Outcomes following stenting for symptomatic chronic iliofemoral venous stenosis — a comparison of three stent types

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ABSTRACT

Objective: Venous stenting has become the standard of care for patients with iliofemoral venous stenosis who have failed conservative therapy. Although outcome data following such stenting exist for Wallstents and Wallstent-Zenith (Z) stent combination, such data for dedicated stents is sparse outside of industry-sponsored trials. This study aims to address this gap by comparing the outcomes of matched cohorts of limbs that underwent stenting with either the Medtronic Abre stent (Medtronic Inc), the Bard Venovo stent (Becton, Dickinson, and Co), or Wallstent-Z stent combination (Boston Scientific; Cook Medical Inc).

Methods: Contemporaneously entered data on matched cohorts of patients who underwent stenting from 2016 to 2022 for quality of life (QoL)-impairing iliofemoral venous stenosis (not occlusion) after failing conservative therapy were analyzed. The venous clinical severity score (VCSS, 0-27), grade of swelling (GOS, 0-4), visual analog scale pain score (VAS pain score, 0-10), and CIVIQ-20 QoL scores were evaluated initially and post stenting to assess the effects of stenting. Analysis of variance and paired *t*-tests were used to compare clinical and QoL variables, whereas Kaplan-Meier analysis was used to examine primary, primary-assisted, and secondary stent patencies, with log-rank test used to discriminate between different curves.

Results: There were a total of 198 limbs that had undergone stenting, including 68 in the Abre, 60 in the Venovo and 70 in the Wallstent-Z stent groups. The median age for the entire cohort was 65 years (range, 21-101 years). The cohort included 141 women and 57 men. Left laterality (112 limbs) was more common than right laterality (86 limbs). Post-thrombotic syndrome was seen in 146 limbs and nonthrombotic iliac vein lesions/May-Thurner syndrome in 52 limbs. The median body mass index was 35 kg/m^2. Median follow-up was 20 months. For the entire cohort, post stenting, VCSS improved from 6 to 4.5 at 3 months ($P < .0001$), further improved to 4 at 6 months ($P < .0001$), and remained at 4 at 12 months ($P < .0001$) and 24 months ($P < .0001$). GOS for the entire cohort improved from 3 to 1 at 3 months ($P < .0001$) and remained at 1 at 6 months, ($P < .0001$), 12 months ($P < .0001$), and 24 months ($P < .0001$). VAS pain score for the entire cohort improved from 8 to 2 at 3 months ($P < .0001$), increased to 3 at 6 months ($P < .0001$) before dropping to 2 at 12 months ($P < .0001$), and remained at 2 at 24 months ($P < .0001$). The CIVIQ-20 score for the entire cohort improved from 61 to 38 ($P < .0001$) over the duration of follow-up. The primary patencies for the Abre, Bard, and Wallstent-Z stent groups at 32 months were 93%, 86%, and 92%, respectively ($P = .37$). Primary assisted patencies for all three groups at 32 months was 100% ($P = .08$). There were no stent occlusions in any of the groups. Reintervention was pursued for QoL-impairing recurrent clinical manifestations in 13 limbs (7%), without a significant difference between groups ($P = .46$).

Conclusions: For patients undergoing stenting for QoL-impairing symptoms of iliofemoral venous stenosis after failing conservative therapy, Abre, Venovo, and Wallstent-Z stent combination all appear to provide similar clinical and QoL improvement. A significant difference between stent patencies for the three stent types was also not detected. Stent selection for treatment of stenotic lesions of the iliofemoral venous territory can be based on stent availability and the preference/expertise of the interventionalist. (J Vasc Surg Venous Lymphat Disord 2025;13:102208.)

