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Is Lauromacrogol 3% Alone Effective in The Management of Pelvic Congestion Syndrome through Transcatheter Ovarian Vein Embolization?

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ABSTRACT

Background: Pelvic congestion syndrome (PCS) refers to non-cyclical, persistent pelvic pain that lasts longer than six months and is primarily felt by women during the childbearing years. Trans-catheter ovarian vein embolization is now thought to be the first line of therapy for PCS.

Objective: This study aimed to evaluate the role of trans-catheter gonadal vein embolization as a management of pelvic venous disorder in females having symptomatic PCS using sclerosing foam (Lauromacrogol 3%).

Patients and methods: This prospective cohort research was performed on fifty female cases (with a mean age of 30.7 years) with persistent chronic pelvic pain (CPP) for over six months and poorly responsive to medical treatment. All cases have been referred to the interventional radiology (IR) Unit for gonadal vein embolization. Sclerosant foam (Lauromacrogol 3%) was chosen as an embolic material, and then the patients underwent a 6-month monitoring duration to evaluate the outcomes and recurrence rates using visual analogue scale (VAS) and transvaginal ultrasound (TVUS).

Results: VAS declined dramatically from 8.8 ± 1.2 pre-procedure to 1.8 ± 1.4 post-procedure (highly significant P value < 0.001). The technical success rate of pelvic vein embolization was 100%. The clinical success has been determined by the TVUS, which demonstrated either complete resolution of the pelvic varices or static varices, and the VAS, which demonstrated a marked improvement.

Conclusions: The management of pelvic congestion syndrome through gonadal vein embolization using sclerosant foam (Lauromacrogol 3%) is an effective and safe procedure with a 100% technical success rate and dramatic improvement of pelvic pain and varices. Moreover, it is a cost-effective procedure.

Keywords: Chronic pelvic pain, Pelvic congestion syndrome, Ovarian vein embolization, Transvaginal ultrasound.

INTRODUCTION

Chronic pelvic pain is characterized as persistent, non-cyclical pelvic pain that primarily affects women during the childbearing years and lasts longer than six months. There are numerous etiological factors associated with CPP, and in certain females, it may also be linked to pelvic and vulvar varices. PCS stands for pelvic congestion syndrome due to aberrant blood flow in the internal iliac vein and gonadal [1, 2].

Trans-catheter ovarian vein embolization is now thought to be the first line of management for pelvic congestion syndrome. Various embolic materials, such as coils or sclerotherapy using sodium tetradecyl sulfate or Lauromacrogol 3%, have been reported to be used in this procedure. These materials can be injected either prior to coiling or by utilizing the sandwich procedure [3]. N2-butyl cyanoacrylate is one of the additional agents [4].

According to **Marcelin *et al.*** [4] the embolization procedure uses the right jugular route and the following tools: A 6F vascular sheath, a 5F Cobra head catheter, a hydrophilic (0.035) j-tip guide wire, and an embolic agent (vascular coils, acrylic glue, sclerosant foam, or a combination of them). Although coils are frequently used and can be used with sclerotherapy, their expensive cost, a significant increase in procedure time and radiation dosage to the pelvic region may encourage the use of other embolic agents. Well-known embolic agents like sclerosants and glue can be used as cheaper and less time-consuming substitutes for coils, or they can be used with coils to reduce exposure time [3].

The goal of this research was to evaluate the role of trans-catheter gonadal vein embolization in the treatment of pelvic venous disorder in females with symptomatic PCS. We chose sclerosant foam (Lauromacrogol 3%) as an embolic material to assess its efficacy in the management of PCS, as the cost of other embolic materials, including embolization plugs, coils, and glue is very high for our populations in Egypt.

PATIENTS AND METHODS

Patients: This prospective cohort research has been performed on fifty female cases diagnosed with PCS medically and also by transvaginal ultrasound. Our study was performed from June 2023 to June 2024 at interventional radiology (IR) units at Menoufia and Ain Shams University hospitals.

Inclusion criteria: Female cases with CPP persistent for over six months poorly responsive to medical treatment (analgesics & oral contraceptives), who suffer from symptoms of pelvic venous insufficiency such as coital ache (dyspareunia), low back pain, menstrual disorders, bladder irritability, progressive hip pain, continuous genital arousal, abnormal uterine bleeding caused by PCS, and transvaginal ultrasound (TVUS) revealing (gonadal vein trunk diameter > 6 mm, pelvic

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and parametrical varices > 4 millimeter and dilated arcuate veins crossing the uterine myometrium through pelvic varices.

Exclusion criteria: Patients with chronic pelvic pain not associated with either pelvic varicosities or extra-axial varicosities, presence of contraindications to venography (pregnant females, patients with poor kidney function (GFR < 30), patients allergic to contrast, bleeding tendency & anemia (Hb less than 9 gm/dl), right-sided varicosities caused by venous compression due to malignancy, and patient refusal of the procedure.

All cases have been sent to the IR Unit for gonadal vein embolization. The first consultation visit produced the following data: Supine decubitus, dyspareunia, urinary urgency, menstrual pain, and the number of kids. The visual analogue score was used to subjectively evaluate the level of pain in all cases. The score has been punctuated from zero to ten, with zero indicating "no pain" and ten indicating the "worst possible pain." to facilitate comprehension of the findings, we categorized the scoring into four categories: no pain (zero to one), mild pain (two to four), moderate pain (five to seven), and severe pain (eight to ten).

