SUMMARY OF SAFETY AND EFFECTIVENESS DATA (SSED)

I. GENERAL INFORMATION

Device Generic Name: Venous stent

Device Trade Name: VENOVO Venous Stent System

Device Procode: QAN

Applicant's Name and Address: Bard Peripheral Vascular, Inc. (BPV)
1625 West 3rd Street
Tempe, AZ 85281
Registration number: 2020394

Date of Panel Recommendation: None

Premarket Approval Application (PMA) Number: P180037

Date of FDA Notice of Approval: 3/13/2019

II. INDICATIONS FOR USE

The VENOVO Venous Stent System is indicated for the treatment of symptomatic iliofemoral venous outflow obstruction.

III. CONTRAINDICATIONS

The VENOVO Venous Stent System is contraindicated for use in:

- Patients with a known hypersensitivity to nitinol (nickel-titanium) and tantalum.
- Patients who are judged to have a lesion that prevents complete inflation of a balloon dilatation catheter or proper placement of the stent or the stent delivery system.
- Patients who cannot receive intraprocedural anti-coagulation therapy.

IV. WARNINGS AND PRECAUTIONS

The WARNINGS and PRECAUTIONS can be found in the VENOVO Venous Stent System labeling (Instructions for Use).

V. DEVICE DESCRIPTION

The VENOVO Venous Stent is a self-expanding nitinol (nickel-titanium) stent pre-mounted on a delivery system.

Description of Stent

The VENOVO Venous Stent (Figure 1) is a flexible, self-expanding nitinol stent framework. The VENOVO Venous Stent is available in a variety of diameters and lengths. Stent diameters range from 10 mm to 20 mm and stent lengths from 40 mm to 160 mm. The diameter of the flared ends is approximately 3 mm larger than the diameter of the nominal stent body. The stent has a total of 12 markers located on the ends of the stent, six at each end. Three at each end are radiopaque tantalum markers and three are made out of nitinol.

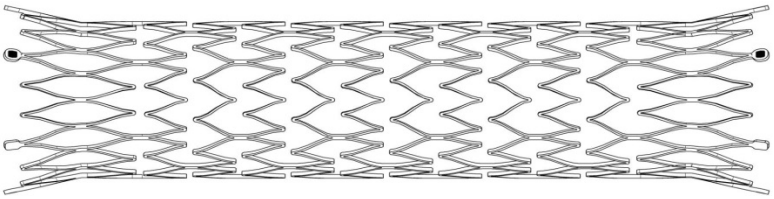


Figure 1: VENOVO® Venous Stent

Description of Delivery System

The VENOVO stent is delivered to its intended deployment location via a delivery system (Figure 2). The stent is pre-mounted on the delivery system and compressed between the inner catheter and the stent sheath at the distal end of the delivery system. The VENOVO Venous Stent Delivery System is an over-the-wire delivery system. The delivery system has a tri-axial design. Depending on stent diameter, the delivery system catheters are compatible with 8F, 9F and 10F introducer sheaths. Delivery system shaft lengths are available at 80 cm and 120 cm. The available sizes for the VENOVO Venous Stent System are listed in Table 1.

Table 1: VENOVO Venous Stent System Product Size Configurations

Stent diameter (nominal) [mm]	Stent length (nominal) [mm]	Working length [cm]	Introducer sheath compatibility	Guidewire compatibility
10	40, 60, 80, 100, 120, 140, 160	80, 120	8F	0.035 in.
12				
14			9F	
16			10F	
18				
20				

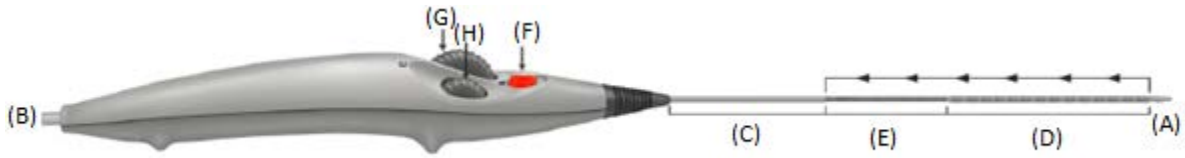


Figure 2: VENOVO® Venous Stent Delivery System

The inner catheter (not visible to the operator) contains the guidewire lumen. An atraumatic tip (A) is affixed to the distal end of the inner catheter which terminates at the female Luer connector (B) at the proximal end of the handle. A proximal system stability sheath (C) is connected to the distal end of the handle and remains stationary throughout the deployment process. The distal catheter assembly consists of two segments. The transparent stent delivery sheath (D) which houses the compressed stent (implant), and a darker brown, smaller diameter diving sheath (E). During stent deployment, the entire distal catheter assembly retracts towards the handle while the dark catheter segment is drawn inside the system stability sheath until the stent is fully deployed. Retraction of the distal catheter and deployment of the stent is initiated by rotating the large wheel (G) on the handle. The large deployment wheel is used for the initiation of deployment and a slower deployment rate whereas the small deployment wheel (H) may be used for faster deployment after initiation. A red safety lock (F) on the handle prevents premature release of the stent. Prior to stent deployment, the safety lock must be retracted from the locked position into the unlocked position.

VI. ALTERNATIVE PRACTICES AND PROCEDURES

There are several alternatives used in the treatment of symptomatic iliofemoral venous outflow obstruction. The current standard of care includes non-invasive therapies, such as exercise, compression therapy, and pharmaceutical therapy; minimally-invasive treatment options including percutaneous angioplasty and thrombolysis; and open surgical treatments including endophlebectomy or bypass. Each alternative has its own advantages and disadvantages. A patient should fully discuss these alternatives with his/her physician to select the method that best meets expectations and lifestyle.

VII. MARKETING HISTORY

The VENOVO Venous Stent System has been commercially available outside the United States since October 2015. It was first marketed in the European Union and has been commercialized in Argentina, Australia, Brazil, India, Israel, Mexico, Russia, Saudi Arabia, Singapore, and Taiwan.

The device has never been withdrawn from any market as a result of risk of serious adverse health consequences or for any reason related to its safety or effectiveness.

VIII. POTENTIAL ADVERSE EFFECTS OF THE DEVICE ON HEALTH

Complications and Adverse Events which may occur include, but are not limited to the following:

- Allergic/anaphylactic reaction
- Amputation
- Aneurysm
- Arteriovenous fistula
- Death related to procedure
- Death unrelated to procedure
- Dissection
- Embolization, venous
- Embolization, stent
- Extravasation
- Fever
- Hemorrhage/bleeding requiring a blood transfusion
- Hematoma, remote site
- Hematoma, puncture site
- Hypotension/hypertension
- Incorrect positioning of the stent requiring further stenting or surgery
- Intimal injury/dissection
- Ischemia/infarction of tissue/organ
- Local infection
- Malposition (failure to deliver the stent to the intended site)
- Open surgical repair
- Pain
- Pulmonary embolism
- Pseudoaneurysm
- Renal failure
- Respiratory arrest
- Restenosis
- Rupture
- Septicemia/bacteremia
- Stent Fracture
- Stent Migration
- Vasospasm
- Venous occlusion/thrombosis, remote from puncture site
- Venous occlusion/thrombosis, near the puncture site
- Venous occlusion/restenosis of the treated vessel

For the specific adverse events that occurred in the clinical study, please see Section X below.

IX. SUMMARY OF NON-CLINICAL STUDIES

A. Biocompatibility

Biocompatibility testing was performed in accordance with applicable sections of ISO 10993, "Biological evaluation of medical devices – Part 1: Evaluation and testing" and the FDA guidance document, "Non-Clinical Engineering Tests and Recommended Labeling for Intravascular Stents and Associated Delivery Systems." Test samples were manufactured in accordance with standard operating procedures, subjected to two cycles of ethylene oxide sterilization, and are representative of finished product.

Components of the stent and delivery system were categorized per ISO 10993-1 based on the intended patient contact and duration. The stent was categorized as an implant device with permanent exposure (> 30 days) to circulating blood, and the delivery system was categorized as an externally communicating device with limited (≤ 24 hours) exposure to circulating blood.

Table 2 provides a listing of the biocompatibility tests performed for both the implant and delivery system along with corresponding results. All studies performed were in compliance with the Good Laboratory Practice (GLP) regulations (21 CFR Part 58).

Table 2: Implant & Delivery System Biocompatibility Testing

Test Name	Test Description	Implant	Delivery System	Results
Cytotoxicity	L929 MEM Elution Test – ISO	X	X	Non-cytotoxic
Sensitization	Kligman Maximization – ISO	X	X	Non-sensitizing
Irritation	Intracutaneous Injection Test – ISO	X	X	Non-irritant
Acute Systemic Toxicity	Systemic Injection Test – ISO	X	X	Non-toxic
Material Mediated Pyrogenicity	Rabbit Pyrogen Test (Material Mediated) – ISO	X	X	Non-pyrogenic
Hemocompatibility	Hemolysis – ASTM Direct and Indirect Contact	X	X	Non-hemolytic
	Complement Activation Assay – ISO Direct Contact	X	X	Not a complement activator

Based on the materials of the delivery system being commonly used in US marketed devices in contact with circulating blood, genotoxicity testing was not conducted. Chemical characterization and toxicological risk assessment were used to assess the endpoint of carcinogenicity for the implant.

The endpoints of thrombogenicity, implantation, and subchronic/chronic toxicity for the implant were assessed in the GLP safety study, as outlined in Section D below. In addition, delivery system thrombogenicity was assessed in the GLP safety study.

B. Laboratory Studies

In vitro bench testing was conducted as part of the design verification and validation to support the safety and effectiveness of the VENOVO Venous Stent System. This testing was conducted based on recommendations from risk assessments with consideration of FDA and industry-recognized standards. The bench test results are summarized in Table 3. The testing presented in Table 3 below includes results from both baseline (T=0) and accelerated aged units. An asterisk indicates testing that was performed at the accelerated aged time points of 2 years.

Table 3: Summary of *In Vitro* Bench Testing

Test	Purpose	Acceptance Criteria	Results
IMPLANT			
Material Composition	To verify the chemical composition of the implant.	Material composition must comply with ASTM F2633, ASTM F2063, and ASTM F560.	The stent materials conform to implant material standards.
Shape Memory and Superelasticity of Intravascular Stents	To verify the transition temperature of the nitinol implant.	The A_f temperature for the nitinol implant, measured in accordance with ASTM F2082-06, must permit the stent to expand to its intended shape and size at body temperature. The A_f temperature must be between 20ºC-30ºC.	PASS
Stent Corrosion Resistance	To verify the implant's ability to resist corrosion (pitting and galvanic corrosion).	Implants must be evaluated for pitting and galvanic corrosion. The corrosion evaluations, performed in accordance with ASTM F2129, must yield a breakdown potential greater than or equal to 300 mV.	PASS
Dimensional Verification*	To verify that critical implant dimensions (implant outer diameter and length in the unconstrained expanded condition) are met.	10, 12, 14, 16, 18 and 20 mm in implant outer diameter 40, 60, 80, 100, 120, 140 and 160 mm implant length	All measurements pass the applicable requirement for implant dimensions.
Foreshortening*	To quantify the percent change in length of the implant from between its crimped and deployed states.	Stent foreshortening must be within ±10% and reported in the labeling.	Stent length change is less than 10%.