Keywords: Venous stenting; May Thurner syndrome; Post thrombotic syndrome; Iliac vein stenting; Dedicated venous stents; Iliofemoral venous obstruction

The treatment of chronic iliofemoral venous obstruction (CIVO) has changed over the years, with an endovenous approach having supplanted open surgery as the mainstay of treatment in those who fail conservative therapy.[1-4] This approach originally began with the use of non-dedicated stents, but now includes use of dedicated

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venous stents. Although multiple studies have individually investigated and evaluated dedicated venous stents,[5-8] and reviews have been published of these studies,[9] head-to-head comparisons are scarce due to a variety of reasons. A previous study from our group had compared the effectiveness of the dedicated Bard Venovo stent (Becton, Dickinson, and Company) with the venous Wallstent-Zenith (Z) stent composite stent configuration (Boston Scientific; Cook Medical Inc).[10] In the present study, we compare the dedicated Medtronic Abre stent (Medtronic Inc), which has since become available, with the Bard Venovo stent and Wallstent-Z stent combination. We evaluate long-term clinical, quality of life (QoL), and stent-related outcomes among matched cohorts of each of the three stent types.

ARTICLE HIGHLIGHTS

- **Type of Research:** Single-center retrospective analysis
- **Key Findings:** For patients undergoing stenting for quality of life-impairing symptoms of iliofemoral venous stenosis who have failed conservative therapy, the Abre stent, the Venovo stent, and the Wallstent-Zenith stent combination all provide similar clinical and quality of life improvement over the long term. There was also no significant difference in stent patencies between the three stent types at 32 months.
- **Take Home Message:** When patients with quality of life-impairing symptoms of iliofemoral venous stenosis (not occlusion) fail conservative therapy, stenting following confirmation by intravascular ultrasound interrogation can be pursued using the Abre, the Venovo or a Wallstent-Zenith stent combination.

METHODS

Study design. This was a single-center analysis of prospectively collected data from 2016 to 2022. Franciscan Missionaries of Our Lady University institutional review board approval was obtained for dissemination of deidentified patient data. Patient consent was obtained for all tests and procedures.

Setting. The RANE center is a tertiary center for the management of venous and lymphatic disorders.

Participants. Patients with quality-of-life impairing manifestations of CIVO who had failed conservative therapy and subsequently underwent intravascular ultrasound (IVUS) confirmation of diagnosis and stenting were included in the study. Such leg symptoms/signs included swelling, heaviness, tiredness, pain, venous claudication, hyperpigmentation, lipodermatosclerosis, and venous ulcers. Patients who underwent stenting in the acute setting (acute or subacute iliofemoral venous thrombosis), bilateral stenting, or for chronic total occlusive lesions were excluded. Conservative therapy included use of compression stockings, regular walking for exercise as tolerated, leg elevation when feasible, weight loss where indicated, anticoagulation when appropriate, and complex decongestive therapy in patients with phlebolymphedema.

Stenting and follow-up. The procedure was performed under general anesthesia, given the pain associated with angioplasty. Access was typically obtained in the mid-thigh femoral vein to enable stent extension across the inguinal ligament if needed. A venogram was initially performed to evaluate flow dynamics as long as there were no contraindications. IVUS interrogation was then performed to confirm the diagnosis in every patient. The latter was through the use of normal minimal luminal areas, which were 125 mm^2, 150 mm^2, and 200 mm^2 in the common femoral, external iliac, and common iliac veins, respectively.[11] A luminal area below these cut-offs in a patient who had failed conservative therapy was considered abnormal and confirmatory for the diagnosis of CIVO.[12,13] Once the diagnosis was confirmed, predilation was carried out. This was done through the use of an angioplasty balloon of a diameter similar to the rated diameter of the caudal stent being placed.[14] Distortion in the contours of the balloon was also confirmatory for the diagnosis of CIVO. Stenting was subsequently performed. Stent sizing of the caudal stent was based on the IVUS inflow channel luminal area and the physical properties of the stent, with the cranial stent of a diameter 2 mm larger than the caudal stent.[14] Stent selection was left to the discretion of the surgeon. Finally post-dilation was pursued followed by a completion IVUS interrogation and venogram to ensure adequate luminal areas had been attained.

