

Foam Sclerotherapy in Pelvic Congestion Syndrome

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Abstract

Chronic pelvic pain (CPP) is a prevalent condition in middle-aged women that represents a heavy social impact on the quality of life of those females. Treatment of pelvic congestion syndrome is a complex and controversial issue, but treatment can be one of 3 lines: medical therapy, endovascular treatment, and surgical intervention. The endovascular line was first introduced in 1993 and has been popular over other lines of treatment methods. This retrospective study was conducted in a tertiary university hospital over 24 months, from March 2019 to March 2021. Forty patients with PGS were managed by left ovarian vein TCFS. The Institutional Review Board waived the need for ethics approval or informed consent to use anonymized and retrospectively analyzed data. The mean age of enrolled women was 33.80 ± 6.54 years, ranging between 20 and 45 years. Trans-catheter ethanolamine foam embolization is an effective and safe method to treat pelvic and atypical lower limb varices.

Keywords

pelvic congestion syndrome, sclerotherapy, chronic pelvic pain, embolization

Introduction

Chronic pelvic pain (CPP) is a prevalent condition in middle-aged women that represents a heavy social impact on the quality of life of those females. Chronic pelvic pain is defined as cyclic or non-cyclic lower abdominal and pelvic pain lasting more than 6 months. Diagnosing chronic pelvic pain is tedious due to its multiple origins and sometimes vague causes. Likewise, the treatment is multidisciplinary that requires collaboration of different medical specialties.¹ Pelvic congestion syndrome (PCS) is considered the most common cause of CPP. The term PCS was first described by Taylor in 1949 as a combination of variant symptoms and signs such as pelvic varices, pelvic pain, dyspareunia, and dysmenorrhea. The pelvic varices causing PCS are commonly located in the suprapubic, vulvar, and perineal regions and back of the thighs.¹

Imaging can document the diagnostic pelvic venous changes and confirm the diagnosis. However, such radiologic venous changes may be asymptomatic and do not necessitate the presence of patient's complaint.² Abdominal ultrasound is the first-line imaging study as it can exclude uterine and pelvic pathology as probable etiology of pain. Moreover, it can detect the expansion of ovarian and uterine veins.³ The main diagnostic findings of PCS are the expansion of the left ovarian vein (<4 mm), presence of dilated tortuous pelvic venous channels, and the reflux in the duplex waveform in these veins with Valsalva's maneuver.⁴

The lines of treatment of PCS involve medical therapy, endovascular treatment, and surgical intervention. The endovascular line was first introduced in 1993 and has been popular over other treatment lines. Different embolizing materials can be used to treat ovarian veins, such as sclerosing agents, detachable balloons, coils, glue, and foam. The symptoms are usually attributed to the left ovarian or iliac vein reflux. Therefore, these veins are managed first, and the right side veins can be treated when indicated.⁵ Our study aims to retrospectively investigate the efficacy and safety of TCFS for cases with CPP and PCS using ethanolamine oleate.

Patients and Methods

This retrospective study was conducted in a tertiary university hospital over 24 months, from March 2019 to March 2021. Forty patients with PGS were managed by left ovarian vein TCFS. The Institutional Review Board waived the need for

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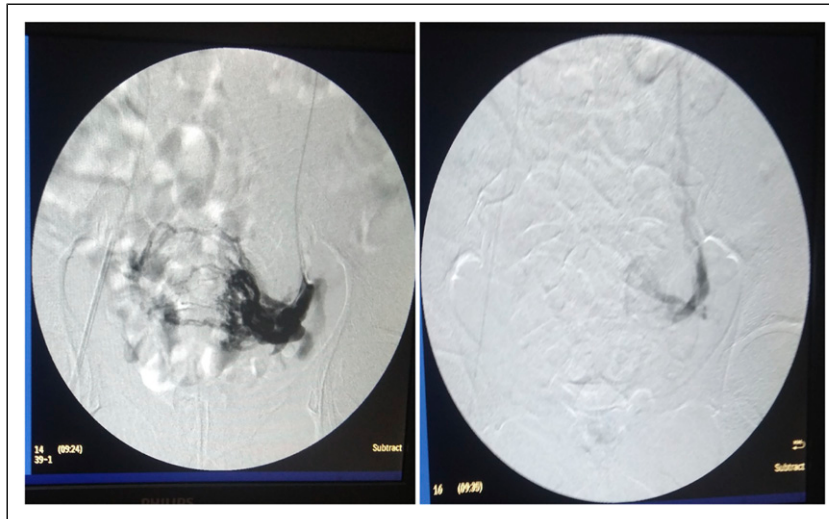


