The AMPLATZER® Septal Occluder and Delivery System
Instructions for Use

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AMPLATZER® Septal Occluder and Delivery System

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

1. BRIEF DEVICE DESCRIPTION

The AMPLATZER Septal Occluder is a self-expandable, double disc device made from a Nitinol wire mesh. The two discs are linked together by a short connecting waist corresponding to the size of the ASD. In order to increase its closing ability, the discs and the waist are filled with polyester fabric. The polyester fabric is securely sewn to each disc by a polyester thread.

The AMPLATZER Delivery System was designed specifically to facilitate attachment, loading, delivery and deployment of the AMPLATZER Septal Occluder and is comprised of a delivery sheath, dilator, loading device, plastic vise and delivery cable.

2. INDICATIONS AND USAGE

The AMPLATZER Septal Occluder is a percutaneous, transcatheter, atrial septal defect closure device intended for the occlusion of atrial septal defects (ASD) in secundum position or patients who have undergone a fenestrated Fontan procedure and who now require closure of the fenestration.

Patients indicated for ASD closure have echocardiographic evidence of ostium secundum atrial septal defect and clinical evidence of right ventricular volume overload (ie, 1.5:1 degree of left to right shunt or RV enlargement).

3. CONTRAINDICATIONS

3.1 Any patient known to have extensive congenital cardiac anomaly which can only be adequately repaired by way of cardiac surgery.

3.2 Any patient known to have sepsis within one month prior to implantation, or any systemic infection that cannot be successfully treated prior to device placement.

3.3 Any patient known to have a bleeding disorder, untreated ulcer or any other contraindications to aspirin therapy, unless another anti-platelet agent can be administered for 6 months.

3.4 Any patient known to have a demonstrated intracardiac thrombi on echocardiography (especially left atrial or left atrial appendage thrombi).

3.5 Any patient whose size (i.e., too small for TEE probe, catheter size, etc) or condition (active infection, etc) would cause the patient to be a poor candidate for cardiac catheterization.

3.6 Any patient where the margins of the defect are <5mm to the coronary sinus, AV valves or right upper lobe pulmonary vein.

4. WARNINGS

4.1 Patients allergic to nickel may suffer an allergic reaction to this device.

4.2 The AMPLATZER Septal Occluder and Delivery System should only be used by those physicians trained in transcatheter defect closure techniques.

4.3 Physicians must be prepared to deal with urgent situations which require removal of embolized devices that result in critical hemodynamic compromise. This includes the availability of an on-site surgeon.

4.4 Embolized devices must be removed. Embolized devices should not be withdrawn through intracardiac structures unless they have been adequately collapsed within a sheath.

4.5 Do not use if the sterile barrier has been compromised in any way.

4.6 Do not release the AMPLATZER Septal Occluder from the delivery cable if the device does not conform to its original configuration or if the device position is unstable. Recapture the device and redeploy. If still unsatisfactory, recapture the device and replace with a new device.

4.7 Implantation of this device may not supplant the need for Coumadin in patients with ASD and paradoxical emboli.

5. PRECAUTIONS

5.1 The use of this device has not been studied in patients with patent foramen ovale.

5.2 Handling

- The AMPLATZER Septal Occluder and Delivery System are for single use only. Do not reuse or resterilize.

5.3 Sizing

- Accurate defect sizing is crucial and mandatory for AMPLATZER Septal Occluder device selection. The use of a compliant balloon catheter to determine defect size is recommended. Device selection should be equal to, or slightly larger than, the balloon stretched diameter of the defect. AGA Medical recommends the use of the AMPLATZER Sizing Balloon for accurate determination of the stretched diameter of the ASD.

5.4 Procedural

- Aspirin (3-5 mg/kg/day) is to be started at least 24 hours prior to the procedure. In the rare case of aspirin intolerance, two times 200 mg of Ticlopidin are given. Cephalosporin therapy is optional.
- Patient should be fully heparinized throughout the procedure with a minimum active clotting time (ACT) of 200 seconds prior to device insertion.
- Transesophageal echocardiography (TEE) or similar imaging equipment (ie, intracardiac echocardiography) is recommended as an aid in placing the AMPLATZER Septal Occluder. If TEE is used, the patient's esophogeal anatomy must be adequate for placement and manipulation of the TEE probe.

5.5 Post-Implant

- Patients should take appropriate endocarditis prophylaxis for 6 months following device implantation. The decision to continue endocarditis prophylaxis beyond 6 months is at the discretion of the physician.
- Patients should be treated with antiplatelet/anticoagulation therapy (such as aspirin) for 6 months post implant. The decision to continue antiplatelet/anticoagulation therapy beyond 6 months is at the discretion of the physician.