Patients were usually discharged the same day unless pain or medical comorbidities required overnight observation. With regards to antithrombotic therapy, anticoagulation was continued for patients who were already on it preoperatively, patients with thrombophilia, patients with a history of an unprovoked venous thromboembolic event, patients whose intraoperative findings were suggestive of possible stent complications in the absence of anticoagulation therapy (eg, severe post-thrombotic syndrome), patients on hormonal therapy, and patients with early severe in-stent restenosis (ISR) on post procedure duplex ultrasound (DUS). A direct oral anticoagulant was typically used when anticoagulation was started post stenting. Aspirin 81 mg daily was started and continued lifelong as long as no contraindications were present.

A DUS was performed prior to discharge on the day of the intervention with additional DUS and clinic visits at 3 weeks, 3 months, 6 months, and 12 months, and annually thereafter, as long as the patients remained asymptomatic without evidence of stent malfunction. Closer follow-up was dictated by concern for clinical recurrence

or stent malfunction. Details pertaining to technique of stenting, stent sizing, peri/postoperative care, and follow-up have been previously published.[14,15]

Reintervention. Reintervention was pursued in patients who developed recurrence of QoL-impairing symptoms and/or signs. Such patients underwent repeat IVUS interrogation and correction of the etiology of their stent malfunction, which may include ISR, stent compression (SC), a combination of ISR and SC, and stent occlusion. Diagnosis of stent malfunction and its correction have also been described in prior publications.[15-18]

Measurements. The clinical metrics evaluated included the venous clinical severity score (VCSS, 0-27), Visual Analog Scale pain score (VAS pain score, 0-10), and grade of swelling (GOS, 0-4). The VCSS was calculated excluding the score allotted to compression stockings. GOS was evaluated as 0: no swelling; 1: pitting with non-obvious swelling; 2: visible ankle swelling, 3: gross swelling involving the leg up to the knee; and 4: gross swelling involving the entire leg including the thigh. All scores were appraised initially before stenting and at every clinic follow-up visit post stenting. QoL was appraised using the 20-item Chronic Venous Insufficiency Quality of Life Questionnaire (CIVIQ-20), with a score of 100 indicating the worst possible QoL and a score of 0 indicating the best possible QoL.[19,20] The response available at the last follow-up visit was used in postoperative outcome analysis.

Groups and matching. The study cohort was divided into three groups. Group 1 included limbs that underwent stenting with a Medtronic Abre stent; group 2 included limbs stented with a Bard Venovo stent; and group 3 included limbs stented with a Wallstent-Z stent composite stent configuration. The groups were matched for their baseline characteristics including age, gender, laterality, clinical, etiologic, anatomic, pathophysiologic (CEAP) clinical class, body mass index, and pathology (ie, post-thrombotic syndrome vs non-thrombotic iliac vein lesion).

Statistical analysis. Analysis was performed using GraphPad Prism version 9 (GraphPad). Comparisons were made using χ^2 tests, paired *t*-tests, and analysis of variance (ANOVA). Paired *t*-tests were used to compare the outcomes within each group before and after intervention (baseline vs 3, 6, 12, and 24 months). χ^2 tests and ANOVA were used to match the three groups. ANOVA was also used to compare the outcomes across the three groups before and after intervention. Limb counts used for analysis are noted in the results where appropriate. Kaplan-Meier analysis was used to assess the primary, primary-assisted, and secondary stent patency post-intervention, with the log-rank test used to discriminate between curves. $P \leq .05$ was considered significant.

Table I. Breakdown of demographic characteristics across the three stent type groups

Variable	Abre (n = 68)	Bard (n = 60)	Wallstent-Z stent (n = 70)	*P*
Follow-up, months	18	28.5	24	.16
Age, years	64 (43-101)	62 (29-87)	67 (21-90)	.43
Gender M:F	20:48	20:40	17:53	.51
Laterality L:R	34:34	35:25	43:27	.38
NIVL:PTS	13:55	21:39	18:52	.12
BMI, kg/m^2 (median)	34.7	35.2	35.5	.64
CEAP clinical class				
C0-2	0 (0%)	1 (2%)	0 (0%)	.31
C3	15 (22%)	7 (12%)	14 (20%)	.28
C4	40 (59%)	44 (73%)	44 (62%)	.21
C5	6 (9%)	2 (3%)	6 (9%)	.40
C6	7 (10%)	6 (10%)	6 (9%)	.94

BMI, Body mass index; *CEAP,* Clinical-Etiology-Anatomy-Pathophysiology; *F,* female; *L,* left; *M,* male; *n,* number of limbs; *NIVL,* non thrombotic iliac vein lesion; *PTS,* post thrombotic syndrome; *R,* right.
Data are presented as median, median (range), or number (%).