Test	Purpose	Acceptance Criteria	Results
Stent Integrity*	To evaluate the integrity of the implant post-deployment and verify the implant shows no defects that would render it unsuitable for the intended use.	Absence of bends, kinks, missing markers, broken struts.	PASS
Radial Outward Force*	To characterize the force exerted by the implant as a function of implant diameter.	COF $\leq$ 0.12 N/mm at maximum recommended oversizing. RRF $\geq$ 0.03 N/mm at minimum recommended oversizing.	PASS
Mechanical Properties	For characterization purposes only to determine uniaxial tensile strength and fatigue strength as inputs to support stress/strain and fatigue analysis.		
Stress/Strain Analysis	For characterization purposes only to determine maximum stresses and strains within the device to support fatigue analysis.		
Fatigue Analysis	To evaluate the device durability based on the results of the stress and strain analysis.	The safety factor determined by the fatigue analysis must be equal or greater than 1 for all fatigue loads.	PASS
Accelerated Durability Testing	To evaluate the durability (maintenance of structural integrity) and resistance to fretting of the implant under bending fatigue conditions as well as parallel and local crush fatigue conditions simulating 10 years of use, respectively.	Implants must withstand an equivalent of 10 years of accelerated durability testing. Upon completion of testing, implants must maintain structural integrity following fatigue evaluation per ISO 25539-2.	PASS The tested implants showed no strut fractures and no strut protrusion into the lumen after 10 years of accelerated durability testing.
Particulate Evaluation*	Characterize particulate following implant expansion to evaluate integrity of the stent.	Implants must be visually inspected for implant integrity (refer also to Stent Integrity test). Delivery system must have no dislodged parts or entanglement during withdrawal.	PASS
MRI Safety and Compatibility	To evaluate MRI safety and compatibility.	For characterization purposes only, the conditions under which the device can be safely scanned are provided in the product labeling.	The implant is MR Conditional at a field strength of 1.5 T and 3.0 T.
Radiopacity	To evaluate the radiopacity of the implant under fluoroscopy.	The visibility of the implant under fluoroscopy during and after deployment as well as after placement must be rated as clinically acceptable by physician experts in an animal model.	PASS

Test	Purpose	Acceptance Criteria	Results
Crush Resistance/ Local Compression*	To evaluate the degree of implant flexibility and the ability of the implant to resist permanent deformation under a localized (e.g. point) load and along the entire length of the stent when subjected to a load uniformly applied along the length of the stent.	After local compression, 3-point bending (bending stiffness), and compression between parallel plates, the stent must maintain structural integrity (refer also to Stent Integrity test) and return to its original shape.	PASS
Kink Resistance*	To generate information about the minimum radius that the implant can be bent (fully expanded) without kinking and without permanent deformation.	Resistance to kink must be evaluated in an anatomically relevant landing zone, applicable to the intended indication. The stent must be kink resistant and the radius of the stent must be characterized at the point at which the stent starts to kink.	PASS
DELIVERY SYSTEM			
Dimensional Verification*	To verify that the delivery system meets dimensional criteria pre- and post-deployment.	120 cm delivery system working length. Delivery system profile must be able to pass through an 8F, 9F or 10F ring gage over its entire working length pre-deployment. Delivery system inner diameter must be compatible with a 0.035" guidewire.	All measurements pass the applicable requirement for delivery system dimensions.
Introducer Sheath Compatibility	To verify that the delivery system can be used with commercially available introducer sheaths.	The endovascular system needs to be compatible with multiple lengths of commercially available introducer sheaths that are commonly used for iliac stenting procedures.	PASS
Pushability and Trackability*	To verify that the delivery system can be tracked over a 0.0035" guidewire, through an appropriately sized introducer sheath.	Operator must be able to track the delivery system over a 0.035" guidewire during simulated use testing [pass/fail]. Operator must be able to access and withdraw the delivery system over the most commonly used 8F, 9F, and 10F introducer sheaths with an average force rated ≤ 3 during simulated use testing. Rating scale: 1. Smooth, 2. Fair, 3. Difficult 4. Impossible	PASS

Test	Purpose	Acceptance Criteria	Results
Delivery, Deployment, and Retraction*	To ensure that the delivery system meets it pre-determined acceptance criteria with respect to its delivery, deployment, and retraction in a simulated use environment.	The endovascular system must be advanced and retracted through a clinically relevant anatomical model, and implants must be deployed into a clinically relevant landing zone. Force to deploy the stent must be rated ≤ 3 during the simulated use testing. Rating scale: 1. Smooth 2. Fair 3. Difficult 4. Impossible System must also withdraw from model without entanglement and pass visual inspection post deployment (i.e. must not exhibit missing components/fragments).	PASS
Force to Deploy*	To determine the deployment force at the proximal catheter of the delivery system and the thumbwheel and verify that the force required to deploy are adequate for the intended use.	The deployment force must be ≤ 40 N at the proximal catheter and ≤ 12 N at the thumbwheel to deploy the stent under normal use as required per ISO 25539-2.	PASS
Deployment Accuracy*	To assess the accuracy of deploying the stent at the target location.	The stent shall be deployed ± 3.0 mm from the intended deployment location.	PASS
Flushability/Leak Proofing*	To verify the delivery system can be flushed without leaking.	Delivery system is flushed with water and water only exits at the distal end.	PASS
Catheter Bond Strength including Tip Pull Test*	To determine the bond strength of delivery system joints and verify that the strength of the bond joints is adequate for the intended use.	The delivery system bonds must maintain integrity above the specified load levels during stent deployment and delivery system retraction per ISO 25539-2.	PASS
Tubing Tensile Strength*	To determine the longitudinal tensile strength of the catheter tubing used in the delivery system and verify that the strength is adequate for the intended use.	The delivery system must have sufficient strength to maintain its function under normal use (refer also to Catheter Bond Strength).	PASS

Test	Purpose	Acceptance Criteria	Results
Flexibility and Kink Test*	Characterize the ability of the delivery system to withstand flexural forces typical of clinical use.	The system must not kink during delivery, deployment, or withdrawal to and from the target deployment site in a clinically relevant anatomical model. The radius of the endovascular system must be characterized at the point at which the endovascular system starts to kink.	PASS
Torquability*	To verify the ability of the delivery system to withstand torsional deformation of ±180˚.	No deformation or damage are observed on the delivery system after applying torque.	PASS

* testing also performed at the accelerated aged time points of 2 years

C. Sterility, Packaging and Shelf-Life Testing

The VENOVO Venous Stent System is a single-use device. In accordance with AAMI/ANSI/ISO 11135, "Sterilization of health-care products – Ethylene oxide – Requirements for the development, validation and routine control of a sterilization process for medical devices," the VENOVO Venous Stent System demonstrates a Sterility Assurance Level (SAL) of 10^{-6}. Ethylene Oxide and Ethylene Chlorohydrin residuals meet the requirements of ISO 10993-7, "Biological Evaluation of Medical Devices – Part 7: Ethylene oxide sterilization residuals". Shelf life testing of the device (which was assessed using the tests denoted with an asterisk in Table 3) was performed and validated to ensure a 2-year shelf life. Baseline and aged packaging testing, including a visual assessment, dye penetration testing, and seal tensile strength testing was also performed to ensure the package integrity over the device's shelf life.

D. Animal Studies

A GLP animal study was performed to evaluate performance characteristics as well as local biological and systemic responses of the VENOVO Venous Stent System. The *in vivo* animal study demonstrated the safety and overall product performance of the VENOVO Venous Stent System *in vivo* in single and overlapped configurations in an ovine model at 30 and 90 days. In addition, an acute evaluation of the VENOVO delivery system, including thrombogenicity, was performed. This study was conducted in accordance with FDA 21 CFR Part 58 GLP Regulations. The results of the animal study are summarized in Table 4.

Table 4: Final Assessment of Study Objectives

Study Objective	Study Attribute / Output	Analysis Methodology	Result
Assessed the local biological and systemic responses to the implant over time	Patency	Venographic measurements of vessel diameters	Patent
		Venographic comparison of vessel diameters in stent vs. distal vessel segment	Patent, max. calculated lumen loss was 30%.
	Thrombogenicity	Clinician assessment based on venography and visual assessment	Clinically acceptable
		Histological assessment of implant	Acceptable (No occlusive thrombi although surface thrombi noted in majority of stents for the 30-day cohort, particularly overlapping stent pairs.)
	Vessel Injury	Clinician assessment based on venography (observance the presence of intimal irregularities, vessel dissection, and other relevant characteristics)	Pass; except one device where a small dissection distal to stent in right iliac vein was noted at post-stent deployment. This small dissection was deemed not clinically relevant.
	Inflammation and Vessel Injury	Semi-Quantitative Histology Scores	None to mild inflammation and vessel injury. No major safety concerns.
	Implant Endotheliazation	Histology evaluation of neointimal and luminal surface coverage	Minimal to mild coverage at 30-31 days with poor coverage in areas of surface thrombi or uncovered struts. Fully incorporated at 90-91 days except for uncovered struts.
Assessed the position, structural integrity and functionality of the stent acutely and over time	Migration	Venographic evaluation of stent position relative to the confluence or landmarks	Acutely: Stent position very good / smooth. One (1) animal had distal migration (5 mm) of the stent (12 x 60 mm) at device pullback in the left iliac vein during stent deployment but was clinically acceptable. Terminal Procedures: One (1) animal was qualitatively evaluated as having proximal migrations in both the right iliac vein (10.7 mm) and the left iliac vein (8.6 mm) at 91 days post-implantation. Migrations assessed as non-device related due to implantation in healthy young animal veins.
	Structural Integrity	X-ray evaluation of stent struts	Stents evenly expanded with no evidence of fracture.

Study Objective	Study Attribute / Output	Analysis Methodology	Result
	Vessel Patency	Clinician assessments of flow through treated vessel segments (based on Venography)	Acutely: Clinically Acceptable Terminal procedures: Qualitatively evaluated as patent.
Assessed the appropriateness of implant sizing	Migration	Venographic measurements of stent position relative to the confluence	Acutely: Stent position very good / smooth. One (1) animal had distal migration (5 mm) of the stent (12 x 60 mm) at device pullback in the left iliac vein during stent deployment but was clinically acceptable. Terminal Procedures: One (1) animal was qualitatively evaluated as having proximal migrations in both the right iliac vein (10.7 mm) and the left iliac vein (8.6 mm) at 91 days post-implantation. Migrations assessed as non-device related due to implantation in healthy young animal veins.
	Vessel Injury	Venographic assessment	Pass; except one device where a small dissection distal to stent in right iliac vein was noted at post-stent deployment. This small dissection was deemed not clinically relevant.
	Inflammation and Vessel Injury	Semi-Quantitative Histology Scores	None to minimal inflammation and vessel injury
Assessed the visualization of the stent upon implantation	*In vivo* Radiopacity	Clinician evaluation based on subjective assessment of visibility	Clinically Acceptable
Monitored for the occurrence of adverse events and potential contributing factors	Animal Health and Well Being	Animal Health Report	Satisfactory health status with a few notable findings of greater clinical relevance during the course of the study; however, none of these clinical observations were related to or could affect stent performance results.

