Combining Multislice Computed Tomography Imaging with Electroanatomic Mapping to Guide Radiofrequency Catheter Ablation Procedures for Atrial Fibrillation

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For self-funded plans, consult individual plan documents. If there is a conflict between this policy and a self-funded plan document, the provisions of the plan document will govern. In addition, coverage for Medicare Advantage members may differ. This is a result of applicable coverage statements by the Center for Medicare and Medicaid Services (CMS). The National Coverage Determinations, Local Coverage Determinations, and Local Medical Review Policies may be found at the CMS website, [http://www.cms.gov](http://www.cms.gov). Please note that for all plans, the member’s health plan benefits that are in effect on the rendered date of service must be used in coverage determinations.

**DEFINITION**

Atrial fibrillation (AF) is the most common type of cardiac arrhythmia in the US. Often associated with advancing age, AF is estimated to affect between 5% and 6% of Americans aged 65 years, which increases to a margin of 8-12% in 80 years olds. In those over 85 years old, AF affects between 16% and 20% of the population. AF is more likely to affect those with other health conditions such as high blood pressure, which are also more common in these age groups.

Atrial Fibrillation is a significant cause of hospitalizations and mortality in the US. AF symptoms can be serious and include heart palpitations, chest pain and loss of consciousness. The most common serious complications of AF are heart failure and stroke.
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07/11/13

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Common treatment for AF is antiarrhythmic medication and cardioversion, but treatment failures are not uncommon. In these cases, radiofrequency ablation (RFA) is the preferred next line of treatment for AF. RFA describes a procedure that delivers radiofrequency energy to targeted pulmonary and cardiac veins using a catheter as a means of disrupting electrical signals causing AF.

Critical in the performance of RFA is accurate visualization of the catheter in relation to tedious veins in the chest. Several imaging technologies have been considered to optimize the safety and efficacy of RFA. One of the most recent is a combination of two different types of imaging technologies: the 3 dimensional intraoperative electroanatomic mapping (EAM) and multislice computed tomography (MSCT). When combined, RFA is visualized in high resolution 3-dimensions allowing improved precision. This is particularly important in RFA in that improved precision can contribute to improved clinical outcomes while also mitigating complications. Other potential benefits include a decrease in procedural time. Also, MSCT with EAM is considered noninvasive and may be performed as an outpatient procedure.

COVERAGE CRITERIA

MSCT with EAM for AF is not considered medically necessary because it is experimental and investigational. Preliminary studies are too few and too small to evaluate this device for safety, efficacy and long-term outcomes.

MEDICAL BACKGROUND

Radiofrequency ablation (RFA) is an important treatment option that augments the anatomy of the chest to prevent Atrial Fibrillation (AF) episodes. Although RFA is well established as a safe and effective treatment of AF for those who have failed medication, there is still much to be learned about corresponding methods of visualizing the anatomy of the chest during the procedure.

Several imaging different technologies have been evaluated for use with RFA procedures for AF. Visualization has been provided by intracardiac echocardiography (ICE), which requires an additional procedure for ICE catheter placement. Imaging for ICE is also limited to 2 dimensions, which presents challenges for the accurate spatial navigation of cardiac anatomy. Intraoperative electroanatomic mapping (EAM) is another type of imaging that visualizes the area in 3 dimensions but has poor resolution. RFA is currently most commonly used in conjunction with computed tomography (CT) or magnetic resonance imaging (MRI).

Given the shortcomings of many of these technologies, using a combination of MSCT with EAM for RFA procedures is a potential method of maximizing multislice CT technology coupled with 3 dimensional imaging used during the procedure. Although combining the two technologies seems promising, little evidence in currently published studies suggest improvements in procedural outcomes as compared to other methods of visualization. The majority of currently published studies are small European studies of fewer than 30 subjects with small follow up windows. For example, a study of 24 patients in Austria by Feuchtner and colleagues, for example, is an uncontrolled study of how well the two imaging technologies integrate, finding...
success rate of 96% of the time during RFA procedures.\textsuperscript{10}

The largest published study and one of the few American studies that evaluate MSCT does not address its efficacy when used with EAM. Instead, this study focuses on MSCT alone for RFA and as a replacement for the pre-operative TEE often performed before RFA procedures to exclude the presence of left atrial appendage (LAA) thrombus. In their evaluation of over 400 patients from the Mayo clinic, Martinez and colleagues suggest that MSCT is sufficient to replace the RFA post-operative TEE.\textsuperscript{11} Unfortunately, this study does little to evaluate the efficacy of MSCT compared to other imaging technology or as a complement to EAM during RFA in its large sample size. Also, there was no effort to measure safety. Looming safety concerns persist with MSCT technology due to the radiation exposure that occurs during imaging studies. In fact, this radiation dose is significant.\textsuperscript{12} For this reason, MRI technology is preferred by many over MSCT, although its imaging capabilities are inferior in terms of spatial resolution.\textsuperscript{13}

REGULATORY INFORMATION

Kentucky – No legislative mandates were found for coverage of atrial fibrillation treatments.
Indiana – No legislative mandates were found for coverage of atrial fibrillation treatments.
Tennessee – No legislative mandates were found for coverage of atrial fibrillation treatments.

COVERAGE DETAIL

For self-funded plans, consult individual plan documents. If there is a conflict between this policy and a self-funded plan document, the provisions of the plan document will govern.

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ICD.9 
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REFERENCES


