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Interventional therapy of cardiac arrhythmias

Mario Matta, MD*; Matteo Anselmino, MD PhD§

*Cardiology Division, Sant'Andrea Hospital, Vercelli, Italy

§Cardiology Division, Department of Medical Sciences, "Città della Salute e della Scienza di Torino" Hospital, University of Turin, Italy

Corresponding Author:

Matteo Anselmino, MD PhD

Cardiology Division,

Department of Medical Sciences,

"Città della Salute e della Scienza di Torino" Hospital,

University of Turin

c.so Bramante 88, 10126 Turin, Italy

email: matteo.anselmino@unito.it

Technological advancement has dramatically increased, over the last decades, interventional treatment options for a wide range of cardiac arrhythmias or arrhythmogenic diseases. Nowadays, cardiac pacing and implantable devices are routinely inserted in the majority of the Cardiology Centers worldwide; similarly, catheter ablation is a widespread treatment option for patients suffering from malignant arrhythmias. However, several issues remain to be assessed.

The present issue collects a selection of relevant topics to provide the reader with critical views, aiming to continuously improve efficacy and safety of interventional procedures of cardiac arrhythmias.

As an example, cardiac resynchronization therapy (CRT), obtains, in terms of both quality of life and survival, prodigious clinical results, however, is still affected by a high, around 30%, incidence of non-responders (1). Besides anatomical factors, that surely contribute significantly in determining clinical response, patient selection is a key point in optimizing the outcome.

Continuous efforts in identifying the optimal criteria for CRT implantation, in terms of both left ventricular function, etiology and QRS duration, are needed to optimally select candidates among the whole heart failure population (2). The review article present in the issue (Moti Haim) focuses on the question if different QRS ECG criteria should be recommended in women and men. In addition, promising alternatives to CRT are emerging: His bundle pacing (3) has been proposed for patients with left ventricular dysfunction to preserve physiological activation of the ventricles. By the use of dedicated systems to reach the anatomical target area, recent studies reported stable effective His bundle capture (4). Left bundle branch (LBB) selective pacing, in case of left ventricular dysfunction and LBB block, has also become feasible. Anatomical procedural challenges seem overcome by dedicated materials, as active fixation leads carrying a non-retractable screw to reach the LBB across the septum. In fact, selective LBB pacing, at least in small series, has successfully restored an almost physiological narrow-QRS ventricular activation (5).

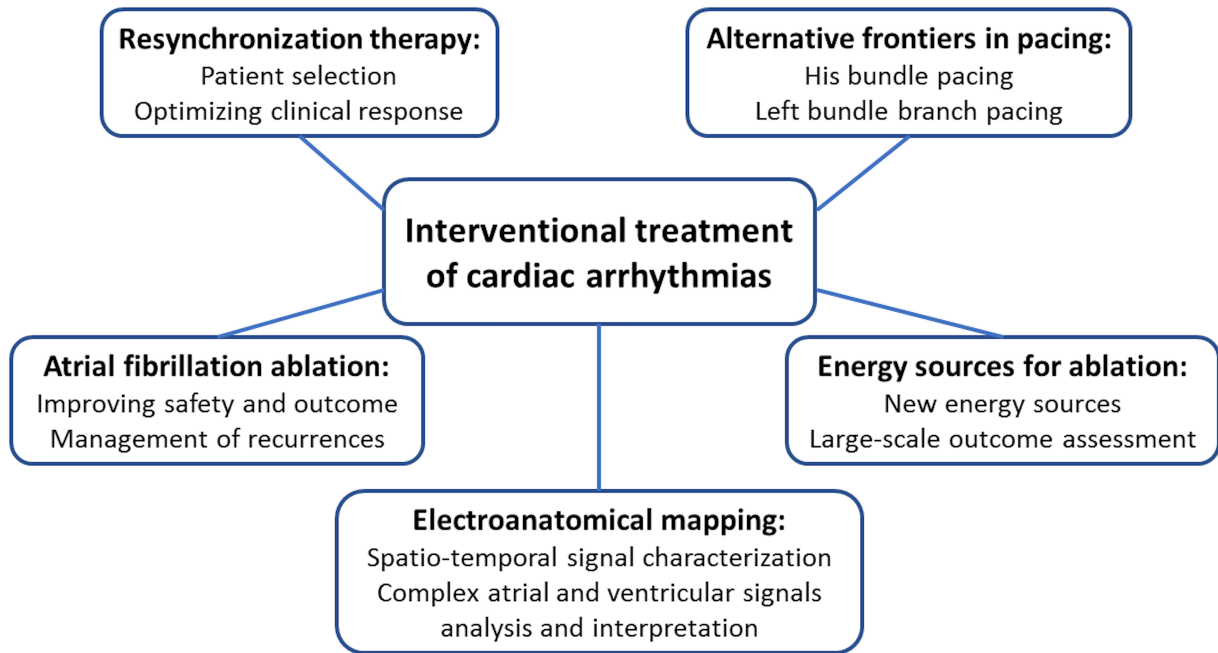
In the Electrophysiology setting, instead, electroanatomical mapping systems have significantly improved substrate mapping, permitting ablation of aggressive atrial and ventricular arrhythmias even in the setting of complex anatomies, as congenital anomalies or post-surgical severe substrate alterations (Figure 1). The introduction of high-density substrate mapping performed through multielectrode, differently shaped catheters has rapidly become the cornerstone in mapping advanced atrial and ventricular arrhythmias. The improved spatial and temporal characterization of the electrograms is of certain value (6), however their interpretation needs training and the link to an improved outcome, safety and/or shorter ablation procedure duration needs to be demonstrated (7-8). For these reasons, one paper of the issue focuses on how to interpret complex cardiac electrograms (Antonio Frontera) and a second describes transcatheter ablation outcome of post-surgical complex atrial arrhythmias (Roberto De Ponti).

Moreover, also concerning classical approaches, as pulmonary vein isolation for atrial fibrillation treatment, the optimal management of arrhythmia relapses is still controversial, both in terms of antiarrhythmic pharmacological treatment than interventional indications (9). Optimization of drug treatment and repeated ablation procedures need to be pursued (10). In this respect, the issue includes a meta-analysis (Arian Sultan) discussing if pharmacological treatment with hydrochlorothiazide, a commonly prescribed antihypertensive drug, could potentially impact outcome of AF ablation and a review paper (Basar Candemir) overviewing interventional protocols for the interventional treatment of recurrent atrial fibrillation. Efficacy and safety improvement, necessarily need to improve, and the introduction of new energy sources have also reported promising results. External stereotaxis radiotherapy, for example, has proved effective in treating ventricular tachycardias refractory to antiarrhythmic drugs and “traditional” catheter ablation (11). In terms of safety, instead, pulsed field ablation has reported interesting findings in preclinical studies (12). Due to its high selectivity towards myocardial cells it holds the potential to reduce the risk of lesions to the the surrounding anatomical structures, with the potential of a critical reduction

in the risk of esophageal, bronchus and phrenic nerve injuries, just as examples, while achieving effective elimination of the electrical activity in the heart (13).

In conclusion, the path towards improvement in outcome and safety of interventional therapy of cardiac arrhythmias is set, however, to reach the goal, the medical community needs to continue focusing on open issues. In this respect, thanks to the contribution of key Authors performing their daily activity in high volume Centers, in the opinion of the Guest Editor, the present issue provides valuable insights.

Figure 1. Goals in interventional treatment of cardiac arrhythmias.



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