All patients underwent external inspection to search for vulvo-perineal, vaginal or extra-axial lower limb varices.

All cases underwent TVUS with Duplex examination: The Patient was instructed to lie in a semi-recumbent position or while covered the patient was asked to take her knee towards her chest (to increase the intra-abdominal pressure and accentuate the reflux). The examination was done by Ultra-sound (GE, Logic E10 and Logic P7), Endo-cavitary probe was introduced into the vagina after applying a captious amount of K-Y Gel. After applying the probe, the ovary is identified in the transverse (TS) position, then the probe is rotated slowly till we identify a continuous lengthy vein (this is the ovarian vein). The ovarian vein diameter was measured pre- and post-straining (> 6 mm in diameter is diagnostic for PCS). Then searching for pelvic varices > 4 mm was done. Searching for other pelvic pathologies was done.

The technique of embolization: A licensed medical professional, typically the operator, who is capable of explaining the suggested intervention to the patient and thoroughly knows the procedure, its risks and advantages, as well as the alternatives, should get informed consent. An adequate and pertinent explanation of the medical condition and its prognosis, a balanced explanation of the available options for treatment and management, and a discussion of the advantages and disadvantages of the procedure and its alternatives should all be provided by the interventional radiologist [5].

We reviewed the patient's data and laboratory investigations, followed by insertion of an intravenous (IV) cannula. The patients were instructed to wear a surgical gown. Sterilization of the right side of the neck was done. Embolization is done under local anesthesia; 10 cm of lidocaine is injected subcutaneously under ultra-sound guidance at the puncture site, Conscious sedation is unnecessary, as the procedure is well-accepted.

Under ultrasound guidance, the right internal jugular vein is typically directly punctured utilizing local anesthesia. 'Typically, a 6F vascular sheath (Cordis, Miami Lakes, Florida), is placed at the right internal jugular vein (IJV), a 5F Cobra head catheter or Bern catheter with J-shaped 0.035''hydrophilic guidewire and an angled hydrophilic wire (Radiofocus, Terumo, Europe) are all that are required to selectively catheterize the ovarian veins. Selective catheterization of the left ovarian vein is the standard to be done. Some cases underwent selective catheterization of the right ovarian vein as well. The right ovarian vein is a target for catheterization only when there is no left-to-right connection of the pelvic varices with the presence of right pelvic varices seen by trans-vaginal ultrasound and Doppler examination, which is rare. Also, it is thought to reduce the recurrence rate if it is successfully embolized. Rarely pelvic varices are caused by reflux of internal iliac vein tributaries especially the internal pudendal vein and the uterine vein. In this situation, these refluxing tributaries should be selectively catheterized and embolized. The right common femoral vein is punctured in case of acute angle of the left renal vein with IVC.

Venography

Normal results: There should not be any clots or tumors in the renal vein. The contrast should flow quickly through the renal vein to inferior vena cava (IVC) and not back up to the ovaries. The embolic substance was the Sclerosant foam (Lauromacrogol 3%) for all cases: It is taken in a 10 cc syringe and mixed via a 3-way connector to room air 1 to 4 respectively and mixed 20 strokes till it forms homogenous foam. Two syringes and a three-way tap with a liquid-to-gas ratio of 1 to 4 are usually used to make foam. The surface-active harmful agent (e.g., 3% sodium tetradecyl sulfate or 3% Lauromacrogol) is carried by the bubbles in the foam. To produce microfoam with bubbles smaller than 250 μm, it is recommended that the foam be generated by 20 passes between the two syringes with the tap slightly "off cock" [6]. The foam was produced with a double syringe and a three-way stopcock [7]. Following the injection of the embolic substance, a second left renal venography from the renal hilum is carried out to ensure gonadal vein occlusion. Following the embolization of the right ovarian vein, venography of the IVC is carried out to ensure occlusion. Next, bilateral venography of the internal iliac veins is carried out to evaluate residual collateral flow into the ovarian, vulvar and thigh area. Senior staff members presided over each procedure. The entire procedure typically takes below forty-five minutes to complete for up to four pelvic truncal veins.

The outcomes include: The definition of technical success was the occlusion of ovarian and/or internal iliac pelvic veins, which showed vascular or reflux abnormalities.

Clinical success is characterized as the disappearance or improvement of the symptoms. Subjectively assessed by the patients on the VAS, the visual analogue score has been punctuated from zero to ten, with zero indicating "no pain" and ten indicating the "worst possible pain." to facilitate comprehension of the findings, we categorized the scoring into four categories: no pain (zero to one), mild pain (two to four), moderate pain (five to seven), and severe pain (eight to ten) [8]. TVUS revealed the disappearance of the pelvic varices or static varices with no blood flow or reflux on Doppler examination. Clinical failure is characterized as a Lack of improvement and the follow-up of the patients reveals recurrence of initial symptoms or transvaginal Doppler ultrasound reveals venous reflux with venous diameter > 6 mm after 6 months.

Post-procedure monitoring and Care: Following the process, the sheath was removed under continuous compression and the patient was kept under observation for half an hour to permit hemostasis at the puncture site. Once ambulatory, they were instructed to avoid Valsalva or exertion for several hours.