RESULTS

There were a total of 198 limbs that had undergone stenting including 68 in the Abre, 60 in the Venovo, and 70 in the Wallstent-Z stent groups. The median age for the entire cohort was 65 years (range, 21-101 years). The cohort included 141 women and 57 men. Left laterality (112 limbs) was more common than right laterality (86 limbs). Post-thrombotic syndrome was seen in 146 limbs and nonthrombotic iliac vein lesions in 52 limbs. The median body mass index was 35 kg/m^2. The CEAP clinical class included one limb (0.5%) in the C0-2 class, 36 limbs (18.2%) in the C3 class, 128 limbs (64.6%) in the C4 class, 14 limbs (7.1%) in the C5 class, and 19 limbs (9.6%) in the C6 class. The patient with CEAP 0 underwent stenting for limb pain due to venous hypertension that had failed conservative therapy. The median follow-up for the entire cohort was 20 months (range, 1-124 months) without a difference between groups ($P = .16$). The demographic breakdown for individual stent type groups is considered in Table I. Stent characteristics are noted in Table II. Forty limbs had isolated superficial venous reflux (26 limbs with reflux in the great saphenous vein alone, five limbs with reflux in the small saphenous vein alone, and the remainder with combined great saphenous vein and small saphenous vein reflux). Nineteen limbs had isolated deep venous reflux (DVR), 14 with segmental and five with axial reflux. Thirty-two limbs had combined superficial venous reflux and DVR. A total of nine limbs underwent concomitant ablation of the superficial vein. None of the limbs with deep venous reflux required correction of their DVR due to residual/persistent symptoms post stenting.

Table II. Characteristics of stent used across the entire cohort

Stent types			
	Abre (n = 68)	Bard (n = 60)	Wallstent/Z stent (n = 70)
Range of length, mm	80-150	60-160	45-90/5
Diameter, mm	16-20	16-20	14-24/25-30
>1 stent	n = 56	n = 20	n = 58

n, Number of limbs; *Z*, Zenith.

Clinical outcomes

Comparative outcomes for the VCSS, GOS, and VAS pain score at each follow-up point across the groups are provided in Tables III-V, respectively, with limbs available for analysis at each time point.

Venous Clinical Severity Score. For the entire cohort, the VCSS improved from 6 to 4.5 at 3 months ($P < .0001$), further improved to 4 at 6 months ($P < .0001$), and remained so at 12 months ($P < .0001$), and at 24 months ($P < .0001$). In the Abre group, the VCSS improved from 6 to 5 at 3 months ($P < .0001$), further improved to 4 at 6 months ($P < .0001$), increasing to 5 at 12 months ($P < .0001$), before finally decreasing to 4 at 24 months ($P < .0001$). In the Bard group, the VCSS improved from 6 to 4 at 3 months ($P < .0001$) and remained at 4 at 6 months ($P < .0001$), and at 12 months ($P < .0001$), before further improving to 3.5 at 24 months ($P < .0001$). In the Wallstent-Z stent group, the VCSS improved from 6 to 4 at 3 months ($P < .0001$), remained at 4 at 6 months ($P < .0001$) and at 12 months ($P < .0001$), before improving to 3 at 24 months ($P < .0001$).

Grade of swelling. For the entire cohort, the GOS improved from 3 to 1 at 3 months ($P < .0001$) and remained at 1 at 6 months ($P < .0001$), 12 months ($P < .0001$), and 24 months ($P < .0001$). In the Abre group, the GOS improved from 3 to 1 at 3 months ($P < .0001$) remained at 1 at 6 months ($P < .0001$), 12 months ($P < .0001$), and at 24 months ($P = .0002$). In the Bard group, the GOS improved from 3 to 1 at 3 months ($P < .0001$) and remained the same at 6 months ($P < .0001$), 12 months ($P < .0001$), and 24 months ($P < .0001$). In the Wallstent-Z stent group, the GOS improved from 3 to 1 at 3 months ($P < .0001$) and remained the same at 6 months ($P < .0001$), 12 months ($P < .0001$), and 24 months ($P = .0003$).

