Medtronic

Avalus™

Bioprosthesis

400

Instructions for Use

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

Explanation of symbols on package labeling

Refer to the device labeling to see which symbols apply to this product.

	Do not reuse
	Use-by date
	Sterile LC: Device has been sterilized using liquid chemical sterilants according to EN/ISO 14160.
	Temperature limit
	Size
	Serial number
	Catalog number
	Date of manufacture
	Manufacturer
	MR Safe
	Quantity
	Nonpyrogenic
	Do not resterilize
	Do not use if indicator turns black
	Authorized representative in the European Community
	Manufactured in
	For US audiences only
	Model

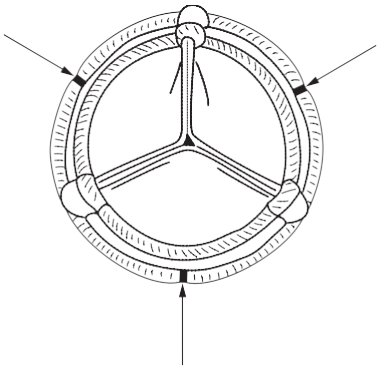


Figure 1. Location of sewing markers

Figure 2. Opening the valve container

Figure 3. Removing the retainer from the jar

Figure 4. Verifying the serial number and removing the retainer cap

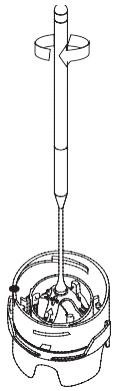


Figure 5. Inserting the valve handle into the holder

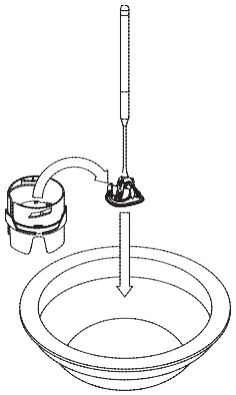


Figure 6. Removing the valve from the retainer and placing it in the rinse basin

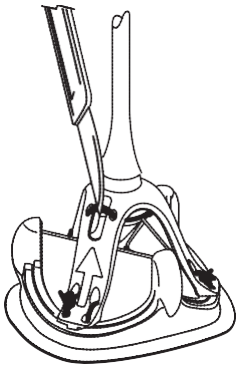


Figure 7. Removing the holder

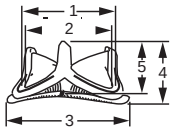
Bioprosthesis

1. Device description

The Avalus™ bioprosthesis, Model 400, consists of a polyester-covered base frame and trileaflet support frame structure shaped to the geometry of a trileaflet valve. The base frame and trileaflet support frame are injection-molded using polyetheretherketone (PEEK) material. The base frame PEEK material is impregnated with barium sulphate to allow for radiographic visualization. The leaflets are laser cut from bovine tissue that has been cross-linked in buffered glutaraldehyde. The leaflets are inserted between the trileaflet support frame and the base frame, and then all components are securely sutured together. A sewing ring, fabricated from polyester cloth, is integrated into the inflow base frame cover to allow the user to suture and seat the Avalus bioprosthesis in the supra-annular position. Sewing markers are located on the sewing ring in the mid sinus area of each cusp to provide guidance for even spacing of the implant sutures (Figure 1). A disposable holder is attached to the outflow of the valve to facilitate implantation. The aortic bioprosthesis (valve) is treated with an alpha amino oleic acid (AOA™) antimineralization process that has been shown to mitigate leaflet calcification in animal studies.

The disposable holder is designed to fit the reusable Medtronic valve handle, Model 7420. The holder features a single cut point to remove the holder from the valve. Double-ended sizers are used to select the appropriate valve size. The barrel end represents the valve orifice. The replica end imitates the prosthesis geometry.