Analgesic medication (Paracetamol; dose: 1000 mg/8h for 5 days for all patients) was prescribed to control post-procedural pain, which may last for up to one week, oral narcotics are rarely required. The patients were reassured that the first menstrual period after embolization is often unusually heavy and that this condition is almost invariably transient.

The Lauromacrogol 3% substance, used for embolization of the target veins, acts by occupying the lumen of veins, inducing thrombosis within the veins and also inducing inflammation of the wall of veins so the non-steroidal anti-inflammatory drugs (NSAIDs) are not prescribed as they have an anti-platelet function that interferes with the needed thrombosis and also has an anti-inflammatory role that interferes with the needed inflammation at the wall of the embolized veins. Patients were assessed 2 weeks, 3 months and 6 months after the procedure for clinical response at which the degree of pain was measured using the VAS and transvaginal ultrasound was performed to assess disappearance of the recurrence or varices.

Ethical approval: The Research Review Committee of Menoufia and Ain Shams University Hospitals has permitted the research protocol and informed consent from each subject was obtained before the technique was performed on them. The study adhered to the Helsinki Declaration throughout its execution.

Statistical analysis

Data were gathered, organized, and statistically examined utilizing an IBM-compatible personal computer with Statistical Package for the Social Sciences (SPSS) version 26.0. Descriptive statistics, such as qualitative data were represented as percentage (%) and number (N), whereas quantitative data were represented as mean ± standard deviation (SD), and range (minimum-maximum) (Snecdecor GW, Cochran WG. Statistical Methods: Wiley; 1991. 14-29 p). Analytic statistics, such as the Chi-square test (χ^2), were utilized to examine the correlations among qualitative parameters. Fisher's exact test has been applied if any predicted cell count was below 5. The Marginal Homogeneity test was utilized to assess multiple tests for paired categorical data assessed twice with more than two results. The Wilcoxon test was utilized for comparing two consecutive measurements of non-normally distributed data within the same group. Spearman correlation was utilized to demonstrate the relationship among 2 continuous, non-normally distributed parameters. Test outcomes for significance were reported as two-tailed rates. The significance of the findings collected has been assessed at the level of five percent. A $P > 0.05$ was defined as statistically non-significant. A P value ≤ 0.05 was regarded as statistically significant. A P value ≤ 0.001 was classified as statistically highly significant.

RESULTS

This research consisted of 50 cases diagnosed with PCS medically and also by transvaginal ultrasound. Cases' age varied between 24 to 40 years old with a mean age of 30.7 ± 4.3. The duration of the disease ranged from 1 to 6 years old (3.7 ± 1.3). 38 cases out of a total of 50 cases (76%) had a number of deliveries more than two, the other 12 cases (24%) had a number of deliveries of two or less [Table 1].

Table (1): Age and clinical data of the participants

	Distribution (N=50)	
Age (years):		
Mean± SD	30.7±4.3	
Range	24-40	
Duration of PCS (years)		
Mean± Standard deviations Range	3.7±1.3 1-6	
	N	**%**
Age group:		
< 30 years	30	60.0
> 30 years	20	40.0
Duration of PCS:		
< 2 years	6	12.0
> 2 years	44	88.0
Number of deliveries:		
< 2	12	24.0
> 2	38	76.0

SD: standard deviation, range: minimum- maximum.

There was a high statistical improvement in VAS score post-procedure ($P<0.001$). It improved from 8.8 ± 1.2 to 1.8 ± 1.4. The majority of patients expressed no pain (48%) post-procedure compared to 80% of patients who expressed severe pain pre-procedure [Table 2].

Table (2): Pre and post-procedure VAS assessment

	Pre-procedure (N= 50)		**Post-procedure (N= 50)**		**Wilcoxon test**	**P-value**
VAS:					6.18	**<0.001 (HS)**
Mean± SD	8.8±1.2		1.8±1.4			
Range	7-10		1-8			
	N	**%**	**N**	**%**		**P-value**
VAS assessment:					**Marginal homogeneity test**	**<0.001 (HS)**
No pain	-	-	24	48.0		
Mild pain	-	-	24	48.0		
Moderate	10	20.0	-	-		
Severe	40	80.0	2	4		

HS: Highly significant (P<0.001).

Regarding technical success, 24 cases out of 50 cases underwent left ovarian vein selective catheterization and embolization (48%), 24 cases out of 50 cases underwent selective catheterization and embolization of right and left ovarian veins (48 %), 2 cases out of 50 cases underwent selective catheterization and embolization of internal iliac vein refluxing pathological tributaries (4%) [Table 3].

Table (3): Technical success

	Distribution (N=50)	
	N	**%**
Technical success:		
Yes	50	100.0
Embolized ovarian vein:		
Left	24	48.0
right and left	24	48.0
right internal iliac vein refluxing tributaries	2	4.0

Regarding clinical success by TVUS, 28 cases out of 50 cases had complete resolution (56 %), 22 cases out of 50 cases had static varices (44 %) after 2 weeks, 2 cases out of 50 cases had recurrence (4%), 48 cases out of 50 cases had no recurrence after 6 months [Table 4 & figures 1, 2, 3 and 4].