Figure 1. Sclerotherapy of refluxing pelvic veins of left ovarian vein.

ethics approval or informed consent to use anonymized and retrospectively analyzed data.

Patients

The study included females in premenopausal period with chronic pelvic pain (CPP) that is related to menses, sexual intercourse, long time of standing or sitting, and relieved when lying down. We excluded patients encountered other causes of CPP such as urological, gynecological, gastrointestinal, musculo-skeletal or psychosomatic causes. Likewise, obstructive causes of PCS such as May-Thurner syndrome and Nut-cracker syndrome were excluded from the study. Patients of our study were referred for treatment by gynecologists after exclusion of gynecological etiologies. Gynecological diseases are among the most common etiologies for chronic pelvic pain especially endometriosis, adenomyosis, leiomyoma and chronic pelvic inflammatory disease. Careful history-taking and analysis of symptoms relevancy to the menstrual cycle were performed. Likewise, bimanual uterine and vaginal speculum examinations were done by a senior gynecologist prior to 2D-transvaginal sonography to exclude such gynecologic conditions.

First, patients have undergone clinical assessment and Duplex examination. The typical Duplex criteria show dilated and tortuous veins, with the reversed and slow flow on both sides of the uterus, preferably on the left side. The presence of circular or linear venous structures with a diameter greater than 5 mm indicates pelvic varicosities. Patients suspected of having PCS were further evaluated using CT venography to confirm the diagnosis and exclude other imitators such as May-Thurner and Nut-Cracker syndromes. In CTV, pelvic varicosities appear as dilated, tubular, and contrast-enhancing structures adjacent

to the adnexa and dilated ovarian veins. Also, reversed flow in the ovarian vein can be suggested in the presence of ovarian vein filling on the arterial phase. The following conventional venography criteria were determined to diagnose incompetent ovarian veins: dilation of veins (>6 mm in diameter), contrast stasis, which means retaining in the pelvic plexuses after administration for 5 seconds or more, an abnormal connection between the left and right sides, and contrast descent to the perineum and genitalia.

All patients were evaluated using the VAS score of 0-to-10 scale to assess the severity of symptoms before performing the intervention. The VAS assessed the severity of every specific manifestation as pelvic pain, dyspareunia, urinary urgency, and menstrual pain, while 0 corresponding to the absence of symptoms and 10 corresponding to the most intense severity.

Procedure

All patients undergoing TCFS were pretreated with nephro-protective therapy and received saline antihistaminic, rapid-acting corticosteroid, and a urinary catheter was inserted with urine output observation.

The procedure was performed under local anesthesia with sedation when needed under US-guided bilateral femoral access in all 40 patients. Antegrade venogram with bilateral iliac visualization was the first step to exclude MayThurner syndrome. The compression of the renal and iliac veins is usually prominent in an AP plane. Radiological signs on this view venography include flattening of the vein, contrast attenuation, and opacification of collaterals. Multiplanar venography may be diagnostic in left common iliac vein compression. If compressive lesions were clinically suspected, IVUS usage was performed to visualize compressive points.



Figure 2. Sclerotherapy of pelvic tributaries and leakage points to lower limb of internal iliac vein.