Table IV. Grade of swelling (*GOS*) across the three stent type groups at baseline and 3, 6, 12, and 24 months post stenting

GOS				
	Abre	Bard	Wallstent-Z stent	*P*
Baseline	3 (n = 68)	3 (n = 60)	1 (n = 70)	.35
3 months	1 (n = 62)	1 (n = 52)	1 (n = 63)	.42
6 months	1 (n = 62)	1 (n = 45)	1 (n = 50)	.62
12 months	1 (n = 55)	1 (n = 34)	1 (n = 43)	.92
24 months	1 (n = 36)	1 (n = 34)	1 (n = 40)	.94

n, Number of limbs; *Z*, Zenith.
Data are presented as median scores.

Visual Analog Scale pain score. For the entire cohort, the VAS pain score improved from 8 to 2 at 3 months ($P < .0001$), increasing to 3 at 6 months ($P < .0001$) before decreasing to 2 again at 12 months ($P < .0001$) and remaining at 2 at 24 months ($P < .0001$). In the Abre group, when pairing baseline and follow-up for comparison, the VAS pain score improved from 8 to 4 at 3 months ($P < .0001$), remained at 4 at 6 months ($P < .0001$), and at 12 months ($P < .0001$), before improving to 3 at 24 months ($P < .0001$). In the Bard group, the VAS pain score improved from 8 to 0 at 3 months ($P < .0001$), increased to 2 at 6 months ($P < .0001$), and then to 3 at 12 months before improving to 2 at 24 months ($P < .0001$). In the Wallstent-Z stent group, the VAS pain score improved from 6 to 0 at 3 months ($P < .0001$) and remained at 0 at 6 months ($P < .0001$), 12 months ($P < .0001$), and at 24 months ($P < .0001$).

Ulcer healing. Of the 19 limbs with ulcers, 13 (68%) had healed over the duration of follow-up. The median time to healing for the full cohort was 6 months. There were

Table III. Venous Clinical Severity Score (*VCSS*) across the three stent type groups at baseline and 3, 6, 12, and 24 months post stenting

VCSS				
	Abre	Bard	Wallstent-Z stent	*P*
Baseline	6 (n = 68)	6 (n = 60)	6 (n = 70)	.51
3 months	5 (n = 62)	4 (n = 51)	4 (n = 63)	.16
6 months	4 (n = 62)	4 (n = 45)	4 (n = 50)	.47
12 months	5 (n = 55)	4 (n = 34)	4 (n = 43)	.28
24 months	4 (n = 36)	3.5 (n = 34)	3 (n = 39)	.29

n, Number of limbs; *Z*, Zenith.
Data are presented as median scores.

Table V. Visual Analog Scale (*VAS*) pain scores across the three aspect ratio groups at baseline and 3, 6, 12, and 24 months post stenting

VAS pain score				
	Abre	Bard	Wallstent-Z stent	*P*
Baseline	8 (n = 68)	7 (n = 60)	7 (n = 70)	.05
3 months	4 (n = 53)	0 (n = 38)	0 (n = 59)	.01
6 months	4 (n = 48)	2 (n = 39)	0 (n = 50)	.1
12 months	4 (n = 45)	3 (n = 44)	0 (n = 42)	.01
24 months	3 (n = 35)	2 (n = 41)	0 (n = 41)	.24

n, Number of limbs; *Z*, Zenith.
Data are presented as median scores.