Table 1. Available sizes and sewing ring diameters (nominal values in millimeters)



Size	19 mm	21 mm	23 mm	25 mm	27 mm
(1) Stent diameter (TAD)	19	21	23	25	27
(2) Internal orifice diameter	17.5	19.5	21.5	23.5	25.5
(3) External sewing ring diameter	27.0	29.0	31.0	33.0	36.0
(4) Valve profile height	13.0	14.0	15.0	16.0	17.0
(5) Aortic protrusion	11.0	12.0	13.0	14.0	15.0

Note: TAD—tissue annulus diameter

2. Indications for use

The Avalus bioprosthesis is indicated for the replacement of diseased, damaged, or malfunctioning native or prosthetic aortic valves.

3. Contraindications

None known.

4. Warnings and precautions

4.1. Warnings

- This device was designed for single use only. Do not reuse, reprocess, or resterilize this product. Reuse, reprocessing, or resterilization may compromise the structural integrity of the device or create a risk of contamination of the device, which could result in patient injury, illness, or death.
- **Do not resterilize the valve by any method.** Exposure of the valve and container to irradiation, steam, ethylene oxide, or other chemical sterilants will render the valve unfit for use.
- Check the shipping temperature indicator inside the carton. If the shipping temperature indicator window is black, the valve is not suitable for clinical use.
- Do not use the valve in any of the following circumstances:
  - The valve has been dropped, damaged, or mishandled in any way
  - The Use-by date has elapsed
  - All tamper strips are damaged
  - The serial number tag does not match the number on the container label
  - The glutaraldehyde storage solution does not completely cover the valve
  - Fluid is leaking from the packaging
  - The valve shows signs of deterioration
- Do not handle the tissue portion of the valve with instruments. Extreme care must be taken to prevent damage to the delicate valve tissue. Even a minor perforation could enlarge in time to significantly impair valve function.
- Do not attempt to repair a damaged valve. A damaged valve must not be used.
- Do not add antibiotics or any other substance to the storage solution or the rinse solution.

- Do not attempt to insert a valve that is too large for the annulus. Select a valve that will fit securely in the aortic root without deforming the native anatomy or the Avalus bioprosthesis.
- Do not use other manufacturers' valve sizers, or sizers for another Medtronic prosthesis, to size the valve.
- Do not allow the valve to dry. To prevent the valve tissue from drying, periodically irrigate the valve with sterile, normal saline during implantation.
- Calcific degeneration could cause accelerated structural deterioration of the valve in the following individuals:
  - Children, adolescents, or young adults
  - Patients with altered calcium metabolism (for example, chronic renal failure, or hyperparathyroidism)

  Carefully consider these potential hazards when selecting an appropriate valve substitute for such patients.

4.2. Precautions

- Do not place the nonsterile exterior of the valve container in the sterile field.
- Do not use the Avalus™ sizers, Model 7400S, or the Medtronic valve handle, Model 7420, until they have been thoroughly cleaned and sterilized. Refer to the appropriate instructions for use for further instructions.
- When selecting a valve size, consider the patient's anatomy, and select a valve that adequately provides for the hemodynamic requirements of the patient.
- Do not implant a valve without completing proper rinsing procedures.
- Orient the stent posts and seat the valve so that the coronary ostia are not obstructed.
- Avoid contact of the valve or the rinse solution with towels, linens, or other sources that may transfer particulate matter to the leaflet tissue.
- Identify the inflow and outflow of the valve before suturing.
- Use caution when placing sutures through the sewing ring to avoid laceration of the leaflet tissue. If the leaflet tissue is damaged, the valve must be explanted and replaced.
- Do not use cutting needles, unprotected forceps, or sharp instruments that could cause structural damage to the valve.
- Consider the potential for damage before passing catheters, surgical instruments, and transvenous pacing leads across the valve.
- When using interrupted sutures, it is important to cut the sutures close to the knots. Ensure that exposed suture tails will not come into contact with the leaflet tissue.
- Do not bend the bioprosthesis commissures when tying knots.
- Do not handle the leaflet tissue.
- Avoid prolonged contact with the valve storage solution. Glutaraldehyde could cause irritation of the eyes, nose, skin, and throat if continued exposure occurs. Avoid prolonged exposure to, or breathing of, the chemical vapor. Use only with adequate ventilation. If skin contact occurs, immediately flush the affected area with copious amounts of water for 10 to 15 minutes. If eye contact occurs, flush the eye with water for 15 minutes and seek immediate medical attention.

