Long-term follow-up for the treatment of symptomatic pelvic venous insufficiency secondary to combined iliac vein stenosis and ovarian vein reflux treated with iliac vein stenting alone

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ABSTRACT

Background: We previously reported that in women with symptomatic pelvic venous insufficiency secondary to combined iliac vein stenosis (IVS) and ovarian vein reflux (OVR), treated with iliac vein stenting alone that 78% reported complete symptom resolution up to 6 months. The purpose of this investigation was to determine the long-term effectiveness of this treatment strategy, the poststent reintervention rate and the incidence of poststent ovarian vein embolization (OVE) for residual symptoms.

Methods: A retrospective review of prospectively collected data at the Center for Vascular Medicine was performed. We investigated women with pelvic pain or dyspareunia secondary to combined IVS and OVR who were treated with stenting alone. Patients whose primary complaint was dysmenorrhea and/or leg symptoms were excluded from the analysis. Assessments and interventions consisted of an evaluation for other causes of pelvic venous disorder by a gynecologist, documentation of preintervention and 3-, 6-, 12-, 24-, and 36-month visual analog scale pain scores; transabdominal duplex ultrasound examination; stent type, diameter, and length; vein territory covered; and reintervention rates. All patients underwent diagnostic venography of their pelvic, left ovarian veins, and pelvic reservoirs, and intravascular ultrasound examination of their iliac veins.

Results: From February 2018 to January 2023, 141 women with a pelvic venous disorder secondary to IVS and OVR were identified. The average age was 44.7 ± 10.5 years with 3.18 ± 1.82 pregnancies. The average follow-up time for the entire cohort was 12.0 ± 12.1 months (median, 10.65 months). Types of stents were Venovo 48 (34%), Wallstent 14 (10%), and Abre 79 (56%). The most common diameter and stent lengths used were 14 and 16 mm and 140 and 150 mm, respectively. The most common vein territories covered were the inferior vena cava to the left external iliac vein in 83% and inferior vena cava to right external iliac vein in 13%. Pelvic and dyspareunia VAS scores before the intervention and at 3, 6, 12, 24, and 36 months after the intervention were as follows: 6.4 ± 73 (n = 141), 2.6 ± 3.3 (n = 98), 1.71 ± 2.83 (n = 77), 2.04 ± 3.5 (n = 76), 2.4 ± 3.7 (n = 30), and 1.15 ± 3 (n = 13) ($P \leq .001$). Of the entire cohort no patients required OVE and pelvic reservoir embolization. Pelvic reservoirs were present in 113 of 141 patients (83%). Stent reinterventions were required in 19 of 141 patients (13%).

Conclusions: The majority of women with pelvic pain secondary to combined IVS and OVR achieved near complete symptom resolution with iliac vein stenting alone, despite the presence of a pelvic reservoir in 83% of patients. Although most women complained of some minimal residual pelvic pain or dyspareunia, the majority were satisfied with their outcomes and did not require further intervention. In this patient population, iliac vein stenting should be considered the primary treatment modality. OVE should be reserved for patients with persistent or recurrent pelvic pain unresolved with stenting. (J Vasc Surg Venous Lymphat Disord 2025;13:101990.)

Keywords: Pelvic venous insufficiency; Iliac vein stenting; Iliac vein stenosis; Ovarian vein reflux

Pelvic venous insufficiency (PVI) is increasingly recognized as a primary etiologic factor for the development of pelvic pain with or without lower extremity symptoms.[1-9] We have previously reported that in patients with PVI, 15% present with isolated ovarian vein reflux (OVR), 25% with isolated iliac vein outflow stenosis (IVS), and 60% present with combined iliac vein outflow stenosis and OVR.[1,10] There is no controversy regarding the

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management of patients with symptomatic isolated OVR or iliac vein stenoses. These patients demonstrate excellent results with ovarian vein embolization (OVE) and iliac vein stenting, respectively.[1,2,6,7,10-21] The optimal treatment strategy for the management of patients with combined IVS and OVR is ill-defined. We have reported previously that, in 38 women with combined disease treated with iliac vein stenting alone, 78% demonstrated complete resolution of their pelvic pain with stenting alone up to 6 months.[22] The purpose of this investigation was to determine the long-term pain resolution outcomes and reintervention rates in a large cohort of women with PVI secondary to combined IVS and OVR.