6. ADVERSE EVENTS

6.1 Clinical Summary

The AMPLATZER Septal Occluder was evaluated in a multi-center, non-randomized, pivotal study comparing the device to surgical closure of atrial septal defects; 423 patients received 433 devices with a total device exposure of 911.5 years. Individual patient exposure to the device averaged 25.6 months (ranging from 0 to 38.9).

A Registry group was also studied to evaluate the device in patients with other conditions appropriate for device closure. Forty-eight (48) patients with Fenestrated Fontan (communication in the baffle with at least 5mm distance from the free atrial wall and central venous pressure less than 15Hg) were enrolled in the study.

6.2 Deaths

There was one non device or procedure related death reported in the pivotal study and no deaths were reported in the Fenestrated Fontan Registry Group.

6.3 Observed Adverse Events

6.3.1 Pivotal Clinical Study

Table 1 Adverse Events – Pivotal Study

Major Adverse Events	AMPLATZER Patients	Surgical Control Patients	p-value
Cardiac Arrhythmia requiring major treatment	2/442 (0.5%)	0/154 (0.0%)	1.00
Device Embolization with surgical removal	3/442 (0.7%)	0/154 (0.0%)	0.57
Device Embolization with percutaneous removal	1/442 (0.2%)	0/154 (0.0%)	1.00
Delivery System Failure	1/442 (0.2%)	0/154 (0.0%)	1.00
Pericardial Effusion with tamponade	0/442 (0.0%)	3/154 (1.9%)	0.017
Pulmonary Edema	0/442 (0.0%)	1/154 (0.6%)	0.26
Repeat Surgery	0/442 (0.0%)	2/154 (1.3%)	0.066
Surgical Wound Adverse Events	0/442 (0.0%)	2/154 (1.3%)	0.066
Total Major Adverse Events Patients	7/442 (1.6%)	8/154 (5.2%)	0.030
Minor Adverse Events			
Anemia	0/442 (0.0%)	1/154 (0.6%)	0.26
Allergic reaction (drug)	2/442 (0.5%)	0/154 (0.0%)	1.00
Atelectasis	0/442 (0.0%)	1/154 (0.6%)	0.26
Cardiac Arrhythmias Minor Treatment	15/442 (3.4%)	9/154 (5.8%)	0.23
Device Embolization with percutaneous removal	1/442 (0.2%)	0/154 (0.0%)	1.00
Extremity Tingling/Numbness	1/442 (0.2%)	0/154 (0.0%)	1.00
Headaches/Possible TIA	2/442 (0.5%)	0/154 (0.0%)	1.00
Delivery System Failure	2/442 (0.5%)	0/154 (0.0%)	1.00
Pericardiotomy Syndrome	0/442 (0.0%)	2/154 (1.3%)	0.066
Pericardial effusion	0/442 (0.0%	6/154 (3.9%)	<0.001
Pleural Effusion	0/442 (0.0%)	1/154 (0.6%)	0.26
Pneumothorax	0/442 (0.0%)	3/154 (1.9%)	0.017
Staph Infection	0/442 (0.0%)	1/154 (0.6%)	0.26
Surgical Wound Adverse Events	0/442 (0.0%)	1/154 (0.6%)	0.26
Thrombus formation	3/442 (0.7%)	0/154 (0.0%)	0.56
Transfusions	0/442 (0.0%)	2/154 (1.3%)	0.066
Upper Respiratory Infection/Fever	0/442 (0.0%)	2/154 (1.3%)	0.066
Urinary Tract Disturbance	1/424 (0.2%)	0/154 (0.0%)	1.00
Total Minor Adverse Events (Patients)	27/442 (6.1%)	29/154 (18.8%)	<0.001

6.3.2 Registry Group – Fenestrated Fontan

Table 2: Adverse Events -FF

	AMPLATZER Patients	Upper 95% Confidence Bound
Major Adverse Event		
Repeat Surgery	1/48 (2.1%)	0.095
Hemothorax	1/48(2.1%)	0.095
Minor Adverse Event		
Vomiting (required 2 nights in hospital)	1/48 (2.1%)	0.095
Atrial fibrillation/cardioversion	1/48 (2.1%)	0.095
Total Adverse Events	4/48 (8.3%)	0.181

6.4 Potential Adverse Events

Placement of the AMPLATZER Septal Occluder involves using standard interventional cardiac catheterization techniques. The following adverse events (listed in alphabetical order) might be expected from interventional cardiac catheterization techniques.