Table (4): Clinical success by TVUS

	Distribution (N=50)	
	N	**%**
TVUS after 2 weeks:		
Complete resolution	28	56.0
Static varices	22	44.0
TVUS after 6 months:		
Recurrence	2	4.0
No recurrence	48	96.0

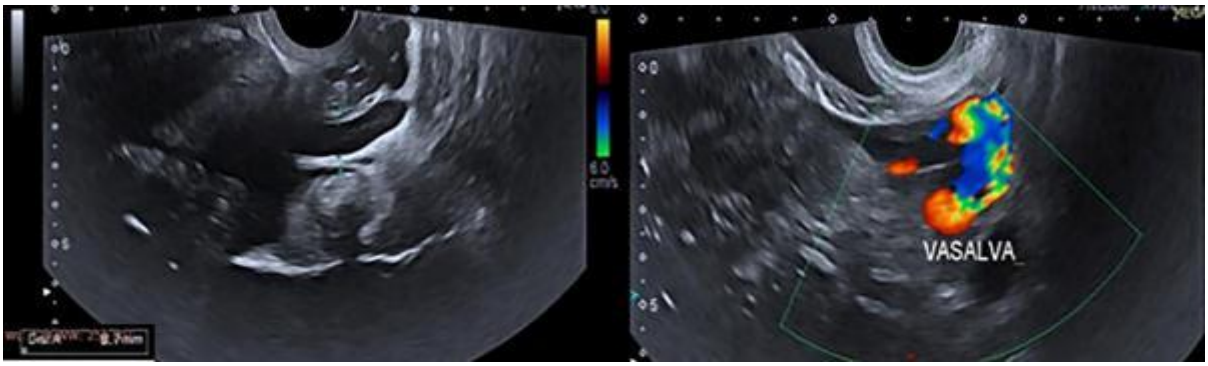

Figure (1): Female patient 21 years old, para 0, presented with chronic pelvic pain for 2 years. TVUS revealed multiple dilated tortious pelvic varicosities showing reflux on the Valsalva manoeuvre.

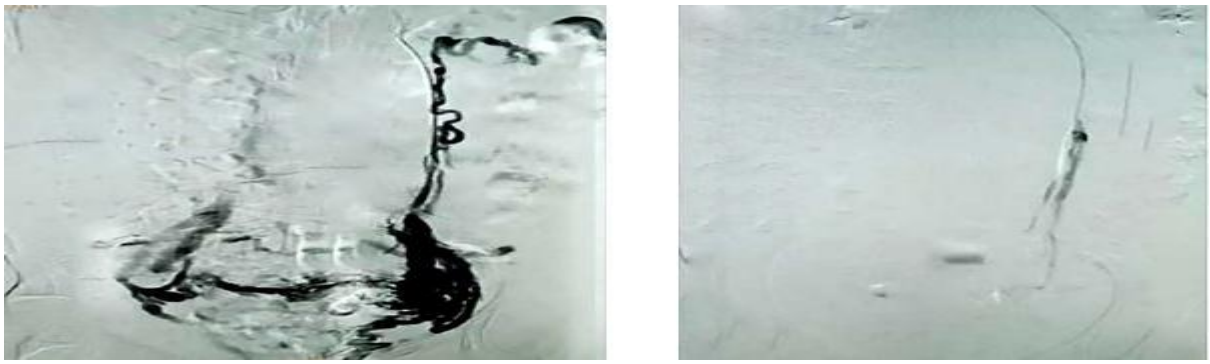

Figure (2): Dilated left ovarian vein showing reflux of contrast with related multiple pelvic varicosities showing left to right bridging connections are seen. Also, vulvovaginal varicosities are noted. Embolization of the pelvic varicosities and the left ovarian vein was done.

