

<b>2.02.26</b>	<b>Percutaneous Left Atrial Appendage Closure Devices for Stroke Prevention in Atrial Fibrillation</b>	
<b>Section</b> Medicine	<b>Effective Date</b> August 29, 2014	
<b>Subsection</b> Cardiology	<b>Original Policy Date</b> July 6, 2012	<b>Next Review Date</b> August 2015

**Description**

Stroke prevention in atrial fibrillation (AF) is an important consideration. Treatment with anticoagulant medications is the most common approach to stroke prevention. Most embolic strokes originate from the left atrial appendage; therefore, occlusion of the left atrial appendage may offer a nonpharmacologic alternative to anticoagulant medications for the prevention of stroke in patients with AF. Multiple percutaneously deployed devices are being investigated for left atrial appendage closure.

**Related Policies**

- N/A

**Policy**

The use of percutaneous left atrial appendage closure devices for the prevention of stroke in atrial fibrillation is considered **investigational**.

**Policy Guidelines**

Effective in 2012, there is a specific CPT category III code for this procedure:  
 0281T: Percutaneous transcatheter closure of the left atrial appendage with implant, including fluoroscopy, transseptal puncture, catheter placement(s), left atrial angiography, left atrial appendage angiography, radiological supervision and interpretation.

**Benefit Application**

Benefit determinations should be based in all cases on the applicable contract language. To the extent there are any conflicts between these guidelines and the contract language, the contract language will control. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

Some state or federal mandates (e.g., Federal Employee Program (FEP)) prohibit Plans from denying Food and Drug Administration (FDA) - approved technologies as investigational. In these instances, plans may have to consider the coverage eligibility of FDA-approved technologies on the basis of medical necessity alone.

**Rationale**

**Background**

Stroke is the most serious complication of AF. The estimated incidence of stroke in nontreated patients with AF is 5% per year. Stroke associated with AF is primarily embolic in nature, tends to be more severe than the typical ischemic stroke, and causes higher rates of mortality and disability. As a result, stroke prevention is one of the main goals of AF treatment.

Stroke in AF occurs primarily as a result of thromboembolism from the left atrium. The lack of atrial contractions in AF leads to blood stasis in the left atrium, and this low flow state increases the risk for thrombosis. The area of the left atrium with the lowest blood flow in AF, and, therefore, the highest risk of thrombosis, is the left atrial appendage (LAA). It has been estimated that 90% of left-atrial thrombi occur in the LAA.

The main treatment for stroke prevention in AF is anticoagulation, which has proven efficacy. The risk for stroke among patients with AF is stratified on the basis of several factors. A commonly used score, the CHADS<sub>2</sub> score, assigns 1 point each for the presence of heart failure, hypertension, age 75 years or older, diabetes, or prior stroke or transient ischemic attack (TIA). The CHA<sub>2</sub>DS<sub>2</sub>-VASc score includes sex, more age categories, and the presence of vascular disease, in addition to the risk factors used in the CHADS<sub>2</sub> score. Warfarin is the predominant agent in clinical use. A number of newer anticoagulant medications, including dabigatran, rivaroxaban, and apixaban, have recently received U.S. Food and Drug Administration (FDA) approval for stroke prevention in nonvalvular AF and have demonstrated noninferiority to warfarin in clinical trials. While anticoagulation is effective for stroke prevention, there is an increased risk of bleeding. Also, warfarin requires frequent monitoring and adjustments, as well as lifestyle changes. Dabigatran does not require monitoring. However, unlike warfarin, the antithrombotic effects of dabigatran are not reversible with any currently available hemostatic drugs. Guidelines from the American College of Chest Physicians recommend the use of oral anticoagulation for patients with AF who are at high risk of stroke (i.e., CHADS<sub>2</sub> score  $\geq$  2), with more individualized choice of antithrombotic therapy in patients with lower stroke risk.(1)

Surgical removal, or exclusion, of the LAA is often performed in patients with AF who are undergoing open heart surgery for other reasons. Percutaneous LAA closure devices have been developed as a nonpharmacologic alternative to anticoagulation for stroke prevention in AF. The devices may prevent stroke by occluding the LAA, thus preventing thrombus formation.

Several versions of LAA occlusion devices have been developed. The Watchman™ left atrial appendage system (Boston Scientific, Maple Grove, MN) is a self-expanding nickel titanium device. It has a polyester covering and fixation barbs for attachment to the endocardium. Implantation is performed percutaneously through a catheter delivery system, utilizing venous access and transeptal puncture to enter the left atrium. Following implantation, patients are anticoagulated with warfarin or alternate agents for approximately 1 to 2 months. After this period, patients are maintained on antiplatelet agents (i.e., aspirin and/or clopidogrel) indefinitely. The Lariat® Loop Applicator is a suture delivery device that is intended to close a variety of surgical wounds in addition to left atrial appendage closure. The Cardioblate® closure device developed by Medtronic Corp. is currently being tested in clinical studies. The Amplatzer® cardiac plug (St. Jude Medical, Minneapolis, MN), is FDA-approved for closure of atrial septal defects but has not received FDA approval for LAA closure device. The Percutaneous LAA Transcatheter Occlusion device (eV3, Plymouth, MN) has also been evaluated in research studies but has not received FDA approval.