X. SUMMARY OF PRIMARY CLINICAL STUDY

The applicant performed a clinical study to establish a reasonable assurance of safety and effectiveness of the VENOVO Venous Stent for the treatment of symptomatic iliofemoral venous outflow obstruction in the United States, Europe, and Australia under IDE G150248. Data from this clinical study were the basis for the PMA approval decision. A summary of the clinical study is presented below.

A. Study Design

The VERNACULAR study was a global prospective, multi-center, non-randomized, single-arm clinical study intended to assess the safety and effectiveness of the VENOVO Venous Stent in patients with symptomatic (non-malignant) venous outflow obstruction in iliofemoral venous segments of ≥ 50% as determined by catheter contrast venography. One hundred and seventy (170) subjects were treated with the VENOVO Venous Stent. Subjects were treated between 15 June 2016 and 01 May 2017. The database for this PMA reflects data locked on 17 July 2018 and included 170 treated patients (last subject 12-month data collected on 19 June 2018). There were 22 investigational sites which enrolled patients.

The subpopulation split for the VERNACULAR study was 45% Non-thrombotic Iliac Vein Lesions (NIVL) subjects and 55% Post-Thrombotic Syndrome (PTS) subjects. The analyses were conducted based on all known information for subjects who had reached pre-specified time points: 30 days for primary safety, and 12-months for effectiveness and secondary endpoints. Subjects will be followed through 24 and 36 months.

An independent Clinical Events Committee (CEC) reviewed all adverse events (AEs), and performed adjudication of required events in accordance with the CEC charter.

1. Clinical Inclusion and Exclusion Criteria

   Enrollment in the VERNACULAR study was limited to patients who met the following inclusion criteria:

   1. The subject provides written informed consent using an Informed Consent Form (ICF) that is reviewed and approved by the Ethics Committee (EC) / Institutional Review Board (IRB) for the site.
   2. Subject agrees to comply with the protocol-mandated follow-up procedures and visits.
   3. The subject is a male or non-pregnant female ≥ 18 years old with an expected lifespan sufficient to allow for completion of all study procedures. Female subjects of childbearing potential must have a negative pregnancy test (urine or blood) within 14 days prior to the index procedure.
   4. The subject has symptomatic (non-malignant) venous outflow obstruction in iliofemoral venous segments (unilateral obstruction of the common femoral vein, external iliac vein, common iliac vein, or any combination thereof) of ≥ 50% as determined by catheter contrast venography.
   5. The subject has symptomatic venous outflow obstruction (non-malignant) in iliofemoral venous segment(s) with a CEAP "C" ≥ 3 or a VCSS pain score of ≥ 2.
   6. The subject is able and willing to comply with any required medication regimen.
   7. The reference vessel diameter(s) is (are) between 7 mm and 19 mm as determined by the Investigator's visual estimate.

Patients were not permitted to enroll in the VERNACULAR study if they met any of the following exclusion criteria:

1. The subject is unable or unwilling to provide written informed consent, or is unable or unwilling to conform to the study protocol follow-up procedures and visits.
2. The subject is or plans to become pregnant during the study.
3. The subject has contralateral disease of the common femoral vein, external iliac vein, common iliac vein, or any combination thereof and does not meet the venous outflow obstruction requirement as determined by the treating Investigator or the target vessel has a malignant obstruction.
4. The subject is asymptomatic and has a CEAP "C" <3, or a VCSS pain score of <2.
5. The subject has a venous obstruction that extends into the inferior vena cava (IVC) or below the level of the lesser trochanter.
6. The subject has a known uncorrectable bleeding diathesis or active coagulopathy.
7. The subject has a known allergy or sensitivity to nickel or titanium or has intolerance to antiplatelet, anticoagulant or thrombolytic medications required per the protocol.
8. The subject has a known allergy or sensitivity to contrast media, which cannot be adequately pre-medicated.
9. The subject has any planned surgical interventions (other than pre-stenting procedures of thrombolysis, thrombectomy, and/or vena cava filter placement in patients with high risk for pulmonary embolism) within 30 days prior to or within 30 days after the planned study procedure.
10. The subject has a lesion(s) which cannot be traversed with a guide wire.
11. The subject has had prior stenting in the target vessel.
12. The subject has iliofemoral venous segment(s) unsuitable for treatment with available sizes of study devices.
13. The subject has another medical condition, which, in the opinion of the Investigator, may cause him/her to be non-compliant with the protocol, confound the data interpretation, or is associated with a life expectancy insufficient to allow for the completion of study procedures and follow-up.
14. The subject is currently participating in an investigational drug, biologic, or another device study for which the investigational treatment has not ended. Studies requiring extended follow-up for products that are not commercially available are not considered investigation studies.
15. The subject is currently on dialysis or has a serum creatinine ≥ 2.5 mg/dl.

2. Follow-up Schedule

All subjects underwent a clinical evaluation at screening (prior to index procedure); treated subjects underwent a clinical evaluation prior to hospital discharge. All subjects were scheduled for follow-up at 30-days, 6-months, and 12-months post-

operatively. Additionally, subjects will be followed through 24 and 36 months post-operatively.

Preoperatively, information on subjects was collected including: demographics, medical history, clinical exam including overall health, Venous Clinical Severity Score (VCSS) assessment, Quality of Life (QoL) assessment (CIVIQ-20), lesion success, documentation of applicable medication taken within 72 hours prior to the index procedure and duplex ultrasound imaging (DUS) was collected.

Postoperatively, the objective parameters measured during the study included data collected on AEs, re-interventions performed, and changes in applicable medications.

The key time points are shown below in the Table 5 summarizing the time and events schedule.

Table 5: Time and Events Schedule

Observation	Baseline/ Screening	Index Procedure	Hospital Discharge	30 d[5] (± 7d)	6 mo (± 30d)	12, 24, & 36 mo (± 30d)
Eligibility Criteria	✓	✓				
Informed Consent	✓					
Demographics	✓					
Medical History	✓					
Pregnancy test	✓[1]					
Labs (CBC including Platelets)	✓					
Concomitant Medications/Anticoagulation Review	✓	✓	✓	✓	✓	✓
Comprehensive Physical Exam	✓		✓	✓	✓	✓
Venogram/Imaging	✓[2]	✓[2]				
Radiographic Imaging including X-ray analysis for stent fracture						✓[2]
Adverse Event Assessment		✓	✓	✓	✓	✓
TLR/TVR Assessment				✓[2]	✓[2]	✓[2]
Color Flow Duplex Ultrasound				✓[3]	✓[3]	✓[3]
CEAP, VCSS, CIVIQ-20	✓[4]			✓	✓	✓

[1]Perform pregnancy test (urine or blood) for women who are of childbearing potential ≤ 14 days prior to the index procedure.
[2]Send images to Core Laboratory
[3]Send images to Ultrasound Core Laboratory
[4]Complete ≤ 30 days prior to the index procedure
[5]Subjects meeting the criteria for deployment failure will be evaluated at hospital discharge and the 30 day follow-up visit to assess and document any AEs or SAEs that may have occurred since the index procedure

3. Clinical Endpoints

The primary safety endpoint is freedom from any major adverse events (MAEs) through 30 days post-index procedure, as adjudicated by a CEC. The performance goal of freedom from primary safety event is 89%, which was set at 10% below the literature-derived average freedom from MAE rate at 30 days of 99%. A one-sided p-value was derived based on an exact binomial test. The study device was considered to have achieved the safety objective if the one-sided p-value was less than 0.05. Or equivalently, the lower limit of the one-sided 95% confidence limit based on the exact method is greater than 89%.

MAE is defined as any of the following components through 30 days, which were determined by the CEC adjudication of AEs:

- Target vessel revascularization (TVR), as defined as the first revascularization procedure of the target vessel as determined by an Independent Core Lab;
- Device and/or procedure-related death;
- Major amputation of target limb;
- Pulmonary embolism which is clinically important (symptomatic with chest pain, hemoptysis, dyspnea, hypoxia, etc.);
- Vascular injury requiring surgical/endovascular intervention;
- Embolization/migration of stent; and
- Device or procedure-related acute deep vein thrombosis (DVT) involving the treated limb.

Subjects who discontinued prior to day 30 and had no MAEs were considered as not evaluable for the endpoint and were not included in the denominator in calculating the summary statistics.

The primary effectiveness endpoint of the study was primary patency at 12-months post-index procedure, defined as: freedom from TVR; freedom from thrombus occlusion and stenosis > 50% as measured by DUS. The primary effectiveness endpoint was evaluated against a literature-derived performance goal (PG) of 74%, which was determined as 10% below a weighted mean of primary patency rate at 12-months (55% PTS subjects at primary patency rate of 77.1% and 45% NIVL subjects at primary patency rate of 93.4%).

A one-sided p-value was derived using normal distribution. The primary effectiveness endpoint was considered to have achieved the primary effectiveness objective if the one-sided p-value was less than 0.05, and a significant rejection of the null hypothesis would have indicated success for this endpoint. Success was determined if the lower limit of the two-sided 90% confidence limit of the combined patency rate based on the weighted Z-statistics was greater than the PG of 74%.

Two secondary endpoints were evaluated with formal hypothesis testing. These were the 12-month VCSS pain assessment change from baseline and the 12-month CIVIQ-20 change from baseline.

Secondary endpoints without hypothesis testing included the following:

- **Evaluation of VCSS Scores** assessed at screening/baseline and at 30-days, 6-, 12-, 24-, and 36-months and at any target lesion revascularization (TLR) or TVR;
- **QoL** as assessed by the screening/CIVIQ-20 at baseline, 30-days and 6-, 12-, 24- and 36-months post-index procedure and at any TLR/TVR;
- **Evaluation of CEAP Scores** assessed at baseline and at 30-days, 6-, 12-, 24-, and 36-months and at any TLR/TVR;
- **Acute Procedure Success** defined as technical success with no major adverse events between index procedure and discharge;
- **Lesion Success** defined as attainment of ≤ 50% residual stenosis at the conclusion of the index procedure;
- **Acute Technical Success** defined as successful deployment of stent(s) to intended target with adequate lesion coverage as assessed by the Investigator;
- **Freedom from Target Lesion Revascularization** at 30-days, 6-, 12-, 24-, and 36-months post-index procedure. TLR is defined as the first revascularization procedure of the target lesion(s) following the index procedure, as determined by an Independent Core Lab;
- **Freedom from Target Vessel Revascularization** at 30-days, 6-, 12-, 24-, and 36-months post-index procedure. TVR is defined as the first revascularization procedure in the target vessel(s) following the index procedure, as determined by an Independent Core Lab;
- **Primary Patency** defined as freedom from TVR; freedom from thrombus occlusion and stenosis > 50% as measured by DUS at 24-, and 36-months;
- **X-ray analysis for stent fracture** at 12-, 24-, and 36-months.

