Angioslide PROTEUS™ PTA Catheter with Embolic Capture Feature

Caution: Federal law (US) restricts this device to sale by or on the order of a physician.

Device Description (see Figure 1)

The Angioslide PROTEUS™ Percutaneous Transluminal Angioplasty (PTA) Balloon Catheter with Embolic Capture Feature is an over the wire dual lumen catheter with a foldable balloon (5) located near the distal atraumatic soft tip (9).

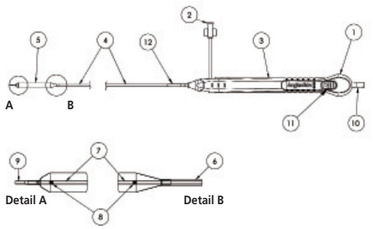

Figure 1

One lumen is used for inflation of the balloon and is accessed via the inflation port (2). The other lumen, starting at the guidewire port (10), allows access to the distal tip for guidewire insertion (refer to package labeling for guidewire size). The balloon has two radiopaque markers (8) for positioning the balloon relative to stenosis. The radiopaque markers indicate the dilating section of the balloon and help in balloon placement. The balloon is designed to provide an inflatable segment of known diameter and length at specified pressure.

The shaft (4) comprises the outer shaft (6) and the inner shaft (7). The distal end of the balloon (A) is connected to the inner shaft and the proximal end of the balloon (B) is connected to the outer shaft. The inner shaft is connected to the proximal hub (10) which is connected to the pulling knob (1) and the outer shaft is connected to the handle grip (3). The pulling knob lock (11) locks the handle grip and the pulling knob together. The distal end of the balloon is folded inwards towards the proximal end of the balloon, by pressing on pulling knob lock (11) and pulling the pulling knob away from the handle (1).

The embolic capture feature involves a single-use suction mechanism that works through inwards folding of the balloon, which creates negative pressure within the capture cavity for debris capture and removal. The reduced pressure in the capture cavity causes some of the particles that are released during the procedure to flow into the cavity for containment and removal.

The balloon size and diameter are printed on the strain relief (12). Refer also to the package label for information about catheter length, balloon nominal and rated burst pressure, balloon size, balloon compliance, guidewire compatibility and sheath compatibility.

How Supplied

The Angioslide PROTEUS™ is supplied sterile and is intended for single use only. The package includes one Angioslide PROTEUS™ PTA balloon catheter, one protective hoop, one support card and one protective sheath that is placed over the balloon.

Storage

Angioslide PROTEUS™ PTA balloon catheter should be stored in a cool dry place and should be protected from direct sunlight, ionizing radiation and organic solvents.

Indications for Use

The Angioslide PROTEUS™ Percutaneous Transluminal Angioplasty (PTA) Balloon Catheter with Embolic Capture Feature is indicated for peripheral transluminal angioplasty and for capture and removal of embolic material (e.g. debris, thrombus) during angioplasty, for the femoral, iliac, ilio-femoral, popliteal, tibial, peroneal, and profunda arteries.

The Angioslide PROTEUS™ PTA Balloon Catheter with Embolic Capture Feature is not intended for use in the renal, cerebral, coronary or carotid vasculature.

Contraindications

- For pediatric or neonatal use.
- For patients who are contraindicated for angioplasty treatment.
- Any vessel requiring treatment with balloon/stent greater than the maximum balloon diameter listed on the device label.