ARTICLE HIGHLIGHTS

- **Type of Research:** Retrospective, single-center, cohort study
- **Key Findings:** Women with pelvic venous insufficiency secondary to combined iliac vein stenosis and ovarian vein reflux demonstrate significant and long-term pain reduction with stenting alone. No women in this cohort required subsequent ovarian vein embolization. Reintervention occurred most commonly for new contralateral lesions or need for distal stent extensions.
- **Take Home Message:** Women with pelvic venous insufficiency secondary to combined iliac vein stenosis and ovarian vein reflux demonstrate significant and long-term pain reduction with stenting alone. No women in this cohort required subsequent ovarian vein embolization. Reintervention occurred most commonly for new contralateral lesions or need for distal stent extensions.

METHODS

We retrospectively reviewed prospectively collected data from January 2018 to January 2023, from our Office of the National Coordinator for Health Information Technology certified electronic medical record (Nextgen Healthcare Information Systems, Irvine, CA) at the Center for Vascular Medicine (CVM). Institutional review board approval for the investigation was obtained (Integ Review IRB, Austin, TX). Informed consent was not required as per the institutional review board. Women with PVI secondary to combined IVS and OVR were included in the study. It is our protocol at CVM that all patients receive a thorough evaluation by a gynecologist for non-venous-related causes of chronic pelvic pain before considering interventions for symptomatic PVI. Once other pelvic pain causes were ruled out, a CVM venous specialist evaluates patients for the presence of symptomatic PVI. A venous specialist is defined as a physician who dedicates their practice to the care of patients with venous disease. At CVM, this cohort consists of board-certified physicians in vascular surgery, cardiology, gynecology and cardiothoracic surgery. We also use advanced practice nurses and physician assistants to optimize the intake process. All patients with a negative gynecological assessment for chronic pelvic pain, a history of pelvic pain, dyspareunia, postcoital pain, urinary frequency, flank pain, abdominal bloating, and/or clinical evidence of lower extremity pelvic escape veins, were evaluated with a transabdominal ultrasound (TAU) examination. Patients with clinical symptoms and positive TAU findings were offered, diagnostic venography, intravascular ultrasound examination and possible iliac vein stenting.

Our TAU protocol has been published previously.[23,24] Briefly, all patients were fasted after midnight and given simethicone to minimize the presence of intra-abdominal gas the morning of the imaging assessment. Ultrasound examinations were performed using either a Samsung HS70 CA1-7A with a curvilinear probe or a GE S8 C1-5 with a curvilinear probe (Samsung, Seoul, South Korea; General Electric, Boston, MA). The angle of insonation was set at 60°, and the sample volume was parallel to the flow channel. Patients were placed in a supine and reverse Trendelenburg position for diameter measurements. Diameter measurements of the common femoral veins, external iliac veins, common iliac veins, ovarian veins and inferior vena cava (IVC) were obtained after obtaining longitudinal images. Diameter measurements were obtained by drawing a perpendicular line with Doppler calipers where the vein walls appeared parallel in the prestenotic and stenotic portions of the vein. Variable vein diameters due to body habitus were accounted for by using the patient's ipsilateral common femoral vein diameter and applying the following formula: Stenosis = (1 − ([Vein Diameter stenosis mm]/[Ipsilateral common femoral vein diameter mm])) × 100. A significant stenosis was defined as a normalized diameter of ≤5 mm.[23] Duplex ultrasound examination was performed before the intervention; 1 week after the intervention; 3, 6, 12, 18, and 24 months after the intervention; and yearly thereafter.

