

Z-MED™

BALLOON AORTIC AND PULMONIC VALVULOPLASTY CATHETER

Instructions for Use

CAUTION:

Federal (USA) Law restricts this device to sale by or on the order of a physician.



Manufactured for:

B. Braun Interventional Systems Inc.

824 Twelfth Avenue
Bethlehem, PA 18018

Customer Service:

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Made in the U.S.A.

Manufacturer:

NuMED, Inc.

2880 Main Street

Hopkinton, NY 12965



PERCUTANEOUS TRANSLUMINAL VALVULOPLASTY

INDICATIONS:

Recommended for Percutaneous Transluminal Valvuloplasty (PTV) of the pulmonary valve.

- A patient with isolated pulmonary stenosis.
- A patient with valvular pulmonary stenosis with other minor congenital heart disease that does not require surgical intervention.

DESCRIPTION:

The catheter is a coaxial design catheter with a balloon mounted on its distal tip. The lumen labeled with the balloon size is for balloon inflation while the through lumen allows the catheter to track over a guidewire. A radiopaque band[s] defines the center [or shoulders, if two] of the dilatation balloon. Each balloon inflates to the stated diameter and length at a specific pressure. The balloon size is $\pm 10\%$ at the Rated Burst Pressure (RBP). The RBP is different for each size. Check the package label for the RBP. It is important that the balloon not be inflated beyond the RBP.

HOW SUPPLIED:

Supplied sterilized by ethylene oxide gas. Sterile and non-pyrogenic if package is unopened or undamaged. Do not use the product if there is doubt as to whether the product is sterile. Avoid extended exposure to light. Upon removal from package, inspect the product to ensure no damage has occurred.

CONTRAINDICATIONS:

Other than standard risks associated with insertion of a cardiovascular catheter, there are no known contraindications for valvuloplasty. The patient's medical condition could affect successful use of this catheter.

- Patients with mild valvular stenosis.
- A patient with valvular stenosis with major congenital heart defects that requires open heart surgery.

WARNINGS:

- **CAUTION:** Do not exceed the RBP. An inflation device with pressure gauge is recommended to monitor pressure. Pressure in excess of the RBP can cause balloon rupture and potential inability to withdraw the catheter through the introducer sheath.
- Catheter balloon inflation diameter must be carefully considered in selecting a particular size for any patient. The inflated balloon diameter should not be significantly greater than valvular diameter. The choice of the balloon size to be used for valve stenosis has been established by the VACA Registry to be approximately 1.2 to 1.4 times the valve annulus. It is important to perform an angiogram prior to valvuloplasty to measure the size of the valve in the lateral projection.
- Balloons ≥ 4 cm in length may impinge upon the tricuspid valve mechanism and may injure it. Balloons longer than 4cm are not recommended for children ≤ 10 years old.
- Use only appropriate balloon inflation medium. Do not use air or gaseous medium to inflate the balloon.
- This catheter is not recommended for pressure measurement or fluid injection.
- Do not remove the guidewire from the catheter at any time during the procedure.
- This device is intended for single use only. Do not resterilize and/or reuse it, as this can potentially result in compromised device performance and increased risk of cross-contamination.
- The catheter should be used prior to the 'Use Before' date noted on the package label.
- Right ventricular outflow tract damage has occurred with balloons larger than 1.5 times the size of valve annulus.
- The catheter is intended for valvuloplasty applications only, and is not intended for angioplasty.
- **THE CATHETER IS NOT INTENDED FOR USE WITH STENTS.**

PRECAUTIONS:

- Dilatation procedure should be conducted under fluoroscopic guidance with appropriate x-ray equipment.
- Guidewires are delicate instruments. Care should be exercised while handling to help prevent the possibility of breakage.
- Careful attention must be paid to the maintenance of tight catheter connections and aspiration before proceeding to avoid air introduction into the system.
- Under no circumstances should any portion of the catheter system be advanced against resistance. The cause of the resistance should be identified with fluoroscopy and action taken to remedy the problem.
- If resistance is felt upon removal, then the balloon, guidewire, and the sheath should be removed together as a unit, particularly if balloon rupture or leakage is known or suspected. This may be accomplished by firmly grasping the balloon catheter and sheath as a unit and withdrawing both together, using a gentle twisting motion combined with traction.
- Before removing the catheter from the sheath it is very important that the balloon is completely deflated.
- Proper functioning of the catheter depends upon its integrity. Care should be used when handling the catheter. Damage may result from kinking, stretching, or forceful wiping of the catheter.

