

The relation between pelvic varicose veins, chronic pelvic pain and lower extremity venous insufficiency in women

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PURPOSE

To determine the frequency of pelvic varicose veins with transvaginal ultrasound and associated lower extremity venous insufficiency with Doppler ultrasound in women with chronic pelvic pain of undetermined origin.

MATERIALS AND METHODS

A total of 100 women with chronic pelvic pain of undetermined origin lasting more than 6 months were included in the study. The presence of anechogenic and non-pulsatile vascular structures demonstrating flow in Doppler ultrasound with a diameter >5 mm in parauterine and paraovarian localizations was accepted as pelvic varicose veins. In all patients, lower extremity venous systems were examined with Doppler ultrasound to assess possible associated venous insufficiency. Chi-square test was used for statistical analysis.

RESULTS

Pelvic varicose veins were discovered with transvaginal ultrasound in 30 of 100 patients. This association was shown to be statistically significant. Various degrees of associated lower extremity venous insufficiency were also discovered in 21 of these 30 patients.

CONCLUSION

This study has shown that the presence of pelvic varicose veins in women with chronic pelvic pain is not infrequent, and in the majority of cases, they are associated with lower extremity venous insufficiency. Since the diagnosis of lower extremity venous insufficiency plays an important part in deciding the course of treatment, lower extremity Doppler ultrasound must be included in the evaluation when pelvic varicose veins are discovered.

Key words: • pelvis • varicose veins • ultrasonography, Doppler

Chronic pelvic pain is a frequent disorder in women and it considerably disrupts daily activities. Although dilatation of the broad ligament and the ovarian plexus veins has been identified as the cause of the pain, they are usually not taken into consideration because of the difficulty in their diagnosis and treatment (1, 2). Pelvic venous congestion and pelvic varices have increasingly been identified as the causes of chronic pelvic pain. Although ultrasonographically a normal pelvic venous plexus appears as one or two small, smooth tubular structures that are <5 mm in diameter, pelvic varices typically appear as parauterine or paraovarian dilated and tortuous vascular segments, and anechoic structures that are >5 mm in diameter (2-5). Since transvaginal ultrasonography (TVUS) is a non-invasive, inexpensive, relatively easy procedure, it has been widely accepted for use in the diagnosis of pelvic varicose veins and is the most commonly used diagnostic tool (5-7).

Pelvic varices are commonly associated with vulvar, perineal, and lower extremity varices (2, 3, 8, 9). To the best of our knowledge, there are no studies concerning the rate of frequency that pelvic varices are associated with lower extremity venous insufficiency.

Materials and methods

One hundred women between the ages of 22 and 52 years (mean, 38 years) presenting between February 1 and May 1, 2004, with chronic pelvic pain of undetermined origin that continued for more than 6 months were included in the study. None of the cases had been previously diagnosed to have lower extremity venous insufficiency.

The study adhered to the principles of the World Medical Association's Declaration of Helsinki and informed consent was obtained from every subject. An institutional ethics board had not been constructed during the time of the study. Each patient's age and number of births were noted before ultrasound examination. High-resolution 6.5 MHz transvaginal and 7.5 mm linear probes, and a Shimadzu SDU-2200 were used in the ultrasound examinations. Initially, TVUS was performed. Before examination, patients emptied their urinary bladder. Examinations were performed when the subjects were lying in the supine position with knees in 30-45 degree flexion. Endometrial thickness of all the patients was noted, and when present, uterine and ovarian abnormalities were recorded. The presence of non-pulsatile flow in dilated veins was shown by Doppler ultrasound. The presence of parauterine or paraovarian circular or linear, non-pulsatile anechoic structures that were >5 mm was accepted as pelvic varices (2, 7) (Figures 1 and 2).