Medical/surgical histories, presenting signs and symptoms, preintervention, and 1-, 3-, 6-, 12-, 18-, 24-, and 36-month visual analog scale (VAS) pain scores, stent type, diameter, length, location, ovarian vein diameter, presence of a pelvic reservoir, and types of reinterventions were all evaluated. All treated women underwent a diagnostic venogram, which consisted of an anteroposterior view of the bilateral iliac veins, IVC, left renal vein, left ovarian veins, and any pelvic veins. Balloon occlusion venography of the internal iliac veins and interrogation of the right ovarian vein was not performed. All patients had a prestenting and poststenting intravascular ultrasound examination for the identification of an area-reducing lesion of the iliac veins and confirmation of good wall apposition and appropriate stent expansion.

Table I. Demographics of patients with combined iliac vein stenoses and ovarian vein reflux treated with iliac vein stenting alone

Characteristics	
Female	141
Average age, years	44.72 ± 10.50
Average gravida	3.18 ± 1.82
Average BMI	29.59 ± 7.76
Race	
White	85 (60.3)
Unknown	18 (12.8)
African American	15 (10.6)
Hispanic	11 (7.8)
Declined to specify	9 (6.4)
Multiracial	2 (1.4)
Asian	1 (0.7)
Medical history	
Diabetes mellitus	10 (7.1)
Hypertension	39 (27.7)
Coronary artery disease	2 (1.4)
Hyperlipidemia	25 (17.7)
Endometriosis	7 (4.9)
Uterine fibroids	2 (1.4)
Ovarian cysts	2 (1.4)
Cancer	11 (7.8)
Thyroid disease	13 (9.2)
Arthritis	35 (24.8)
Sciatica	2 (1.4)

Values are mean ± standard deviation or number (%).

If a residual stenosis required postdeployment venoplasty, a completion intravascular ultrasound examination was performed to ensure proper expansion of the residual stenosis. A pelvic reservoir was defined as the presence of cross-pelvic collaterals, the presence of at least three unilateral and/or bilateral pelvic segments that communicated with either the internal iliac vein, and/or ovarian veins. All venograms were reviewed by one of the senior authors (G.L.) for accuracy. Antiplatelet therapy after stent implantation was not used. Anticoagulation with a factor Xa inhibitor for 90 days after stent implantation is used at the discretion of the treating physician. Indications for extending anticoagulation past 90 days is the presence of thrombus layering, as identified by duplex scanning, a residual stenosis, or the presence of intraluminal post-thrombotic scar tissue.

RESULTS

From February 2018 to January 2023, 141 women with a pelvic venous disorder secondary to IVS and OVR were identified. Table I outlines the demographics of this patient cohort. The average age was 44.7 ± 10.5 years with 3.18 ± 1.82 pregnancies. The racial distribution was as follows: Caucasian 60%, African American 10%, Hispanic 8%, Asian 1%, mixed 1%, and 20% either declined to identify or were not recorded. The average follow-up time for the entire cohort was 12 ± 12.1 months. Figs 1 and 2 demonstrate the vein territories covered and the stent types, diameters, and lengths, respectively. The most common vein territories covered were from the IVC to the left external iliac vein in 83% and the IVC to the right external iliac veins in 13%. Types of stents deployed were Venovo (Becton Dickinson, Tempe, AZ) 48 (34%), Wallstent (Boston Scientific, Marlborough, MA) 14 (10%), and Abre (Medtronic, Minneapolis, MN) 79 (56%). The most common diameter and stent lengths used were 14 and 16 mm and 149 and 150 mm, respectively. Pelvic and dyspareunia VAS scores preintervention, 3, 6, 12, 24, and 36 months after the intervention were as follows: 6.4 ± 73 (n = 141), 2.6 ± 3.3(n = 98), 1.71 ± 2.83 (n = 77), 2.04 ± 3.5 (n = 76), 2.4 ± 3.7 (n = 30), and 1.15 ± 3 (n = 13) ($P \leq .001$) (Fig 3). Of the entire cohort, no patient required bilateral ovarian vein and pelvic reservoir embolization. Pelvic reservoirs were present in 113 of 141 patients (83%).