Table 1. Baseline clinical data of study subjects

	N = 40
Age (years)	33.80 ± 6.54
Range	20-45
Menstrual cycle	
Average menstrual blood	24 (60%)
Menorrhagia	16 (40%)
Obstetric history uniparous	
Uniparous	6 (15%)
Multiparous	34 (85%)
Dyspareunia	32 (80%)
Tender ovarian point	28 (70%)
Urgency	24 (60%)
Dysuria	20 (50%)
Vulvar varices	16 (40%)
Hemorrhoids	8 (20%)

Data expressed as frequency (percentage), mean (SD).
Duplex findings in studied women (n = 40).

Different types of catheters were used for access to the left renal vein. We usually cannulated the left ovarian vein, which is a tributary of the left renal vein, by using a combination of a cobra catheter (Cook Medical Inc, Bloomington, USA) and a 5-french support catheter (TrailBlazer™ Support Catheter, ev3 Endovascular, Inc Plymouth, MN, USA) with cross coat hydrophilic coating. We first did a venogram of the left ovarian to check for reflux in the left renal vein and ovarian vein. The venogram was performed while the patient performed Valsalva's maneuver, as in Figure 1.

Incompetent ovarian veins were diagnosed by the following criteria dilation (>6-8 mm in diameter) and contrast stasis, which means retaining in the pelvic plexuses after administration for 5 seconds or more. Abnormal connection between the left and right sides and contrast descends to the perineum and genitalia. In this study, we have used ethanolamine oleate 5% 5 mL as a sclerosing agent injected as

distal as possible to occlude the pelvic plexus of veins. We injected 2 mL of the agent prepared by the Tessari technique with 2% concentration per time. This could be repeated up to 3 times according to completion after each injection (the volume of injected foam was determined according to the volume of contrast needed to opacify the refluxing vein). Following ovarian vein closure, we investigated for another point of reflux as internal iliac veins, and we treated accordingly if necessary and safe. We search for the presence of escape points from the pelvis to the lower limbs and connections between internal iliac veins with peri-uterine varicose veins and perineal or vulvar varicosities. Selective catheterization and embolization with sclerosants should be performed as in Figure 2. We injected LOV in all cases and left internal iliac vein tributaries in one case of this study. The patients were discharged 4-6 hours after the procedure with 3-7 days oral acetaminophen.

Follow-Up

Follow-up was performed by physical examination, pelvic and transvaginal color Doppler US, and a questionnaire-based evaluation of pain using the VAS at 1, 3, 6, and 12 months after the maneuver. We tracked each symptom's intensity after the procedure and compared it with their corresponding prior to the procedure.

Statistical Analysis and Study Endpoints

The study endpoints were technical success rates and PCS recurrence during a 12-month follow-up period. Technical success is the complete occlusion of pelvic varices at post-procedural venography with no evidence of venous flow observed at color Doppler US. The appearance of pelvic varices and/or return to baseline values during follow-up was considered a recurrence of PCS. Also, tracking of symptoms was performed through the year after the

procedure and rates of recurrence were documented. Recurrence was defined as the return of the VAS measures as they were before the TCFS. Data were collected and analyzed using SPSS (Statistical Package for the Social Science, version 20, IBM, and Armonk, New York). Continuous data were expressed in the form of mean $\pm$ SD or median (range) as appropriate, while nominal data were expressed in frequency (percentage). The intensity of pain (pelvic pain, leg pain, dyspareunia, and pain with menses) at different follow-up times was compared to baseline data using the Wilcoxon test. The confidence level was kept at 95%, and the P-value was significant if $< .05$.

Results

(n = 40):

Table 1 shows the baseline demographic and clinical data of the included patients. Dyspareunia was the most common manifestation. The mean age of enrolled women was 33.80 ± 6.54 years, ranging between 20 and 45 years. The menstrual blood loss was average in 24 (60%) patients, while menorrhagia presented in 16 (40%) patients. Out of the studied women, 34 (85%) of them were multiparous, and only 6 (15%) women were primiparous. All patients included in our study had chronic pelvic pain, and none of them had experienced a history of previous deep venous thrombosis.