5. Specific patient populations

The safety and effectiveness of the Avalus bioprosthesis has not been established for the following specific populations because it has not been studied in these populations:

- Patients who are pregnant
- Nursing mothers
- Patients with chronic renal impairment or calcium metabolism disorders
- Patients with active endocarditis or myocarditis
- Children or adolescents

6. Potential adverse events

Adverse events potentially associated with the use of bioprosthetic heart valves include:

- Angina
- Cardiac dysrhythmias
- Endocarditis
- Heart failure
- Hemolysis
- Hemolytic anemia
- Hemorrhage
- Infection other than endocarditis
- Leak, transvalvular or paravalvular
- Myocardial infarction
- Nonstructural valve dysfunction (leaflet entrapment/impingement, obstructive pannus ingrowth, suture dehiscence, inappropriate sizing or positioning, or other)

- Pericardial effusion or tamponade
- Prosthesis regurgitation
- Prosthesis stenosis
- Prosthesis thrombosis
- Stroke
- Structural valve deterioration (calcification, leaflet tear or perforation, or other)
- Thromboembolism
- Tissue dehiscence
- Transient ischemic attack

These complications could lead to:

- Reoperation
- Explant of the bioprosthesis
- Permanent disability
- Death

7. Clinical study

7.1. Trial design

The Avalus bioprosthesis, Model 400, was evaluated for safety and effectiveness under the PERIcardial SurGical AOrtic Valve ReplacemeNt (PERIGON) Pivotal Trial. The PERIGON Pivotal Trial was a multicenter, prospective, nonrandomized, observational study, conducted at 36 investigative sites in the United States, Europe, and Canada. Patients were evaluated at baseline, index procedure, discharge (or up to 30 days postoperatively), 3 to 6 months, and annually thereafter.

7.2. Diagnosis and main criteria for inclusion

Patients meeting all of the following criteria were included in the trial:

Patient has moderate or greater aortic stenosis or regurgitation, and there is clinical indication for replacement of their native or prosthetic aortic valve with a bioprosthesis, with or without concomitant procedures, which are limited to any of the following:

- Left atrial appendage ligation
- Coronary Artery Bypass Graft (CABG)
- Patent Foramen Ovale closure
- Ascending aortic aneurysm or dissection repair not requiring circulatory arrest
- Resection of a subaortic membrane not requiring myectomy

7.3. Main criteria for exclusion

Patients were excluded from the study if any of the following exclusion criteria were met:

1. Patient has a pre-existing prosthetic valve or annuloplasty device in another position or requires replacement or repair of the mitral, pulmonary, or tricuspid valve
2. Patient had a previous implant and then explant of the Avalus bioprosthesis
3. Patient presents with active endocarditis, active myocarditis, or other systemic infection
4. Patient has an anatomical abnormality which would increase surgical risk of morbidity or mortality, including the following:
   - Ascending aortic aneurysm or dissection repair requiring circulatory arrest
   - Acute Type A aortic dissection
   - Ventricular aneurysm
   - Porcelain aorta
   - Hostile mediastinum
   - Hypertrophic obstructive cardiomyopathy (HOCM)
   - Documented pulmonary hypertension (systolic >60 mmHg)
5. Patient has a noncardiac major or progressive disease with a life expectancy of less than 2 years. These conditions include, but are not limited to:
   - Child-Pugh Class C liver disease
   - Terminal cancer
   - Endstage lung disease
6. Patient has renal failure, defined as dialysis therapy or GFR <30 mL/min/1.73 m^2.
7. Patient has hyperparathyroidism
8. Patient is participating in another investigational device, drug trial, or observational competitive study
9. Patient is pregnant, lactating, or planning to become pregnant during the trial period
10. Patient has a documented history of substance (drug or alcohol) abuse