The average follow-up time for the entire cohort was 12.0 ± 12.1 months (median, 10.65 months). Stent reinterventions were required in 19 of the 141 patients (13%) (Table II). The average time to the first reintervention was 14.0 ± 10.6 months. All reinterventions were for symptom recurrences and 17 of 19 reinterventions were in patients who received Nitonol stents as their initial intervention. Of the 19 reinterventions, 11 were for new contralateral iliac vein lesions that required additional stenting. Three reinterventions were on the index stent and all three required distal stent extensions for either missed or new inflow stenoses. Five patients had contralateral stents and ipsilateral reinterventions. Three ipsilateral reinterventions were secondary to in-stent restenosis and were treated with relining the original stent. Four of the ipsilateral reinterventions in this group required distal stent extensions into the common femoral vein. Overall, seven of the eight ipsilateral reinterventions required distal stent extension into the common femoral vein. In-stent restenosis was the indication for reintervention in only 2% of the entire cohort.

DISCUSSION

It is currently well-accepted that, among venous specialists, PVI is a common cause of chronic pelvic pain in women.[1-10,19,25-27] The abdominal and pelvic venous hemodynamics associated with reflux and obstruction and pain generation are complex and incompletely understood. PVI can occur secondary to reflux with or without outflow obstruction. Despite the numerous flow patterns that can occur with PVI, patient can be separated into several broad categories: (1) isolated OVR, (2) isolated iliac vein outflow obstruction, (3) combined OVR and obstruction, and (4) left renal vein obstruction. All of these flow patterns can occur with or

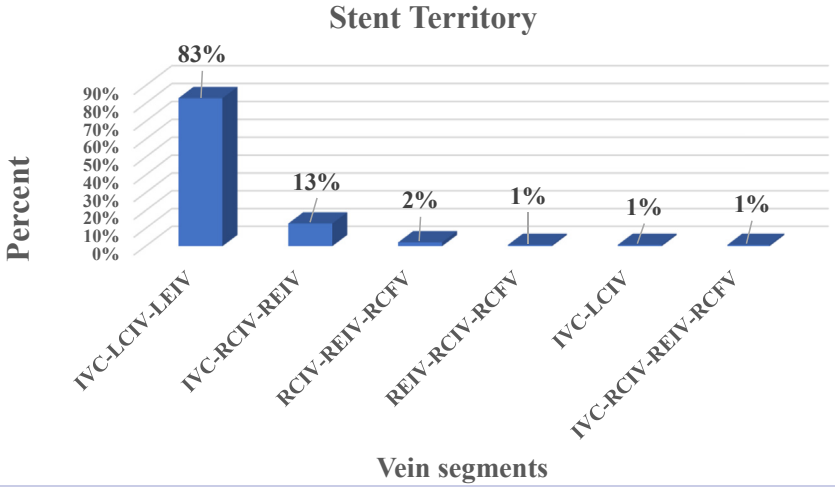

Fig 1. Iliac vein territories covered by stents. *IVC*, inferior vena cava; *LCIV*, left common iliac vein; *LEIV*, left external iliac vein; *RCIV*, right common iliac vein; *RCFV*, right common femoral vein; *REIV*, right external iliac vein.

without a pelvic reservoir, which is postulated to contribute to the development of pelvic pain. There are numerous controversies as to the optimal management of these flow patterns and which strategy is associated with low complication/reintervention rates and sustained long-term pain reduction.

The major controversy currently facing clinicians is the appropriate treatment strategy to use in the management of patients with symptomatic PVI. For example, in women with isolated OVR, embolization is the current standard. However, there is no consensus as to how many vessels should be embolized or the type of embolization technique to use. Table III lists the results of various embolization treatment strategies and their results. Treatments range from unilateral left OVE to bilateral ovarian and internal iliac vein embolization with coils, plugs, and/or sclerosants. The report by De Gregorio et al[34] is the only large scale clinical review of four-vessel embolization performed using coils and plugs alone with excellent 5-year follow-up. This investigation specifically excluded patients with iliac vein outflow disease. In this investigation, technical success was reported as follows: Four-vessel embolization (bilateral ovarian and internal iliac veins) in 85.0%, three vessels (bilateral internal iliac and left ovarian vein) in 11.5%, two vessels (left internal and ovarian veins) in 3.46%, and one vessel (left ovarian vein) in 0.19%. The average preintervention VAS score of 7.63 ± 0.90 was reduced to 0.91 ± 1.50 after the intervention and sustained for ≤5 years. Recurrence of symptoms was observed in 5.0% of patients, 1.9% demonstrated coil migration, and 15.1% reported postembolization abdominal pain that was treated solely with nonsteroidal anti-inflammatory medications. These data clearly suggest that aggressive embolization of all sources of reflux is