In the second phase, the lower limb venous system was examined with Doppler ultrasound. The common femoral vein (CFV), superficial femoral vein (SFV), deep femoral vein (DFV), popliteal vein (PV), long saphenous vein (LSV), and short saphenous vein (SSV) were ex-

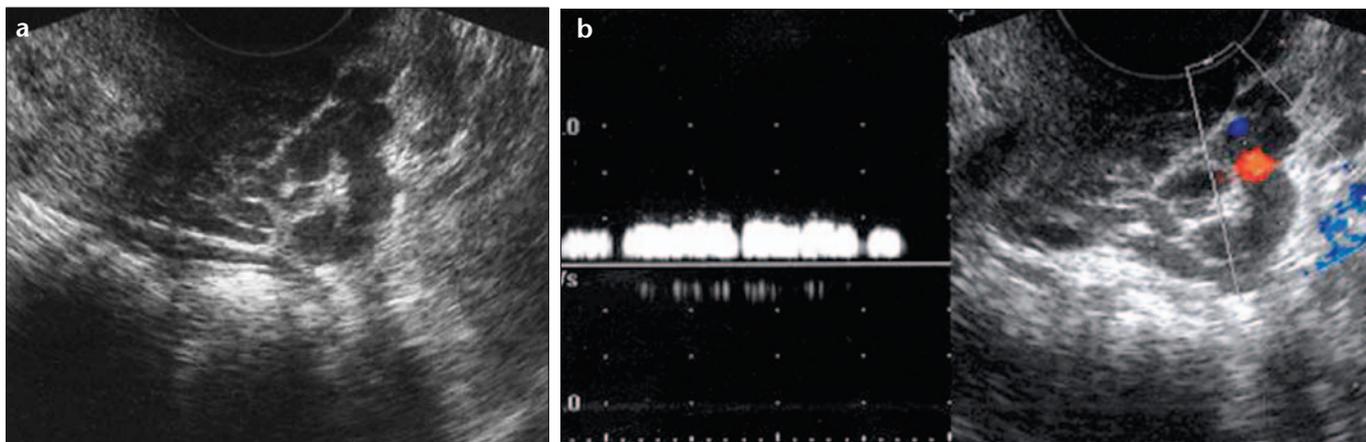


Figure 1. a, b. Gray scale ultrasound examination (a) of the pelvic region in a 45-year-old woman reveals serpiginous structures, which are thought to be varicose veins. Color and duplex Doppler ultrasound (b) shows venous flow within these structures.

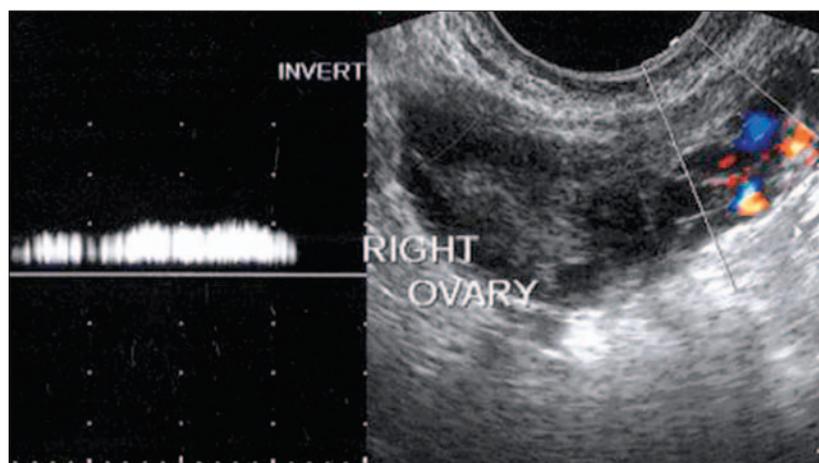


Figure 2. Varicose venous veins around the right ovary with venous flow on Doppler ultrasound examination are seen in a 34-year-old woman (vein diameter: 5.4 mm).

amined in gray scale, with patients in the supine position, according to the wall structure, intraluminal echogeneity, diameter, and compressibility. Later, color and spectral examination of venous structures were performed. In the literature, it has been shown that there is no absolute limit for reflux duration, and the duration of reflux changes depending on the position of the patient, diameter of the lumen, and number and localization of the venous valves; generally, a duration of ≥ 0.5 -1 sec has been suggested as pathological (10). In this study, we accepted inverse flow >0.7 sec with mechanical compression and Valsalva maneuver to be pathological.

In order to evaluate the association between pelvic varices and lower limb venous insufficiency and the relationship with the number of deliveries, chi-square statistical test was used.

Results

The diameter of pelvic veins was >5 mm in 30 of 100 patients. In 21 of these 30, concomitant lower limb venous insufficiency was found. Although in 6 patients pelvic vein diameter was <5 mm, lower limb venous insufficiency was observed. Venous insufficiency was not observed in 64 patients in whom pelvic vein diameter was <5 mm (Table 1). Statistical analysis revealed ($\alpha=0.05$ confidence interval; $C=34$; $29 > \chi^2 0.95$; $1=3.84$) a significant relationship between the presence of pelvic varices and the presence of lower limb venous insufficiency.