### **Regulatory Status**

There are currently no percutaneous LAA closure devices with FDA approval for that indication. In December 2013, an FDA advisory panel voted in favor of premarket approval clearance for the Watchman™ Left Atrial Appendage Closure Therapy.(2) However, in June 2014, FDA determined that the device will be required to undergo a third panel review before it would consider approval. The Watchman™ device was originally considered for FDA approval in 2009 based on the results of the Percutaneous

Closure of the Left Atrial Appendage Versus Warfarin Therapy for Prevention of Stroke in Patients with Atrial Fibrillation (PROTECT-AF) randomized controlled trial (RCT). While the FDA advisory panel for this topic voted in favor of approval, FDA did not grant final approval after concluding that further studies of efficacy and safety were necessary.

At least 2 other devices, referred to earlier, have been studied for LAA occlusion, but are not approved in the U.S. for percutaneous closure of the LAA. The Lariat® Loop Applicator device (SentreHEART Inc., Redwood City, CA) is a suture delivery system that received 510(k) marketing clearance from FDA in 2006. The intended use is to facilitate suture placement and knot tying in surgical applications where soft tissues are being approximated or ligated with a pretied polyester suture. The Amplatzer Amulet® device (St. Jude Medical, Plymouth, MN) has a CE approval in Europe for left atrial appendage closure, but is not currently approved in the U.S. for any indication.

### Literature review

The evidence on the efficacy of left atrial appendage (LAA) closure devices consists of numerous case series of various occlusion devices, 1 randomized controlled trial (RCT) of the Watchman™ device that compared LAA closure with warfarin anticoagulation for which results have been published, and 1 RCT of the Watchman™ device that has been presented to the FDA advisory panel. Evidence on each different device will be reviewed separately, because the devices are not similar in design, and each may have its own unique considerations.

#### Watchman device

The review of the evidence related to the efficacy of the Watchman device is based, in part, on a Blue Cross Blue Shield Association TEC Assessment developed in June 2014, which evaluated use of the Watchman device for patients who were eligible and ineligible for anticoagulation therapy and determined that it does not meet Technology Evaluation Criteria.(3) Although the Watchman device and other LAA closure devices would ideally represent an alternative to oral anticoagulation for the prevention of stroke in patients with AF, during the postimplantation period, the device may be associated with increased thrombogenicity and, therefore, anticoagulation is used during the periprocedural period. Most studies that have evaluated the Watchman device have included patients who are eligible for anticoagulation.

*Patients who are eligible for anticoagulation.* Two RCTs have evaluated the Watchman device for stroke prevention in patients with atrial fibrillation (AF).

The single RCT published is the PROTECT-AF study,(4) which was a randomized, unblinded trial that evaluated the noninferiority of an LAA closure device compared with warfarin for stroke prevention in AF. The trial randomized 707 patients from 59 centers in the U.S. and Europe to the Watchman device or warfarin treatment in a 2:1 ratio. Mean follow-up was 18±10 months. The primary efficacy outcome was a composite end point of stroke (ischemic or hemorrhagic), cardiovascular or unexplained death, or systemic embolism. There was also a primary safety outcome, which was a composite end point of excessive bleeding (intracranial or gastrointestinal [GI] bleeding) and procedure-related complications (pericardial effusion, device embolization, procedure-related stroke).

The primary efficacy outcome occurred at a rate of 3.0 per 100 patient years in the LAA closure group compared with 4.9 per 100 patient years in the warfarin group (rate ratio [RR], 0.62; 95% credible interval [CrI], 0.35 to 1.25). Based on these outcomes, the probability of noninferiority was greater than 99.9%. For the individual components of the primary outcome, cardiovascular/unexplained death and hemorrhagic stroke were higher in the warfarin group. In contrast, ischemic stroke was higher in the LAA closure

group at 2.2 per 100 patient years compared with 1.6 per 100 patient years in the warfarin group (RR=1.34; 95% CrI, 0.60 to 4.29).

The primary safety outcome occurred more commonly in the LAA closure group, at a rate of 7.4 per 100 patient years compared with 4.4 per 100 patient years in the warfarin group (RR=1.69; 95% CrI, 1.01 to 3.19). The excess in adverse event rates for the LAA closure group were primarily the result of early adverse events associated with placement of the device. The most frequent type of complication related to LAA closure device placement was pericardial effusion requiring intervention, which occurred in 4.8% of patients (22/463).