- Air embolus
- Allergic dye reaction
- Anesthesia reactions
- Apnea
- Fever
- Hypertension/hypotension
- Infection including endocarditis
- Perforation of vessel or myocardium
- Pseudoaneurysm including blood loss requiring transfusion
- Valvular regurgitation

7 CLINICAL STUDIES

The AMPLATZER Septal Occluder was evaluated in a multi-center, non-randomized controlled study to compare the clinical performance of the device for ASD closure with that documented for the ASD Surgical repair procedure. Additionally, the device was studied in patients with uncommon conditions wherein transcatheter closure with the device may also be beneficial (Registry Group).

7.1 Patients Studied

7.1.1 Pivotal study – Atrial Septal Defects

Attempt to treat was initiated in 442 device patients and 154 surgical patients. Enrolled patients had echocardiographic evidence of ostium secundum atrial septal defect (device group: defect size $\leq$ 38mm) and clinical evidence of right ventricular volume overload or

had clinical symptoms such as paradoxical embolism or atrial dysrhythmia in the presence of a minimal shunt. Exclusion criteria included:

- Patients with multiple defects that could not be adequately covered by the device (device group only).
- Associated congenital cardiac anomalies requiring surgery.
- Ostium primum or sinus venosus atrial septal defects.
- Partial anomalous pulmonary venous drainage.
- Pulmonary vascular resistance above 7 Woods units or a right-to-left shunt at the atrial level with a peripheral arterial saturation < 94%.
- Patients with recent myocardial infarction, unstable angina and decompensated congestive heart failure.
- Patient with right and/or left ventricular decompensation with ejection fraction < 30%.
- Sepsis (local/generalized).
- History of repeated pulmonary infection.
- Any type of serious infection < 1 month prior to procedure.
- Malignancy where life expectancy was < 2 years.
- Demonstrated intracardiac thrombi on echocardiography.
- Weight < 8 Kilograms.
- Inability to obtain informed consent.
- Patient with gastritis, gastric ulcer, duodenal ulcer, bleeding disorders etc and other contraindications to aspirin therapy unless other anti-platelet agents could not be administered for 6 months.

Patients underwent physical examination which included: heart murmur classification; an electrocardiogram, chest x-ray, and 2D Color Doppler Transthoracic Echo (TTE).

Table 3: Patient Baseline Demographics

Variable		AMPLATZER Patients	Surgical Control Patients	p-value
Age (years)	Mean±s.d.(N) [range]	18.1 ± 19.3 (442) [0.6, 82.0]	5.9 ± 6.2 (154) [0.6, 38.2]	<0.001
Gender				
Female		299/442 (67.6%)	94/154 (61.0%)	0.14
Male		143/442 (32.4%)	60/154 (39.0%)	
Height (cm)	Mean±s.d.(N) [range]	134.6 ± 32.0 (440) [58,188]	105.5 ± 26.9 (151) [60,178]	<0.001
Weight (kg)	Mean±s.d (N) [range]	42.3 ±27.3 (440) [6.3,130]	20.6 ± 15.2 (153) [4.8,78.4]	<0.001
Medical History				
CHF		11/442 (2.5%)	7/154 (4.5%)	0.27
Failure to Thrive		14/442 (3.2%)	13/154 (8.4%)	0.012
CAD		9/442 (2.0%)	0/154 (0%)	0.12
Respiratory Infections		7/442 (1.6%)	13/154 (8.4%)	<0.001
TIA		6/442 (1.4%)	1/154 (0.6%)	0.68
COPD		1/442 (0.2%)	0/154 (0%)	1.00
Hypertension		16/442 (3.6%)	0/154 (0%)	0.016
Stroke		13/442 (2.9%)	0/154 (0%)	0.026

Variable	AMPLATZER Patients	Surgical Control Patients	p-value
Recurrent Strokes/TIA's	5/442 (1.1%)	1/154 (0.6%)	1.00
Diabetes	4/442 (0.9%)	0/154 (0%)	0.58

7.1.2 Registry Group - Fenestrated Fontan

Table 4: Pre-Closure –Fenestrated Fontan

Age (years)	Mean±s.d (N) [range]	7.8 ± 6.9 (48) [1.6, 44.9]
Gender: Female		29/48 (60.4%)
Height (cm)	Mean±s.d.(N) [range]	114.5 ± 25.2 (46) [78,168]
Weight (kg)	Mean±s.d (N) [range]	22.4 ± 13.5 (48) [9.7, 68.7]
Medical History:		
CHF		1/48 (2.1%)
Failure to thrive		1/48 (2.1%)
Stroke		2/48 (4.2%)
Heart Murmur		26/47 (55.3%)
Pulmonary Ejection Murmur		2/47 (4.3%)
Mid Diastolic Murmur		1/47 (2.1%)
Right axis deviation		11/45 (24.4%)
Peaked p waves		1/45 (2.2%)
Cardiomegaly		20/45 (44.4%)

7.2 Methods

7.2.1 Device Patients

Device placement was attempted in 442 patients. The patients underwent cardiac catheterization. Position and size of the defect were confirmed by angiography. The size of the defect was determined by obtaining the "stretched" diameter of the defect with a compliant balloon catheter. If the size and position of the defect were determined to be feasible for transcatheter closure, device placement was attempted. Nineteen (19) patients did not receive the device due to anatomical conditions. There was one acute embolization. Thus 423 patients received 433 devices..