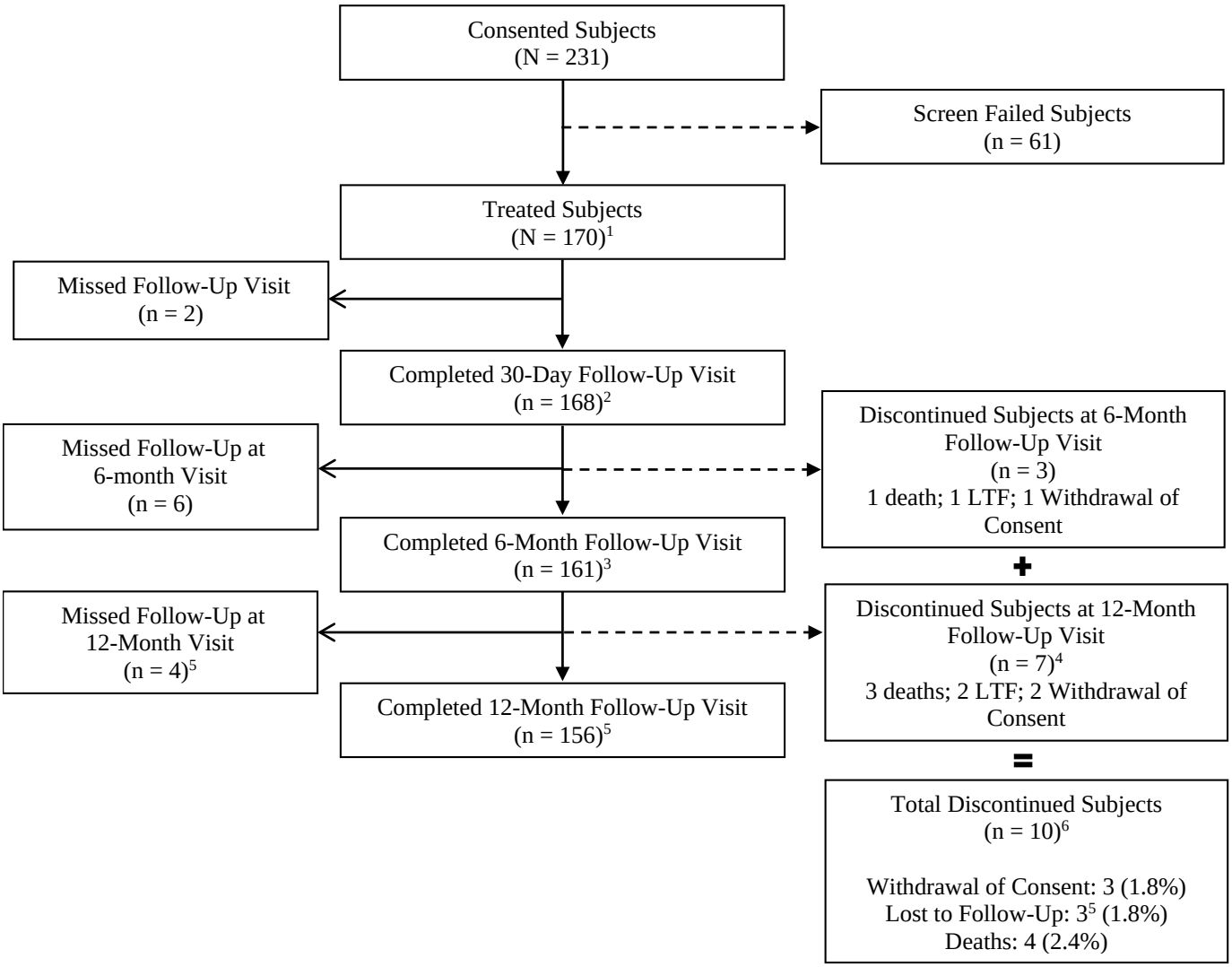
B. Subject Accountability in the PMA Study

Overall, 231 subjects were consented into the VERNACULAR study. One hundred and seventy (170) subjects were treated with the study device and formed the Intent-to-Treat (ITT) population. Of the sixty-one (61) subjects which were enrolled but not treated, fifty-eight (58) subjects did not meet the inclusion/exclusion criteria as defined above and were considered screen failures. The remaining three (3) subjects met all eligibility criteria but were not treated with the study device: one (1) subject was consented but could not be treated prior to completion of overall enrollment of the study, and two (2) subjects were enrolled in a different device trial at the discretion of the investigator. One hundred and fifty-six (156) subjects were available for the effectiveness analysis at 12-months as of July 17, 2018 (date of database lock). Of the fourteen (14) subjects that did not have a 12-month follow-up, three (3) subjects withdrew consent, four (4) subjects died, three (3) subjects were lost to follow-up, and four (4) subjects missed the 12-month visit with the following caveat. Five (5) subjects

missed the 12-month follow-up visit. One (1) subject was lost to follow-up at day 398 and is therefore accounted for in the lost to follow-up total and not the missed visit total listed in Figure 3. Figure 3 depicts the number of subjects included in the safety and effectiveness analyses.

The death events were adjudicated by the CEC and determined to not be related to the study device or procedure.

Figure 3: Subject Accountability



[1] 231enrolled subjects - 61 screen failures = 170 subjects treated
[2] 170 treated subjects - 2 missed visits = 168 subjects completed 30-Day Follow-Up visit
[3] 170 treated subjects - 3 discontinued subjects = 167; 167 treated subjects still in study - 6 missed follow-up visits = 161 subjects completed 6-Month Follow-Up visit
[4] 167 treated subjects still in study - 7 additional discontinued subjects = 160; 160 treated subjects still in study - 4 missed follow-up visits = 156 subjects completed 12-Month Follow-Up visit
[5] One subject Lost to Follow-Up at day 398 after missing 12-month Follow-Up visit. This subject included in lost-to-follow-up-count, not the missed follow-up visit count in this figure.
[6] Sum of subjects lost cumulatively before database lock on July 17, 2018.

C. Study Population Demographics and Baseline Parameters

Specific demographics and baseline characteristics for the subjects enrolled in the VERNACULAR study are provided in Table 6 through Table 9.

Table 6: Subject Demographics

	PTS N = 93	NIVL N = 77	Total N= 170
Age Categories	**n (%)**	**n (%)**	**n (%)**
< 65 years	77 (82.8)	48 (62.3)	125 (73.5)
≥ 65	16 (17.2)	29 (37.7)	45 (26.5)
Sex	**n (%)**	**n (%)**	**n (%)**
Male	42 (45.2)	21 (27.3)	63 (37.1)
Female	51 (54.8)	56 (72.7)	107 (62.9)
Ethnicity	**n (%)**	**n (%)**	**n (%)**
Hispanic or Latino	7 (7.5)	5 (6.5)	12 (7.1)
Not Hispanic or Latino	86 (92.5)	72 (93.5)	158 (92.9)
Race	**n (%)**	**n (%)**	**n (%)**
Asian	3 (3.2)	1 (1.3)	4 (2.4)
Black or African American	7 (7.5)	2 (2.6)	9 (5.3)
White	83 (89.2)	73 (94.8)	156 (91.8)
Other	0	1 (1.3)	1 (0.6)
BMI (kg/m^2)			
N	93	76	169
Mean (SD)	28.57 (6.36)	29.12 (7.65)	28.82 (6.95)
Median	27.10	28.30	27.40
Min-Max	18.2 – 49.1	18.2 – 50.0	18.2 – 50.0
Disease Category	**n (%)**	**n (%)**	**n (%)**
PTS	93 (100.0)	0	93 (54.7)
NIVL	0	77 (100.0)	77 (45.3)
Number of Target Lesions	**n (%)**	**n (%)**	**n (%)**
1	81 (87.1)	73 (94.8)	154 (90.6)
2	12 (12.9)	4 (5.2)	16 (9.4)
Number of Study Devices Implanted	**n (%)**	**n (%)**	**n (%)**
1	53 (57.0)	69 (89.6)	122 (71.8)
2	39 (41.9)	8 (10.4)	47 (27.6)
3	1 (1.1)	0	1 (0.6)

Table 7: Medical History

	PTS N= 93	NIVL N= 77	Total N= 170
Cardiovascular Disease	**n (%)**	**n (%)**	**n (%)**
Subjects with any Cardiovascular Disease	93 (100.0)	77 (100.0)	170 (100.0)
Stroke	2 (2.2)	2 (2.6)	4 (2.4)
Angina	3 (3.2)	2 (2.6)	5 (2.9)
Hypertension	27 (29.0)	28 (36.4)	55 (32.4)
Coronary Artery Disease (CAD)	6 (6.5)	9 (11.7)	15 (8.8)
Myocardial Infarction (MI)	3 (3.2)	3 (3.9)	6 (3.5)
Transient Ischemic Attack (TIA)	2 (2.2)	1 (1.3)	3 (1.8)
Cardiomyopathy	2 (2.2)	1 (1.3)	3 (1.8)
Vascular Heart Disease	1 (1.1)	1 (1.3)	2 (1.2)
Deep Vein Thrombosis (DVT)	92 (98.9)	0	92 (54.1)
May-Thurner Syndrome	35 (37.6)	67 (87.0)	102 (60.0)
Venous Valve Disease	7 (7.5)	5 (6.5)	12 (7.1)
Varicosis	71 (76.3)	62 (80.5)	133 (78.2)
Dyslipidemia	20 (21.5)	27 (35.1)	47 (27.6)
Peripheral Arterial Disease (PAD)	6 (6.5)	12 (15.6)	18 (10.6)
Atrial Fibrillation (A-FIB)	4 (4.3)	2 (2.6)	6 (3.5)
Arrhythmia (Other Than A-FIB)	3 (3.2)	5 (6.5)	8 (4.7)
Other	19 (20.4)	24 (31.2)	43 (25.3)
Renal Disease	**n (%)**	**n (%)**	**n (%)**
Subjects with any renal disease	7 (7.5)	3 (3.9)	10 (5.9)
Chronic Kidney Disease	2 (2.2)	2 (2.6)	4 (2.4)
Acute Renal Insufficiency (Serum Creatinine Greater Than or Equal to 2.5 mg/dL)	1 (1.1)	0	1 (0.6)
Uremia	1 (1.1)	0	1 (0.6)
Other	5 (5.4)	2 (2.6)	7 (4.1)
Other Disease	**n (%)**	**n (%)**	**n (%)**
Subjects with any other disease	72 (77.4)	64 (83.1)	136 (80.0)
Diabetes	5 (5.4)	13 (16.9)	18 (10.6)
Bleeding Disorder	7 (7.5)	0	7 (4.1)
Cancer	6 (6.5)	8 (10.4)	14 (8.2)
Gastrointestinal Disease	11 (11.8)	7 (9.1)	18 (10.6)
Genitourinary Disorder	5 (5.4)	3 (3.9)	8 (4.7)
Respiratory Disorder	13 (14.0)	7 (9.1)	20 (11.8)
Liver Disease	4 (4.3)	2 (2.6)	6 (3.5)
Systemic Lupus Erythematosus	2 (2.2)	0	2 (1.2)
Cigarette Smoking	28 (30.1)	30 (39.0)	58 (34.1)
Allergic Reaction, Sensitivity, or Intolerance to Nickel or Titanium, Contrast Media, Antiplatelet, Anticoagulant or Thrombolytic Medications	3 (3.2)	5 (6.5)	8 (4.7)
Other	60 (64.5)	54 (70.1)	114 (67.1)