Longer term follow-up from the PROTECT AF study was reported by Reddy et al in 2012.(5) At a mean follow-up of 2.3 years, the results were similar to the initial report. The relative risk for the composite primary outcome in the Watchman group compared with anticoagulation was 0.71, and this met noninferiority criteria with a confidence of greater than 99%. Complications were more common in the Watchman group, with an estimated rate of 5.6%/year in the Watchman group compared with 3.6%/year in the warfarin group.

Alli et al reported quality-of-life parameters, as measured by change in scores on the Short-Form 12 Health Survey from baseline to 12 months of follow up, for a subset of 547 subjects in the PROTECT AF study.(6) For the subset of PROTECT AF subjects included in the present analysis, at baseline, control group subjects had a higher mean CHADS<sub>2</sub> score (2.4 vs 2.2; p=0.052) and were more likely to have a history of coronary artery disease (49.5% vs 39.6%; p=0.028). For subjects in the Watchman group, the total physical score improved in 34.9% and was unchanged in 29.9%; for those in the warfarin group, the total physical score improved in 24.7% and was unchanged in 31.7% (p=0.01).

A second RCT, the PREVAIL trial, was conducted after the 2009 FDA decision on the Watchman device to address some of the limitations of the PROTECT AF study, including its inclusion of patients with low stroke risk (CHADS<sub>2</sub> scores of 1), high rates of adjunctive antiplatelet therapy use in both groups, and generally poor compliance with warfarin therapy in the control group. Results from the PREVAIL trial have been presented in FDA documentation, but not in peer-reviewed form.(2) In the PREVAIL trial, 461 subjects enrolled at 41 sites were randomized in a 2:1 fashion to either the Watchman™ device or control, which consisted of either initiation or continuation of warfarin therapy with a target international normalized ratio (INR) of 2.0 to 3.0. Subjects had nonvalvular AF and required treatment for prevention of thromboembolism based on a CHADS<sub>2</sub> score of 2 or higher (or ≥1 with other indications for warfarin therapy based on American College of Cardiology/American Heart Association/European Society of Cardiology guidelines) and were eligible for warfarin therapy. In the device group, warfarin and low-dose aspirin were continued until 45 days postprocedure; if a follow-up echocardiogram at 45 days showed occlusion of the LAA, warfarin therapy could be discontinued. Subjects who discontinued warfarin were treated with aspirin and clopidogrel for 6 months postdevice implantation and with 325 mg aspirin indefinitely after that.

Three noninferiority primary efficacy end points were specified: (1) occurrence of ischemic or hemorrhagic stroke, cardiovascular or unexplained death, and systemic embolism (18 month rates); (2) occurrence of late ischemic stroke and systemic embolization (beyond 7 days postrandomization, 18-month rates); and (3) occurrence of all-cause death, ischemic stroke, systemic embolism, or device- or procedure-related events requiring open cardiac surgery or major endovascular intervention (e.g., pseudoaneurysm repair, arteriovenous fistula repair, or other major endovascular repair) occurring within 7 days of the procedure or by hospital discharge, whichever was later.

The 18-month event rates were determined using Bayesian statistical methods to integrate data from the PROTECT-AF study.

The first primary end point, the 18-month modeled RR between the device and control groups was 1.07 (95% CrI, 0.57 to 1.89). Because the upper bound of the 95% CrI was above the preset noninferiority margin of 1.75, the noninferiority criteria were not met. For the second primary end point of late ischemic stroke and systemic embolization, the 18-month RR between the device and control groups was 1.6 (95% CrI, 0.5 to 4.2), with an upper bound of the 95% CrI above the preset noninferiority margin of 2.0. The rate difference between the device and control groups was 0.005 (95% CrI, -0.019 to 0.027). The upper bound of the 95% CrI was lower than the noninferiority margin of 0.0275, so the noninferiority criterion was met for the rate difference. For the third primary end point, major safety issues, the noninferiority criterion was met. At the time of the FDA decision, only 28% of PREVAIL subjects had actually reached 18-month follow-up.