The patients were instructed to avoid strenuous activity for a period of one month. and to take aspirin for 6 months post placement (3-5mg/kg/day). Additionally, patients were examined and a transthoracic Echocardiogram (TTE) was conducted at 24 hours, 6 months and 1 year.

7.2.2 Surgical Control Group

Surgical repair of an atrial septal defect requires sternotomy, cardiopulmonary bypass, aortic cross clamp and right atriotomy. If the defect is small, primary repair by suturing the defect is feasible, however, if the defect is large, then patch closure is the preferred method. Different surgeons use different material for the patch. Most surgeons use pericardium, however, some surgeons use Goretex® to

repair the ASD. At the end of the operation, the surgeon inserts chest tubes to drain any blood. The chest tubes last for 24-48 hours after which they are removed. The patient spends 3-5 days at the hospital after which they go home.. A total of 154 patients underwent surgical closure of their ASD. The surgical group required a 12 month visit.

7.3 Results

Table 5: Principal Effectiveness and Safety Results - Pivotal Study

	AMPLATZER Patients[1]	Surgical Control Patients	90% Confidence Interval
Technical Success	423/442 (95.7%)	154/154 (100.0%)	(-0.084,-0.010)
Procedure Success	413/423 (97.6%)	154/154 (100.0%)	(-0.059, +0.008)
Early (≤ 30 days) Composite Success	401/442 (90.7%)	148/154 (96.1%)	(-0.096, +0.019)
12-month Composite Success	331/362 (91.4%)	146/154 (94.8%)	(-0.153, -0.033)
24-hour Closure Success	404/418 (96.7%)	154/154 (100%)	(-0.073, -0.001)
6-month Closure Success	376/387 (97.2%)	154/154 (100%)	(-0.068, +0.003)
12-month Closure Success	326/331 (98.5%)	149/149 (100%)	(-1.052, 0.017)
Principal Safety Measures			
Major Adverse Events 12-months	7/442 (1.6%)	8/154 (5.2%)	(-0.090, -0.002)
Minor Adverse Events 12-months	27/442 (6.1%)	29/154 (18.8%)	(-0.200, -0.070)
12-month Composite Success (K-M)	0.934	0.938	[-0.044, +0.036]
Survival at 30 days (K-M)	0.939	0.956	[-0.052, +0.036]
Survival at 180 days (K-M)	0.936	0.947	[-0.048, +0.026]

Table 6: Principal Effectiveness and Safety Results - Pivotal Study
Patient Age < 20 years

	AMPLATZER Patients	Surgical Control Patients	90% Confidence Interval
Technical Success	315/328 (96.0%)	149/149 (100%)	(-0.086, -0.005)
Procedure Success	306/315 (97.1%)	149/149 (100%)	(0.074, +0.005)
Early (≤ 30 days) Composite Success	295/328 (89.9%)	143/149 (95.9%)	(-0.124, -0.007)
12-month Composite Success	256/281 (91.1%)	142/149 (95.3%)	(-0.108, +0.013)
24-hour Closure Success	301/310 (97.1%)	149/149 (100%)	(-0.075, +0.005)
6-month Closure Success	270/278 (97.1%)	149/149 (100%)	(-0.077, +0.006)
12-month Closure Success	246/251 (98.0%)	149/149 (100%)	(-0.068, +0.014)
Principal Safety Measures			
Major Adverse Events 12-months	6/328 (1.8%)	7/149 (4.7%)	(-0.086, +0.008)
Minor Adverse Events 12-months	16/328 (4.9%)	29/149 (19.5%)	(-0.221, -0.085)
12-month Composite Success (K-M)	0.930	0.944	[-0.055, +0.027]
Survival at 30 days (K-M)	0.933	0.954	[-0.059, +0.017]
Survival at 180 days (K-M)	0.930	0.954	[-0.062, +0.014]

[1]Unit of analysis = Patient. Although 10 patients had 2 defects each treated with an AMPLATZER Septal Occluder; all patients with multiple AMPLATZER implants were successfully treated.