INSTRUCTIONS FOR USE (PTV)

Prior to valvuloplasty, carefully examine all equipment to be used during the procedure, including the catheter, to verify proper function. Verify that the catheter and sterile packaging have not been damaged in shipment and that the catheter size is suitable for the specific procedure for which it is intended.

NOTE: DO NOT REMOVE THE BALLOON PROTECTOR UNTIL AFTER THE PURGING PROCESS IS COMPLETED.

1. Attach the 3-way stopcock to the balloon inflation extension of the catheter.
2. Fill the inflation device with pressure gauge with approximately 6cc of normal saline. Attach this device to the straight port of the stopcock and turn the handle to close the vacant port.
3. Inject approximately $\frac{1}{2}$ of the 6cc of fluid into the catheter. Draw back on the inflation device to apply full vacuum. Repeat this procedure 2 or 3 times to insure total air evacuation.
4. Remove the inflation device and fill with a solution of 1:5 or more saline to contrast medium. Reattach the inflation device to the stopcock.
5. Purge the stopcock.
6. Attach a 20cc vacuum syringe to the remaining port of the stopcock. Turn the stopcock handle toward this syringe and lock syringe in vacuum position.
7. Pull vacuum on the filled inflation device to evacuate any air in the stopcock.
8. Turn the stopcock handle to expose the catheter port to the 20cc vacuum syringe. This will pull a small amount of fluid into the 20cc syringe.
9. Under fluoroscopic guidance advance the guidewire to the desired position. Remove the balloon protector and pass the catheter over the guidewire.
10. Advance the catheter into the heart and through the valve under fluoroscopic guidance. Place the catheter to position the mid-length of the balloon within the valve. A radiopaque band(s) defines the center (or shoulders if two) of the dilatation balloon.
11. After correct positioning is confirmed, turn the stopcock to close the vacuum syringe port.
12. Inject a small amount of fluid into the balloon. This will inflate the ends of the balloon and seat the balloon into position in the valve.
13. After reconfirming proper positioning, balloon can be either partially or fully inflated to achieve dilatation. **DO NOT EXCEED THE RBP.**
14. Deflate the balloon by drawing a vacuum on the syringe. Note: the greater the vacuum applied and held during withdrawal, the lower the deflated balloon profile. Gently withdraw the catheter using a smooth, gentle, steady motion. IF resistance is felt upon removal, then the balloon and sheath should be removed together as a unit under fluoroscopic guidance, particularly if balloon rupture or leakage is known or suspected. This may be accomplished by firmly grasping the balloon catheter and sheath as a unit and withdrawing both together, using a gentle twisting motion combined with traction.

POTENTIAL COMPLICATIONS/ADVERSE EFFECTS:

Potential balloon separation following balloon rupture or abuse and the subsequent need to use a snare or other medical interventional techniques to retrieve the pieces.

NOTE: There have been infrequent reports of larger diameter balloons bursting circumferentially, possibly due to a combination of tight focal strictures in large vessels. In any instance of a balloon rupture while in use, it is recommended that a sheath be placed over the ruptured balloon prior to withdrawal through the entry site. This can be accomplished by cutting off the proximal end of the catheter and slipping an appropriately sized sheath over the catheter into the entry site.

For specific technique, refer to: Tegtmeier, Charles J., M.D. & Bezirdijan Diran R., M.D. "Removing the Stuck, Ruptured Angioplasty Balloon Catheter." Radiology, Volume 139, 231-232, April 1981.

Potential complications and related adverse effects associated with the valvuloplasty catheter use include, but are not limited to:

- Perforation
- Conduction System Injury
- Thromboembolic Events
- Hematoma
- Cardiovascular Injury
- Arrhythmia Development
- Valvular Tearing or Trauma
- Restenosis Development
- Inflammation
- Infection

BALLOON AORTIC VALVULOPLASTY

INDICATIONS:

Balloon Aortic Valvuloplasty

DESCRIPTION:

The catheter is a coaxial design catheter with a balloon mounted on its distal tip. The lumen labeled with the balloon size is for balloon inflation while the through lumen allows the catheter to track over a guidewire. A radiopaque band[s] defines the center [or shoulders, if two] of the dilatation balloon. Each balloon inflates to the stated diameter and length at a specific pressure. The balloon size is $\pm 10\%$ at the Rated Burst Pressure (RBP). The RBP is different for each size. Check the package label for the RBP. It is important that the balloon not be inflated beyond the RBP.