In addition to these RCTs, a number of case series have reported on outcomes on the Watchman device. A number of small published case series are primarily intended to establish safety and feasibility of the device. (7-11) A larger case series of 143 patients from Europe was published in 2011.(9) This series reported that successful implantation was achieved in 96% (137/143) of patients and that serious complications occurred in 7.0% (10/143). Complications included stroke (n=3), device embolization (n=2), and pericardial effusion (n=5). Another larger series was reported by Reddy et al,(10) primarily focusing on the adverse event rate from a registry of 460 patients who received the Watchman device. Serious pericardial effusion occurred in 2.2% of patients, and there were no deaths or periprocedural strokes reported. Matsuo et al reported results from a case series of 179 patients who underwent LAA closure at a single center, most (n=172) of whom received a Watchman device.(12) Device deployment was successful in 98.9% of patients. The overall complication rate was 11.2%; major complications occurred in 3.3% (tamponade in 2 cases; possible transient ischemic attack [TIA] in 1 case; and device dislocation in 3 cases). At 45-day follow-up, 99.4% of patients (164/166) had closure of the LAA.

*Patients who are not eligible for anticoagulation.*

The PROTECT AF and PREVAIL studies included only patients who were candidates for oral anticoagulation therapy. As such, uncertainty remains about the role of the Watchman device in patients with AF who have absolute contraindications to oral anticoagulants. Reddy et al conducted a multicenter, prospective, nonrandomized trial to evaluate the safety and efficacy of LAA closure with the Watchman device in patients with nonvalvular AF with a CHADS<sub>2</sub> score 1 or higher who were considered ineligible for warfarin.(13) Postimplantation, patients received 6 months of clopidogrel or ticlopidine and lifelong aspirin therapy. Thirteen patients (8.7%) had a procedure- or device-related serious adverse event, most commonly pericardial effusion (3 patients). Over a mean 14.4 months of follow-up, all-cause stroke or systemic embolism occurred in 4 patients.

Chun et al compared the Watchman™ device with the Amplatzer cardiac plug among patients with nonvalvular AF, who were at high risk for stroke and had a contraindication to or were not willing to accept oral anticoagulants.(14) Eighty patients were randomized to LAA occlusion with the Watchman™ or the Amplatzer device. After device implantation, either preexisting oral anticoagulation therapy or dual platelet inhibition with aspirin and clopidogrel was continued for 6 weeks. A follow-up transesophageal echocardiogram was performed at 6 weeks postprocedure; if a device-related thrombus had formed, patients received intensive anti-thrombotic therapy for 6 weeks. Aspirin was continued indefinitely for all patients. The primary end point of successful

device implantation occurred in 98% of patients. There were no statistically significant differences in procedure time, fluoroscopy time, or major safety events between the 2 groups. At a median 364 days of follow-up, there were no cases of stroke/TIA or other bleeding complications.

#### Lariat® device

The available evidence on the efficacy of the Lariat device for LAA closure consists of a number of small case series. The largest case series was reported by Bartus et al in 2012.(15) This study enrolled 89 patients with AF and either a contraindication to warfarin or previous warfarin failure. A total of 85/89 (96%) had successful left atrial ligation, and 81/89 (91%) had complete closure immediately. There were 3 access-related complications, 2 cases of severe pericarditis postoperatively, 1 late pericardial effusion, and 2 cases of unexplained sudden death. There were 2 late strokes, which the authors did not attribute to an embolic source. At 1-year follow-up, complete closure was documented by echocardiography in 98% of available patients (n=65). In a smaller, earlier series from the same research group,(16) 13 patients were treated with the Lariat device, 11 of whom were treated as part of percutaneous radiofrequency ablation for AF. One of the 11 procedures was terminated due to unsuccessful placement, and the other 10 procedures were successful, with complete closure verified on echocardiography. There was 1 procedural complication in which the snare was unable to be removed and needed to be retrieved by thoracoscopy.

In 2013, Stone et al reported outcomes for 27 patients with AF, a high stroke risk (CHADS<sub>2</sub> score ≥2), and contraindications or intolerance to anticoagulation who underwent percutaneous LAA ligation with the Lariat device.(17) Acute procedural success was 92.6%; periprocedural complications included 3 cases of pericarditis and 1 periprocedural stroke which was associated with no long-term disability. A follow-up transesophageal echo was performed in 22 patients at an average of 45 days postprocedure, which demonstrated successful LAA exclusion in all 22. Follow-up was for an average of 4 months, during which time 1 stroke and no deaths occurred.

Massumi et al(18) reported on 21 patients with AF and contraindications to anticoagulation. A total of 20/21 patients had successful atrial closure, which was documented by echocardiography to be intact at a mean follow-up of 96 days. No patients had a stroke during a mean follow-up of approximately 1 year. There were complications reported in 5 of 21 patients. One patient had right ventricular perforation and tamponade requiring surgical intervention. One patient developed pleuro-pericarditis that required multiple drainage procedures. Three additional patients developed pericarditis within 30 days of the procedure.

#### Amplatzer® Cardiac Plug device

The available evidence on use of the Amplatzer device for left atrial occlusion consists of a number of case series. The largest series identified was by Nietlispach et al, (19) which included 152 patients from a single institution in Europe. Short-term complications occurred in 9.8% (15/152). Longer term adverse outcomes occurred in 7% of patients, including 2 strokes, 1 peripheral embolization, and 4 episodes of major bleeding. Device embolization occurred in 4.6% (7/152) of patients.