Table VI. Quality of life (QoL): Chronic Venous Insufficiency Quality of Life Questionnaire (*CIVIQ*)-20 questionnaire scores across the three aspect ratio groups at baseline and post stenting. Values noted are median scores

CIVIQ-20 scores				
	Abre	Bard	Wallstent-Z stent	*P*
Baseline	58	69	51	.23
Post stenting	46	37	36	.99

n, Number of limbs; *Z*, Zenith.
Data are presented as median scores.

two unhealed ulcers in the Abre group (2/7), three in the Bard group (3/6), and one in the Wallstent-Z stent group (1/6). There was no significant difference in either ulcer healing ($P = .63$) or time to healing ($P = .58$) between the 3 groups. There was one instance of a recurrent ulcer (Abre group) with a time to recurrence of 1 month.

Quality of life

For the entire cohort, the median CIVIQ-20 score had improved from 61 to 38 ($P < .0001$). The median CIVIQ-20 score improved from 58 to 46 in the Abre group ($P = .005$), 69 to 37 in the Bard group ($P < .0001$), and 51 to 36 in the Wallstent-Z stent group ($P = .02$). No significant difference was found in the CIVIQ-20 scores across the three groups ($P > .05$) either at baseline or post stenting (Table VI).

Stent outcomes

Stent patency. For the entire cohort, the primary and primary-assisted at 32 months were 91% and 100%, respectively. As there were no stent occlusions, secondary patency could not be analyzed. At 32 months for the Abre group, the primary and primary-assisted patencies were 93% and 100%, respectively; for the Bard group, the primary and primary-assisted patencies were 86% and 100%, respectively; and for the Wallstent-Z stent group, the primary and primary-assisted patencies were 92% and 100%, respectively. Primary and primary-assisted patency curves for the three groups are shown in Figs 1 and 2, respectively.

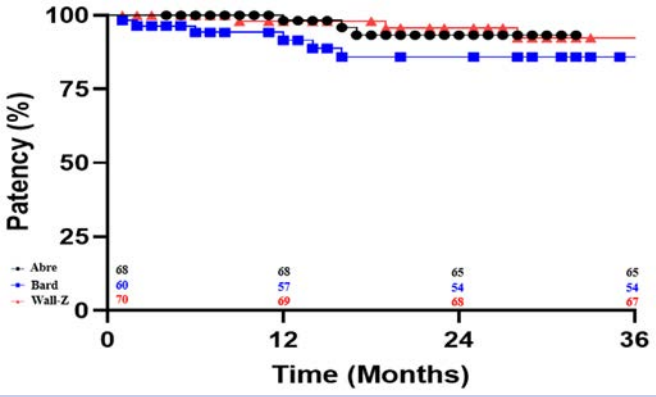

Fig 1. Plot demonstrating primary stent patencies for the three stent type groups (Standard error of the mean was <10%). *Z*, Zenith.

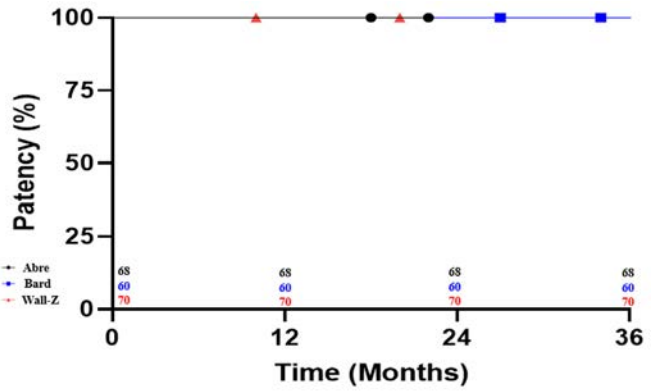

Fig 2. Plot demonstrating primary assisted stent patencies for the three stent type groups (Standard error of the mean was <10%). *Z*, Zenith.

Reintervention

For the entire cohort, reintervention had to be pursued in 13 of 198 limbs (7%). Reintervention was required for three limbs (4%) in the Abre group, six limbs (10%) in the Bard group, and four limbs (6%) in the Wallstent-Z stent group. Of the three reinterventions in the Abre group, two were for ISR, and one was for ISR + SC. Of the six reinterventions in the Bard group, 3 were for ISR, and 1 was for SC. Of the four reinterventions in the Wallstent-Z stent group, three were for ISR, and one was for SC. There were no stent occlusions in any of the groups. The breakdown of reinterventions across the three groups can be found in Table VII.