HOW SUPPLIED:

Supplied sterilized by ethylene oxide gas. Sterile and non-pyrogenic if package is unopened or undamaged. Do not use the product if there is doubt as to whether the product is sterile. Avoid extended exposure to light. Upon removal from package, inspect the product to ensure no damage has occurred.

CONTRAINDICATIONS:

Other than standard risks associated with insertion of a cardiovascular catheter, there are no known contraindications for valvuloplasty. The patient's medical condition could affect successful use of this catheter.

WARNINGS:

- **CAUTION:** Do not exceed the RBP. An inflation device with pressure gauge is recommended to monitor pressure. Pressure in excess of the RBP can cause balloon rupture and potential inability to withdraw the catheter through the introducer sheath.
- Catheter balloon inflation diameter must be carefully considered in selecting a particular size for any patient. The inflated balloon diameter should not be significantly greater than valvular diameter. The choice of the balloon size to be used for valve stenosis has been established by the VACA Registry to be approximately 0.9 to 1.0 times the valve annulus. It is important to perform fluoroscopy, echocardiography, or CT scan prior to valvuloplasty to measure the size of the valve in the lateral projection.
- Balloons longer than 4cm are not recommended for children ≤ 10 years old.

- Use only appropriate balloon inflation medium. Do not use air or gaseous medium to inflate the balloon.
- This catheter is not recommended for pressure measurement or fluid injection.
- Do not remove the guidewire from the catheter at any time during the procedure.
- This device is intended for single use only. Do not resterilize and/or reuse it, as this can potentially result in compromised device performance and increased risk of cross-contamination.
- The catheter should be used prior to the 'Use Before' date noted on the package label.
- **THE CATHETER IS NOT INTENDED FOR USE WITH STENTS.**

PRECAUTIONS:

- Dilatation procedure should be conducted under fluoroscopic guidance with appropriate x-ray equipment.
- Guidewires are delicate instruments. Care should be exercised while handling to help prevent the possibility of breakage.
- Careful attention must be paid to the maintenance of tight catheter connections and aspiration before proceeding to avoid air introduction into the system.
- Under no circumstances should any portion of the catheter system be advanced against resistance. The cause of the resistance should be identified with fluoroscopy and action taken to remedy the problem.
- If resistance is felt upon removal, then the balloon and the sheath should be removed together as a unit, particularly if balloon rupture or leakage is known or suspected. This may be accomplished by firmly grasping the balloon catheter and sheath as a unit and withdrawing both together, using a gentle twisting motion combined with traction.
- Before removing the catheter from the sheath it is very important that the balloon is completely deflated.
- Proper functioning of the catheter depends upon its integrity. Care should be used when handling the catheter. Damage may result from kinking, stretching, or forceful wiping of the catheter.

INSTRUCTIONS FOR USE (BAV)

Prior to valvuloplasty, carefully examine all equipment to be used during the procedure, including the catheter, to verify proper function. Verify that the catheter and sterile packaging have not been damaged in shipment and that the catheter size is suitable for the specific procedure for which it is intended.

NOTE: DO NOT REMOVE THE BALLOON PROTECTOR UNTIL AFTER THE PURGING PROCESS IS COMPLETED.

1. Attach the 3-way stopcock to the balloon inflation extension of the catheter.
2. Fill the inflation device with pressure gauge with approximately 6cc of normal saline. Attach this device to the straight port of the stopcock and turn the handle to close the vacant port.
3. Inject approximately ½ of the 6cc of fluid into the catheter. Draw back on the inflation device to apply full vacuum. Repeat this procedure 2 or 3 times to insure total air evacuation.
4. Remove the inflation device and fill with a solution of 1:5 or more saline to contrast medium. Reattach the inflation device to the stopcock.
5. Purge the stopcock.
6. Attach a 20cc vacuum syringe to the remaining port of the stopcock. Turn the stopcock handle toward this syringe and lock syringe in vacuum position.
7. Pull vacuum on the filled inflation device to evacuate any air in the stopcock.
8. Turn the stopcock handle to expose the catheter port to the 20cc vacuum syringe. This will pull a small amount of fluid into the 20cc syringe.
9. Under fluoroscopic guidance advance the guidewire to the desired position. Remove the balloon protector and pass the catheter over the guidewire.
10. Advance the catheter into the heart and through the valve under fluoroscopic guidance. Place the catheter to position the mid-length of the balloon within the valve. A radiopaque band(s) defines the center (or shoulders if two) of the dilatation balloon.
11. After correct positioning is confirmed, turn the stopcock to close the vacuum syringe port.
12. Inject a small amount of fluid into the balloon. This will inflate the ends of the balloon and seat the balloon into position in the valve.