11. Patient has greater than mild mitral valve regurgitation or greater than mild tricuspid valve regurgitation as assessed by echocardiography
12. Patient has systolic EF <20% as assessed by echocardiography
13. Patient has Grade IV Diastolic Dysfunction
14. Patient has documented bleeding diatheses
15. Patient has had an acute preoperative neurological deficit or myocardial infarction and has not returned to baseline or stabilized ≥30 days prior to enrollment
16. Patient requires emergency surgery

7.4. Enrollment

The reporting period for the PERIGON trial was from May 12, 2014 through October 31, 2016, with an enrollment cut-off of June 30, 2016. The implant period for the study was from May 12, 2014 to September 7, 2016. At the time of the database snapshot (the date that the data were retrieved from the database for analysis), 962 subjects were enrolled and 864 subjects were implanted among 36 centers in Europe, Canada, and United States. These 864 subjects comprise the study population presented herein. The mean length of follow-up was 1.05 ± 0.57 years. The range of follow-up was 0 to 2.38 years. The total number of patient-years was 904.1 and the number of late patient-years (>30 days post-implant) was 834.2.

7.5. Study Endpoints

With regards to safety, the PERIGON study evaluated the time-related incidence of valve-related adverse events in comparison to twice the Objective Performance Criteria listed in ISO 5840:2009 for thromboembolism, valve thrombosis, all and major hemorrhage, all and major paravalvular leak, and endocarditis. With regards to effectiveness, the PERIGON study evaluated New York Heart Association (NYHA) functional classification status and valve hemodynamic parameters (peak gradient, mean gradient, effective orifice area (EOA), effective orifice area index (EOAI), performance index, cardiac output, cardiac index, and valvular regurgitation) in comparison to literature controls from commercially available devices.

7.6. Baseline demographics and characteristics

Table 2. Baseline demographics and characteristics

Age at implant	**N: Mean ± SD (min – max)**
Age (years)	864: 70.4 ± 8.9 (21.1 – 90.9)
Gender	**% (n / N)**
Female	25.5% (220/864)
Male	74.5% (644/864)
Body surface area	**N: Mean ± SD (min – max)**
BSA (m^2)	864: 2.0 ± 0.2 (1.4 – 2.9)
NYHA classification	**% (n / N)**
Class I	11.3% (98/864)
Class II	47.5% (410/864)
Class III	39.6% (342/864)
Class IV	1.6% (14/864)
STS risk scores	**N: Mean ± SD (min – max)**
STS risk of mortality	864: 2.0 ± 1.4 (0.4 – 10.1)
STS risk of morbidity or mortality	864: 14.8 ± 6.0 (5.6 – 48.7)

7.7. Follow-up compliance

Table 3. Follow-up compliance

Visit interval	Number expected	Number evaluated % (n)	Censored[a]
Baseline	962	99.3% (955)	0
Procedure	864	100.0% (864)	98
Discharge	859	100.0% (859)	5
3–6 Months	821	99.0% (813)	38
1 Year	581	99.3% (577)	240
2 Year	101	99.0% (100)	480

[a] Censored includes visits due but not yet occurred, visits not due, death, explant, lost to follow-up (LTF), or withdrawn (by self or physician).