Technical Success: successful deployment of the device, or the successful completion of the surgical procedure.
Procedure Success: successful closure of the defect as measured immediately following the procedure (≤ 2 mm residual shunt)
Composite Success: All device placement attempts without a major adverse event, surgical reintervention, embolization, technical failure or major shunt (defined as > 2 mm).
Closure Success: among patients that were technical successes, closure of the atrial septal defect (defined as a shunt ≤ 2mm) without the need for surgical repair.
Major Adverse Events: Events that are life threatening, prolong hospitalization or have long-term consequences or need for ongoing therapy. These include but are not limited to cerebral embolism, cardiac perforation with tamponade, endocarditis, pericardial effusion with tamponade, repeat surgery, death, cardiac arrhythmias requiring permanent pacemaker placement or long term anti-arrhythmic medication and device embolizations requiring immediate surgical removal.
Minor Adverse Events: Device embolization with percutaneous retrieval, cardiac arrhythmia with treatment, phrenic nerve injury, hematoma, other vascular access site adverse events, retroperitoneal hematoma, surgical wound adverse events, other procedural adverse events, pericardial effusion requiring medical management, evidence of device associated thrombus formation without embolization (with or without treatment) and marker band embolization without known sequelae.

7.3.2 Registry Group – Fenestrated Fontan

Table 7: Principal Efficacy Results—FF

	AMPLATZER Patients	Lower 95% Confidence Bound
Technical Success	46/48 (95.8%)	0.875
Procedure Success	46/46 (100.0%)	0.937
Early Composite Success	44/48 (91.7%)	0.819
6 month Success	38/38 (100.0%)	0.924
Primary Efficacy Outcome (12 month Success)	32/32 (100.0%)	0.911
Hospital days Mean±s.d. (N) [range]	1.2± 0.7 (39) [0.0, 4.0]	(0.95, 1.41)

Table 8: Principal Safety Results – FF

	AMPLATZER Patients[1]	Upper 95% Confidence Bound
Major Adverse Events	2/48 (4.2%)	0.125
Minor Adverse Events	2/48 (4.2%)	0.125
Total Adverse Events	4/48 (8.3%)	0.181

[1]Unit of analysis = "patient"

8 INDIVIDUALIZATION OF TREATMENT

8.1 Patient Selection

- Device placement should only be attempted in those patients with sufficient rim around the defect to allow stable seating of the device.

8.2 Patient's with multiple ASD's

Closure of multiple ASD's should only be attempted by those physicians who have gained sufficient experience (>10-15 cases) to undertake more technically challenging procedures.

- If there are two large ASD's separated by more than a 7mm rim of tissue, then implantation of two devices may be justified.

- If there are multiple ASD's that are close to each other, one device may be used to cover all defects when placed in the largest defect.

8.3 Device Placement and Size Selection

- Device placement should only be done with the assistance of TEE or similar imaging equipment (ie, intracardiac echocardiography).
- Device size selection should be the same size (or slightly larger than) the stretched diameter of the defect.

8.2 Use in specific populations

- **Pregnancy** – care should be taken to minimize the radiation exposure to the fetus and the mother.
- **Nursing Mothers** –There has been no quantitative assessment of the presence of leachables in breast milk.

9 PATIENT INFORMATION

Refer to the *Patient's Guide to Transcatheter Closure of an Atrial Septal Defect Using the AMPLATZER® Septal Occluder System.*

10 HOW SUPPLIED

The AMPLATZER Septal Occluder is packaged separately from the AMPLATZER Delivery System. Refer to Table 9 in the following section for the recommended Delivery System sizes.

11 DIRECTIONS FOR USE

11.1 Maintaining Device Effectiveness

Store in a cool dry place.

11.2 Complete Device Description

11.2.1 AMPLATZER Septal Occluder

The AMPLATZER Septal Occluder is a self-expandable, double disc device made from a nickel-titanium (Nitinol) wire mesh. The two discs are linked together by a short connecting waist. In order to increase its closing ability, the discs and the waist are filled with polyester fabric. The polyester fabric is securely sewn to each disc by a polyester thread.