13. After reconfirming proper positioning, balloon can be either partially or fully inflated to achieve dilatation. DO NOT EXCEED THE RBP.
14. Deflate the balloon by drawing a vacuum on the syringe. Note: the greater the vacuum applied and held during withdrawal, the lower the deflated balloon profile. Gently withdraw the catheter using a smooth, gentle, steady motion. If resistance is felt upon removal, then the balloon and sheath should be removed together as a unit under fluoroscopic guidance, particularly if balloon rupture or leakage is known or suspected. This may be accomplished by firmly grasping the balloon catheter and sheath as a unit and withdrawing both together, using a gentle twisting motion combined with traction.

POTENTIAL COMPLICATIONS/ADVERSE EFFECTS:

Potential balloon separation following balloon rupture or abuse and the subsequent need to use a snare or other medical interventional techniques to retrieve the pieces. **NOTE:** There have been infrequent reports of larger diameter balloons bursting circumferentially, possibly due to a combination of tight focal strictures in large vessels. In any instance of a balloon rupture while in use, it is recommended that a sheath be placed over the ruptured balloon prior to withdrawal through the entry site. This can be accomplished by cutting off the proximal end of the catheter and slipping an appropriately sized sheath over the catheter into the entry site. For specific technique, refer to: Tegtmeier, Charles J., M.D. & Bezirdijan Diran R., M.D. "Removing the Stuck, Ruptured Angioplasty Balloon Catheter." Radiology, Volume 139, 231-232, April 1981.

Potential complications and related adverse effects associated with the valvuloplasty catheter use include, but are not limited to:

- Bleeding
- Death
- Balloon Rupture
- Valvular Regurgitation
- Valvular Tearing or Trauma
- Restenosis Development
- Inflammation
- Infection
- Arrhythmia Development
- Cardiac Tamponade
- Calcium Embolic Events
- Conduction System Injury
- Thromboembolic Events
- Hematoma
- Cardiovascular Injury
- Perforation of Vascular or Cardiac Tissue

WARNING:

These catheters are placed in the extremely hostile environment of the human body. Catheters may fail to function for a variety of causes including, but not limited to, medical complications or failure of catheters by breakage. In addition, despite the exercise of all due care in design, component selection, manufacture and testing prior to sale, catheters may be easily damaged before, during, or after insertion by improper handling or other intervening acts. Consequently, no representation or warranty is made that failure or cessation of function of catheters will not occur or that the body will not react adversely to the placement of catheters or that medical complications will not follow the use of catheters. B. Braun Interventional Systems Inc. cannot warrant or guarantee B. Braun Interventional Systems Inc. accessories because the structure of the accessories may be damaged by improper handling before or during use. Therefore, no representations or warranties are made concerning them.

WARRANTY AND LIMITATIONS:

Catheters and accessories are sold in an 'as is' condition. The entire risk as to the quality and performance of the catheter is with the buyer. B. Braun Interventional Systems Inc. disclaims all warranties, expressed or implied, with respect to catheters and accessories, including but not limited to, any implied warranty of merchantability or fitness for a particular purpose. B. Braun Interventional Systems Inc. shall not be liable to any person for any medical expenses or any direct or Consequential damages resulting from the use of any catheter or accessory or caused by any defect, failure, or malfunction of any catheter or accessory, whether a claim for such damages is based upon warranty, contract, tort, or otherwise. No person has any authority to bind B. Braun Interventional Systems Inc. to any representation or warranty with respect to catheters and accessories.