Other smaller series of patients treated with the Amplatzer device include a series of 86 patients from Portugal,(20) 37 patients from Italy,(21) 35 patients from Spain,(22) 21 patients from Poland,(23) and 20 patients from China.(24) All of these series reported high procedural success, but also reported various complications such as vascular complications, air embolism, esophageal injury, cardiac tamponade, and device embolization.

Several studies have reported the use of the Amplatzer device in patients with a contraindication to oral anticoagulation therapy. The largest study included 100 patients with AF, a CHADS<sub>2</sub> score of 2 or higher, and a contraindication to oral warfarin who were treated with the Amplatzer device at a single institution.(25) All patients were treated with heparin during the procedure; they were maintained on clopidogrel for 1 month postprocedure and daily aspirin indefinitely. Successful deployment occurred in all patients. There were 2 significant periprocedural complications, including 1 pericardial effusion with tamponade and 1 case of acute respiratory distress with pulmonary edema.

Wiebe et al reported results of a retrospective cohort of 60 patients with nonvalvular AF who had a CHA<sub>2</sub>DS<sub>2</sub>-VASc score of at least 1 and contraindications to warfarin anticoagulation who underwent percutaneous LAA closure with the Amplatzer device.(26) Contraindications to warfarin included contraindications as defined in the warfarin product label, a history of severe bleeding while receiving anticoagulant therapy as well as a history of bleeding tendencies in the absence of anticoagulation or blood dyscrasia, along with patients who were unable to maintain a stable INR and those with a known hypersensitivity to warfarin or a high-risk of falling who were also included. Patients received heparin during the closure procedure; they were maintained on clopidogrel for 3 months postprocedure and daily aspirin indefinitely. Device implantation was successful in 95% of patients. Over a median follow-up of 1.8 years, no patients experienced a stroke. The rate of major bleeding complications was 1.9%/year of follow-up.

Urena et al reported results from a similar cohort of 52 patients with nonvalvular AF who had a CHADS<sub>2</sub>-VASc score of at least 2 and contraindication to oral anticoagulation therapy who underwent percutaneous LAA closure with the Amplatzer device.(27) Device implantation was successful in all but 1 patient. There were no periprocedural strokes or death. Over the follow-up period (mean, 20 months), rates of death, stroke, and systemic embolism were 5.8 (3/52), 1.9% (1/52), and 0%, respectively.

Other smaller case series of patients with contraindication to oral anticoagulation include studies by Danna et al,(28) which included 37 patients and reported a 1-year stroke rate of 2.94%, and Horstmann et al,(29) which included 20 patients and reported no episodes of strokes over a mean follow-up of 13.6 months.

#### PLAATO device

The available evidence on outcomes following use of the PLAATO device for stroke prevention in AF comes from case series and cohort studies. Bayard et al reported on 180 patients with nonrheumatic AF and a contraindication to warfarin and who were treated with the Percutaneous Left Atrial Appendage Transcatheter Occlusion (PLAATO) device.(30) Placement was successful in 90% of patients. Two patients died within 24 hours of the procedure (1.1%), and 6 patients had cardiac tamponade (3.3%), with 2 requiring surgical drainage. Other case reports and small case series report complications, including multiple reports of thrombus formation at the site of device placement.(31,32)

#### **Ongoing clinical trials**

There are currently a number of additional ongoing clinical trials of LAA closure devices. (33) Of studies listed online at [ClinicalTrials.gov](http://ClinicalTrials.gov), there are at least 4 RCTs listed as of February 2014:

- [NCT01628068](https://clinicaltrials.gov/ct2/show/study/NCT01628068). ELIGIBLE (Efficacy of Left atrial Appendage Closure After Gastrointestinal Bleeding) study. This study randomizes patients with a history of GI

bleed with nonvalvular to left atrial occlusion with the Amplatzer device or usual care with anticoagulation. Enrollment is planned for 120 subjects; the expected completion date is July 2014.

- [NCT01363895](#). Interventional Strategies in Treatment of Atrial Fibrillation: Percutaneous Closure of the Left Atrial Appendage Versus Catheter Ablation. This is a study that randomizes 120 patients with AF to left atrial closure with the Watchman™ device or catheter ablation. Estimated completion date is November 2013.
- [NCT01118299](#). AMPLATZER Cardiac Plug Clinical Trial. This trial randomizes 3000 patients with AF to left atrial occlusion with the Amplatzer® cardiac plug versus optimal medical care. Estimated completion date is June 2017.
- [NCT02039167](#). Left Atrial Appendage Occlusion vs. Usual Care in Patients With Atrial Fibrillation and Severe Chronic Kidney Disease (WatchAFIB). This study randomizes patients with severe chronic kidney disease with paroxysmal, persistent, or permanent nonvalvular AF to LAA occlusion with the Watchman® device or to usual care. Enrollment is planned for 300 subjects; the expected completion date is June 2017.