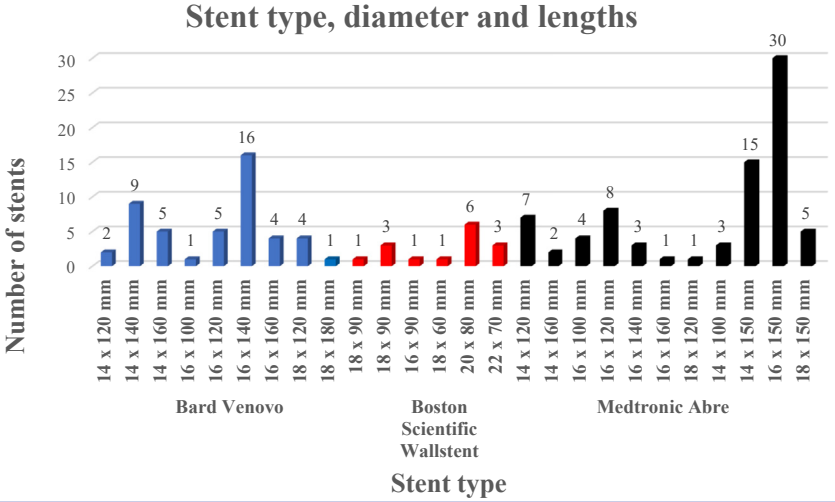

Fig 2. Stent types, diameters, and lengths used to treat women with iliac vein stenoses and a pelvic venous disorder.

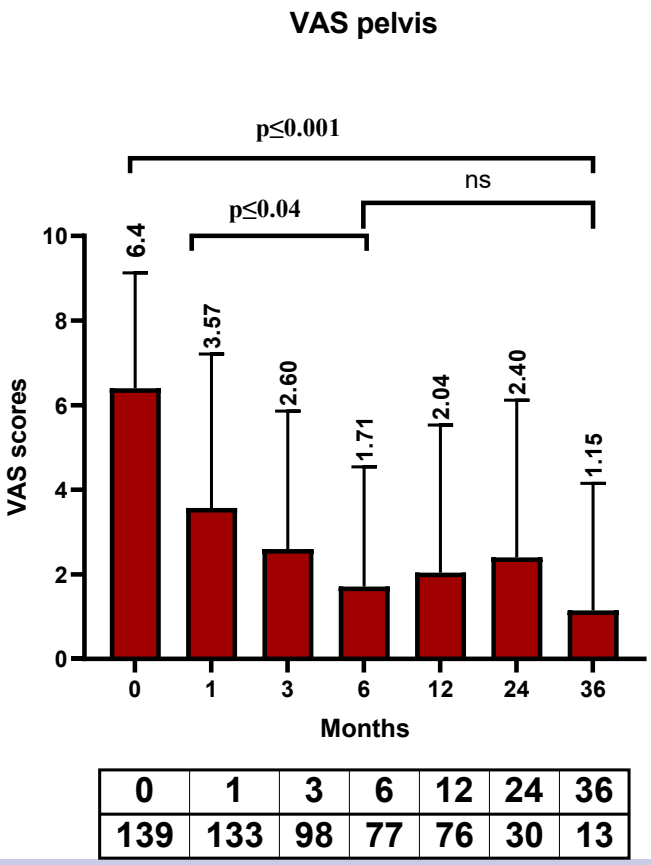

Fig 3. Visual analog scale (*VAS*) pain scores in women with iliac vein stenoses, treated with iliac vein stenting before intervention, 3, 6, 12, 24, and 36 months after intervention. All VAS scores are significantly improved compared to preintervention scores. Scores improve up to 6 months. No significant differences are noted after 6 months.

associated with excellent and sustained long-term pain reduction. However, the results reported in Table III suggest that similar results can be obtained with limited, less aggressive embolization. To date, there are no studies comparing four-vessel embolization with ovarian vessel embolization alone. Similarly, there are no data on the necessity to embolize a pelvic reservoir.

