

Media backgrounder

Cardiac Arrhythmia and Catheter Ablation Technique

Cardiac arrhythmia – when the heart falls out of rhythm

Cardiac arrhythmias (CA) represent a group of conditions with an abnormal heart rhythm or heart rate. This may involve the heart beating too fast (over 100 bpm), too slow (less than 60 bpm) or irregularly.¹ Arrhythmias are often caused by problems with the electrical system that regulates the steady heartbeat and can originate in the lower chambers of the heart (ventricles) or in the upper chambers (atria).² There are various types of arrhythmia; the most common forms include atrial fibrillation (AF), atrial flutter and atrioventricular nodal re-entrant tachycardia. Noticeable warning symptoms include fluttering in the chest, shortness of breath, fatigue, chest pain, dizziness or fainting.³

Many people experience irregular heartbeats at some point in their lives. Most of the time they are harmless, especially when not associated with other heart conditions. However, some arrhythmias can be serious and even life-threatening if left untreated. For example, atrial fibrillation is the most common cardiac arrhythmia and an independent contributor to mortality, morbidity and impaired quality of life.^{4,5} According to data from the long-term, ongoing Framingham heart study, AF is associated with a 1.5- to 1.9-fold higher risk of death. This is in part attributed to the strong association between AF and thromboembolic events (where the blood in the heart can clot).⁶ Overall, AF is estimated to be responsible for approximately 15 percent of all strokes^{7,8,9} and 20 percent of all ischemic strokes.¹⁰

Cardiac arrhythmia – a growing global burden

- Anyone can develop arrhythmias, even young adults without previous heart problems. Nonetheless, the condition is most common in people over 65 years of age with a weak or damaged heart.¹¹
- Risk factors include high blood pressure, coronary artery disease and other heart and lung conditions. Furthermore, emotional stress, alcohol abuse and excessive tobacco consumption are associated with arrhythmias. Sometimes the condition occurs without any known cause (idiopathic).
- In developed countries about one percent of the population is affected by cardiac arrhythmia, which corresponds to approximately eleven million people in Europe.¹² Currently over six million Europeans suffer from AF alone.^{13,14}
- Due to a growing and aging population, the prevalence of cardiac arrhythmia is estimated to increase strongly in the future and is expected to remain a growing burden for patients, physicians and healthcare systems.

Catheter ablation is the first-line treatment for tachycardias

There are various forms of cardiac arrhythmias and symptoms may differ over time and vary between patients, so consequently therapy options are multi-faceted. Treatment options to control a patient's heart rhythm can vary depending on the underlying cause; this may include lifestyle changes, medication, cardioversion and surgery (invasive and non-invasive). The treatment decision is dependent upon a variety of factors including a patient's current health, the severity of symptoms and individual

circumstances.¹⁵ The current European Society of Cardiology Guidelines recommend catheter ablation therapy as an alternative to medication for first-line treatment of rhythm control in certain patients with AF. This is due to its improved outcomes and a good safety-performance profile.¹⁶ Pharmacological treatments can also be used to control the arrhythmia and associated symptoms, however potential side effects and long term use should be taken into consideration when balancing the treatment options.^{17,18}

Catheter ablation aims to stop the heart beating irregularly by removing the abnormal tissue responsible for causing the arrhythmia. It is a minimally invasive procedure, which is usually performed under local anesthesia. During the procedure, one or more flexible thin tubes (called catheters) are threaded through blood vessels directly into the heart, usually from a vein in the groin or elsewhere. These catheters record the heart's electrical activity and target the tissue responsible for the arrhythmia. Localised radiofrequency electrical energy is then transmitted through the tip of one of the catheters to disrupt the non-vital tissue and thus restore the normal heart rhythm. Following the procedure, patients usually only need to be monitored overnight.

The genesis of radiofrequency catheter ablation dates back to 1985. Since then the procedure has developed into an established, safety-proven and highly effective treatment option with success rates over 90 percent for certain arrhythmias. As with any surgery, procedure-related complications may occur and should be discussed with the physician upfront.¹⁹ A recent medical database analysis of 4,156 patients, who underwent catheter ablation, demonstrated that only five percent experienced complications.²⁰

Next-generation catheter and mapping technologies improve ablation practice

According to the European Heart Rhythm Association (EHRA), there were approximately 38,000 ablation procedures performed in Germany and 16,000 in the United Kingdom in 2012.²¹ In 2014, approximately 140,000 EU patients are estimated to receive catheter ablation with the number projected to increase to 200,000 by 2019.²² This underlines the growing impact of cardiac arrhythmias and the need for state-of-the-art catheter and cardiac mapping technology to improve diagnosis and treatment of all types of rhythm disorders. For performing successful and safe ablation procedures, precise visualisation of catheter location, accurate tissue identification and information about the lesions are of pivotal importance.^{23,24}

Previous catheters used to have bigger size electrodes, which can lead to less precise information regarding the ablation area. New catheters such as the IntellaTip MiFi™ XP Temperature Ablation Catheter by Boston Scientific with its unique MicroFidelity sensor technology are equipped with embedded mini electrodes on the tip. These provide high-resolution visualisation of the heart tissue, allowing the physicians to pinpoint the exact tip location of the catheter to precisely target the ablation and assess ablation effectiveness. This real-time feedback contributes to reducing total time for ablation delivery. Furthermore, the unique MicroFidelity technology helps to accurately differentiate viable and non-viable tissue due the higher specificity and sensitivity of the provided data, thus minimising the diagnostic part of the procedure and potentially offering significant benefits to patients, physicians and health care systems.²⁵

Second-generation 3D mapping devices like the Rhythmia™ Mapping System enable electrophysiologists to create highly accurate anatomical and electrical maps of the heart. These high-resolution images may improve procedural efficacy and reduce the time needed to diagnose and deliver treatment. Using a hybrid technology of both impedance and magnetic catheter tracking location technologies, paired with

continuous and automatic mapping capabilities, the Rhythmia™ Mapping System is able to collect thousands of relevant data points in only a few minutes. High resolution and high density electrical maps of the heart are of key importance to facilitate confident clinical decisions for effective and safe treatment of cardiac arrhythmias.

For more information and the latest updates on product and technology innovations, please visit the Boston Scientific European Newsroom at news.bostonscientific.eu.

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