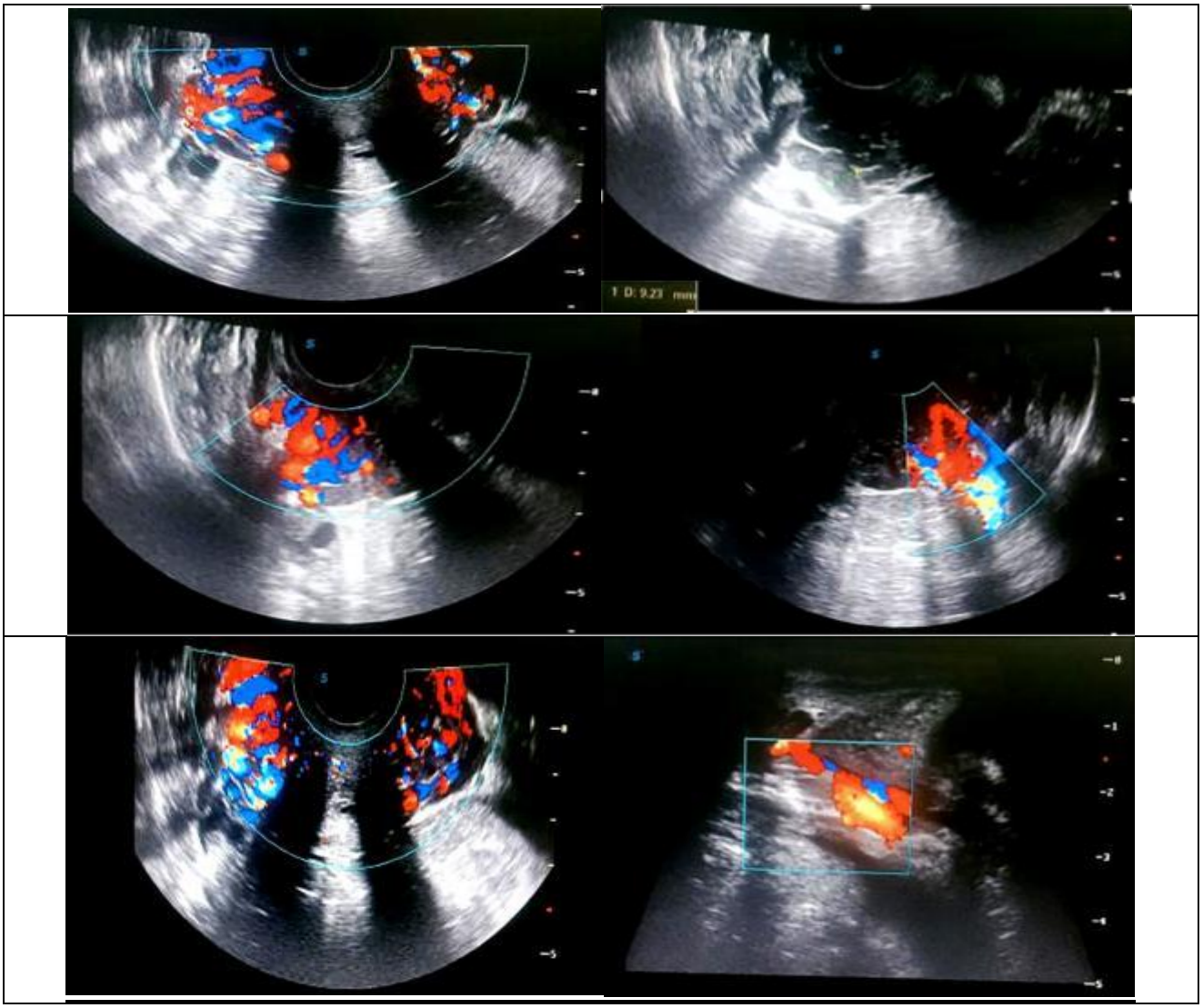

Figure (3): TVUS revealed: Multiple dilated tortious pelvic varicosities showing reflux on Valsalva manoeuvre and no detectable bridging connections. Superficial TVUS revealed dilated vulvovaginal varicosities with reflux on Valsalva manoeuver.