While the diameter of pelvic veins was observed to be bilaterally >5 mm in 13 patients, they were right sided in 10 and they were left sided in 7. In 9 of 21 patients who had concomitant venous insufficiency, their dilated pelvic veins were bilateral, whereas in 7 patients they were on the left side and in 5 on the right.

In 21 patients with concomitant pelvic varices and lower limb insufficiency, insufficiency was observed in the CFV of 16, LSV of 7, DFV of 2, SFV of 2, PV of 3, and SSV of 1 patient (Figure 3).

Among 30 patients whose pelvic vein diameters were >5 mm in TVUS, 24 had normal TVUS findings, 3 had myoma foci, which, based on their size and appearance, may have been the cause of pelvic pain, and 3 had hemorrhagic ovarian cysts that were >3 cm in diameter. There was no retroverted uterus detected in this study group (Figure 4).

Among 70 patients whose pelvic vein diameters were <5 mm, 50 had normal TVUS findings, 7 had myoma foci, which, based on their size and appearance, may have been the cause of pelvic pain, 11 had complicated ovarian cysts that were >3 cm in diameter, and 2 patients had retroverted uteri (Figure 5).

Mean endometrial thickness was 9.2 mm in patients that had pelvic varices and 6.7 mm in those that did not.

The mean number of deliveries was 2 (range, 0-7) in the study group, which was composed of 5 nulliparous and 95 multiparous women. Pelvic varices were observed in 18 of 63 patients who had fewer than 2 births and in 12 of 37 who had more than 2 deliveries (Table 2). There was no statistical relationship between pelvic varices and the mean number of deliveries ($C=0.039$; $79 < \chi^2 0.95$; $1=3.84$).

Discussion

The complaint of chronic pelvic pain constitutes about 10-40% of all presentations to obstetrics and gynecology outpatient clinics (7, 11, 12). Pelvic pain among women is a common con-

dition, which may be caused by various reasons. The most common causes include pelvic varicocele, endometriosis, pelvic adhesions, atypical menstrual pain, urological problems, spastic colon syndrome, and psychosomatic disorders (7). Dilatation of broad ligament and ovarian plexus veins and the presence of an incompetent ovarian vein is a specific entity known as pelvic congestion syndrome (PCS) or pelvic varicocele (1). It has been reported that pelvic varicocele occurs in 10% of the general female population and in about half of women who have chronic pelvic pain (2, 7). Pain secondary to pelvic congestion increases with fatigue, coitus, and conditions that increase intra-abdominal pressure, such as walking, bending, heavy lifting, and prolonged sitting during the premenstrual period. Chronic pelvic pain is generally unilateral (2, 3, 8, 9).

Pelvic congestion is diagnosed mostly in multiparas. During pregnancy, the ovarian vein dilates permitting a 60-fold increase in blood flow, which is considered to be one of the most important causes of venous insufficiency (3, 13). In our study group, which had a mean number of deliveries of 2 (range, 0-7), pelvic varices were observed in 18 (28.5%) of the 63 women who had <2 deliveries and in 12 (32.4%) who had >2 births. Statistical analysis did not reveal any significant relationship between pelvic congestion and the mean number of births.

Venous drainage of ovarian veins occurs via the ovarian plexus, which connects with the uterine plexus at the level of the broad ligament. Generally, a single ovarian vein leaves the ovarian plexus and ascends superiorly along the course of the psoas muscle and drains into the left renal vein on the left side, and into the inferior vena cava (IVC) on the right side. Sometimes more than one ovarian vein leaves the ovarian plexus and they unify before draining into the IVC or left renal vein. In autopsy series, valves in the upper portion of ovarian veins were absent on the right side in 6% and on the left side in 15% of the study population. The presence of pelvic congestion in nulliparous women is believed to be linked to the congenital absence of these valves (3). Although invasive methods such as vulvar phlebography, transuterine venography, retrograde phlebography, and selective