Warnings

- The safety and efficacy of this device has not been evaluated for use in primary embolectomy or primary thrombectomy procedures.
- Do not reuse or resterilize! Catheters and accessories should be discarded after one procedure as they are extremely difficult to resterilize adequately after being exposed to biological materials and may cause adverse patient reactions if reused. Cleaning and/or resterilizing the product may alter the structural properties.
- Use of guidewires with a diameter other than specified for use within the PROTEUS™ package labeling or designed and intended for use only with specific interventional devices (i.e. ViperWire™) can cause incorrect folding of the balloon during embolic capture and difficulty retracting the balloon into the sheath increasing risk of procedural complications including access site and vessel damage.
- To reduce the potential for vessel damage the inflated diameter of the balloon should approximate the diameter of the vessel just proximal and distal to the stenosis.
- To reduce the potential for vessel damage the catheter should be manipulated while under high-quality fluoroscopic observation when the catheter is exposed to the vascular system.
- Do not advance or retract the catheter or the guidewire unless the balloon is fully deflated under vacuum. If resistance is met during manipulation, determine the cause of the resistance before proceeding.
- Only physicians who are thoroughly trained in angioplasty interventional procedures and are trained in the proper use of the device should use the Angioslide PROTEUS™ Balloon Catheter. (see Physician training section)
- Embolization may occur with each balloon inflation step; embolic capture occurs only after the last inflation step. To avoid release of captured embolic material, do not re-inflate or unfold the balloon after completion of embolic material capture procedure (folding and deflation) unless necessary to retract balloon into the sheath.
- Balloon pressure should not exceed the Rated Burst Pressure. Balloon inflation in excess of the Rated Burst Pressure (RBP) may cause the balloon to rupture and result in vessel damage. Refer to the product label for device specific information. The RBP is based on results of in vitro testing. At least 99.9% of the Balloons (with a 95% confidence) will not burst at or below their RBP. Use of pressure monitoring device is recommended to prevent over-pressurization
- Never use the Angioslide PROTEUS™ Balloon Catheter beyond its "Use Before" date.
- Use only the recommended balloon inflation medium. Never use air or other gaseous medium to inflate the balloon.
- Failure to remove all the air from the balloon during preparation, failure to anchor the catheter handle with slight shaft tension during balloon folding (embolic capture) and deflation, failure to fully complete balloon deflation or undersizing of the balloon diameter may result in incorrect folding of the balloon resulting in difficulty retracting the device into the sheath increasing risk of procedural complications including access site and vessel damage.
- The application of excessive proximal force when retracting the device into the sheath may damage the balloon and result in difficulty in retrieving the catheter.

Precautions

- Store the Angioslide PROTEUS™ Balloon Catheter in a cool dry place. Do not expose the device to organic solvents or ionizing radiation.
- Treatment with the Angioslide PROTEUS™ Balloon Catheter should only be conducted in hospitals where emergency surgery can be immediately performed in the event of a potentially injurious or life-threatening complication.
- Handle the Angioslide PROTEUS™ Balloon Catheter with care. Prior to its use and during the procedure, inspect the package and the catheter for bends, kinks, or other damage.
- Do not use if inner package is damaged or opened and discontinue the use of any component that may have become damaged or contaminated.
- Always refer to package labeling for the Angioslide PROTEUS™ Balloon Catheter compatibility with other interventional devices.
- Precautions to prevent or reduce clotting should be taken when any catheter is used:
  1. Consider the use of systemic heparinization.
  2. Flush or rinse all products entering the vascular system with sterile isotonic saline or a similar solution prior to use.
- To minimize the possible introduction of air into the system it is imperative that prior to proceeding, careful attention is to be paid to the maintenance of tight catheter connections and thorough aspiration and flushing of the system.
- Appropriate anticoagulant and vasodilator therapy must be used during the procedure. Anti-coagulant therapy should be continued for the period of time to be determined by the physician after the procedure.
- If due to unanticipated procedural complications, it becomes necessary to unfold the balloon after performing embolic capture, perform the unfolding maneuver only as follows:
  1. Ensure the proximal end of the balloon is at least 2 cm distal to the end of the introducer sheath and that the guidewire tip is far enough distal to the balloon to allow for unfolding without the interference between the catheter tip and the guidewire tip.
  2. Inflate the balloon to 1.5 atm then advance the pulling rod completely into the handle.
  3. Deflate the balloon completely and withdraw.

Potential Complications

The following complications may occur as a result of PTA, but may not be limited to:

- Spasm reactions of vessel
- Arterial wall injuries, including perforation and dissection
- Access site injuries including hemorrhage or hematoma
- Arteriovenous fistula, false aneurysm
- Vascular thrombosis, systemic embolization
- Infection
- Pyrogenic reaction (fever)
- Amputation
- Death

Complications related to concomitant medication, e.g.,

- Drug reactions
- Bleeding from anticoagulation/antiplatelet medication
- Allergic reactions to contrast medium

Physician Training

Background

Only physicians thoroughly trained in percutaneous intravascular techniques and procedures should use the Angioslide PROTEUS™ Balloon Catheter. The physician should be knowledgeable of the current medical literature concerning the complications of angioplasty.