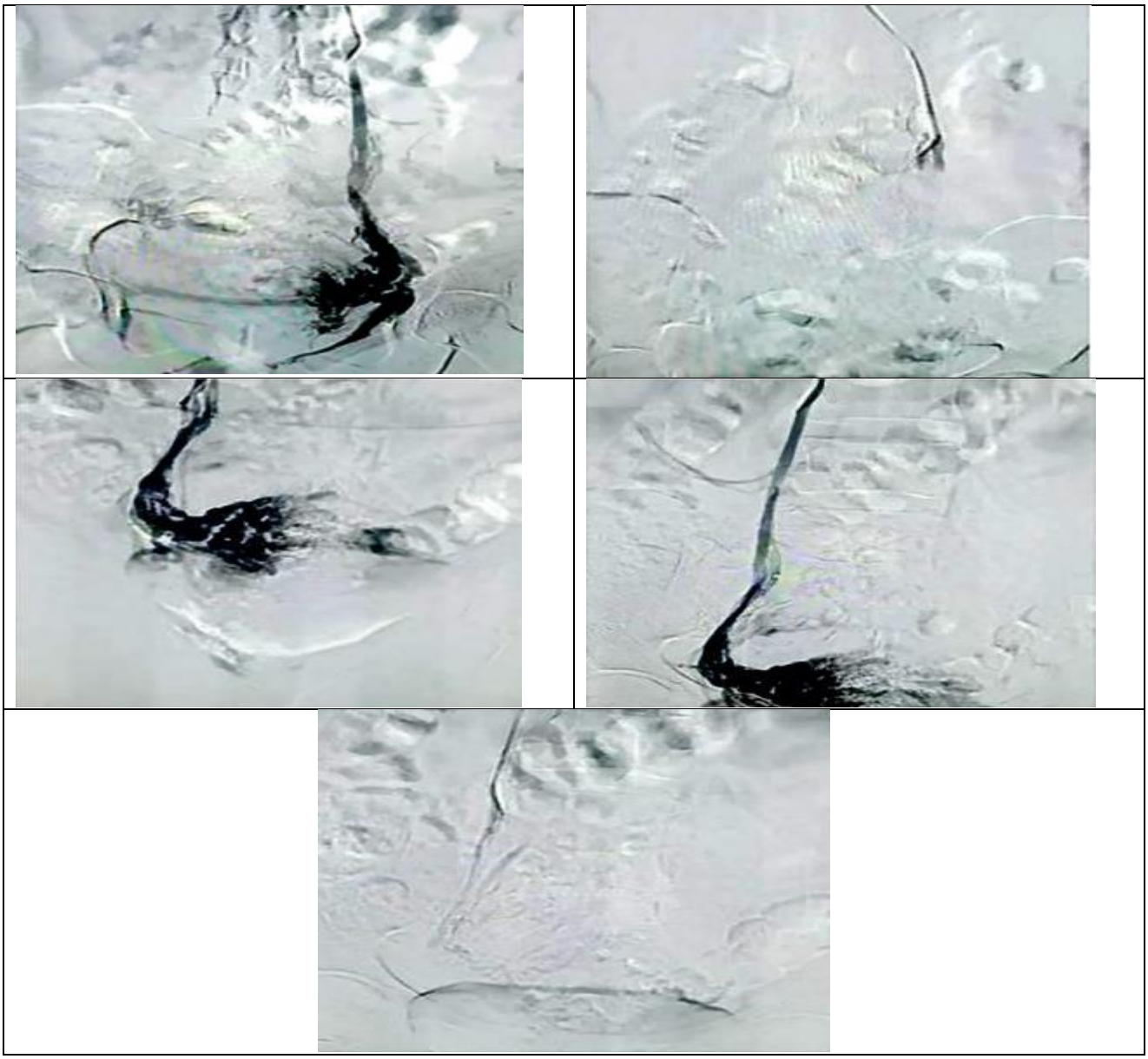

Figure (4): Dilated right and left ovarian veins showing reflux of contrast with related multiple bilateral pelvic varicosities with no bridging connections could be noted. Also, left vulvovaginal varicosities were noted. Embolization of the pelvic varicosities and both ovarian veins was done.

There was a significant positive weak correlation between age (years) and post-procedure VAS (r-value= 0.454, P-value less than 0.05). Also, there was insignificant association between PCS duration (years) and post-procedure VAS (r -value= -0.034, P-value higher than 0.05). There was a highly significant negative weak correlation between number of previous deliveries and post-procedure VAS (r= -0.458, P<0.001) [Table 5 & figure 5].

Table (5): Association among clinical data and post-procedure VAS

	post-procedure VAS	
	r_{rho}	**P-value**
Age (years)	0.454	**0.001 (S)**
Duration of PCS (years)	- 0.034	0.815
Number of previous deliveries	- 0.458	**<0.001 (HS)**

r_{rho}: Spearman correlation coefficient, S: significant (P<0.05), HS: Highly significant (P<0.001).

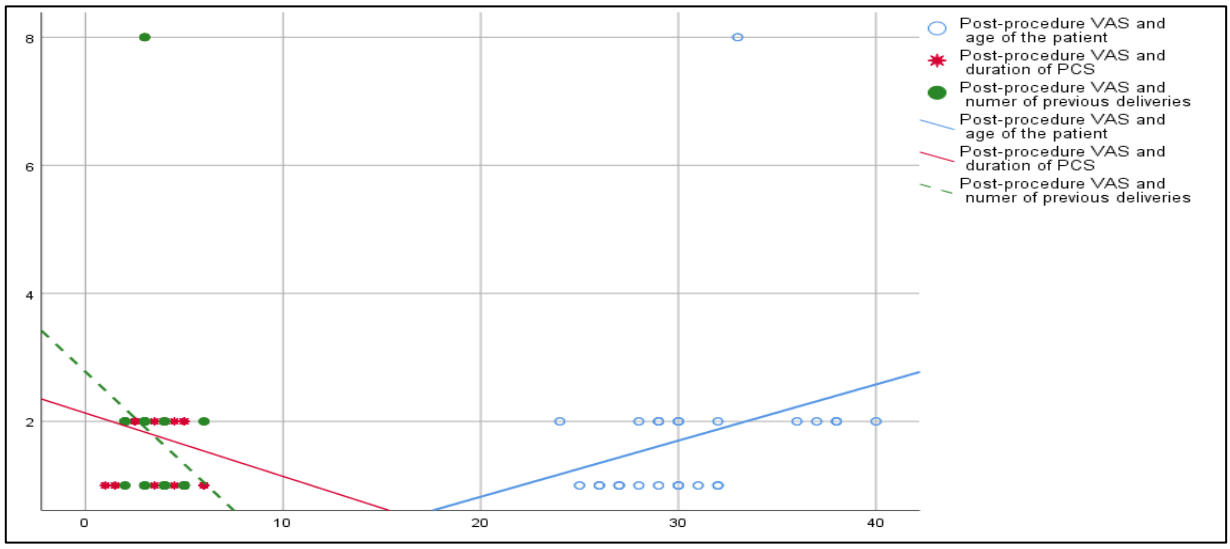

Figure (5): Correlation between clinical data and post-procedure VAS.

There was no statistically significant difference between TVUS results after 2 weeks and clinical data of the participants (P > 0.05) [Table 6].

Table (6): Correlation among TVUS after 2 weeks and clinical data of the participants

	Complete resolution (N=28)		**Static varices (N=22)**		**χ^2**	**P-value**
	N	**%**	**N**	**%**		
Age group:						
≤ 30 years	16	57.1	14	63.6	0.22	0.642
> 30 years	12	42.9	8	36.4		
Duration of PCS:						
≤ 2 years	2	7.1	4	18.2	**FE** 1.42	0.385
> 2 years	26	92.9	18	81.8		
Number of deliveries:						
≤ 2	6	21.4	6	27.3	0.23	0.631
> 2	22	78.6	16	72.7		

Regarding the clinical data and patients with and without recurrence, we noticed that the recurrence was found with the increase in the patient's age, duration of PCS and increased number of deliveries [Table 7].