7.8. Safety results

Table 4. Summary of observed adverse event rates

Adverse events	Early events[a]			Late events[b]			Freedom from event[c] at 1 Year (95% CI[d]) n = 577
	Number of events	Number of subjects	Early event rate	Number of events	Number of subjects	Linearized late event rate[e]	
All-cause mortality	10	10	1.2%	28	28	3.4%	96.4 (94.8,97.5)
Valve-related mortality	0	0	0.0%	4	4	0.5%	99.7 (98.6,99.9)
Thromboembolism	12	11	1.4%	14	14	1.7%	97.2 (95.7,98.1)
Stroke	8	8	0.9%	8	8	1.0%	98.0 (96.7,98.8)
Transient ischemic attack	4	4	0.5%	6	6	0.7%	98.8 (97.7,99.4)
Valve thrombosis	0	0	0.0%	0	0	0.0%	100.0 (NA)
All hemorrhage	14	13	1.6%	30	28	3.6%	95.1 (93.2, 96.4)
Major hemorrhage	8	8	0.9%	21	19	2.5%	96.9 (95.4, 97.9)
All paravalvular leak	2	2	0.2%	5	5	0.6%	99.3 (98.3, 99.7)
Major paravalvular leak	1	1	0.1%	0	0	0.0%	99.9 (99.2, 100.0)
Endocarditis	2	2	0.2%	11	11	1.3%	98.7 (97.4, 99.3)
Clinically significant hemolysis	0	0	0.0%	0	0	0.0%	100.0 (NA)
Structural valve deterioration	0	0	0.0%	0	0	0.0%	100.0 (NA)
Nonstructural valve dysfunction[g] (NSVD)	2	2	0.2%	5	5	0.6%	99.3 (98.3, 99.7)
Explant[h]	4	4	0.5%	6	6	0.7%	98.9 (97.8, 99.5)
Reintervention[h]	4	4	0.5%	6	6	0.7%	98.9 (97.8, 99.5)

a Early events include events that occurred on or before 30 days post-procedure.
b Late events include events that occurred greater than 30 days post-procedure.
c Freedom from event rate is based on Kaplan-Meier analysis.
d CI= Confidence Interval. The 95% CI is calculated using the loglog transformed 95% CI based on Greenwood formula. The lower and upper bound are presented, respectively.
e Late linearized rates (percent per patient-year) were calculated by dividing the number of late events by the sum of the late patient-years of experience and expressed as a percentage.
f Anticoagulant-related and/or antiplatelet-related events only included.
g NSVD is inclusive of all paravalvular leak events. No NSVD of other etiology was observed.
h One outcome was due to a procedure-related event and not a valve-related event.

Table 5. Late linearized event rates compared to objective performance criteria (OPC)

Adverse event	Late linearized event rate[a] % LPY[b] = 834.2	Number of events	Number of subjects	95% Upper confidence bound[c] of late linearized rate	2x OPC[d] (%/patient-year)
Thromboembolism	1.7%	14	14	2.55%	5.0%
Valve thrombosis	0.0%	0	0	0.00%	0.4%
All hemorrhage	3.6%	30	28	4.81%	2.8%
Major hemorrhage	2.5%	21	19	3.55%	1.8%
All paravalvular leak	0.6%	5	5	1.18%	2.4%
Major paravalvular leak	0.0%	0	0	0.00%	1.2%
Endocarditis	1.3%	11	11	2.11%	2.4%

a Late linearized event rate calculated by number of events/LPY, expressed as a percentage.
b LPY = Late patient-years. LPY are calculated from post-implant day 31 through last point of contact.
c Upper confidence bound calculated by Greenwood formula.
d OPC = Objective performance criteria for tissue valves, as described in Table R.1 of EN ISO5840; 2009, Annex R.1.

7.9. Effectiveness results

Table 6. New York Heart Association (NYHA) classification

NYHA classification	Baseline (N = 864)	1 Year (N = 577)	2 Year (N = 100)
I	11.3% (98/864)	73.4% (423/576)	67.0% (67/100)
II	47.5% (410/864)	22.4% (129/576)	29.0% (29/100)
III	39.6% (342/864)	3.5% (20/576)	4.0% (4/100)
IV	1.6% (14/864)	0.2% (1/576)	0.0% (0/100)
Not done	0.0% (0/864)	0.5% (3/576)	0.0% (0/100)

Table 7. Change in New York Heart Association (NYHA) classification from baseline

NYHA classification	1 Year (N = 577)	2 Year (N = 100)
Improved 3 class	1.4% (8/573)	0.0% (0/100)
Improved 2 class	24.8% (142/573)	26.0% (26/100)
Improved 1 class	48.9% (280/573)	48.0% (48/100)
No change	23.2% (133/573)	24.0% (24/100)
Worsened 1 class	1.7% (10/573)	2.0% (2/100)
Worsened 2 class	0.0% (0/573)	0.0% (0/100)
Worsened 3 class	0.0% (0/573)	0.0% (0/100)