In patients with symptomatic PVI secondary to isolated iliac vein stenoses, iliac vein stenting is the current standard of care. The major concern with iliac vein stenting is long-term patency. The average age of women receiving iliac vein stents in the current investigation is 44.7 ± 10.5 years and mirrors our previous publications.[1,10,22] There are currently no reports on long-term adverse outcomes associated with either early or late venous stent thrombosis. The concern is that a stent occlusion may cause venous thrombo-=embolic events, the development of post-thrombotic syndrome, or limb-threatening outflow obstruction. This clinical uncertainty demands caution when placing venous stents in all patients but is especially concerning in younger patients in their twenties and thirties. A report by Sulakvelidze et al[10] indicated that venous stenting in women in their 20s was associated with poor outcomes and emphasized the need to perform a thorough evaluation for alternative pelvic pain etiologies in this patient cohort. To our knowledge, this investigation is the first to assess long-term treatment outcomes in women with combined OVR and iliac vein outflow disease, treated with iliac vein stenting alone. Our current investigation confirmed the results observed in our previous investigation of 38 women, which reported complete resolution of pelvic symptoms in 78% of women up to 6 months.[22] We observed similar results in the 141 women evaluated with sustained results up to 3 years. As in our previous report, none of the women in the current cohort required reintervention with OVE for persistent or recurrent symptoms despite the presence of a pelvic reservoir in 83% of patients. The majority of reinterventions were performed for symptom recurrences secondary to the development of contralateral iliac vein lesions or untreated lesions distal to the index stent requiring a stent extension. Only three patients required reintervention to the index stent due to the development of in-stent stenosis.

The major issue the current investigation raises is the role that OVR plays in women with concomitant iliac vein outflow stenoses. The underlying premise for pain generation is venous hypertension. It is clear that in isolated OVR or isolated iliac vein outflow obstruction, these individual anatomic lesions are the source of venous hypertension. It is not clear, in patients with concomitant venous abnormalities which lesion is predominantly responsible for symptom generation. The only investigation to try and determine the role of reflux and

Table II. Table outlining indications for re-intervention and vein territories treated

	No. of patients	Average No. of stents	Average time to first reintervention	Indication	Reintervention type
Ipsilateral	3	2.30 ± 0.50	8.00 ± 9.60	Symptom recurrence: 3	Distal extension: 3
Contralateral	11	2	18.8 ± 14.4	Symptom recurrence: 11	Contralateral stenting: 11
Both	5	3	11.8 ± 10.1	Symptom recurrence: 2 Symptom recurrence from in-stent restenosis: 2	Relining: 3 Distal stent extension into common femoral vein: 2

Table III. Table outlining results of ovarian vein embolization and methods used to assess treatment outcomes

Study	Year published	No. of patients	Veins treated	Embolization technique	Mean follow-up, months	Clinical outcome	VAS scores
Maleux et al[28]	2000	41	32 LOV, 9 B/I OV	Glue	19.9	58.5% significant improvement, 9.7% partial, 4% none	None
Venbrux et al[20]	2002	56	56 B/L OV, 43 B/L IIV	Sclerosant + coils	22.1	96% significant/ partial, 4% none	7.80 to 2.70 at 12 months
Pieri et al[29]	2003	33	1 ROV, 11 LOV, 21 B/L OV	Sclerosant	12	100% significant	None
Kim et al[17]	2006	127	106 B/L OV, 95 B/L IIV, 23 Unilateral IIV	Sclerosant + coils	45	85% significant, 12% none, 3% worse	7.60 ± 1.80 to 2.90 ± 2.80
Kwon et al[30]	2007	67	64 LOV, 1 ROV, 2 B/L OV	Coils	44.8	82% significant, 15% none, 3% worse	None
Creton et al[16]	2007	24	24 LOV, 10 ROV	Coils	36	68% significant	5.30 to 3.10 at one month
Gandini et al[31]	2008	38	38 B/L OV	STS foam	12	100% significant	7.80 ± 1.80 to 2.70 ± 2.80
Asciutto et al[15]	2009	35	35 LOV and IIV	Coils	45	Significant improvement	5.20 ± 3.50 to 1.20 ± 0.90
Laborda et al[32]	2013	179	202 LOV, 193 ROV, 184 L IIV, 149 R IIV	Coils	60	Significant improvement	7.34 ± 0.70 to 0.78 ± 2.80
Santoshi et al[1]	2018	38	38 LOV	Sclerosants + coils	3	35% complete resolution, 54% partial, 5% none	7.41 ± 1.33 to 3.15 ± 3.10
Guirola et al[33]	2018	100	B/L OV, IIV	Coils and plugs	12	Relief in 90%	N/A
De Gregorio et al[34]	2019	520	84.5% (LOV, ROV, RIIV, LIIV) 11.5% (LOV, RIIV, LIIV) 3.5% (LOV, LIIV) 0.2% (LOV)	Coils or plugs	59	Significant resolution	7.63 ± 0.90 to 0.90 ± 1.50