Table (7): Relation between TVUS after 2 weeks and clinical data of the participants

	Recurrence (N=2)		**No recurrence (N=48)**	
	N	**%**	**N**	**%**
Age group:				
≤ 30 years	-	-	30	62.5
> 30 years	2	100.0	18	37.5
Duration of PCS:				
≤ 2 years	-	-	6	12.5
> 2 years	2	100.0	42	87.5
Number of deliveries:				
≤ 2	-	-	12	25.0
> 2	2	100.0	36	75.0

DISCUSSION

Pelvic venous disorder (PVD) is a worldwide problem affecting the female population, known as Pelvic Congestion Syndrome (PCS) which affects a great number of females and remains undiagnosed [9]. The purpose of this study was to properly diagnose female pelvic venous disorders and assess the role of trans-catheter gonadal vein embolization in the treatment of this medical problem using sclerosant foam (Lauromacrogol 3%).

Our research was conducted on fifty cases (average age 30.7 years) suffering from PCS manifested by chronic pelvic pain for more than 6 months, deep dyspareunia and some of them were suffering also from abnormal uterine bleeding. Within our research; regarding the cases' age, it was varying between 24 to 40 years old (mean age ± SD is 30.7±4.3). This is keeping with **Durham and Machan** [5] who reported that cases' age varied between 20 to 40 years old. Also keeping with **Awad *et al.*** [10] who showed that the mean age of the cases was 29:44 years old. This age group was more vulnerable to PCS as it is the age of the childbearing period with its hormonal changes and multiparty that predispose to PCS.

Within our research regarding the duration of the disease, it ranged from 1 to 6 years old (3.7 ± 1.3). This is keeping with **Hocquelet *et al.*** [11] who reported that 32 cases out of 33 cases were suffering from chronic pelvic pain for more than 6 m. In our study, the mean duration of PCS was 3.7 ± 1.3 years). This may be because the patients sought multiple medical advice and used multiple medical treatments before they sought the interventional radiology consultation.

In our study regarding the number of deliveries, we found that 38 cases out of a total of 50 cases (76%) had a number of deliveries of more than two, and the other 12 cases (24%) had a number of deliveries of two or less. **Awad *et al.*** [10] reported that a comparison between the 2 groups of the study showed that the frequency of pelvic congestion syndrome rises with age during the childbearing duration, and it is more prevalent in multiparous females.

In our research, we used VAS to measure the pain level subjectively before and after embolization. We found that the VAS declined dramatically from 8.8 ± 1.2 pre-procedure to 1.8 ± 1.4 post-procedure (highly significant P value <0.001). The majority of patients expressed no pain (48%) and mild pain (48%) post-procedure compared to 80% of patients who expressed severe pain and 20 % who expressed moderate pain pre-procedure. **Venbrux *et al.*** [1], **Kim *et al.*** [12] and **Kwon *et al.*** [13] also measured subjective pain levels before and after embolization using the VAS in order to evaluate patient satisfaction. They stated that clinical success was achieved in eighty to eighty-five percent of cases, with an average score of over eight points prior to embolization decreasing to 2.5 points twelve months following therapy.

Within this investigation, the technical achievement was examined. The technical achievement has been characterized as the occlusion of internal iliac pelvic veins and/or ovarian that show reflux or vascular abnormalities. We found that 24 cases out of 50 cases underwent left ovarian vein selective catheterization and embolization (48%), 24 cases out of 50 cases underwent selective catheterization and embolization of both right and left ovarian veins (48 %), 2 cases out of 50 cases underwent selective catheterization and embolization of internal iliac vein refluxing pathological tributaries (4%). Every patient had a complete blockage of the pathological vein on control venography, which had a 100% technical success rate. The majority of reported data revealed that the embolization is technically successful in 98–100% of cases with recurrence rates of less than 8% [1].

In our study, TVUS was done in all patients 2 weeks and 6 months after embolization to confirm complete resolution or static varices. On color Doppler study, 2 weeks post-procedure and check for recurrence 6 months after embolization. 2 weeks after embolization all patients had a TVUS, which revealed that complete resolution of the previously reported pelvic varices occurred in 28 cases out of 50 cases (56 %) and presence of static varices occurred in 22 cases out of 50 cases (44%). 6 months follow up, TVUS revealed recanalization off pelvic varices in 2 patients (recurrence rate 4%). 33 patients with complaints of pelvic varices were included in the study by **Hocquelet *et al.*** [11]. The patients underwent embolization using foam, and after a follow-up period of 4–12 months, they documented a recurrence in 6 patients, with 18% recurrence rate. This may be related to the technique of embolization as embolization of the right ovarian vein and its related pelvic varicosities is important in certain cases showing right pelvic varicosities with no detectable bridging left to right connections, this is thought to decrease the recurrence rate as in the study of **Hocquelet *et al.*** [11] only 2 cases out of 33 cases underwent right ovarian vein embolization. Also the longer duration of follow-up in the study of **Hocquelet *et al.*** [11] where mean follow-up period was 26 months (3–59 months) may be a cause of the discovery of more cases of recurrence.