Table 8. Hemodynamic parameters

Parameter		19 mm Mean ± SD (n[a])	21 mm Mean ± SD (n[a])	23 mm Mean ± SD (n[a])	25 mm Mean ± SD (n[a])	27 mm Mean ± SD (n[a])
1 Year						
Mean gradient (mmHg)		17.1 ± 5.0 (27)	14.5 ± 4.3 (106)	12.1 ± 3.8 (205)	11.7 ± 4.0 (170)	10.3 ± 4.2 (43)
EOA (cm^2)		1.11 ± 0.25 (25)	1.25 ± 0.25 (99)	1.47 ± 0.32 (201)	1.57 ± 0.31 (167)	1.77 ± 0.41 (41)

[a] n represents the number of subjects with evaluable data.

Table 9. Transvalvular aortic regurgitation

Visits	19 mm % (n/N[a])	21 mm % (n/N[a])	23 mm % (n/N[a])	25 mm % (n/N[a])	27 mm % (n/N[a])	All sizes % (n/N[a])
1 Year						
None	70.4% (19/27)	74.1% (80/108)	87.9% (181/206)	91.9% (158/172)	93.0% (40/43)	86.0% (478/556)
Trace	22.2% (6/27)	17.6% (19/108)	8.7% (18/206)	4.7% (8/172)	7.0% (3/43)	9.7% (54/556)
Mild	7.4% (2/27)	5.6% (6/108)	2.4% (5/206)	2.9% (5/172)	0.0% (0/43)	3.2% (18/556)
Moderate	0.0% (0/27)	0.0% (0/108)	0.0% (0/206)	0.0% (0/172)	0.0% (0/43)	0.0% (0/556)
Severe	0.0% (0/27)	0.0% (0/108)	0.0% (0/206)	0.6% (1/172)	0.0% (0/43)	0.2% (1/556)
Not evaluable	0.0% (0/27)	2.8% (3/108)	1.0% (2/206)	0.0% (0/172)	0.0% (0/43)	0.9% (5/556)

[a] n represents the number of subjects with evaluable data. N represents the number of subjects with data who had echos performed.

Table 10. Paravalvular aortic regurgitation

Visits	19 mm % (n/N[a])	21 mm % (n/N[a])	23 mm % (n/N[a])	25 mm % (n/N[a])	27 mm % (n/N[a])	All sizes % (n/N[a])
1 Year						
None	96.3% (26/27)	89.8% (97/108)	92.7% (191/206)	93.0% (160/172)	93.0% (40/43)	92.4% (514/556)
Trace	3.7% (1/27)	6.5% (7/108)	4.4% (9/206)	1.2% (2/172)	2.3% (1/43)	3.6% (20/556)
Mild	0.0% (0/27)	0.9% (1/108)	1.9% (4/206)	4.7% (8/172)	2.3% (1/43)	2.5% (14/556)
Moderate	0.0% (0/27)	0.0% (0/108)	0.0% (0/206)	1.2% (2/172)	2.3% (1/43)	0.5% (3/556)
Severe	0.0% (0/27)	0.0% (0/108)	0.0% (0/206)	0.0% (0/172)	0.0% (0/43)	0.0% (0/556)
Not evaluable	0.0% (0/27)	2.8% (3/108)	1.0% (2/206)	0.0% (0/172)	0.0% (0/43)	0.9% (5/556)

[a] n represents the number of subjects with evaluable data. N represents the number of subjects with data who had echos performed.

8. Instructions for use

8.1. Handling and preparation instructions

Proper size selection is critical to heart valve replacement. Use Avalus sizers, Model 7400S, to select the appropriately sized Avalus bioprosthesis. For further information, refer to the instructions for use.

The exteriors of the container and lid are nonsterile. The valve and all packaging components inside the container are sterile and must be handled within the sterile operative field.