Table 8: Summary of Target Lesions

	PTS	NIVL	Total
Target Limb	**n/N (%)**	**n/N (%)**	**n/N (%)**
Right Leg	18/89 (20.2)	8/74 (10.8)	26/163 (16.0)
Left Leg	71/89 (79.8)	66/74 (89.2)	137/163 (84.0)
Target Lesion Location*	**n/N (%)**	**n/N (%)**	**n/N (%)**
Common Iliac	82/89 (92.1)	72/74 (97.3)	154/163 (94.5)
External Iliac	52/89 (58.4)	14/74 (18.9)	66/163 (40.5)
Common Femoral	13/89 (14.6)	2/74 (2.7)	15/163 (9.2)
Lesion Length (mm)			
N	73	73	146
Mean (SD)	80.52 (42.78)	55.15 (31.99)	67.84 (39.74)
Median	71.18	45.40	56.17
Minimum–Maximum	18.05 – 199.66	22.13 – 183.44	18.05 – 199.66

Note: A subject may have multiple target lesion locations.

Table 9: Summary of Study Device Details (ITT Subjects)

	PTS N = 93	NIVL N = 77	Total N = 170
Stent Diameter (mm)			
Mean (SD)	15.4 (2.09)	16.6 (1.99)	15.9 (2.12)
Median	16.0	16.0	16.0
Min - Max	10 - 20	12 - 20	10 - 20
Stent Length (mm)			
Mean (SD)	100.1 (33.15)	83.0 (26.33)	93.5 (31.74)
Median	100.0	80.0	80.0
Min - Max	40 - 160	40 - 160	40 - 160
Device Used to Treat Study Subject?	**n/N (%)**	**n/N (%)**	**n/N (%)**
Yes	134/136 (98.5)	85/87 (97.7)	219/223 (98.2)
No	2/136 (1.5)	2/87 (2.3)	4/223 (1.8)
Location of Stent Placement	**n/N (%)**	**n/N (%)**	**n/N (%)**
Single Stent Only	93/134 (69.4)	77/85 (90.6)	170/219 (77.6)
Distal Overlap	27/134 (20.1)	4/85 (4.7)	31/219 (14.2)
Proximal Overlap	14/134 (10.4)	4/85 (4.7)	18/219 (8.2)
Overlap (mm)			
N	41	8	49
Mean (SD)	21.4 (8.05)	18.9 (11.61)	21.0 (8.63)
Median	20.0	15.0	20.0
Min - Max	5 - 40	8 - 40	5 - 40
Stenosis Post-Deployment (%)			
N	134	85	219
Mean (SD)	9.35 (13.88)	8.20 (12.03)	8.91 (13.18)
Median	4.75	0.00	0.00
Min - Max	0.0 - 50.0	0.0 - 50.0	0.0 - 50.0
Was placement successful at the intended site?	**n/N (%)**	**n/N (%)**	**n/N (%)**
Yes	134/134 (100.0)	85/85 (100.0)	219/219 (100.0)

D. Safety and Effectiveness Results

1. Safety Results

The primary safety endpoint of the study was freedom from MAEs through 30 days post-index procedure, as adjudicated by the CEC. The PG of freedom from a primary safety event was 89%, which was set at 10% below the literature-derived average freedom from MAE rate of 99% at 30 days. The 30-day primary safety rate for the VENOVO Venous Stent demonstrated a statistically significant difference from the PG of 89%. The MAE rate through 30 days was 93.5% with a 90% confidence interval [89.5%,96.3%]. The key safety outcome for this study is presented in Table 10. Adverse events are reported in Table 11.

Table 10: Freedom from any Safety Event through 30 days (ITT Subjects)

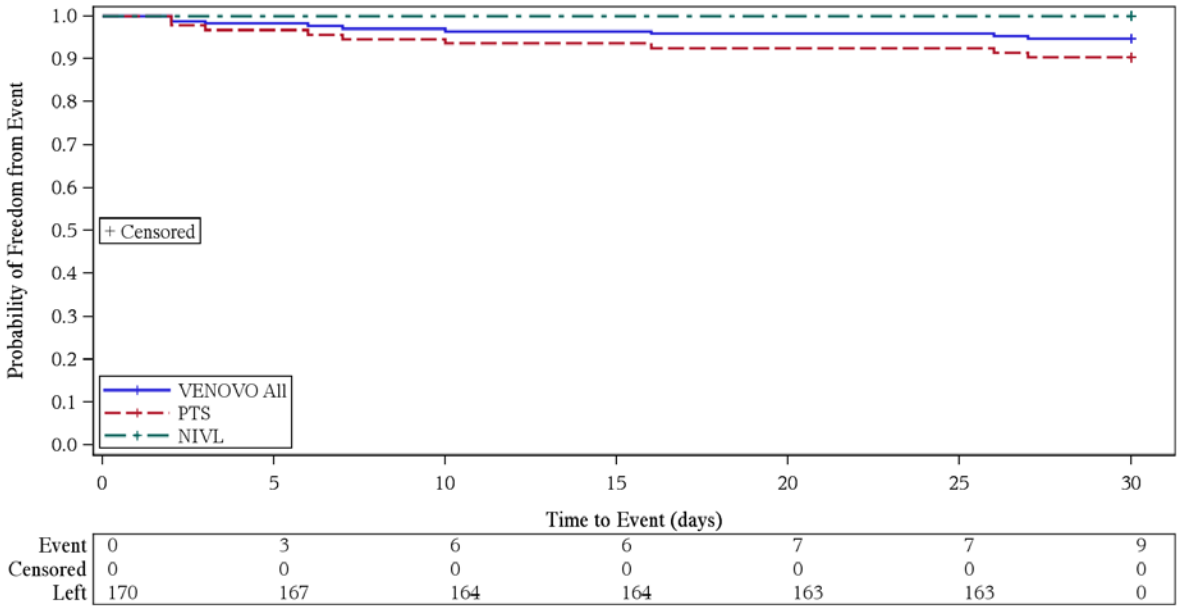
Primary Safety Endpoint	PTS N = 93 n/N (%)	NIVL N = 77 n/N (%)	Total N = 170 n/N (%)	90% CI (%)	p-value
Free from Composite Safety Events (MAE) through 30 Days	82/93 (88.2)	77/77 (100.0)	159/170 (93.5)	[89.5%,96.3]	0.0322
Had Failure:*	11/93 (11.8)	0	11/170 (6.5)		
TVR	6/93 (6.5)	0	6/170 (3.5)		
Pulmonary Embolism	1/93 (1.1)	0	1/170 (0.6)		
Device or procedure-related acute DVT	10/93 (10.8)	0	10/170 (5.9)		

Note: The primary safety endpoint is freedom from major adverse events (MAEs) through 30 days post-index procedure, as adjudicated by CEC. The p-value is computed compared with performance goal = 89% on one-sided exact binomial test. The 90% confidence interval is calculated using the exact binomial method.
**Six (6) of the eleven (11) subjects had more than one MAE (i.e. TVR and device or procedure related DVT)*

As represented in Table 10 above, eleven (11) subjects experienced MAEs. Six of these eleven subjects experienced more than one MAE. One subject experienced one (1) clinically significant pulmonary embolism (PE) after the index procedure, which was determined by the CEC to not be device- or procedure-related. Six (6) subjects were reported to have a TVR and a procedure- or device-related DVT after index procedure. Four (4) subjects were reported to have a procedure or device-related DVT. These eleven (11) subjects were counted as failures (per the Statistical Analysis Plan (SAP)) toward the primary safety endpoint. Any subject who did not experience an identified MAE and did not discontinue the study prior to day 30 was considered free from MAE through 30 days and was included in the analysis.

Figure 4 presents the Kaplan-Meier curve for primary safety endpoint through 30 days for all treated subjects.

Figure 4: Kaplan-Meier Analysis of the Primary Safety Endpoint (ITT Subjects)



Adverse Events that occurred in the PMA clinical study

A list of Adverse Events (AEs) observed in the Clinical Study through 12-months can be found in Table 11. The CEC reviewed all adverse events during the study and determined that no serious adverse events (SAEs) were definitely device-related. There were no unanticipated adverse device effects (UADE).