DISCUSSION

Venous stenting has become the first line of treatment for patients with QoL-impairing symptoms of CIVO who fail conservative therapy. Over the past several years, dedicated venous stents have been introduced for the treatment of CIVO; however, head-to-head comparisons that would help determine superiority or lack of one stent type over another are lacking. This study by comparing matched cohorts of limbs that had undergone IVUS-guided stenting using the Abre, Venovo, or Wallstent-Z stent combination sheds light on their role in the treatment of CIVO.

Clinical improvement after stenting. Post-stenting, a statistically significant improvement in clinical outcomes was noted in all three groups at the various follow-up points compared with baseline. When the three groups were compared with one another, there were no statistically significant differences between the three stent types with regards to improvement of VCSS, GOS, or ulcer healing. However, the VAS pain score noted in the Abre group was somewhat higher compared with the

Table VII. Breakdown of stent reinterventions across the three stent type groups

Stent reinterventions					
Reintervention	Full cohort (N = 198)	Abre (n = 68)	Bard (n = 60)	Wallstent-Z stent (n = 70)	*P*
ISR	8	2	3	3	.85
SC	1	0	0	1	.35
ISR + SC	4	1	3	0	.14
Stent occlusion	0	0	0	0	–
Total	13	3	6	4	.46

ISR, In-stent restenosis; *n*, number of limbs; *SC*, stent compression; *Z*, Zenith.
Rationale for reintervention was recurrence of quality of life-impairing clinical manifestations post stenting.

other two groups both at baseline (8 vs 7; $P = .05$) and at 3 ($P = .01$) and 12 months ($P = .009$). But when one looks at the improvement per se, this difference is less conspicuous. Also, no difference was noted in the VAS pain score between the three groups at 6 or 24 months.

Quality of life comparison. Significant improvement was found in CIVIQ-20 scores across all three groups ($P < .05$) following stenting. There was no significant difference either in the baseline CIVIQ-20 score or in the score post stenting between the three groups.

Stent patency and reintervention. Overall, for the entire cohort, the primary and primary-assisted patencies at 32 months were 91% and 100%, respectively. At 32 months, the primary patency for Abre, Bard, and Wallstent-Z stent groups were 93%, 86%, and 92%, respectively ($P = .37$). At the same time point, all three stent types had excellent primary assisted patency as well (100%). There were no stent occlusions and thus no secondary patencies. This is likely due to the non-inclusion of stenting in the chronic total occlusive and occlusive acute/subacute venous thrombosis situations. The authors tend to avoid open cell stents in these situations due to risk of stent occlusion from surrounding fibrotic tissue/residual thrombus burden. Wallstents, which are woven stents, tend to do better in these scenarios based on the authors' experience. The authors avoid stenting in the acute stenting unless absolutely required to restore inline flow based on IVUS evaluation. This has been considered in a prior publication.[21] From a reintervention standpoint, there was no significant difference in the reason for reintervention between the three groups ($P > .05$).

Limitations. The limitations of this study included the relatively small size of the groups, retrospective nature, and loss of patients to follow-up, all of which likely have a bearing on the findings. Nevertheless, this study is the first to compare three different stent types used in the treatment of chronic iliofemoral venous stenosis.

CONCLUSIONS

For patients undergoing stenting for QoL-impairing symptoms of iliofemoral venous stenosis after failing conservative therapy, Abre, Venovo, and Wallstent-Z stent combination all provide similar clinical and QoL improvement besides having similar stent patencies. Stent selection for treatment of stenotic lesions of the iliofemoral venous territory can be based on stent availability and the preference/expertise of the interventionalist.

AUTHOR CONTRIBUTIONS

Conception and design: AJ
Analysis and interpretation: SS, HB, JO, SM, MD, AJ
Data collection: SS, HB, JO, SM, MD
Writing the article: SS, HB, JO, SM, MD, AJ
Critical revision of the article: SS, HB, JO, SM, MD, AJ
Final approval of the article: SS, HB, JO, SM, MD, AJ
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SS and HB share co-first authorship.

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