The total cohort of patients showed competent saphenous-popliteal junction and normal short saphenous vein. Also, all patients had atypical veins. Regarding Duplex findings of saphenous-femoral junction (SFJ), it was noticed that competent, incompetent, and ligated in 20 (50%), 18 (45%), and 2 (5%) women, respectively [Figure 3].

We observed that 16 (40%), 18 (45%), 4 (10%), and 2 (5%) patients had normal, dilated, stripped, and ablated greater saphenous vein (GSV), respectively. Computed tomography (CT) venography was performed in only one patient, while conventional venography was done in all patients [Table 2].

Targeted vein and duration of procedure in studied women (n = 40):

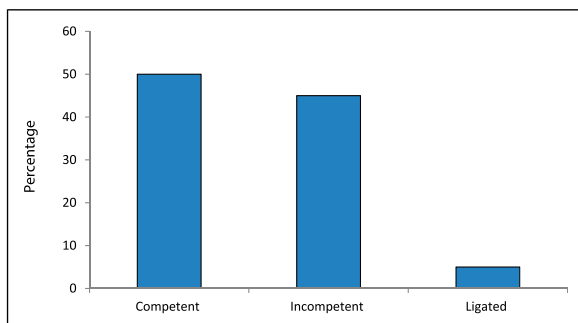


Figure 3. Duplex findings of SFJ in studied women.

The ovarian vein and its tributaries were the targeted veins in most women (95%), whereas both ovarian and iliac veins and their tributaries were the targeted veins in only one patient. The mean time of the procedure was 46.50 ± 17.47 minutes, with a range between 25 and 90 minutes. Embolotherapy was done by using foam sclerotherapy.

Baseline and follow up intensity of pain in studied women (n = 40):

The intensity of pelvic pain, leg pain, dyspareunia, and dysmenorrhea was recorded at baseline, one month, 3 months, 6 months, and 1 year after the procedure. There was a significant improvement in all types of pain at 3 and 6 months of follow-up compared to baseline data [Table 3]. One month after the procedure, all types of pain significantly improved compared to baseline data except lying down pelvic pain and leg pain, where both showed non-significant improvement.

The sclerotherapy procedure had a 100% technical success rate and a 97.5% primary clinical success rate as there was one case with recurrence during the 12 months follow up duration.

Twenty-four of women (60%), had clinical improvement in the atypical lower limb varicosities (the veins became less apparent and disappeared in some cases). On the contrary, 16 (40%) women showed no improvement in the atypical lower limb varicosities.

Complications of the Procedure

The TCFS procedure was safe and tolerable in (32/40, 80%) of patients. Complications occurred in 8 women; 6 women had mild post-procedural pain required simple analgesics, one woman experienced post-procedural chest tightness and mild dyspnea that diagnosed as segmental and sub-segmental pulmonary embolism and improved completely

Table 2. Duplex findings of studied women.

	N = 40
Saphenous-femoral junction	
Competent	20 (50%)
Incompetent	18 (45%)
Ligated	2 (5%)
Saphenous-popliteal junction	
Competent	40 (100%)
Greater saphenous vein	
Normal	16 (40%)
Dilated	18 (45%)
Stripped	4 (10%)
Ablated	2 (5%)
Short saphenous vein	
Normal	20 (50%)
Atypical vein	40 (100%)

Data expressed as frequency (percentage).

on anticoagulation. One woman had mild contrast allergy which improved on medical treatment.