Table 11: Subjects with Adverse Events by Body System and Preferred Term (Site Reported) - Intent to Treat Subjects

	PTS (N = 93)	NIVL (N=77)	VENOVO (N = 170)
Any Adverse Events	**152**	**125**	**277**
Sent for Adjudication	**75**	**54**	**129**
Any Subjects with at least one AE	**59 (63.4%)**	**46 (59.7%)**	**105 (61.8%)**
Blood and lymphatic system disorders	**1 (1.1%)**	**4 (5.2%)**	**5 (2.9%)**
Anemia	0	1 (1.3%)	1 (0.6%)
Hemorrhagic anemia	1 (1.1%)	2 (2.6%)	3 (1.8%)
Leukopenia	0	1 (1.3%)	1 (0.6%)
Cardiac disorders	**2 (2.2%)**	**5 (6.5%)**	**7 (4.2%)**
Angina pectoris	0	2 (2.6%)	2 (1.2%)
Angina unstable	1 (1.1%)	0	1 (0.6%)
Cardiac failure congestive	1 (1.1%)	1 (1.3%)	2 (1.2%)
Coronary artery disease	0	2 (2.6%)	2 (1.2%)
Palpitations	0	1 (1.3%)	1 (0.6%
Eye disorders	**0**	**1 (1.3%)**	**1 (0.6%)**

	PTS (N = 93)	NIVL (N=77)	VENOVO (N = 170)
Retinal detachment	0	1 (1.3%)	1 (0.6%)
Gastrointestinal disorders	**12 (12.9%)**	**5 (6.5%)**	**17 (10.0%)**
Abdominal pain	1 (1.1%)	0	1 (0.6%)
Abdominal pain lower	2 (2.2%)	0	2 (1.2%)
Abdominal tenderness	1 (1.1%)	0	1 (0.6%)
Coeliac artery stenosis	1 (1.1%)	0	1 (0.6%)
Constipation	1 (1.1%)	0	1 (0.6%)
Diverticular perforation	1 (1.1%)	0	1 (0.6%)
Diverticulum	1 (1.1%)	0	1 (0.6%)
Gingival bleeding	1 (1.1%)	0	1 (0.6%)
Hemorrhoidal hemorrhage	1 (1.1%)	0	1 (0.6%)
Mouth hemorrhage	1 (1.1%)	0	1 (0.6%)
Nausea	0	1 (1.3%)	1 (0.6%)
Rectal hemorrhage	1 (1.1%)	0	1 (0.6%)
Rectal polyp	1 (1.1%)	0	1 (0.6%)
Toothache	0	1 (1.3%)	1 (0.6%)
Umbilical hernia	0	1 (1.3%)	1 (0.6%)
Vomiting	0	2 (2.6%)	2 (1.2%)
General disorders and administration site conditions	**28 (30.1%)**	**13 (16.9%)**	**41 (24.1%)**
Adverse drug reaction	2 (2.2%)	2 (2.6%)	4 (2.4%)
Chest discomfort	1 (1.1%)	0	1 (0.6%)
Death	3 (3.2%)	1 (1.3%)	4 (2.4%)
Device occlusion	3 (3.2%)	0	3 (1.8%)
Fatigue	2 (2.2%)	0	2 (1.2%)
Induration	0	1 (1.3%)	1 (0.6%
Injection site discoloration	0	2 (2.6%)	2 (1.2%)
Injection site discomfort	0	3 (3.9%)	3 (1.8%)
Injection site hematoma	0	1 (1.3%)	1 (0.6%)
Injection site induration	0	2 (2.6%)	2 (1.2%)
Injury associated with device	0	1 (1.3%)	1 (0.6%)
Local swelling	2 (2.2%)	0	2 (1.2%)
Non-cardiac chest pain	0	1 (1.3%)	1 (0.6%)
Edema peripheral	3 (3.2%)	1 (1.3%)	4 (2.4%)
Thrombosis in device	10 (10.8%)	0	10 (5.9%)
Vessel puncture site hematoma	2 (2.2%)	1 (1.3%)	3 (1.8%)
Vessel puncture site hemorrhage	2 (2.2%)	0	2 (1.2%)
Vessel puncture site pain	2 (2.2%)	3 (3.9%)	5 (2.9%)
Vessel puncture site swelling	1 (1.1%)	0	1 (0.6%)
Immune system disorders	**1 (1.1%)**	**1 (1.3%)**	**2 (1.2%)**
Hypersensitivity	1 (1.1%)	1 (1.3%)	2 (1.2%)
Infections and infestations	**7 (7.5%)**	**7 (9.1%)**	**14 (8.2%)**
Arthritis bacterial	0	1 (1.3%)	1 (0.6%)
Cellulitis	1 (1.1%)	0	1 (0.6%
Clostridium difficile infection	0	1 (1.3%)	1 (0.6%
Erysipelas	1 (1.1%)	0	1 (0.6%)
Lower respiratory tract infection	1 (1.1%)	0	1 (0.6%)
Nasopharyngitis	1 (1.1%)	0	1 (0.6%)

	PTS (N = 93)	NIVL (N=77)	VENOVO (N = 170)
Esophageal candidiasis	0	1 (1.3%)	1 (0.6%)
Parotitis	1 (1.1%)	0	1 (0.6%)
Pneumonia	0	1 (1.3%)	1 (0.6%)
Urinary tract infection	2 (2.2%)	3 (3.9%)	5 (2.9%)
Viral infection	0	1 (1.3%)	1 (0.6%
Injury, poisoning and procedural complications	**19 (20.4%)**	**10 (13.0%)**	**29 (17.1%)**
Contusion	1 (1.1%)	0	1 (0.6%)
Cystitis radiation	1 (1.1%)	0	1 (0.6%)
Excoriation	0	1 (1.3%)	1 (0.6%)
Femoral neck fracture	0	1 (1.3%)	1 (0.6%)
Laceration	3 (3.2%)	0	3 (1.8%)
Limb injury	0	1 (1.3%)	1 (0.6%)
Meniscus injury	1 (1.1%)	0	1 (0.6%)
Muscle strain	3 (3.2%)	0	3 (1.8%)
Nerve injury	0	1 (1.3%)	1 (0.6%)
Post procedural discomfort	3 (3.2%)	2 (2.6%)	5 (2.9%)
Procedural pain	7 (7.5%)	5 (6.5%)	12 (7.1%)
Upper limb fracture	1 (1.1%)	0	1 (0.6%)
Vascular pseudoaneurysm	0	2 (2.6%)	2 (1.2%)
Metabolism and nutrition disorders	**0**	**1 (1.3%)**	**1 (0.6**
Hypokalemia	0	1 (1.3%)	1 (0.6%)
Musculoskeletal and connective tissue disorders	**12 (12.9%)**	**16 (20.8%)**	**28 (16.5%)**
Arthralgia	1 (1.2%)	6 (7.8%)	7 (4.1%)
Back pain	3 (3.2%)	4 (5.2%)	7 (4.1%)
Bursitis	0	1 (1.3%)	1 (0.6%)
Limb discomfort	2 (2.2%)	1 (1.3%)	3 (1.8%)
Musculoskeletal chest pain	1 (1.1%)	0	1 (0.6%)
Musculoskeletal discomfort	2 (2.2%)	0	2 (1.2%)
Osteoarthritis	1 (1.1%)	1 (1.3%)	2 (1.2%)
Pain in extremity	2 (2.2%)	4 (5.2%)	6 (3.5%)
Rhabdomyolysis	1 (1.1%)	1 (1.3%)	2 (1.2%)
Neoplasms benign, malignant and unspecified (incl cysts and polyps)	**3 (3.2%)**	**2 (2.6%)**	**5 (2.9%)**
Benign neoplasm of bladder	1 (1.1%)	0	1 (0.6%)
Colon cancer	0	1 (1.3%)	1 (0.6%)
Prostate cancer recurrent	1 (1.1%)	0	1 (0.6%)
Uterine leiomyoma	1 (1.1%)	1 (1.3%)	2 (1.2%)
Nervous system disorders	**5 (5.4%)**	**8 (10.4%)**	**13 (7.6%)**
Burning sensation	1 (1.1%)	0	1 (0.6%)
Headache	0	2 (2.6%)	2 (1.2%)
Hypoesthesia	1 (1.1%)	3 (3.9%)	4 (2.4%)
Meralgia paraesthetica	0	1 (1.3%)	1 (0.6%)
Paresthesia	2 (2.2%)	2 (2.6%)	4 (2.4%)
Sciatica	0	1 (1.3%)	1 (0.6%)
Status epilepticus	1 (1.1%)	0	1 (0.6%)
Syncope	1 (1.1%)	0	1 (0.6%)
Psychiatric disorders	**3 (3.2%)**	**1 (1.3%)**	**4 (2.4%)**
Alcohol withdrawal syndrome	1 (1.1%)	0	1 (0.6%)

	PTS (N = 93)	NIVL (N=77)	VENOVO (N = 170)
Mental status changes	0	1 (1.3%)	1 (0.6%)
Panic attack	1 (1.1%)	0	1 (0.6%)
Psychotic disorder	1 (1.1%)	0	1 (0.6%)
Renal and urinary disorders	**9 (9.7%)**	**2 (2.6%)**	**11 (6.5%)**
Hematuria	1 (1.1%)	1 (1.3%)	2 (1.2%)
Nephrolithiasis	2 (2.2%)	0	2 (1.2%)
Renal artery arteriosclerosis	1 (1.1%)	0	1 (0.6%)
Renal failure acute	1 (1.1%)	1 (1.3%)	2 (1.2%)
Renal impairment	2 (2.2%)	0	2 (1.2%)
Urinary incontinence	1 (1.1%)	0	1 (0.6%)
Urinary retention	1 (1.1%)	0	1 (0.6%)
Reproductive system and breast disorders	**2 (2.2%)**	**2 (2.6%)**	**4 (2.4%)**
Cystocele	0	1 (1.3%)	1 (0.6%)
Menorrhagia	1 (1.1%)	0	1 (0.6%)
Pelvic pain	0	1 (1.3%)	1 (0.6%)
Vaginal hemorrhage	1 (1.1%)	0	1 (0.6%)
Varicose veins pelvic	1 (1.1%)	0	1 (0.6%)
Respiratory, thoracic and mediastinal disorders	**5 (5.4%)**	**3 (3.9%)**	**8 (4.7%)**
Acute respiratory failure	0	1 (1.3%)	1 (0.6%)
Dyspnea	1 (1.1%)	1 (1.3%)	2 (1.2%
Epistaxis	1 (1.1%)	1 (1.3%)	2 (1.2%)
Hemoptysis	1 (1.1%)	0	1 (0.6%)
Pneumonia aspiration	1 (1.1%)	0	1 (0.6%)
Upper-airway cough syndrome	1 (1.1%)	0	1 (0.6%
Skin and subcutaneous tissue disorders	**6 (6.5%)**	**4 (5.2%)**	**10 (5.9%)**
Blister	1 (1.1%)	0	1 (0.6%)
Decubitus ulcer	0	1 (1.3%)	1 (0.6%)
Diabetic neuropathic ulcer	0	1 (1.3%)	1 (0.6%
Rash	1 (1.1%)	0	1 (0.6%)
Rash generalized	1 (1.1%)	0	1 (0.6%)
Rash macular	0	1 (1.3%)	1 (0.6%)
Rash maculo-papular	1 (1.1%)	0	1 (0.6%)
Skin disorder	1 (1.1%)	0	1 (0.6%)
Skin ulcer	2 (2.2%)	1 (1.3%)	3 (1.8%)
Vascular disorders	**13 (14.0%)**	**16 (20.8%)**	**29 (17.1%)**
Circulatory collapse	1 (1.1%)	0	1 (0.6%)
Deep vein thrombosis	4 (4.3%)	0	4 (2.4%)
Hematoma	1 (1.1%)	1 (1.3%)	2 (1.2%)
Iliac vein occlusion	1 (1.1%)	1 (1.3%)	2 (1.2%)
Orthostatic hypotension	0	1 (1.3%)	1 (0.6%)
Pelvic venous thrombosis	1 (1.1%)	0	1 (0.6%)
Peripheral arterial occlusive disease	0	2 (2.6%)	2 (1.2%
Peripheral artery stenosis	0	1 (1.3%)	1 (0.6%)
Peripheral artery thrombosis	0	1 (1.3%)	1 (0.6%)
Post thrombotic syndrome	0	1 (1.3%)	1 (0.6%)
Thrombophlebitis superficial	1 (1.1%)	0	1 (0.6%)
Varicose vein	0	5 (6.5%)	5 (2.9%)

	PTS (N = 93)	NIVL (N=77)	VENOVO (N = 170)
Vasospasm	0	1 (1.3%)	1 (0.6%)
Venous insufficiency	2 (2.2%)	5 (6.5%)	7 (4.1%)
Venous stenosis	2 (2.2%)	0	2 (1.2%)

Note that events were coded using MedDRA version 16.1.
All AEs up to Day 395 were included. The summary is by subject. Some AEs may be described by multiple preferred terms, in these cases only the most pertinent term was used.