### Summary

Left atrial appendage (LAA) occlusion devices are nonpharmacologic alternatives to anticoagulation for stroke prevention in patients with atrial fibrillation. Currently, there are no devices that have Food and Drug Administration (FDA) approval for this indication in the U.S., but at least 3 different devices have been evaluated for this purpose. Case series have demonstrated that these devices can be successfully implanted percutaneously in most patients. Complications such as pericardial effusion and tamponade are reported in available studies at a rate of 2% to 5%.

One published RCT compared the Watchman™ device with warfarin and reported noninferiority on a composite outcome of stroke, cardiovascular/unexplained death, or systemic embolism after 2 years of follow-up. There were a higher number of complications in the LAA closure group, primarily due to early complications associated with the device placement. Data from another randomized controlled trial have been presented to the FDA advisory panel but have not yet been published in the peer reviewed literature.

For the Lariat, PLAATO, and Amplatzer devices, there were no controlled trials identified. Case series of these devices report high procedural success but also numerous complications.

Given the lack of FDA approval, the limited published data regarding impact on net health outcome from controlled trials, and the potential for complications, left atrial appendage closure devices are considered investigational.

### Practice Guidelines and Position Statements

The American College of Chest Physicians has evidence-based clinical best practice guidelines on the use of antithrombotic therapy for prevention of stroke in AF.(1) In relation to the use of LAA closure devices, the guidelines state: "At this time, we make no formal recommendations regarding LAA closure devices, pending more definitive research in this field."

In 2014, the American College of Cardiology, the American Heart Association, and the Heart Rhythm Society issued guidelines on the management of patients with AF.(34) These guidelines recommend that surgical excision of the LAA may be considered in

patients undergoing cardiac surgery (Class IIB recommendation; Level of evidence: C), but make no specific recommendations regarding percutaneous LAA closure.

### U.S. Preventive Services Task Force Recommendations

LAA closure devices are not preventive services.

### References

1. You JJ, Singer DE, Howard PA et al. Antithrombotic therapy for atrial fibrillation: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. *Chest* 2012; 141(2 Suppl):e531S-75S.
2. FDA. 2013 Meeting Materials of the Circulatory System Devices Panel. 2013. Available online at: <http://www.fda.gov/advisorycommittees/committeesmeetingmaterials/medicaldevices/medicaldevicesadvisorycommittee/circulatorysystemdevicespanel/ucm342357.htm>. Last accessed May, 2014.
3. Blue Cross and Blue Shield Association. Technology Evaluation Center (TEC). Percutaneous left atrial appendage closure therapy for prevention of stroke. TEC Assessments 2014; Volume 29, Tab TBA.
4. Holmes DR, Reddy VY, Turi ZG et al. Percutaneous closure of the left atrial appendage versus warfarin therapy for prevention of stroke in patients with atrial fibrillation: a randomised non-inferiority trial. *Lancet* 2009; 374(9689):534-42.
5. Reddy VY, Doshi SK, Sievert H et al. Percutaneous Left Atrial Appendage Closure for Stroke Prophylaxis in Patients With Atrial Fibrillation: 2.3-Year Follow-up of the PROTECT AF (Watchman Left Atrial Appendage System for Embolic Protection in Patients With Atrial Fibrillation) Trial. *Circulation* 2013; 127(6):720-9.
6. Alli O, Doshi S, Kar S et al. Quality of life assessment in the randomized PROTECT AF (Percutaneous Closure of the Left Atrial Appendage Versus Warfarin Therapy for Prevention of Stroke in Patients With Atrial Fibrillation) trial of patients at risk for stroke with nonvalvular atrial fibrillation. *J Am Coll Cardiol* 2013; 61(17):1790-8.
7. Lam YY, Yip GW, Yu CM et al. Left atrial appendage closure with Amplatzer cardiac plug for stroke prevention in atrial fibrillation: initial Asia-Pacific experience. *Catheter Cardiovasc Interv* 2012; 79(5):794-800.
8. Montenegro MJ, Quintella EF, Damonte A et al. Percutaneous occlusion of left atrial appendage with the Amplatzer Cardiac Plug™ in atrial fibrillation. *Arq Bras Cardiol* 2012; 98(2):143-50.
9. Park JW, Bethencourt A, Sievert H et al. Left atrial appendage closure with Amplatzer cardiac plug in atrial fibrillation: initial European experience. *Catheter Cardiovasc Interv* 2011; 77(5):700-6.
10. Reddy VY, Holmes D, Doshi SK et al. Safety of percutaneous left atrial appendage closure: results from the Watchman Left Atrial Appendage System for Embolic Protection in Patients with AF (PROTECT AF) clinical trial and the Continued Access Registry. *Circulation* 2011; 123(4):417-24.
11. Swaans MJ, Post MC, Rensing BJ et al. Percutaneous left atrial appendage closure for stroke prevention in atrial fibrillation. *Neth Heart J* 2012; 20(4):161-6.
12. Matsuo Y, Sandri M, Mangner N et al. Interventional Closure of the Left Atrial Appendage for Stroke Prevention. *Circ J* 2014; 78(3):619-24.