Discussion

The pathology of PCS is vague and not well understood, but it may be due to result of pelvic valvular insufficiency and changes in vein walls as a result of repeated pregnancies or elevated hormonal levels, causing refluxing veins, congested pelvic organ, and reversed blood flow in the pelvic vasculature.^{6,7} Patients usually complain of pelvic heaviness or lower abdominal dull aching pain that increases at the end of the day and with exercises. Moreover, it may be associated with dysuria, dysmenorrhea, vaginal discharge, and dyspareunia. The pain increased after and before menstruation, after sexual intercourse, and during pregnancy. This may also be associated with lower limb varicosities. Other patients may have psychological problems like depression because of the long duration of the disease.^{6,7} Complex and obscure risk factors for the PCS such as a history of pelvic surgery, a family history of venous disorders, repeated pregnancies, and hormonal changes with estrogen hormone suggested to be linked to venous wall weakness.⁶⁻⁹

Management of PCS is challenging and usually requires multidisciplinary teams to negotiate with the complex syndrome. Its diagnosis requires collaboration among diverse specialties of gynecology, radiology, urology, neurology, and psychiatry. To-date, the management of pelvic varicose veins involves either sclerotherapy then embolization with coils or coil embolization. Since the first description of pelvic embolization in 1993, several methods were developed for pelvic embolization, such as glue or sclerosing agents. This technique disturbs intimal endothelium of the vein and initiates inflammation via activation of inflammatory mediators, which induce fibrosis and occlusion of the vein.⁹ TCFS of pelvic varices is an endovascular procedure requiring only local anesthesia and is considered a 1-day procedure.¹⁰ The advantage of using ethanolamine as foam coverage of the wider surface area of intima leads to a more effective result.^{11,12}

Unilateral or bilateral ovarian vein embolization is currently principally performed for PCS after Edward introduced it in 1993. Several studies have proposed successful outcomes for such an approach.¹³ A retrospective analysis of 33 patients who underwent pelvic vein embolization demonstrated clinical efficacy of 94% 0 on 26 month follow-up period and a significant reduction of VAS from 7.37 to 1.36.¹⁴ Kown et al¹⁵ analyzed 67 cases who pursued ovarian vein coil embolization and elucidated that 82% (55/67) were satisfied after the procedure and did not undergo further management, whereas 18% (12/67) did not experience a significant pain improvement with 9 of them further treated surgically. Similarly, Laborda et al¹⁶ found an improvement in VAS in 94% of patients treated by coils, with the left ovarian and iliac vein being responsible for most cases. However, the right-side veins are only operated on when indicated.^{1,7} Gandini et al¹⁷ demonstrated that transcatheter foam sclerotherapy (TCFS) for ovarian veins sodium-tetradecyl-sulfate (STS) is an efficacious and safe treatment and associated with significant patient satisfaction with a lower recurrence rate when analyzing 38 patients. Our data revealed a significant improvement of pelvic pain in 97.5% of cases with only one case of pain recurrence over a period of 12 months by TCFS with ethanolamine foam.

The incidence and severity of side effects and complications represent a vital issue when validating each treatment option. The lower complication rate adds too much privilege to such a procedure with a higher technical success rate and clinical efficacy.^{18,19} Access site complications such as bleeding, hematoma, or arteriovenous fistula were seldom reported.²⁰ Correspondingly, intraprocedural complications such as non-target vessel embolization or embolic agent migration were also described with coil embolization.^{13,19} The mean causes behind technical failure are congenital anomalies or postthrombotic changes in pelvic veins.²¹ Technical failure was not identified in our cohort. Sclerotherapy have distinct, yet scarce, serious complications. Distal and proximal thrombosis were reported as uncommon ($\geq 1\%$ to $<1\%$) and very rare ($<0.01\%$), respectively.²⁰ The data concerning fatal complications like pulmonary embolism, anaphylaxis, and

Table 3. Baseline and follow up intensity of pain in studied women.