There were four (4) deaths reported in the 12-month follow-up period. Two (2) deaths were classified as unknown per CEC adjudication because the subjects expired with an unknown cause. The remaining two death events were adjudicated by the CEC and determined to not be related to the study device or procedure. One (1) subject expired from metastatic rectal cancer and one (1) subject expired from acute myocardial infarction resulting in cardiac arrest.

2. Effectiveness Results

The primary effectiveness endpoint of the study was primary patency at 12-months post-index procedure, defined as: freedom from TVR and freedom from thrombus occlusion and stenosis > 50% as measured by DUS. The primary effectiveness endpoint was evaluated using the 145 ITT subjects with evaluable 12-month follow up imaging. The primary effectiveness endpoint was evaluated against a literature-derived PG of 74%, which was set at 10% below the weighted mean of primary patency rate at 12-months as a combination of 55% PTS subjects at primary patency rate of 77.1% and 45% NIVL subjects at primary patency rate of 93.4%.

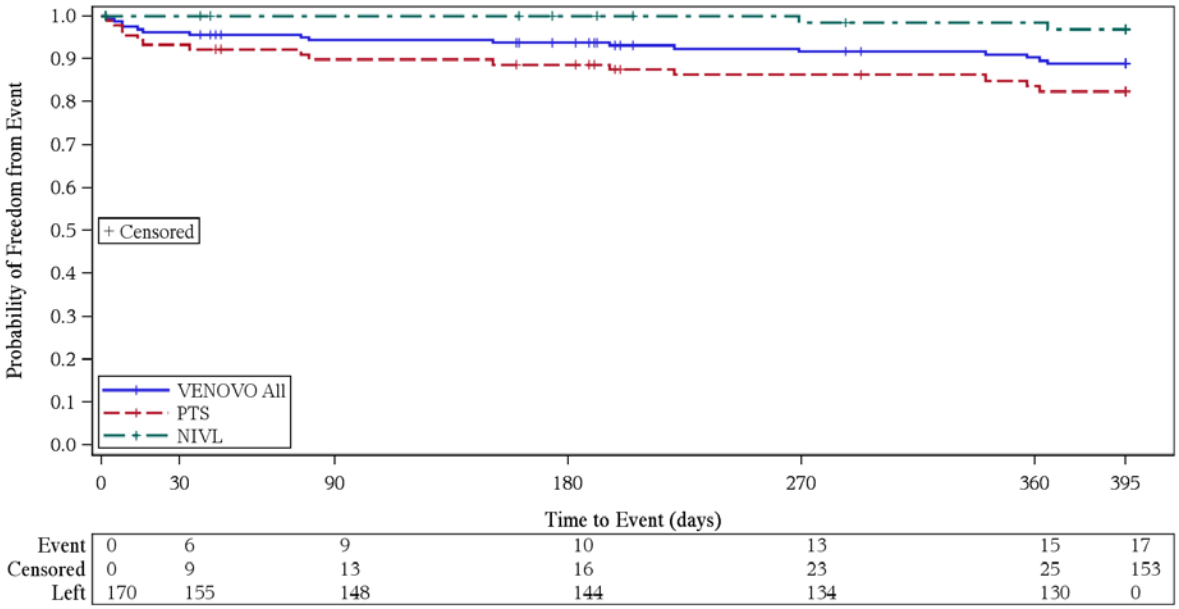
As presented in Table 12, the 12-month weighted primary patency rate in the VENOVO Venous Stent group was 88.3% with 90% CI [82.4%, 94.2%] and met the PG of 74%.

Table 12: Analysis of the Primary Effectiveness Endpoint (ITT Subjects)

	PTS N = 93 n/N(%) [90% CI]	NIVL N = 77 n/N(%) [90% CI]	VENOVO Unweighted N = 170 n/N(%) [90% CI]	VENOVO Weighted N = 170 % [90% CI]	p-value
Primary Patency at 12-month	65/80 (81.3) [72.6,88.1]	63/65 (96.9) [90.6,99.5]	128/145 (88.3) [82.9,92.4]	88.3 [82.4, 94.2]	<.0001
	n/N(%)	**n/N(%)**	**n/N(%)**	**%**	
Subjects Failed at 12-month*	15/80 (18.8)	2/65 (3.1)	17/145 (11.7)	11.7	
TVR	11/80 (13.8)	1/65 (1.5)	12/145 (8.3)	8.3	
Thrombus Occlusion	1/80 (1.3)	0	1/145 (0.7)	0.7	
> 50% Stenosis	7/80 (8.8)	1/65 (1.5)	8/145 (5.5)	5.5	

Figure 5 presents the Kaplan-Meier curve for primary effectiveness endpoint through 12-months for all treated subjects.

Figure 5: Kaplan-Meier Analysis of the Primary Effectiveness Endpoint (ITT Subjects)



Event	0	6	9	10	13	15	17
Censored	0	9	13	16	23	25	153
Left	170	155	148	144	134	130	0

3. Secondary Endpoints

Table 13 presents information on secondary endpoints without hypothesis testing. These secondary endpoints were evaluated at the time of the procedure: acute technical success, acute procedure success, and lesion success. Acute Technical Success as defined as successful deployment of stent(s) to intended target with adequate lesion coverage as assessed by the Investigator was achieved in 100% (170/170) of the treated study population. Acute Procedure Success as defined as technical success with no MAEs (see primary safety endpoint definition) between index procedure and discharge was achieved in 98.8% (168/170) of the treated population with two subjects in the PTS subgroup recorded MAEs. Lesion Success defined as attainment of ≤ 50% residual stenosis (based on Core Lab assessment) at the conclusion of the index procedure was achieved in 100% (170/170) of the study population.

Freedom from TLR was 96.5% at 30 days, 94.7% at 6-months, and 92.6% at 12-months in the evaluable subjects. Freedom from TVR, as determined by an independent Core Lab was 96.5% at 30 days, 94.7% at 6-months, and 92.6% at 12-months in the evaluable subjects.

Stents were evaluated at the 12-month follow-up for fracture analysis. X-rays from one hundred thirty-seven (137) subjects were analyzed, and no stent fractures were reported. Missing x-ray analyses were recorded as Protocol Deviations.

Table 13: Secondary Endpoints without Hypothesis Testing

	All Subjects N=170			
	PTS N =93 n/N (%)	**NIVL N=77 n/N (%)**	**Total N=170 n/N (%)**	**95% Confidence Interval**
Acute Technical Success	93/93 (100.0)	77.77 (100.0)	170/170 (100.0)	[97.9%, 100.0]
Acute Procedure Success	91/93 (97.8)	77.77 (100.0)	168/170 (98.8)	[95.8%, 99.9]
Lesion Success	93/93 (100.0)	77/77 (100.0)	170/170 (100.0)	[97.9%, 100.0]
Freedom from TLR				
30 Day	87/93 (93.5)	77/77 (100.0	164/170 (96.5)	[92.5%, 98.7]
6 Months	84/93 (90.3)	77/77 (100.0)	161/170 (94.7)	[90.2%, 97.6]
12 Months	78/89 (87.6)	73/74 (98.6)	151/163 (92.6)	[87.5%, 96.1]
Freedom from TVR				
30 Day	87/93 (93.5)	77/77 (100.0)	164/170 (96.5)	[92.5%, 98.7]
6 Months	84/93 (90.3)	77/77 (100.0)	161/170 (94.7)	[90.2%, 97.6]
12 Months	78/89 (87.6)	73/74 (98.6)	151/163 (92.6)	[87.5%, 96.1]
Freedom from Stent Fracture				
12 Months	72/72 (100.0)	65/65 (100.0)	137/137 (100.0)	

Table 14 presents the 12-month VCSS pain score which improved from baseline in the ITT population with a decrease of 1.7 with a 95% confidence interval of -1.81 to -1.49 ($p < .0001$). Table 15 presents the 12-month CIVIQ-20 change from baseline in the total study population which was -15.7 with a 95% confidence interval of -18.41 to -12.96 ($p < .0001$).

Table 14: Analysis of VCSS Pain Score at 12 Months (ITT Subjects)

		PTS N = 93	**NIVL N = 77**	**Total N = 170**	**p-value**
	N	83	72	155	
Baseline	Mean (95% CI)	2.2 (2.08,2.35)	2.3 (2.14,2.44)	2.3 (2.15,2.35)	
12 Month	Mean (95% CI)	0.7 (0.48,0.90)	0.5 (0.33,0.67)	0.6 (0.46,0.74)	
12 Month Change from Baseline	Mean (95% CI)	-1.5 (-1.75,-1.31)	-1.8 (-2.02,-1.57)	-1.7 (-1.81,-1.49)	<.0001

Table 15: Analysis of Total CIVIQ-20 Score at 12 Months (ITT Subjects)

		PTS N = 93	**NIVL N = 77**	**Total N = 170**	**p-value**
	N	81	72	153	
Baseline	Mean (95% CI)	52.5 (48.62,56.37)	45.7 (41.81,49.52)	49.3 (46.52,52.04)	
12 Month	Mean (95% CI)	34.0 (30.45,37.63)	33.1 (29.32,36.88)	33.6 (31.02,36.17)	
12 Month Change from Baseline	Mean (95% CI)	-18.5 (-22.23,-14.68)	-12.6 (-16.48,-8.66)	-15.7 (-18.41,-12.96)	<.0001

Table 16 summaries the CEAP scores assessed at baseline, 30-days, 6- months, and 12- months. Although not powered, there was an observed trend toward a reduction in the disease classifications (from baseline to 12-months) for CEAP "C" > 2.