1. Prepare 2 rinse basins each containing 500 mL of sterile, normal saline solution.
2. Examine the tamper strips to verify that the container has not been damaged or previously opened. Do not use the valve if all of the tamper strips are damaged.
3. Turn the lid counterclockwise and open the container (Figure 2).
4. Hold the retainer with the thumb and index finger. Slowly lift the valve out of the container, allowing for drainage of the glutaraldehyde storage solution (Figure 3).
5. Verify that the serial number on the retainer matches the serial number on the container lid, shelf carton, and Patient Registration Form. Record the serial number in the patient's record using the stickers provided on the Patient Registration Form.
6. Hold the retainer upright. Remove the retainer cap by turning it counterclockwise using the thumb and index finger (Figure 4). The holder will be visible.
7. Insert a sterile handle into the holder. Rotate the handle clockwise into the threaded opening of the holder until resistance is felt (Figure 5).
8. Pull upward on the handle to remove the valve from the retainer (Figure 6).

8.2. Rinse procedure

1. Place the entire valve and holder in 1 of the rinse basins (Figure 6).
2. Use the handle to continually agitate the valve for a minimum of 30 seconds.
3. Gently squeeze the sewing ring to remove any residual glutaraldehyde. Do not touch the tissue portion of the valve.
4. Place the valve in the second basin. Keep the valve in the basin until required by the surgeon.

8.3. Aortic valve implantation

The Avalus bioprosthesis is designed for implantation in the supra-annular position. Use Avalus sizers, Model 7400S, to visualize placement of the sewing cuff above the annulus and to confirm placement and fit of the valve in the supra-annular space.

The choice of surgical technique is left to the discretion of the individual surgeon when implanting in the supra-annular position. Any modified technique should be in accordance with the Warnings and Precautions described in this Instructions for use. In general, follow these steps:

1. Orient the valve so that the coronary ostia are not obstructed by the stent and sewing ring.
2. Irrigate the valve periodically with sterile, normal saline to prevent drying of the delicate tissue.
3. Position the valve in the annulus and place the sutures in the sewing ring.
4. Suture the valve in place using an appropriate suture technique. Refer to Warnings and Precautions to avoid potential problems.

5. Cut the sutures at the single cut point indicated by the white arrow to release the holder (Figure 7). Gently pull the handle away from the valve to remove the holder.
6. Remove the holder from the handle and discard the holder.
7. Tie all knots and trim suture tails. Verify that no suture remnants are present. If suture remnants are present, remove them before completing the valve implantation.

8. Individualization of treatment

Some medical professional societies recommend anticoagulant therapy, unless contraindicated, during the first 3 months after bioprosthetic aortic valve implantation. Such postoperative anticoagulant therapy should be determined on an individual basis.

Long-term low dose aspirin, unless contraindicated, is recommended for all patients with bioprosthetic valves. Long-term anticoagulant therapy, unless contraindicated, is recommended for all patients with bioprosthetic valves who have risk factors for thromboembolism.

9. Patient counseling information

Continuous medical follow-up (at least annually) is recommended so that complications related to the valve can be diagnosed and properly managed.

It is recommended that prophylactic antibiotic therapy be given to patients undergoing dental or other procedures which are potentially bacteremic in order to minimize the risk of endocarditis.

Encourage patients to carry the Implanted Device Identification Card, provided by Medtronic, with them at all times.

10. How supplied

10.1. Packaging

The Avalus bioprosthesis is chemically sterilized and is supplied sterile in a buffered 0.2% glutaraldehyde solution. Sterility is compromised if the glass jar-and-lid container is opened or damaged. The outside of the container is not sterile. Do not place it in the sterile field.

10.2. Storage

Store the Avalus bioprosthesis between 5°C and 25°C (41°F and 77°F). Refrigeration is not required, and freezing could damage the valve. Room temperature storage up to 25°C (77°F) is satisfactory. Do not expose the valve to sunlight or other ultraviolet light sources, or placed where significant temperature fluctuations could occur.