	Baseline	One month	3-months	6 months	One year
Pelvic pain					
Lying pain	1.05 $\pm$.80	.48 $\pm$.35	.35 $\pm$.11*	.30 $\pm$.13*	.30 $\pm$.11*
Standing	4.45 $\pm$ 1.46	2.05 $\pm$ 1.43*	1.55 $\pm$.68	1.50 $\pm$.15*	1.30 $\pm$.13*
Leg pain					
Lying pain	1.20 $\pm$.69	.95 $\pm$.39	1.11 $\pm$.34*	.94 $\pm$.14*	.90 $\pm$.10*
Standing	4.55 $\pm$ 1.27	3.45 $\pm$ 1.53*	2.86 $\pm$.22*	1.80 $\pm$.24*	1.77 $\pm$.21*
Dyspareunia	5.90 $\pm$ 1.80	2.90 $\pm$ 1.48*	2.11 $\pm$ 1.22*	1.98 $\pm$ 1.98*	1.80 $\pm$ 1.01*
Pain with menses	5.65 $\pm$ 1.53	2.75 $\pm$ 1.55*	2.65 $\pm$ 1.78*	2.11 $\pm$ 1.88*	1.90 $\pm$ 1.22*

Data expressed as mean (SD). * Statistically significant change from baseline value (Wilcoxon test). Improvement of atypical lower limb varicosities in studied women (n = 40).

stroke are just in the context of few case reports.²⁰ Only side effects related to skin including hyperpigmentation and telangiectatic matting were proposed as common ($\geq 1\%$ to $<10\%$).²² In our study, post-procedural pain was the most common complication encountered [15%, (6/40)], and it was simply managed by non-steroidal anti-inflammatory drugs. Mild contrast allergy occurred in one case (2.5%) and one case had segmental and sub-segmental PE (2.5%) and both improved on conservative treatment.

Unfortunately, the data regarding the effect of pelvic vein embolization on future fertility and endocrine functions are still scarce. Some reports found no harm for an embolization on the hormonal levels and gynecological examinations after the procedures.^{23,24} Likewise, there were no changes in female hormonal levels after embolotherapy of ovarian varices in a study that included 127 women with 2 successful childbirths after the procedure.²⁵ Moreover, fertility was shown to be improved in cases that underwent embolization of dilated ovarian veins when there was no other evident infertility cause.^{23,24} Our data have the limitation of lacking the data of post-procedural hormonal and reproductive functions evaluation.

Conclusion

Trans-catheter ethanolamine foam embolization is an effective and safe method to treat pelvic and atypical lower limb varices.