Training

Angioslide PROTEUS™ Balloon Catheter training and monitoring of 2 initial cases is required. Additional training requirements will be based on the physician's level of experience.

Selection of Balloon Size and Compatibility of System to Accessories

The diameter of the expanded balloon should not exceed that of the artery just distal, or proximal, to the stenosis.

Verify that selected accessories accommodate the balloon catheter. See the balloon catheter label for specific device compatibility.

Preparation for Use

Prior to PTA, all equipment to be used for the procedure, including the catheter, should be carefully examined for defects. Carefully inspect the catheter to verify that it has not been damaged in shipment and that its size, shape and condition are suitable for the planned procedure.

To verify the integrity of the PTA catheter, inflate and deflate the balloon and make sure that all the air is eliminated, and there is no leakage through any of the different connections. Complete the following steps to prepare the catheter for use:

1. Prepare an Inflation device with a mixture of contrast medium and normal saline (recommended ratio of up to 50% contrast)
2. Connect the inflation device to the inflation port of the catheter and inflate to Rated Burst Pressure (RBP) (reference package labelling for Rated Burst Pressure).
3. Carefully inspect handle for leakage; if hydraulic pressure is not maintained and leakage is detected – Discard and replace with new device, and repeat steps 1-3 above.
4. Ensure balloon is deflated, then slide the protective sheath off the balloon.
5. Flush and fill the guide wire lumen of the balloon catheter with heparinized normal saline.
6. To evacuate air from the balloon segment and handle:
   a) Fill a 20 cc syringe or the inflation device with approximately 5 to 10 cc of the recommended contrast medium and saline mixture.
   b) After attaching the syringe or inflation device to the balloon inflation port, orient the balloon catheter with the distal tip and the balloon pointing in a downward vertical position.
   c) Apply negative pressure and aspirate for 15 seconds. Slowly release pressure to neutral, allowing contrast mixture to fill the shaft of the balloon catheter.
   d) Disconnect the syringe or inflation device from the balloon inflation port of the balloon catheter.
   e) Remove all air from the syringe or inflation device barrel. Reconnect the syringe or inflation device to the balloon inflation port of the balloon catheter. Maintain negative pressure on the balloon until air no longer returns to the device.
   f) Slowly release the device pressure to neutral.

Note: All air must be removed from the balloon and displaced by the contrast mixture prior to inserting into vascular system (repeat steps 6 a) through 6 f) as necessary); otherwise complications, as noted in the Precautions section above, may occur.

7. Disconnect the 20 cc syringe (if used) and connect the inflation device to the inflation port of the catheter without introducing air into the catheter.

Note: Perform all further catheter manipulations under fluoroscopic control.

Balloon Dilatation without Embolic Capture (Standard PTA)

1. After positioning the guide wire, advance the balloon catheter over the guide wire and into the stenosis. Inflate the balloon to the pressure of 1 atm to confirm that the balloon is correctly positioned.
2. Inflate the balloon to achieve the desired dilatation.
3. Deflate the balloon by applying negative pressure. Repeat the balloon inflation and deflation as necessary.
4. Retract the balloon catheter under fluoroscopic control into the introducer sheath.

Balloon Dilatation with Embolic Capture

1. After positioning the guide wire, advance the balloon catheter over the guide wire and into the stenosis area.
2. Verify balloon position by means of dedicated markers on balloon catheter.
3. Inflate the balloon to achieve the desired dilatation.
4. Deflate the balloon by applying negative pressure.

Repeat the balloon inflation and deflation as necessary.

Warning: Embolization may occur with each balloon inflation step; embolic capture occurs only after the last inflation step. To avoid release of captured embolic material, do not re-inflate or unfold the balloon after completion of embolic material capture procedure (folding and deflation) unless necessary to remove device due to procedural complications.