Table 16: Analysis of CEAP by Follow-Up Period (ITT Subjects)

	All Subjects N = 170			
Assessment	**Baseline**	**30 Day**	**6 Month**	**12 Month**
Clinical "C" Classification				
Category	**n/N (%)**	**n/N (%)**	**n/N (%)**	**n/N (%)**
CLASS 0 - No visible signs of venous disease	0	28/166 (16.87)	34/160 (21.25)	40/155 (25.81)
CLASS 1 - Telangiectasias or reticular veins	2/170 (1.18)	15/166 (9.04)	18/160 (11.25)	23/155 (14.84)
CLASS 2 - Varicose veins	2/170 (1.18)	37/166 (22.29)	38/160 (23.75)	27/155 (17.42)
CLASS 3 - Oedema	112/170 (65.88)	52/166 (31.33)	35/160 (21.88)	34/155 (21.94)
CLASS 4 - Skin changes ascribed to venous disease (e.g. pigmentation, venous eczema, lipo-dermatosclerosis)	36/170 (21.18)	22/166 (13.25)	24/160 (15.00)	22/155 (14.19)
CLASS 5 - Skin changes as defined above with healed ulceration	7/170 (4.12)	8/166 (4.82)	9/160 (5.63)	6/155 (3.87)
CLASS 6 - Skin changes as defined above with active ulceration	11/170 (6.47)	4/166 (2.41)	2/160 (1.25)	3/155 (1.94)
Value				
N	170	166	160	155
Mean(SD)	3.5(0.90)	2.4(1.51)	2.2(1.57)	2.0(1.63)
Median	3.0	3.0	2.0	2.0
Min, Max	1, 6	0, 6	0, 6	0, 6
95% CI	(3.32, 3.59)	(2.16, 2.62)	(1.95, 2.45)	(1.77, 2.29)
Change from Baseline				
N		166	160	155
Mean(SD)		-1.1(1.26)	-1.3(1.34)	-1.5(1.33)
Median		-1.0	-1.0	-1.0
Min, Max		-4, 2	-5, 2	-5, 1
95% CI		(-1.26, -0.87)	(-1.47, -1.05)	(-1.67, -1.25)
Etiology "E" Classification				
	n/N (%)	**n/N (%)**	**n/N (%)**	**n/N (%)**
ETIOLOGY C - Congenital	9/170 (5.29)	9/166 (5.42)	10/160 (6.25)	7/154 (4.55)
ETIOLOGY P - Primary	91/170 (53.53)	86/166 (51.81)	78/160 (48.75)	71/154 (46.10)
ETIOLOGY S - Secondary (usually due to prior DVT)	70/170 (41.18)	71/166 (42.77)	72/160 (45.00)	76/154 (49.35)
Anatomy "A" Classification				
	n/N (%)	**n/N (%)**	**n/N (%)**	**n/N (%)**
ANATOMY S - Superficial veins	11/170 (6.47)	14/166 (8.43)	16/160 (10.00)	20/153 (13.07)
ANATOMY D - Deep veins	158/170 (92.94)	151/166 (90.96)	143/160 (89.38)	131/153 (85.62)
ANATOMY P - Perforating veins	1/170 (0.59)	1/166 (0.60)	1/160 (0.63)	2/153 (1.31)
Pathophysiology "P" Classification				
	n/N (%)	**n/N (%)**	**n/N (%)**	**n/N (%)**
PATHOPHYSIOLOGY R - Reflux	9/170 (5.29)	8/166 (4.82)	10/160 (6.25	15/154 (9.74)
PATHOPHYSIOLOGY O - Obstruction	70/170 (41.18)	60/166 (36.14)	51/160 (31.88)	50/154 (32.47)

	All Subjects N = 170			
Assessment	**Baseline**	**30 Day**	**6 Month**	**12 Month**
Clinical "C" Classification				
Category	**n/N (%)**	**n/N (%)**	**n/N (%)**	**n/N (%)**
PATHOPHYSIOLOGY R,O - Reflux and Obstruction	90/170 (52.94)	85/166 (51.20)	83/160 (51.88)	72/154 (46.75)
PATHOPHYSIOLOGY N - No venous pathology identifiable	1/170 (0.59)	13/166 (7.83)	16/160 (10.00)	17/154 (11.04)

4. Subgroup Analyses

   Analyses to evaluate differences in the primary effectiveness endpoint of the evaluable subjects were conducted for subgroups defined for age, gender, ethnicity, race and disease category, although the study was not specifically powered for these subgroups. No differences were noted based on age or gender. The small differences based on race and ethnicity are likely due to the small sample size.

5. Pediatric Extrapolation

   In this premarket application, existing clinical data were not leveraged to support approval of a pediatric patient population.

E. Financial Disclosure

The Financial Disclosure by Clinical Investigators regulation (21 CFR 54) requires applicants who submit a marketing application to include certain information concerning the compensation to, and financial interests and arrangement of, any clinical investigator conducting clinical studies covered by the regulation. The clinical study included 22 investigators of which none were full-time or part-time employees of the sponsor and 7 had disclosable financial interests/arrangements as defined in 21 CFR 54.2(a), (b), (c) and (f) and described below:

- Compensation to the investigator for conducting the study where the value could be influenced by the outcome of the study: 0
- Significant payment of other sorts: 7
- Proprietary interest in the product tested held by the investigator: 0
- Significant equity interest held by investigator in sponsor of covered study: 0

The applicant has adequately disclosed the financial interest/arrangements with clinical investigators. An initial analysis was conducted which did not raise any questions about the reliability of the data.

XI. PANEL MEETING RECOMMENDATION AND FDA'S POST-PANEL ACTION

In accordance with the provisions of section 515(c)(3) of the act as amended by the Safe Medical Devices Act of 1990, this PMA was not referred to the Circulatory System Devices Panel, an FDA advisory committee, for review and recommendation because the

information in the PMA substantially duplicates information previously reviewed by this panel.

XII. CONCLUSIONS DRAWN FROM CLINICAL STUDY

A. Effectiveness Conclusions

The *in vitro* engineering testing conducted on the stent and delivery system demonstrated that the performance characteristics of the device met the product specifications. The test results obtained from sterilization testing demonstrated that the product can be adequately sterilized and is acceptable for clinical use. The shelf life testing has established acceptable performance for a labeled shelf life up to 2 years.

The global, prospective, non-randomized, multi-center VERNACULAR clinical study was designed to evaluate the VENOVO Venous Stent for the treatment of symptomatic iliofemoral venous outflow obstruction. The primary effectiveness endpoint of the study was primary patency at 12-months post-index procedure, defined as: freedom from TVR and freedom from thrombus occlusion and stenosis > 50% as measured by DUS. The primary effectiveness endpoint was evaluated against a literature-derived PG based on a weighted mean of primary patency rate at 12-month in subjects with Post-Thrombotic Syndrome (PTS) or non-thrombotic iliac vein lesions (NIVL).

The 12-month weighted primary patency rate in the 145 subjects with evaluable imaging was 88.3% with a 90% CI [82.4%, 94.2%] and met the PG of 74% as derived from literature (one-sided p-value <0.0001). Additionally, patients improved clinically as demonstrated by reductions in the VCSS Pain Score, CIVIQ-20 assessment, and CEAP classifications at 12-months.

B. Safety Conclusions

The biocompatibility and *in vivo* animal testing demonstrated that the acute and chronic *in vivo* performance characteristics of the VENOVO Venous Stent provide reasonable assurance of safety and acceptability for the intended clinical use.

In the VERNACULAR trial, all 170 treated study subjects were included in the 30-day primary safety analysis. The primary safety endpoint was freedom from Major Adverse Events (MAEs) through 30 days defined as the following:

- Target Vessel Revascularization
- Device and/or procedure related death
- Major amputation of target limb
- Pulmonary Embolism (PE) which is clinically important (symptomatic with chest pain, hemoptysis, dyspnea, hypoxia, etc.)
- Vascular injury requiring surgical/endovascular intervention
- Embolization/migration of stent
- Device or procedure related acute DVT involving the treated limb.

The proportion of subjects free from primary safety events was 93.5% with 90% CI [89.5%,96.3%], which met the literature-derived PG of 89%. No deaths occurred that were related to the study device. In addition, no stent fractures were reported at 12-months.

C. Benefit-Risk Determination

The probable benefits and risks of the device are also based on data collected in a clinical study conducted to support PMA approval as described above. The probable benefit of using the VENOVO Venous Stent to treat symptomatic iliofemoral venous outflow obstruction is providing an alternative treatment method to current standard of care by improving blood flow and quality of life. The frequency and the types of the adverse events reported through the pivotal clinical study are in alignment with those that might be expected in the studied patient population and therapeutic area.

In conclusion, given the available information above, the data support that the probable benefits outweigh the probable risks for using the VENOVO Venous Stent for the treatment of symptomatic iliofemoral venous outflow obstruction.

1. Patient Perspectives

   This submission did not include specific information on patient perspectives for this device.

D. Overall Conclusions

The clinical and non-clinical data in this application support the reasonable assurance of safety and effectiveness of the devices when used in accordance with the indications for use. The results of the prospective, multi-center, non-randomized, single-arm clinical study demonstrate that the VENOVO Venous Stent is safe and effective in the treatment of symptomatic iliofemoral venous obstruction when used in accordance with the labeling and Instructions for Use.

XIII. CDRH DECISION

CDRH issued an approval order on 3/13/2019 with the following Conditions of Approval.

Post-Approval Study – VERNACULAR Continued Follow-Up Study. This study should be conducted per protocol VERNACULAR, BPV-14-007 Version 2.0 (dated January 31, 2018). This study is a prospective, multi-center follow-up of the VERNACULAR pivotal study (G150248) that treated 170 subjects from 21 investigational sites. It will evaluate the long-term safety and effectiveness of the VENOVO Venous Stent System. All 160 remaining subjects (10 subjects have discontinued the study), active at the end of the 12-month evaluation, will continue to be followed annually through 36 months. The primary endpoint to be assessed is freedom from target lesion revascularization (TLR) at 36 months, as defined by the protocol. The secondary endpoints to be assessed include the following:

1. Overall rate and incidence of type of serious adverse events from Day 0 through completion of Study follow-up at Month 36.
2. Primary stent patency rate: determined at Month 24 and Month 36 per protocol definition of primary stent patency.
3. Freedom from target lesion revascularization (TLR) at Month 24 and Month 36, as defined by the protocol.
4. Freedom from target vessel revascularization (TVR) at Month 24 and Month 36, as defined by the protocol.
5. Comparison of VCSS Scores measured at Baseline, Month 12, Month 24 and Month 36.
6. Comparison of Quality of Life Questionnaire (QOL) Scores measured at Baseline, Month 12, Month 24 and Month 36.
7. Comparison of CEAP Scores measured at Baseline, Month 12, Month 24 and Month 36.
8. Stent integrity measured as freedom from stent fracture, defined as clear interruption of a stent strut observed in a minimum of two projections, determined by core lab examination of X-rays at 24 and 36 Months.

The applicant's manufacturing facilities have been inspected and found to be in compliance with the device Quality System (QS) regulation (21 CFR 820).

XIV. APPROVAL SPECIFICATIONS

Directions for use: See device labeling.

Hazards to Health from Use of the Device: See Indications, Contraindications, Warnings, Precautions, and Adverse Events in the device labeling.

Post-approval Requirements and Restrictions: See approval order.