B/L, Bilateral; *IIV*, internal iliac vein; *LIIV*, left internal iliac vein; *L*, left; *LOV*, left ovarian vein; *RIIV*, right internal iliac vein; *ROV*, right ovarian vein.

obstruction in pain resolution is from Santoshi et al.[1] This investigation treated a group of women with concomitant disease with embolization followed by stenting. Pain reduction was only observed after venous stenting was performed. The criticism of this investigation was that the time interval between embolization and stenting was only 2 to 4 weeks. Expert opinion from thought leaders suggests that it may take ≤6 months after embolization before patients experience significant symptom resolution. The current investigation however, supports the observations reported by Santoshi et al.[1] Significant symptom resolution was observed at one month and continued up to three months. After 3 months, no further improvement was observed. No patient who developed symptom recurrence after stenting required embolization and the presence of a pelvic reservoir did not seem to predict treatment failure. To determine the role of OVR in patients with concomitant disease, embolization must be performed first and the need for iliac vein stenting should not be considered for ≥6 months after embolization. This evaluation is necessary, especially in young women. The life-long consequences of iliac vein stent failure in this treatment group is a legitimate concern and should be factored into the decision-making process when assessing patients with disabling, chronic pelvic pain secondary to PVI that affects patient quality of life.

LIMITATIONS

The major limitation of this investigation is that it is a retrospective analysis of prospectively collected data. Furthermore, OVR was assessed only by venography of the left renal vein and left ovarian veins. Right ovarian vein cannulations and/or balloon occlusion venography

of the internal iliac veins were not performed. All iliac lesions treated were nonthrombotic lesions therefore the generalizability of these findings to patients with post-thrombotic iliac vein stenoses is unknown. For example, the reintervention rate in women with post-thrombotic disease will most likely be higher and the long-term stent patency lower.

CONCLUSIONS

PVI is a known cause of chronic pelvic pain. In patients with isolated OVR or isolated iliac vein outflow obstruction, embolization and stenting, respectively, are currently the standard of care. In patients with concomitant OVR and iliac vein outflow obstruction, our data indicate that patients are best treated with iliac vein stenting alone. Continued pelvic pain reduction is observed for ≤3 months after intervention and sustained in the long term. Symptom recurrence is secondary to the development of new contralateral iliac vein lesions or the need for stent extension for residual disease. Symptom recurrence typically occurs within the first 24 months after the intervention and emphasizes the need for long-term clinical follow-up. OVE for symptom recurrence was not required in this patient cohort and a pelvic reservoir was not predictive of treatment failure with stenting alone.

AUTHOR CONTRIBUTIONS

Conception and design: AT, GL, LS, RK, SL, PP
Analysis and interpretation: AT, LS, PP
Data collection: AT, LS
Writing the article: AT, LS, PP
Critical revision of the article: AT, GL, LS, RK, SL, PP
Final approval of the article: AT, GL, LS, RK, SL, PP
Statistical analysis: AT, LS, PP
Obtained funding: RK, SL, PP
Overall responsibility: PP

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DISCLOSURES

None.

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