5. To remove embolic debris:
   a) Reduce pressure to 1.5 – 2.5 atm.
   b) Anchor the handle grip with slight proximal tension on the catheter shaft.
   c) Press the pulling knob lock from both sides simultaneously to unlock it and pull the pulling knob away from the handle grip until full stop and end part of pulling rod lock snaps into the handle grip; this secures the pulling knob in the retracted position. Do not move the handle when retracting the pulling knob.
   d) Under fluoroscopy, inspect the shape of the proximal cone of the balloon (triangle). If the cone is deformed or compressed, apply slight tension on the catheter shaft to restore the shape of the cone.
   e) Under fluoroscopy and while anchoring the handle, slowly push the pulling knob in the distal direction until movement of the distal marker is initiated (~2mm). Inspect the shape of the proximal cone prior to deflation. If the cone is deformed, apply additional shaft tension to the catheter handle to restore the shape.

   CAUTION: To prevent the potential to release captured particles, distal movement of the pulling knob should be limited to ~2mm.

   f) Completely deflate the balloon by applying negative pressure.
6. After debris removal retract the balloon catheter under fluoroscopic control into the introducer sheath.
7. If resistance is met during the catheter withdrawal through the sheath follow the steps below and attempt retrieval at the completion of each step;

- Under fluoroscopic guidance, slightly advance the catheter shaft distally into the introducer to ensure the balloon is not in the sheath, then ensure the balloon is fully deflated by applying additional vacuum with the inflation device.
- Push the pulling knob into the handle body while observing the position of the distal marker. Ensure the distal marker moves distally a short distance (~10 mm), then re-attempt to withdrawal the balloon. If after performing the above steps, the balloon cannot be withdrawn through the sheath, either unfold the balloon as directed in the final Precaution statement above, or carefully withdraw the catheter and sheath as one unit. Extreme care should be taken to avoid vessel or access site damage when withdrawing catheter and sheath together.

Disposal

Dispose of contaminated device, components, and packaging materials utilizing standard hospital procedures and universal precautions for biohazardous waste.

Table 1: Overview of MC-LEADER Clinical Study

Study Descriptors	MC-LEADER Original (S1)	MC-LEADER Supplemental (S2)	MC-LEADER Summary (pooled)
Objective	The primary objective was to evaluate the performance of the Angioslide PROTEUS™ Balloon Catheter as an Embolic Capture and an Angioplasty device during lower extremity transluminal angioplasty and/or stenting and/or post-stent dilatation of a balloon-expandable stent. The secondary objective was to evaluate additional angioplasty performance measures (Rutherford-Becker, ABI, and TVR) of the Angioslide PROTEUS™ Balloon Catheter as an angioplasty device during lower extremity transluminal angioplasty and/or stenting and/or post-stent dilatation of a balloon-expandable stent. The safety objective was to demonstrate the safety of the Angioslide PROTEUS™ Balloon Catheter.		
Study Design	Prospective, comparative, multi-center, non-randomized, single arm study		
Sample Size	79 (3 Sites OUS)	44 (2 Sites OUS)	123 (3 OUS Sites Total)
Primary Endpoint	• Device success[1] • Embolic particulate analysis[2] • Acute procedural success: <50% res. stenosis	• Device success[1] • Acute procedural success: <50% res. stenosis	Combined Primary Endpoint (Freedom from death, amputation and Target Vessel Revascularization at 30 days)
Secondary Endpoints	• MAE • Clinical success at 30 days: ABI and Rutherford-Becker (RB) improvement, Adverse Event Rate • TVR @ 12 months	• MAE • Clinical success at 30 days: ABI and Rutherford-Becker (RB) improvement, Adverse Event Rate • TVR @ 12 Months	• MAE • Distal Embolization Rate • Device Success • Acute procedural success: <50% res. stenosis • TVR @ 12 Months
Study Hypothesis	Probability of device success is less than 90%	Probability of device success is less than 90%	Safety outcome of PROTEUS treated subjects is not inferior to standard PTA treated patients
Eligibility Criteria Summary	• >18 years • Lifestyle limiting claudication or rest pain • RB: 2-4 • Superficial femoral artery, common femoral, iliac, ilio-femoral, popliteal, tibial, peroneal, and profunda arteries >= 50% stenosed • Participation in follow-up to 12 mo.	• >18 years • Lifestyle limiting claudication or rest pain • RB: 2-4 • Superficial femoral artery, common femoral, iliac, ilio-femoral, popliteal, tibial, peroneal, and profunda arteries >= 50% stenosed • Participation in f/U through 12 mo.	See Columns 1 and 2
Patient Follow-up	• Discharge: Duplex, ABI • 1 Week: Phone Interview • 30 Days: Duplex, RB, ABI • 12 Month: Phone Interview	• Discharge: Duplex, ABI • 1 Week: Phone Interview • 30 Days: Duplex, RB, ABI • 12 Month: Phone Interview	
Control Methods	• Ethics Committee / IRB • Clinical Events Committee • Angiography Core Laboratory	• Ethics Committee / IRB • Clinical Events Committee • Angiography Core Laboratory	
Primary Results	• 97% Device success, reject null hypothesis • Average Particle Capture: 339/subj • Acute Procedural Success: 98.9%	• 99% Device success, reject null hypothesis • Acute Procedural Success: 98.6%	• 96% Patients free from death, amputation, and TVR @ 30 days, reject the null hypothesis
Secondary Results	• SAE Rate by subj: 5.1% • 92% RB improvement >1 • Average ABI improvement of +0.28. • AE Rate by subj: 21.5% • TVR Rate @ 12 months: 22.5%	• SAE Rate by subj: 11.4% • 72.5% RB improvement >1 • Average ABI improvement of +0.23. • AE Rate by subj: 25%	• SAE Rate by subj: 7.3% • Dvc Assoc Dstl Emb Rate by subj: 0.8% • Device Malf Rate by subj: 0.8% • Peri-Procedural Tech Succ: 98.7% • TVR Rate @ 12 months: 18.8%