13. Reddy VY, Möbius-Winkler S, Miller MA et al. Left Atrial Appendage Closure With the Watchman Device in Patients With a Contraindication for Oral Anticoagulation The ASAP Study (ASA Plavix Feasibility Study With Watchman Left Atrial Appendage Closure Technology). *J Am Coll Cardiol* 2013; 61(25):2551-56.
14. Chun KR, Bordignon S, Urban V et al. Left atrial appendage closure followed by 6 weeks of antithrombotic therapy: a prospective single-center experience. *Heart Rhythm* 2013; 10(12):1792-9.
15. Bartus K, Han FT, Bednarek J et al. Percutaneous left atrial appendage suture ligation using the LARIAT device in patients with atrial fibrillation: initial clinical experience. *J Am Coll Cardiol* 2013; 62(2):108-18..
16. Bartus K, Bednarek J, Myc J et al. Feasibility of closed-chest ligation of the left atrial appendage in humans. *Heart Rhythm* 2011; 8(2):188-93.
17. Stone D, Byrne T, Pershad A. Early Results With the LARIAT Device for Left Atrial Appendage Exclusion in Patients With Atrial Fibrillation at High Risk for Stroke and Anticoagulation. *Catheter Cardiovasc Interv* 2013.
18. Masumi A, Chelu MG, Nazeri A et al. Initial Experience With a Novel Percutaneous Left Atrial Appendage Exclusion Device in Patients With Atrial Fibrillation, Increased Stroke Risk, and Contraindications to Anticoagulation. *Am J Cardiol* 2013; 111(6):869-73.
19. Nietlispach F, Gloekler S, Krause R et al. Amplatzer left atrial appendage occlusion: Single center 10-year experience. *Catheter Cardiovasc Interv* 2013; 82(2):283-9.
20. Guerios EE, Schmid M, Gloekler S et al. Left atrial appendage closure with the Amplatzer cardiac plug in patients with atrial fibrillation. *Arq Bras Cardiol* 2012; 98(6):528-36.
21. Danna P, Proietti R, Sagone A et al. Does Left Atrial Appendage Closure with a Cardiac Plug System Reduce the Stroke Risk in Nonvalvular Atrial Fibrillation Patients? A Single-Center Case Series. *Pacing Clin Electrophysiol* 2013; 36(3):347-53.
22. Lopez-Minguez JR, Eldoayen-Gragera J, Gonzalez-Fernandez R et al. Immediate and One-year Results in 35 Consecutive Patients After Closure of Left Atrial Appendage With the Amplatzer Cardiac Plug. *Rev Esp Cardiol* 2013; 66(2):90-97.
23. Streb W, Szymala M, Kukulski T et al. Percutaneous closure of the left atrial appendage using the Amplatzer Cardiac Plug in patients with atrial fibrillation: evaluation of safety and feasibility. *Kardiol Pol* 2013; 71(1):8-16.
24. Lam YY, Yip GW, Yu CM et al. Left atrial appendage closure with AMPLATZER cardiac plug for stroke prevention in atrial fibrillation: initial Asia-Pacific experience. *Catheter Cardiovasc Interv* 2012; 79(5):794-800.
25. Meerkin D, Butnaru A, Dratva D et al. Early safety of the Amplatzer Cardiac Plug for left atrial appendage occlusion. *Int J Cardiol* 2013; 168(4):3920-5.
26. Wiebe J, Bertog S, Franke J et al. Safety of percutaneous left atrial appendage closure with the amplatzer cardiac plug in patients with atrial fibrillation and contraindications to anticoagulation. *Catheter Cardiovasc Interv* 2013.
27. Urena M, Rodes-Cabau J, Freixa X et al. Percutaneous left atrial appendage closure with the AMPLATZER cardiac plug device in patients with nonvalvular

atrial fibrillation and contraindications to anticoagulation therapy. J Am Coll Cardiol 2013; 62(2):96-102.

