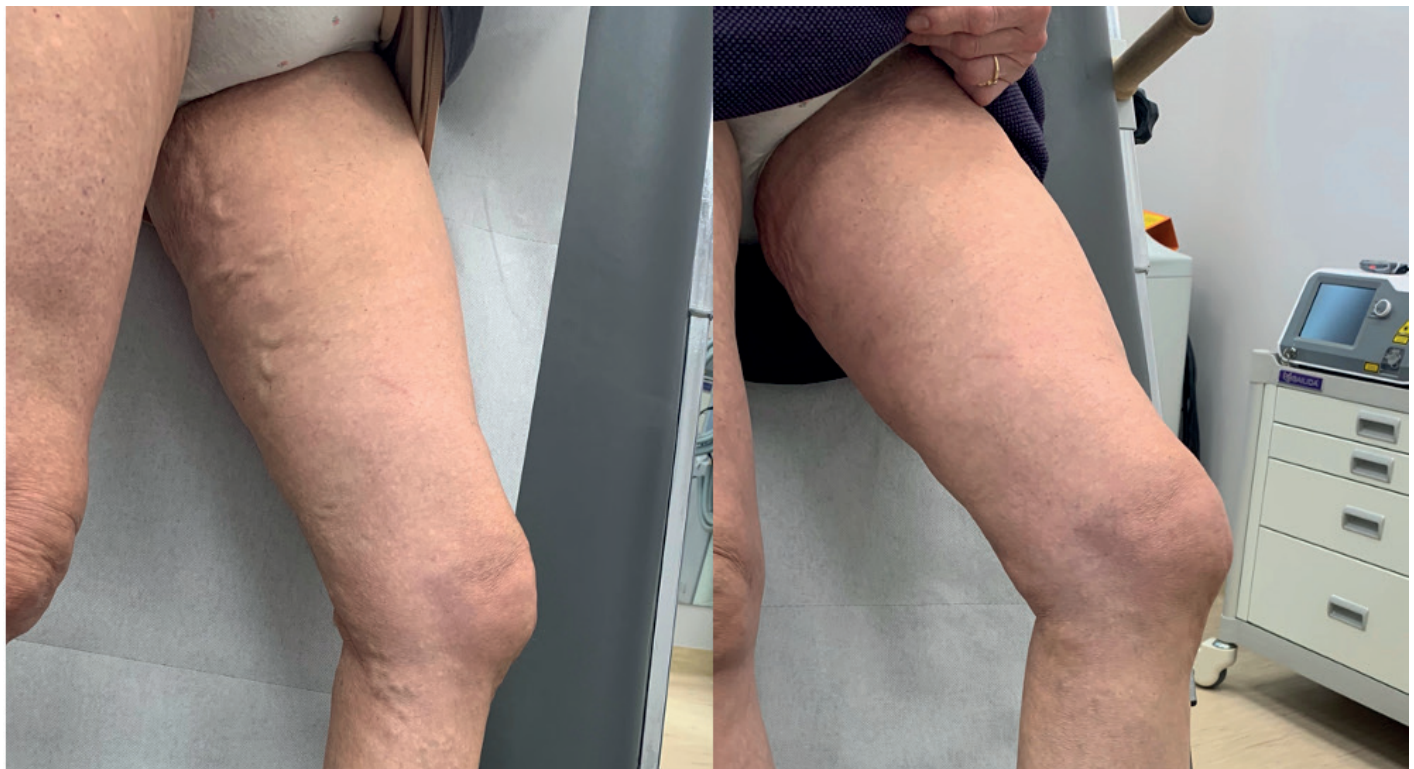
Ultrasound-guided foam sclerotherapy (UGFS) is commonly used for VVs of the lower limbs, allowing the elimination of both incompetent tributaries and perforating veins [21]. As PELVs act as perforators connecting the pelvic veins to the superficial veins

of the lower limbs, are usually tortuous and narrow in diameter, UGFS is the ideal method for their elimination (Figure 5). The use of the UGFS for PELVs also allows foam to close incompetent peri-vaginal venous plexuses. The results of bottom-up UGFS of PELVs and VVs of pelvic origin are shown at figure 6.

An alternative treatment for PELVs and VVs of pelvic origin is surgical ligation with miniphlebectomy [15]. This is particularly applicable for wide (>1 cm) and short PELVs.



**Figure 5.** Ultrasound-guided sclerotherapy of the intermediate labial PELV in a patient in the anti-Trendelenburg position



**Figure 6.** 64-year-old woman with typical lower limb VVs of pelvic origin before the treatment and 12 months after UGFS of PELVs and related VVs

## CONCLUSIONS

VVs of pelvic origin are increasingly being diagnosed in patients in phlebological offices these days. These patients are usually young, have no pelvic symptoms, and very often come for treatment both for lower extremity and vulvar symptoms and for aesthetic reasons.

A proper history and diagnosis, especially PELVs evaluation, are essential for good treatment results. Bottom-up treatment is a

useful option to avoid unnecessary and more expensive pelvic vein embolization and should be considered as an initial therapeutic approach. It is important not to treat images, especially since top-down treatment has not yielded good results in the context of eliminating VVs of pelvic origin as well as minimizing the risk of VVs recurrence. Only if bottom-up treatment fails, if the VVs recur rapidly, or if the patient develops pelvic symptoms due to PVI, pelvic veins embolization can be considered.

## Limitation

The limitation is the lack of studies including homogeneous study population, comparing the outcome of bottom- up treatment of PELVS and VVs of pelvic origin with pelvic vein treatment alone in these patients.

**Data Sharing Statement:** The data that support the findings of this study are available from the corresponding author upon reasonable request.

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