Subject Demographics

Table 2: Baseline Subject Demographics (ITT)

Attribute	S1			S2		
	%	Range	Mean	%	Range	Mean
Age Distribution	<65: 35% 65-75: 39% >75: 25%	44 – 89	68.3	<65: 30% 65-75: 43% >75: 27%	41-93	68.5
Gender	Female: 39% Male: 61%	N/A	N/A	Female: 32% Male: 68%	N/A	N/A
Body Mass Index (BMI)	N/A	19.0 – 40.9	27.5	N/A	20.0 – 38.9	27.2
Hypertension	82%	N/A	N/A	84%	N/A	N/A
Hyperlipidemia	78%	N/A	N/A	77%	N/A	N/A
Diabetes mellitus	43%	N/A	N/A	43%	N/A	N/A
Smoking	41%	N/A	N/A	66%	N/A	N/A
Coronary Artery Disease	26%	N/A	N/A	66%	N/A	N/A
Claudication (Rutherford-Becker scale 1-3)	88%	N/A	N/A	96%	N/A	N/A
Critical Limb Ischemia (Rutherford-Becker scale 4-6)	12%	N/A	N/A	4%	N/A	N/A
Ankle-Brachial Index	N/A	0 – 1.4	0.65	N/A	0.1 – 1.4	0.69
Lesion length, mm	N/A	6.69 – 176.00	57.66	N/A	8.1 – 219.7	57.89
Vessel Calcification, Severe, %	69.6%	N/A	N/A	89.9%	N/A	N/A
Vessel Stenosis , %	N/A	50.9% – 100.0%	83.5%	N/A	52.3% - 100.0%	75.4%
Thrombotic	0%	N/A	N/A	0%	N/A	N/A

Table 3: Safety Assessment Adverse Events rate (< 30 days)