Maintain appropriate inventory control so that bioprostheses with earlier Use-by dates are implanted first to avoid expiration dates.

10.3. Return of explanted bioprostheses

Medtronic would like to obtain recovered Avalus bioprostheses. When determined to be appropriate, explants will be studied by a consulting pathologist. A written report summarizing the findings will be returned to the physician. Product return kits, including an explant information form, are available by contacting Medtronic distribution centers or a Medtronic sales representative. It is important that the explant form is filled out completely. If a kit is not available, place the explanted bioprosthesis in a container of glutaraldehyde or 10% buffered formalin immediately after excision. For further instructions on the return of an explanted device, contact a Medtronic sales representative.

11. Patient information

11.1. Registration information

Note: Patient registration does not apply in countries where patient privacy laws conflict with providing patient information, including countries from the European Union.

A Patient Registration Form is included in each device package. After implantation, please complete all requested information. Return the original form to the Medtronic address indicated on the form. Provide the patient with the temporary identification card before discharge.

An Implanted Device Identification Card is provided to the patient. This card contains the name and telephone number of the patient's physician, as well as information that medical personnel would require in the event of an emergency.

12. Postoperative information

12.1. Magnetic resonance imaging (MRI) compatibility

The Avalus bioprosthesis Model 400, is magnetic resonance (MR) safe. The valve contains no metal and, therefore, poses no known hazards in all MR environments.

MR scanning at 3.0 T and 1.5 T can be performed immediately after implantation. The valve will not cause any harm to the patient when exposed to MR scanning.

12.2. Image artifact

MR image quality could be compromised if scanning on or near the position of the valve. If necessary, optimize the MR imaging parameters for the presence of the valve.

13. Accessories

Use only Avalus sizers, Model 7400S, and the Medtronic valve handle, Model 7420, to determine the appropriate Avalus bioprosthesis size.

Caution: Do not use the sizers or handles until they have been thoroughly cleaned and sterilized. Refer to the appropriate instructions for use for further instructions.

Caution: Do not use other manufacturers' valve sizers, or sizers from another Medtronic prosthesis, to size the Avalus bioprosthesis.

14. Disclaimer of warranty

THE FOLLOWING DISCLAIMER OF WARRANTY APPLIES TO UNITED STATES CUSTOMERS ONLY:

ALTHOUGH THE AVALUS BIOPROSTHESIS, MODEL 400, HEREAFTER REFERRED TO AS "PRODUCT," HAS BEEN MANUFACTURED UNDER CAREFULLY CONTROLLED CONDITIONS, MEDTRONIC HAS NO CONTROL OVER THE CONDITIONS UNDER WHICH THIS PRODUCT IS USED. MEDTRONIC, THEREFORE, DISCLAIMS ALL WARRANTIES, BOTH EXPRESS AND IMPLIED, WITH RESPECT TO THE PRODUCT, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. MEDTRONIC SHALL NOT BE LIABLE TO ANY PERSON OR ENTITY FOR ANY MEDICAL EXPENSES OR ANY DIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES CAUSED BY ANY USE, DEFECT, FAILURE, OR MALFUNCTION OF THE PRODUCT, WHETHER A CLAIM FOR SUCH DAMAGES IS BASED UPON WARRANTY, CONTRACT, TORT, OR OTHERWISE. NO PERSON HAS ANY AUTHORITY TO BIND MEDTRONIC TO ANY REPRESENTATION OR WARRANTY WITH RESPECT TO THE PRODUCT.

The exclusions and limitations set out above are not intended to, and should not be construed so as to, contravene mandatory provisions of applicable law. If any part or term of this DISCLAIMER OF WARRANTY is held by any court of competent jurisdiction to be illegal, unenforceable, or in conflict with applicable law, the validity of the remaining portion of the DISCLAIMER OF WARRANTY shall not be affected, and all rights and obligations shall be construed and enforced as if this DISCLAIMER OF WARRANTY did not contain the particular part or term held to be invalid.

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