In our study regarding the correlation between the clinical data (age of the patient, duration of PCS and the number of deliveries) and post-procedure VAS, we found that there was a significant positive weak correlation between age (years) and post-procedure VAS (r-value = 0.454, P-value less than 0.05). An insignificant association was observed among PCS duration (years) and post-procedure VAS (r= -0.034, P-value higher than 0.05). There was a highly significant negative weak correlation between the number of previous deliveries and post-procedure VAS (r= -0.458, P<0.001). To our knowledge, no other studies could be found to discuss these relations. In our study regarding the relation between the TVUS after 2 weeks and the

clinical data of the patients (age of the patient, duration of PCS and number of deliveries), we found that there was no statistically significant difference between TVUS results after 2 weeks and clinical data of the participants (P>0.05). To our knowledge, no other studies could be found to discuss these relations. In our study; regarding the clinical data and patients with and without recurrence, we noticed that the recurrence was found with the increase in the patient's age, duration of PCS and increased number of deliveries. To our knowledge, no other studies could be found to discuss these relations. Within this research, there were no significant major complications found during the procedure. Immediately following the ovarian vein injection of the sclerosant drug, all patients had significant pelvic pain that lasted for less than five minutes.

Recommendations and limitations of the research

Within the limits of this research, the diagnosis of PCS is unfamiliar to clinicians and patients, so referral of cases by clinicians was very difficult. Also, it was difficult for patients to understand the diagnosis. Moreover, the cost of the procedure was high ranging from 5500 to 7000 EGP (6220 ± 757) so we used only sclerosant foam therapy. Coils and glue were not used in embolization due to limited resources. Changes in the value of EGP to the dollar make the instruments not available all the time, also variable prices are found for the same instrument. The interventional radiology unit is newly established at Menoufia University Hospital so most cases have been conducted at the Interventional Radiology Unit of Ain Shams University that was difficult due to transportation issues. Also, it was difficult to re-communicate the patient 6 months later and ask for a follow-up transvaginal ultrasound as she already felt improvement. Finally, the short duration of follow-up also limits this study. We recommend health insurance, multiple seminars and multicentre study with long follow-up periods.

CONCLUSION

The management of pelvic congestion syndrome through gonadal vein embolization using Sclerosant foam (Lauromacrogol 3%) is an effective and safe procedure with a 100% technical success rate and dramatic improvement of pelvic pain and varices. Moreover, it is a cost-effective procedure.

Conflict of interest: None.
Financial disclosures: None.

REFERENCES

1. **Venbrux A, Chang A, Kim H *et al.* (2002):** Pelvic congestion syndrome (pelvic venous incompetence): impact of ovarian and internal iliac vein embolotherapy on menstrual cycle and chronic pelvic pain. J Vasc Interv Radiol., 13: 171-8.
2. **Koo S, Fan C (2014):** Pelvic congestion syndrome and pelvic varicosities. Tech Vasc Interv Radiol., 17: 90-5.
3. **Abdelhafez A, Elbasiouny A (2015):** Embolization of ovarian vein for pelvic congestion syndrome and its preliminary results. Al-AzharAssuit Med J., 13: 2-7.
4. **Marcelin C, Izaaryene J, Castelli M *et al.* (2017):** Embolization of ovarian vein for pelvic congestion syndrome with ethylene vinyl alcohol copolymer (Onyx(®)). Diagn Interv Imaging, 98: 843-8.
5. **Durham J, Machan L (2013):** Pelvic congestion syndrome. Semin Intervent Radiol., 30: 372-380.
6. **Cavezzi A, Frullini A, Ricci S *et al.* (2002):** Treatment of varicose veins by foam sclerotherapy: two clinical series. Phlebology, 17: 13-8.
7. **Tessari L, Cavezzi A, Frullini A (2001):** Preliminary experience with a new sclerosing foam in the treatment of varicose veins. Dermatol Surg., 27: 58-60.
8. **Laborda A, Medrano J, de Blas I *et al.* (2013):** Endovascular treatment of pelvic congestion syndrome: visual analog scale (VAS) long-term follow-up clinical evaluation in 202 patients. Cardiovasc Intervent Radiol., 36: 1006-14.
9. **Bałabuszek K, Toborek M, Pietura R (2022):** Comprehensive overview of the venous disorder known as pelvic congestion syndrome. Ann Med., 54: 22-36.
10. **Awad A, Taha M, Manaf M *et al.* (2020):** Role of multi-detector CT venography in evaluation of pelvic congestion syndrome. Egyptian Journal of Radiology and Nuclear Medicine, 51: 1-7.
11. **Hocquelet A, Le Bras Y, Balian E *et al.* (2014):** Evaluation of the efficacy of endovascular treatment of pelvic congestion syndrome. Diagn Interv Imaging, 95: 301-6.
12. **Kim H, Malhotra A, Rowe P *et al.* (2006):** Embolotherapy for pelvic congestion syndrome: long-term results. J Vasc Interv Radiol., 17: 289-97.
13. **Kwon S, Oh J, Ko K *et al.* (2007):** Transcatheter ovarian vein embolization using coils for the treatment of pelvic congestion syndrome. Cardiovasc Intervent Radiol., 30: 655-61.