Event Categories	S1		S2		Pooled	
	n/N	%	n/N	%	n/N	%
Death	1/79	1.27%	0/44	0%	1/123	0.8%
Myocardial infarction	0/79	0%	0/44	0%	0/123	0%
Stroke	0/79	0%	0/44	0%	0/123	0%
Restenosis	2/79	2.53%	2/44	4.55%	4/123	3.25%
Target limb amputation	1/79	1.3%	0/44	0%	1/123	0.8%
Distal Embolization, total	4/79	5.06%	0/44	0%	4/123	3.25%
Distal Embolization, device related	1/79	1.27%	0/44	0%	1/123	0.81%
Arterial occlusion or thrombosis at access site or remote site	0/79	0%	0/44	0%	0/123	0%
Arterial rupture, procedure related	0/79	0%	0/44	0%	0/123	0%
Bleeding/ hemorrhage	1/79	1.27%	2/44	4.55%	3/123	2.44%
Hematoma (at access site), w/ possible surgical repair	2/79	2.53%	1/44	2.27%	3/123	2.44%
Hypotension	1/79	1.27%	0/44	0%	1/123	0.81%
Infection	0/79	0%	2/44	4.55%	2/123	1.63%
Ischemia or infarction of renal tissue from device use	0/79	0%	0/44	0%	0/123	0%
Flow limiting vessel dissection rate (N = target lesions)	5/89	5.6%	1/69	1.4%	6/158	3.80%
Device malfunction	1/79	1.27%	0/44	0%	1/123	0.81%
Allergic Reaction	0/79	0%	1/44	2.27%	1/123	0.81%
Pain	4/79	5.0%	0/44	0%	4/123	3.3%

Principal Safety and Effectiveness Table

Table 4: Presentation of Safety and Effectiveness Data

Endpoint	MC-LEADER		MC-LEADER SUPLEMENTAL		POOLED	
	n/N	%	n/N	%	n/N	%
Primary Endpoints – Efficacy Measures						
Device Success	144/148[1]	97%	74/75[1]	99%	**N/A[3]**	
Technical Success (<50% residual stenosis)	88/89[2]	98.99%	68/69[2]	98.55%		
Embolic Particle Analysis	Average Particle Capture/ Subj: 339		**N/A[3]**			
	%Subj >=162 part: 75%					
Primary Endpoints – Safety Measures						
Combined Primary Endpoint (Freedom from death, amputation and Target Vessel Revascularization), 30 days	**N/A[3]**	**N/A[3]**	**N/A[3]**	**N/A[3]**	118/123	95.9%
Secondary Endpoints – Efficacy Measures						
Rutherford-Becker Improvement (>=1) , 30 days	72/78	92%	29/40	72.5%	**N/A[3]**	
Ankle-Brachial Index Improvement , 30 days	+0.28 Average		+0.23 Average			
Target Vessel Revascularization, One Year	16/71	22.5%	5/41	12.2%	21/112	18.8%
AE Related Device Malfunction Rate	**N/A[3]**				1/123	0.8%
Technical Success (<50% residual stenosis)	**See Primary Endpoints**				156/158[2]	98.73%
Secondary Endpoints / Other Analyses - Safety Measures						
SAE Rate[4]	4/79	5.1%	5/44	11.4%	9/123	7.3%
Device Related Distal Embolization Rate	1/79	1.3%	0/44	0%	1/123	0.8%
Clinically Significant Vessel Dissection Rate	5/89[2]	5.6%	1/69[2]	1.4%	6/158[2]	3.8%
AE Rate[4] - 30 days	17/79	21.5%	11/44	25.0%	28/123	22.8%

[1] Denominator is number of devices used
[2] Denominator is number of lesions treated
[3] N/A indicates a particular measure was not a specified endpoint for the study
[4] AE and SAE definitions from ISO 14155

Conclusions

The results of the MC-LEADER and MC-LEADER Supplemental Studies showed results comparable with applicable PTA historical controls and demonstrated the substantial equivalency of the PROTEUS™ to the predicate devices.

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Explanation of Graphical Symbols:

Use before

Contents

STERILE EO — Sterilized using ethylene oxide

Do not re-use

Do not re-sterilize

Over the wire

NPR — Nominal Pressure

RBP — Rated Burst Pressure

BALLOON — Balloon length

Ø BALLOON — Balloon Nominal Diameter

USAB CAT — Usable Catheter length

REC GW — Recommended Guide Wire

SHEATH — Min. Recommended Introducer Sheath

NON PYROGENIC — Only sterile and non pyrogenic in unopened packages

Do not use if package is damaged

15°C 59°F / 30°C 86°F — Store in a cool room

Keep dry

Keep away from sunlight

12/23/2013 P/N 6082-01 Rev J