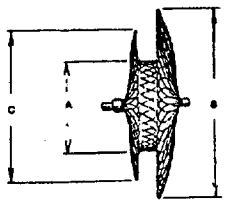


Table 9 - Device Specifications/Recommended sheath sizes

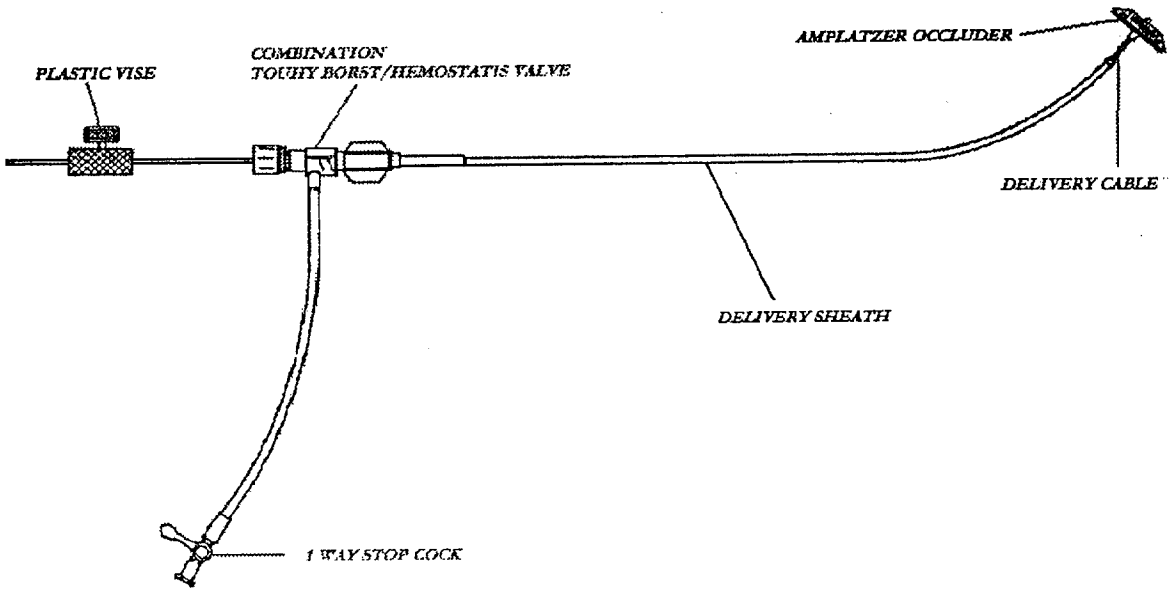
ORDER NUMBER	A DEVICE SIZE (=STRETCHED ASD)	B LA DISC DIAMETER	WIDTH OF CONNECTING WAIST	C RA DISC DIAMETER	SMALLEST RECOMMENDED SHEATH SIZE
9-ASD-004	4 mm	16 mm	3 mm	12 mm	6-7 French
9-ASD-005	5 mm	17 mm	3 mm	13 mm	6-7 French
9-ASD-006	6 mm	18 mm	3 mm	14 mm	6-7 French
9-ASD-007	7 mm	19 mm	3 mm	15 mm	6-7 French
9-ASD-008	8 mm	20 mm	3 mm	16 mm	6-7 French
9-ASD-009	9 mm	21 mm	3 mm	17 mm	6-7 French
9-ASD-010	10 mm	22 mm	3 mm	18 mm	6-7 French
9-ASD-011	11 mm	25 mm	4 mm	21 mm	7 French
9-ASD-012	12 mm	26 mm	4 mm	22 mm	7 French
9-ASD-013	13 mm	27 mm	4 mm	23 mm	7 French
9-ASD-014	14 mm	28 mm	4 mm	24 mm	7 French
9-ASD-015	15 mm	29 mm	4 mm	25 mm	7 French
9-ASD-016	16 mm	30 mm	4 mm	26 mm	7 French
9-ASD-017	17 mm	31 mm	4 mm	27 mm	7 French
9-ASD-018	18 mm	32 mm	4 mm	28 mm	8-9 French
9-ASD-019	19 mm	33 mm	4 mm	29 mm	8-9 French
9-ASD-020	20 mm	34 mm	4 mm	30 mm	8-9 French
9-ASD-022	22 mm	36 mm	4 mm	32 mm	9 French
9-ASD-024	24 mm	38 mm	4 mm	34 mm	9 French
9-ASD-026	26 mm	40 mm	4 mm	36 mm	10 French
9-ASD-028	28 mm	42 mm	4 mm	38 mm	10 French
9-ASD-030	30 mm	44 mm	4 mm	40 mm	10 French
9-ASD-032	32 mm	46 mm	4 mm	42 mm	10 French
9-ASD-034	34 mm	50 mm	4 mm	44 mm	12 French
9-ASD-036	36 mm	52 mm	4 mm	46 mm	12 French
9-ASD-038	38 mm	54 mm	4 mm	48 mm	12 French

11.2.2 AMPLATZER Delivery System

The AMPLATZER Delivery System was designed specifically to facilitate attachment, loading, delivery and deployment of the AMPLATZER Septal Occluder and is comprised of:

- Delivery Sheath with Touhy-Borst Adapter - used to deliver the device.
- Dilator – used to ease penetration of tissue.
- Loading Device – used to introduce the AMPLATZER Septal Occluder into the delivery sheath.
- Plastic Vise – facilitates direction control and serves as the "handle" for disconnecting (unscrewing) the delivery cable from the device.