Declaration of conflicting interests

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References

- Mahmoud O, Vikatmaa P, Aho P, Lappalainen K., Venermo M. Efficacy of endovascular treatment for pelvic congestion syndrome. *J Vasc Surg: Venous Lymphat.* 2016;4(3):355-370.
- Tu FF, Hahn D, Steege JF. Pelvic congestion syndrome-associated pelvic pain: A systematic review of diagnosis and management. *Obstetrical & Gynecological Survey.* 2010;65(5): 332-340.
- Arnoldussen C., de Wolf M., Wittens C., Diagnostic imaging of pelvic congestive syndrome. *Phlebology*, 2015. 30(1_suppl): p. 67-72.
- Park SJ, Lim JW, Ko YT, Lee HK., Huh CY Diagnosis of pelvic congestion syndrome using transabdominal and transvaginal sonography. *Am J Roentgenol.* 2004;182(3):683-688.
- Freedman J, Ganeshan A, Crowe PM. Pelvic congestion syndrome: The role of interventional radiology in the treatment of chronic pelvic pain. *Postgrad Med.* 2010;86(1022):704-710.
- Taylor HC. Vascular congestion and hyperemia Part III. Etiology and therapy. *Am J Obstet Gynecol.* 1949;57(4):654-668.
- Ganeshan A, Upponi S, Hon LQ, Uthappa MC, Warakaulle DR, Uberoi R. Chronic pelvic pain due to pelvic congestion syndrome: The role of diagnostic and interventional radiology. *Cardiovasc Intervent Radiol.* 2007;30(6):1105-1111.
- Neis KJ, Neis F. Chronic pelvic pain: Cause, diagnosis and therapy from a gynaecologist's and an endoscopist's point of view. *Gynecol Endocrinol.* 2009;25(11):757-761.
- Vercellini P, Somigliana E, Viganò P, Abbiati A, Barbara G, Fedele L. Chronic pelvic pain in women: Etiology, pathogenesis and diagnostic approach. *Gynecol Endocrinol.* 2009;25(3):149-158.
- Parsons LH, Stovall TG. Surgical management of chronic pelvic pain. *Obstet Gynecol Clin N Am.* 1993;20(4):765-778.
- Myers KA, Roberts S. Evaluation of published reports of foam sclerotherapy: What do we know conclusively? *Phlebology: The Journal of Venous Disease.* 2009;24(6):275-280. doi:10.1258/phleb.2009.009048.
- Alòs J, Carreño P, López JA, et al. Efficacy and safety of sclerotherapy using polidocanol foam: A controlled clinical trial. *Eur J Vasc Endovasc Surg.* 2006;31:101-107.
- Lopez AJ. Female pelvic vein embolization: Indications, techniques, and outcomes. *Cardiovascular and Interventional Radiology.* 2015;38(4):806-820.
- Hocquet A, Le Bras Y, Balian E, Grenier N. Evaluation of the efficacy of endovascular treatment of pelvic congestion syndrome. *Diagnostic and Interventional Imaging.* 2014;95(3):301-306.
- 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;30(4): 655-661.
- Laborda A, Medrano J, De Blas I, Urtiaga I, Carnevale FC, De Gregorio MA. Endovascular treatment of pelvic congestion syndrome: Visual analog scale (VAS) long-term follow-up clinical evaluation in 202 patients. *Cardiovasc Intervent Radiol.* 2013;36(4):1006-1014.
- Gandini R, Chiochi M, Konda D, Pampana E, Fabiano S, Simonetti G. Transcatheter foam sclerotherapy of symptomatic female varicocele with sodium-tetradecyl-sulfate foam. *Cardiovasc Intervent Radiol.* 2008;31(4):778-784.
- Hansrani V, Abbas A, Bhandari S, Caress AL, Seif M, McCollum CN. Trans-venous occlusion of incompetent pelvic veins for chronic pelvic pain in women: A systematic review. *Eur J Obstet Gynecol Reprod Biol.* 2015;185: 156-163.
- Daniels JP, Champaneria R, Shah L, Gupta JK, Birch J, Moss JG. Effectiveness of embolization or sclerotherapy of pelvic veins for reducing chronic pelvic pain: A systematic review. *J Vasc Intervent Radiol.* 2016;27(10):1478-1486.
- Lazarashvili Z, Hirsch T. Complications and side effects after pelvic vein embolization. *Turkish Journal of Vascular Surgery.* 2021;30(4).

21. Lepage PA, Leonel Villavicencio J, Gomez ER, Sheridan MN, Rich NM. The valvular anatomy of the iliac venous system and its clinical implications. *J Vasc Surg.* 1991;14(5):678-683.
22. Rabe E, Breu F, Cavezzi A, et al. European guidelines for sclerotherapy in chronic venous disorders. *J Vasc Surg.* 2014; 29(6):338-354.
23. Liu J, Han L, Han X. The effect of a subsequent pregnancy after ovarian vein embolization in patients with infertility caused by pelvic congestion syndrome. *Acad Radiol.* 2019;26(10): 1373-1377.
24. Tarazov P, Prozorovskij K, Rumiantseva S. Pregnancy after embolization of an ovarian varicocele associated with infertility: Report of two cases. *Diagn Interventional Radiol.* 2011;17(2):174-176.
25. Kim HS, Malhotra AD, Rowe PC, Lee JM, Venbrux AC. Embolotherapy for pelvic congestion syndrome: Long-term results. *J Vasc Intervent Radiol.* 2006;17(2):289-297.