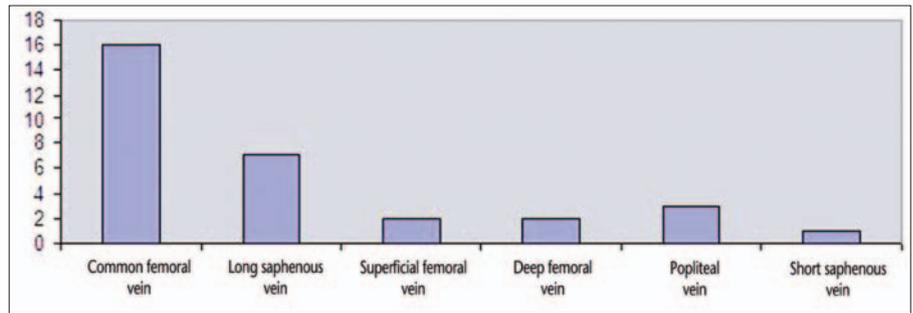


Figure 3. Distribution of lower limb venous insufficiency within the group of women with pelvic congestion.

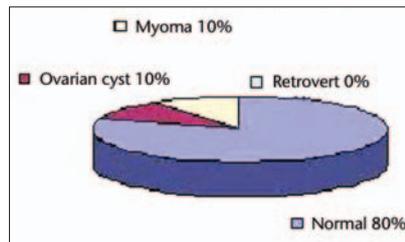


Figure 4. TVUS findings of patients with pelvic pain and pelvic congestion.

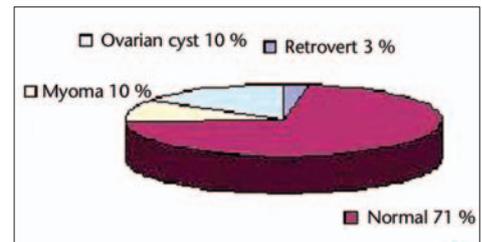


Figure 5. TVUS findings of patients without pelvic pain and pelvic congestion.

Table 1. Distribution of the number of patients according to pelvic congestion and venous insufficiency

Number of patients	Pelvic congestion	Venous insufficiency
21	+	+
9	+	-
6	-	+
54	-	-

Table 2. Distribution of cases with and without pelvic varices according to the number of deliveries they had

Number of deliveries	Pelvic varix (+)	Pelvic varix (-)
<2	18 cases	45 cases
>2	12 cases	25 cases

ovarian venography have been used in the diagnosis of pelvic congestion, all of these methods, except selective ovarian venography, have been abandoned. Selective ovarian venography is used only in patients who will have an endovascular intervention. Selective ovarian venography is performed with local anesthesia. After excluding the possibility of pregnancy, the femoral vein is catheterized with the Seldinger technique. The left ovarian vein draining into the left renal vein is selectively catheterized fluoroscopically, and non-ionized contrast material with low osmolality is administered. Radiographs

are taken with the patient in the semi-erect position. The same procedure is applied to the right ovarian vein since it may also drain into the right renal vein (8).

At the present time, the use of transabdominal ultrasonography, TVUS, spiral computed tomography (CT), and magnetic resonance (MR) imaging is increasing for diagnostic purposes (4, 8, 13, 14). There are also studies that report that reflux in the left ovarian vein could be demonstrated with CT and MR imaging (3, 15). With the use of multidetector CT (MDCT), a larger region can be imaged in the same phase

as compared to spiral CT. Reflux of the contrast material to the left renal vein generally occurs in the corticomedullary phase, i. e. the arterial phase. When the contrast material is in the arterial system and the renal veins in the arterial phase, simultaneous opacification of the ovarian veins show reflux to the ovarian vein. It is not accurate to diagnose every case that shows reflux to the ovarian vein in CT or MR examinations as pelvic congestion, because studies have shown that reflux in asymptomatic women is a common finding approaching 40% to 60% (3, 16). Pelvic varices can be visualized efficiently in 3-dimensional T1-weighted gradient echo MR sequences after the administration of intravenous gadolinium, and flow in the pelvic varices appears in high signal intensity (17).