- Delivery Cable – the device is screwed onto the distal tip of the delivery cable, which allows for placement (and if necessary, retrieval) of the device.



11.3 Directions for Use

- Patients should be fully heparinized throughout the procedure with a minimum active clotting time (ACT) of 200 seconds prior to device insertion.

- Following percutaneous puncture of the femoral vein, perform a standard right heart catheterization.

- Perform an angiogram in order to demonstrate the atrial communication. Catheterize the left atrium using a 45° LAO position and cranial angulation 35-45°, inject contrast medium into the right upper lobe pulmonary vein.

- Introduce a .035" exchange "J" tip guidewire into the left atrium. Insert a compliant balloon catheter over the exchange wire into the left atrium and determine the stretched diameter of the defect.

- Sizing the defect – Two methods can be used:
  a) Pull technique: Using a round compliant balloon, inflate the catheter with various increments of carbon dioxide or contrast medium (for patients not allergic to contrast media) and pull across the atrial communication. There should be only a slight deformity of the sizing balloon to determine the stretched diameter. If using a sizing plate, remove the sizing balloon and reinflate with the identical amount of CO_2 or contrast medium. Pass the inflated balloon through

various openings of the sizing plate to determine the stretched diameter of the defect. Sizing of the defect is very important for appropriate selection of the occlusion device, therefore repeat sizing of the defect is encouraged. Alternatively, determination of the balloon can also be established using echocardiographic or radiographic measurements.

b) Static technique: Using a balloon specifically designed for sizing atrial communications (i.e. AMPLATZER Sizing Balloon) the catheter is passed over the exchange guidewire directly through the skin. To facilitate this percutaneous entry, an assistant should apply forceful negative pressure with an attached syringe. Under fluoroscopic and echocardiographic guidance, the balloon catheter is placed across the defect and inflated with diluted contrast medium until the left-to-right shunt ceases as observed by echocardiography. Measurements can then be made identical to the pull technique.

NOTE: *Always refer to the Instructions for use that accompany each balloon catheter to insure that the recommendations of the manufacturer are followed.*

- Once the stretched diameter of the defect has been determined, select an occlusion device equal or, if the identical size is not available, slightly larger than the defect. Therefore, the device should be stenting the defect.

- Remove the balloon catheter leaving the .035" exchange guidewire in place.

- Pass the delivery cable through the loader and screw the device to the tip of the delivery cable. Once securely attached, immerse the device and loader in saline solution and pull the device into the loader with a jerking motion. Flush the device via the side arm of the loader.

- Insert the dilator into the delivery sheath and secure to the sheath with the locking mechanism. Introduce the dilator/delivery sheath assembly through the groin. Once the delivery sheath has reached the inferior vena cava, remove the dilator to allow back bleeding to purge all air from the system then connect the hemostasis valve and flush with a syringe before the left atrium is entered.

  WARNING: Always use the luer lock adapter when connecting the hemostasis valve to the sheath when using the 12 French delivery system.

- Advance the sheath over the guidewire through the communication into the left upper pulmonary vein. Verify the correct position of the delivery sheath by a test hand injection of contrast medium or by echocardiography. Remove the exchange wire and flush the sheath with saline.

- Attach the loading device to the delivery sheath. Advance the device into the sheath by pushing (not rotating) the delivery cable.

NOTE: *REFER TO DIAGRAMS AT THE END OF THIS SECTION.*

- Under fluoroscopic and echocardiographic guidance, deploy the left atrial disc and part of the connecting waist and pull the device gently against the atrial septum, which can be felt and also observed by ultrasonography. With tension on the delivery cable, pull the sheath back and deploy the right atrial disk. Pull the sheath back by approximately 5-10 cm. Position the frontal camera into the same projection as the angiogram to profile the atrial septum. A gentle "to and fro" motion with the delivery cable assures a secure position across the atrial septal defect, which can also be observed by ultrasound.

  WARNING: **Do not release the device from the delivery cable if the device does not conform to its original configuration or if device position is unstable. Recapture the device and redeploy. If still unsatisfactory, recapture the device and replace with a new device.**

- Confirm correct placement. If device placement is unsatisfactory or if the device does not reconfigure to its original shape, retract the device into the sheath and redeploy or replace with a new device.

- Release the device. Attach the plastic vise to the delivery cable by tightening the screw on the vise. Release the device by rotating the vise counterclockwise as indicated by the arrow. In the unlikely event that this should not be possible, advance the sheath against the right atrial disc to secure the device, which will facilitate detachment.