28. Danna P, Proietti R, Sagone A et al. Does left atrial appendage closure with a cardiac plug system reduce the stroke risk in nonvalvular atrial fibrillation patients? A single-center case series. Pacing Clin Electrophysiol 2013; 36(3):347-53.
29. Horstmann S, Zugck C, Krumsdorf U et al. Left atrial appendage occlusion in atrial fibrillation after intracranial hemorrhage. Neurology 2014; 82(2):135-8.
30. Bayard YL, Omran H, Neuzil P et al. PLAATO (Percutaneous Left Atrial Appendage Transcatheter Occlusion) for prevention of cardioembolic stroke in non-anticoagulation eligible atrial fibrillation patients: results from the European PLAATO study. EuroIntervention 2010; 6(2):220-6.
31. Cruz-Gonzalez I, Martin Moreiras J, Garcia E. Thrombus formation after left atrial appendage exclusion using an amplatzer cardiac plug device. Catheter Cardiovasc Interv 2011; 78(6):970-3.
32. Viles-Gonzalez JF, Reddy VY, Petru J et al. Incomplete occlusion of the left atrial appendage with the percutaneous left atrial appendage transcatheter occlusion device is not associated with increased risk of stroke. J Interv Card Electrophysiol 2012; 33(1):69-75.
33. Fuller CJ, Reisman M. Stroke prevention in atrial fibrillation: atrial appendage closure. Curr Cardiol Rep 2011; 13(2):159-66.
34. January CT, Wann LS, Alpert JS et al. 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. J Am Coll Cardiol 2014.
35. Blue Cross Blue Shield Association. Medical Policy Reference Manual, No. 2.02.26 (July 2014).

**Documentation Required for Clinical Review**

- No documents required

**Coding**

*This Policy relates only to the services or supplies described herein. Benefits may vary according to benefit design; therefore, contract language should be reviewed before applying the terms of the Policy. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement.*

**IE**

**The following services are considered investigational and therefore not covered for any indication.**

Type	Code	Description
CPT	0281T	Percutaneous transcatheter closure of the left atrial appendage with implant, including fluoroscopy, transeptal puncture, catheter placement(s), left atrial angiography, left atrial appendage angiography, radiological supervision and interpretation
HCPC	None	

Type	Code	Description
ICD9 Procedure	None	
ICD9 Diagnosis	All diagnoses	
ICD10 Procedure	For dates of service on or after 10/01/2015	
	None	
ICD10 Diagnosis	For dates of service on or after 10/01/2015	
	All diagnoses	

**Policy History**

This section provides a chronological history of the activities, updates and changes that have occurred with this Medical Policy.

Effective Date	Action	Reason
7/6/2012	BCBSA Medical Policy adoption	Medical Policy Committee
8/29/2014	Policy title change from Left Atrial Appendage Closure Devices for Stroke Prevention in Atrial Fibrillation  Policy revision with position change	Medical Policy Committee

**Definitions of Decision Determinations**

**Medically Necessary:** A treatment, procedure or drug is medically necessary only when it has been established as safe and effective for the particular symptoms or diagnosis, is not investigational or experimental, is not being provided primarily for the convenience of the patient or the provider, and is provided at the most appropriate level to treat the condition.

**Investigational/Experimental:** A treatment, procedure or drug is investigational when it has not been recognized as safe and effective for use in treating the particular condition in accordance with generally accepted professional medical standards. This includes services where approval by the federal or state governmental is required prior to use, but has not yet been granted.

**Split Evaluation:** Blue Shield of California / Blue Shield of California Life & Health Insurance Company (Blue Shield) policy review can result in a Split Evaluation, where a treatment, procedure or drug will be considered to be investigational for certain indications or conditions, but will be deemed safe and effective for other indications or conditions, and therefore potentially medically necessary in those instances.

**Prior Authorization Requirements**

This service (or procedure) is considered **medically necessary** in certain instances and **investigational** in others (refer to policy for details).

For instances when the indication is **medically necessary**, clinical evidence is required to determine **medical necessity**.

For instances when the indication is **investigational**, you may submit additional information to the Prior Authorization Department.

Within five days before the actual date of service, the Provider MUST confirm with Blue Shield that the member's health plan coverage is still in effect. Blue Shield reserves the right to revoke an authorization prior to services being rendered based on cancellation of the member's eligibility. Final determination of benefits will be made after review of the claim for limitations or exclusions.

Questions regarding the applicability of this policy should also be directed to the Prior Authorization Department. Please call 1-800-541-6652 or visit the Provider Portal [www.blueshieldca.com/provider](http://www.blueshieldca.com/provider).

*The materials provided to you are guidelines used by this plan to authorize, modify, or deny care for persons with similar illness or conditions. Specific care and treatment may vary depending on individual need and the benefits covered under your contract. These Policies are subject to change as new information becomes available.*