Pathogenesis of pelvic congestion is multifactorial. Hiromura et al. showed in their study that stenosis of the left renal vein at the aortomesenteric level may cause reflux to the left ovarian vein and development of venous collateral structures at this level (16). Stenosis of the left renal vein at the aortomesenteric level may also be seen secondary to compression of the superior mesenteric artery, which is known as the "nutcracker syndrome", and is characterized by intermittent gross hematuria secondary to left renal vein hypertension. An increase of the venous pressure gradient between the left renal vein and IVC above 1-3 mmHg causes development of collateral veins and inverted flow. When there is suspicion with ultrasound, CT, and MR imaging findings, diagnosis should be confirmed by retrograde renal venography by measuring the pressure gradient between the left renal vein and IVC. The reason why most patients remain asymptomatic in ovarian reflux secondary to stenosis at the aortomesenteric level is thought to be related to the fact that venous pressure gradient does not increase as it does in the "nutcracker syndrome" (16). In addition, pelvic congestion may also occur secondary to a retroaortic left renal vein, in portal hypertension and acquired inferior vena cava syndrome (18).

The cause of pelvic vein dilatation has not been clearly defined. Hormonal factors contribute to vasodilatation, and pelvic veins are exposed to high doses of ovarian hormones. Estrogen is a potent vasodilator. This effect

occurs with various mechanisms, and estrogen receptors on human vascular cells are known to exist. Estrogen also causes nitric acid secretion, which causes relaxation of smooth muscle via stimulating nitric oxide synthase. Nitric oxide not only dilates the uterine vessels, but also causes pelvic pain that can be blocked by nitric oxide inhibitors. However, there is no evidence related to the increase of estrogen in the peripheral blood. There are indirect effects of estrogen on pelvic organs. Ultrasound studies have shown a significant increase in endometrial thickness and size in pelvic congestion (17). In the present study, mean endometrial thickness was 9.2 mm in the group that had pelvic varices and 6.7 mm in the group that did not have pelvic varicose veins. This supports the notion that hormonal factors have important influence in pelvic congestion.

TVUS has an extensive usage as it is inexpensive and non-invasive (2). TVUS may be used with patients who will be followed-up in outpatient clinics and a detailed examination can be completed within such a short time as 15 minutes (20). In TVUS, a full bladder is not required. TVUS, in comparison to transabdominal sonography, is more beneficial in obese patients, patients with an incision scar, and patients who are hysterectomized (5). Pelvic structures are examined in a higher resolution because of the proximity of the vaginal probe to the uterus and ovaries. Pelvic varices are observed with TVUS as multiple dilated veins that are >5 mm in diameter, located within the broad ligament of the uterus and have various venous Doppler ultrasound signals. In a study of 35 females whose adnexal vein diameters measured >5 mm in TVUS, Giacchetto et al. identified reflux in the ovarian veins using retrograde venography (2). For that reason, TVUS has been recommended as a non-invasive method in the diagnosis of pelvic congestion and varicocele (1, 2).

In the present study, the diameters of the pelvic veins in 30 of 100 women with pelvic pain were found to be >5 mm. In 24 of these patients (80%), no other pathology that could have caused pelvic pain was found. Pelvic pain in these patients was thought to be secondary to pelvic congestion. No pelvic varicose veins were detected in 50 patients that had pelvic pain.

Embolization or ligation of the ovarian vein shows good results in ovarian varicocele. Combined extraperitoneal vein ligation and ligation of the branches of the internal iliac vein was demonstrated to be curative in 77% of cases, whereas 58% of cases were successfully treated with ovarian vein embolization (23). In addition to ligation of the uterine veins, which are in relation to the ovarian vein, varicectomy to vulvar and leg varices yields good outcomes (9, 19).

Pelvic varices are frequently associated with vulvar, perineal, and lower limb varices (2, 3, 9). Valvular insufficiency of the pelvic venous system, such as in the internal and external iliac veins, has an important role in the pathophysiology of pelvic venous congestion (3). Although in the literature lower limb varices are reported to accompany pelvic varices, to the best of our knowledge, there is no study regarding the frequency of this association. In the present study, in 21 of 30 (70%) patients having pelvic veins >5 mm in diameter, we observed venous insufficiency in various degrees in the CFV, DFV, SFV, LSV, SSV, and PV. While lower limb venous insufficiency was most frequently seen in the CFV (in 52% of the women), it was also seen, in descending order, in the LSV (23%), PV (10%), DFV (6%), SFV (6%), and SSV (3%). In 6 patients with pelvic pain and lower limb insufficiency, the diameter of the pelvic vein was <5 mm. Statistical analysis showed a significant relationship between the presence of pelvic varices and the presence of lower limb insufficiency. Therefore, in the presence of pelvic varices, lower limb insufficiency should also be investigated, and if it is present it should be treated.

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