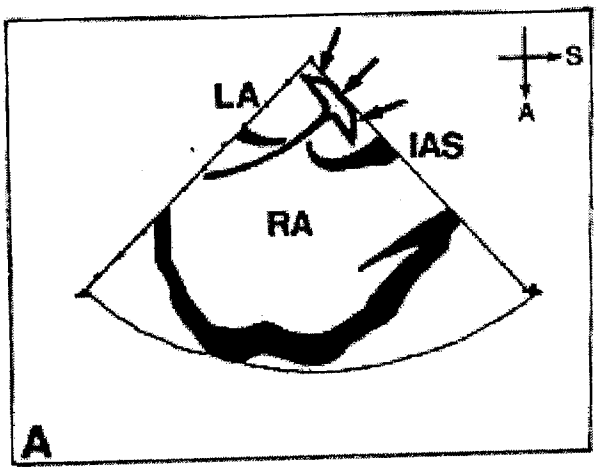


Figure A

Transesophageal echocardiogram during placement of the AMPLATZER™ Septal Occluder. The study is recorded in a vertical plane with the subjects head to the right of the image. The delivery catheter has been advanced across the atrial septum into the mid-left atrium, and the left atrial disc (three arrows) deployed by advancing the delivery cable

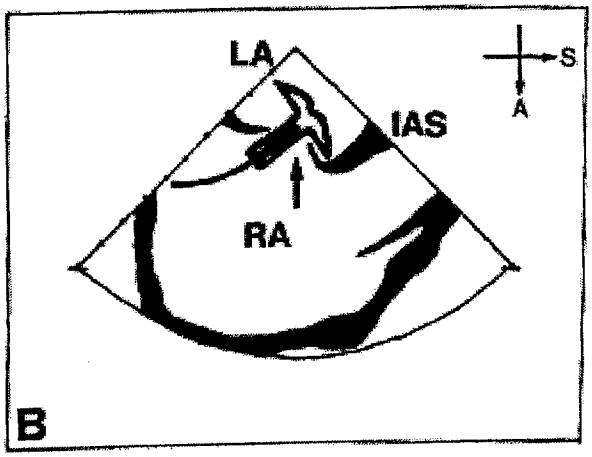


Figure B

The middle centering portion of the device (arrow) is deployed in the left atrium (by pulling the delivery catheter back over the cable) and withdrawn through the atrial defect until the left atrial disc is against the atrial septum.

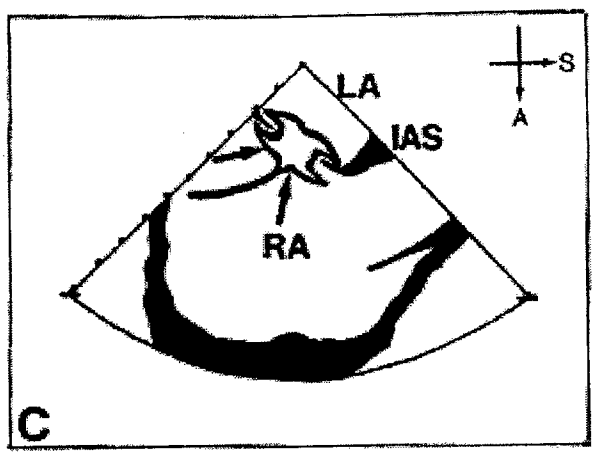


Figure C

The right atrial disc (two arrows) is deployed by further withdrawing the delivery catheter over the cable. The device is still attached to the delivery cable.

LEGEND: A=anterior; S=superior
IAS=level of the interatrial septum

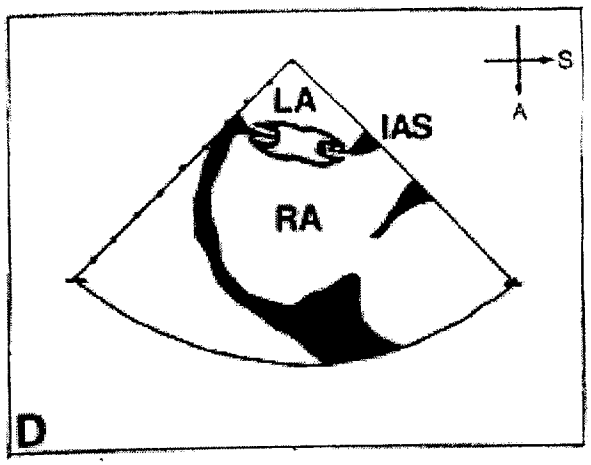


Figure D

The device is released by unscrewing the delivery cable with the vise, and moves to a neutral position no longer tethered by the cable.

LA=left atrium; RA=right atrium;