REFERENCES:

Shuck J, et al: Percutaneous balloon valvuloplasty of the pulmonary valve: Role of right to left shunting through a patent foramen ovale. JACC Vol.4 (1) July 1984:132-5 Pepine CJ, Gessner IH, Feldman RL: Percutaneous balloon valvuloplasty for pulmonic valve stenosis in the adult. Am H. J. 1982:50 1442-5
 Lababidi A, Wu J. Percutaneous balloon pulmonary valvuloplasty. J. Cardiol 1983:52:560-2 Kveselis D, et al: Results of balloon valvuloplasty in the treatment of congenital valvar pulmonary stenosis in children. Am J Cardiol 1985: 56:527-532 Sullivan I, Robinson P, et al. Percutaneous balloon valvuloplasty for pulmonary valve stenosis in infants and children. Br Heart J. 1985: 54:435-41 Tynan M, Baker E, et al. Percutaneous balloon pulmonary valvuloplasty. Br. Heart Journal Martin G, Stanger P. Transient Prolongation of QTc Interval after balloon valvuloplasty and Angioplasty in children. Am J Cardiol 1986: 58:1233-1235 Kan J, et al: Percutaneous transluminal balloon valvuloplasty for pulmonary valve stenosis. Circulation 69:554, 1984 Tynan M, Jones O, et al: Relief of pulmonary valve stenosis in the first week of life by percutaneous balloon valvuloplasty. Lancet 1:273,1984

Z-MED™ Balloon Sizing Chart

Applied Press.	2.0 (mm)	3.0 (mm)	4.0 (mm)	5.0 (mm)	6.0 (mm)	7.0 (mm)	8.0 (mm)	9.0 (mm)	10.0 (mm)	11.0 (mm)	12.0 (mm)	13.0 (mm)	14.0 (mm)	15.0 (mm)	16.0 (mm)
1.0 ATM	1.78	2.69	3.81	4.80	5.69	6.65	7.63	8.32	9.37	10.32	11.35	11.68	13.35	14.36	15.18
1.5 ATM															
2.0 ATM	1.82	2.72	3.89	4.89	5.79	6.76	7.80	8.55	9.54	10.41	11.65	11.98	13.66	14.84	15.64
3.0 ATM	1.86	2.78	3.93	4.98	5.89	6.86	7.94	8.75	9.74	10.48	11.93	12.39	13.94	15.19	16.04
4.0 ATM	1.89	2.82	3.97	5.03	6.02	6.96	8.07	8.91	9.91	10.55	12.16	12.69	14.15	15.56	16.38
5.0 ATM	1.92	2.86	4.01	5.08	6.09	7.05	8.16	9.07	9.98	10.62	12.40	12.96	14.39	15.88	16.75
6.0 ATM	1.97	2.89	4.05	5.13	6.16	7.13	8.24	9.20	10.06	10.69	12.62	13.26	14.64		
7.0 ATM	1.98	2.91	4.08	5.18	6.22	7.20	8.34	9.32	10.12	10.76	12.84				
8.0 ATM	2.00	2.93	4.12	5.23	6.28	7.26	8.41	9.45	10.19						
9.0 ATM	2.01	2.97	4.15	5.28	6.34	7.31	8.48	9.57	10.28						
10.0 ATM	2.02	2.99	4.19	5.33	6.40	7.36	8.56	9.68							

Applied Press.	17.0 (mm)	18.0 (mm)	19.0 (mm)	20.0 (mm)	22.0 (mm)	23.0 (mm)	24.0 (mm)	25.0 (mm)	26.0 (mm)	28.0 (mm)	30.0 (mm)	33.0 (mm)	35.0 (mm)	40.0 (mm)
1.0 ATM	15.71	16.84	17.29	19.36	21.36	21.43	21.85	22.28	24.78	27.28	28.98	32.16	30.35	39.07
1.5 ATM										27.67	29.48	33.42	31.61	
2.0 ATM	16.04	17.44	17.84	19.89	21.98	22.01	22.73	23.49	25.70	28.06	29.98			
3.0 ATM	16.50	18.00	18.42	20.55	22.63	22.58	23.59	24.59	26.58					
4.0 ATM	16.99	18.58	19.03	21.14										
5.0 ATM														
6.0 ATM														
7.0 ATM														
8.0 ATM														
9.0 ATM														
10.0 ATM														

FOR ALL B. BRAUN INTERVENTIONAL SYSTEMS INC. CATHETERS, AN INFLATION DEVICE WITH PRESSURE GAUGE SHOULD BE USED.

The figures in bold print represent Balloon diameter at Rated Burst Pressure. The balloon size is ± 10 % at the Rated Burst Pressure.

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BALLOON AORTIC AND PULMONIC VALVULOPLASTY CATHETER

