Editorial

Focal Atrial Tachycardias and Atrial Flutter: Are they Hot Enough to Make a Thematic Issue?

Focal atrial tachycardias and atrial flutter represent a considerable part of the arrhythmias treated by electrophysiologists worldwide. Antiarrhythmic drug therapy might control these arrhythmias. Unfortunately, in many cases this therapy is fraught with side effects or arrhythmias recur. With the advent of invasive electrophysiology, an increasing number of these substrates are becoming amenable to catheter ablation. This makes catheter ablation the better alternative of medical therapy and is therefore recommended by the currently accepted guidelines [1]. Despite the great advance in our understanding of these arrhythmias, there are still questions that remain and issues that have not been fully elucidated. This thematic issue focuses on important points and problems in the management of atrial tachycardias and flutter with specific emphasis on the challenges electrophysiologists are facing during planning and carrying out catheter ablation.

Surface P wave during tachycardia is a classical tool to aid exact diagnosis and help plan the ablation strategy in cases of focal atrial tachycardias and atrial flutter. Looking at the surface ECG in an attempt to define the P wave morphology and try to pinpoint the focus location is probably the most routine thing an electrophysiologist would do before undertaking electrophysiological study and catheter ablation. But is the ECG the most accurate way to help us plan our procedure in advance? Many groups have attempted to find the best way to predict the location of atrial ectopic foci based on P wave morphology on surface ECG [2]. A detailed review of the different algorithms based on P wave morphology is presented by Lee and Fynn in the current thematic issue [3]. The matter has been presented in a very systematic way with links to arrhythmia mechanisms and specific patterns of interatrial conduction that might explain the observed morphology of P waves. The reader is drawn to the natural conclusion that P wave morphology is an important classical tool. However, there are numerous limitations of ECG that preclude its use as a sole method to guide the ablation approach. One of these limitations is spatial resolution of surface ECG that does not exceed 17 mm according to published data [4]. This makes the method inaccurate in defining the focus location in potentially arrhythmogenic areas located close to each other [5]. In those cases intracardiac mapping should solve the case. However when foci arise at or close to the interatrial septum biatrial mapping is frequently required. This comes with all the inherent risks of transseptal puncture. The review by Traykov looks into the available techniques and maneuvers to predict the chamber of origin in focal atrial tachycardias demonstrating earliest activation at the interatrial septum [6]. Most of these are based on analysis of timing, sequence and morphology of intracardiac electrograms during tachycardia. A very interesting approach described in detail in the paper by Traykov is the analysis of the morphology of the earliest electrogram recorded from the right atrial septum or proximal to middle coronary sinus. The review presents interesting evidence that electrograms from these zones are double or fragmented and consist of two components - a far-field component representing activation of the left atrial septal aspect and a near-field component arising from the activation of the right atrial septal aspect. The sequence of these components can be used to determine the chamber of origin of focal atrial tachycardias. The results from this approach coming from different investigators have been nicely summarized in this review paper emphasizing the fact that chamber of origin of these tachycardias is possible to be determined with high diagnostic accuracy without the need for biatrial mapping.

Atrial tachycardias foci tend to cluster in specific atrial regions. For the right atrium the structures that most frequently exhibit ectopic activity are crista terminalis, coronary sinus os and tricuspid annulus. In the left atrium foci tend to cluster to the pulmonary veins and the mitral annulus. Other more infrequent but increasingly recognized foci locations are the left and right atrial appendages and the aortic root [7-9]. In this thematic issue the paper by Taylor *et al*. provides a very interesting review of the electrophysiological characteristics of foci from these locations [10]. Frequently referring to important anatomical facts and considerations it also provides an update to the ablation approach in these cases.

Apart from focal atrial tachycardias, a considerable part of atrial tachyarrhythmias are due to atrial macroreentry. The most common form of atrial macroreentrant tachycardias is undoubtedly the cavotricuspid isthmus dependent atrial flutter. After the seminal works by several groups in the nineties catheter ablation of the cavotricuspid isthmus with achievement of bi-directional isthmus block became the mainstay of treatment of typical atrial flutter and has turned into one of the most frequently performed electrophysiological procedures [11, 12]. Many techniques and technologies have been introduced in an attempt to reduce fluoroscopy exposure, procedural time and improve success rate. The paper by Bencsik in this thematic issue provides an excellent summary of these novel techniques [13]. A comparison among them is made with special emphasis on intraprocedural use of intracardiac echocardiography. Apart from reduction of fluoroscopy and procedural time intracardiac echocardiography has been shown to be the optimal imaging tool during cavotricuspid isthmus ablation [14]. Macroreentrant circuits other than the typical peristricuspid circuit might also develop. They might involve different zones of the right or left atrium. A central obstacle of nonconducting tissue is typically required for macroreentry to occur. Atrial scarring following atriotomy makes a perfect central obstacle for atrial macroreentry emerging years after open heart surgery. In the early postoperative period other factors such as ischaemia or pericarditis might be of importance for the occurrence of atrial tachyarrhythmias. The paper of Kohari and Pap published in this thematic issue summarizes the data on atrial tachycardias occurring late after open heart surgery in terms of incidence, mechanisms and management strategies [15]. The authors emphasize the fact that despite its great predominance macroreentry is not the only mechanism of postoperative tachycardias and focal ectopic activity might also be responsible for these rhythm disorders. Another very interesting summary on atrial arrhythmias occurring in patients with congenital heart disease is published by Twomey *et al*. in the current thematic issue [16]. In this paper the authors review in a very systematic fashion the most common arrhythmia substrates that might be encountered and provide useful data for their management. The paper is outstanding for the association of the anatomical substrate with the most common arrhythmia types occurring in each specific arrhythmogenic substrates with the anatomical basis in each specific type of congenital heart defect - corrected or uncorrected.

Atrial fibrillation is by far the most common atrial arrhythmia in humans. Since the first introduction of catheter ablation for atrial fibrillation in the nineties the techniques for ablation have evolved considerably [17]. While pulmonary vein isolation has become the mainstay of treatment of paroxysmal cases ablation of persistent atrial fibrillation includes also left atrial substrate modification by creating linear lesions and complex fractionated electrograms (CFAE). Regardless of the ablation technique used regular tachycardias might occur following atrial fibrillation ablation with varying incidence. These iatrogenic tachycardias represent a therapeutic challenge as the ventricular rate is frequently higher than during index arrhythmia. Therefore patients are frequently more symptomatic than during atrial fibrillation. A systematic review of the incidence, mechanisms and clinical management of these tachycardias is published by Saghy *et al*. in the current thematic issue of Current Cardiology Reviews [18]. The authors emphasize that the mechanism of these arrhythmias is most commonly reentry involving gaps in previous ablation lines although some of these cases might demonstrate a focal pattern during mapping. Based on comprehensive review of the published data and their own experience the authors state that catheter ablation, although challenging, plays a key role in the management of these arrhythmias.

In conclusion, this thematic issue of Current Cardiology Reviews provides a detailed overview of important topics in the management of atrial tachycardias and atrial flutter. Written by electrophysiologists the papers focus mainly on the role of catheter ablation in the management of these conditions. This thematic issue is intended for a large number of readers including clinical cardiologists and electrophysiologists.

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Vassil Traykov, MD.
(Guest Editor)

Clinic of Cardiology
Tokuda Hospital – Sofia
N.Vaptzarov blvd. 51B
1407 Sofia
Bulgaria
Tel: +3592 403 46 06
Fax: +3592 815 52 01
E-mail: vtraykov@yahoo.com