

Anti-Tachycardia Pacing and Prevention Pacing to reduce AF Burden in Pacemaker Patients: A Systematic Review

Lorraine McMahon MSc and Cathal Breen PhD

Institute of Nursing and Health Research, Ulster University, Northern Ireland.



Faculty of Life and Health Sciences

ulster.ac.uk

Introduction

Atrial fibrillation (AF) is the most prevalent cardiac arrhythmia in adults above 75 years of age and it is linked with an increased risk of thromboembolic events and stroke [1].

Approximately 20.9 million men and 12.6 million women have AF worldwide in 2010 [2]. Over one million people (1.7% of the population) in the United Kingdom (UK) have been diagnosed with AF[4], including over 32,000 people in Northern Ireland (1.7%).

It is estimated that by 2030 there will be 14-17 million patients with AF in the European Union and up to 215,000 newly diagnosed cases each year [2].

The Arrhythmia Alliance [3] states "AF and related illness, costs the NHS over GB£2.2 billion each year". Approximately 10-40% of patients with AF have at least one hospital admission per year [2]. These costs and rising incidence could place a significant burden on healthcare resources in the future. Hence, it is important to continue to research and develop treatment and prevention strategies.

Cardiac Implantable Electronic Devices (CIED), such as pacemakers, continuously record the heartbeat. They identify paroxysmal and sustained AF/tachyarrhythmias in 10-15% of pacemaker patients by recording Atrial High Rate Episodes (AHREs) [2].

The European Society of Cardiology (ESC) Guidelines for the management of AF[2] recommend that further stroke risk assessments should be made if >5-6 minutes of AHRE at >180bpm are detected on a device.

Through evolving pacemaker technology programmable atrial tachyarrhythmia prevention and therapy algorithms aim to reduce AF. This aim of this review is to explore the current evidence regarding the efficacy of these algorithms.

Objectives

Pacemakers detect subclinical atrial fibrillation that may be a predictor of risk of stroke. Evidence for the efficacy of algorithms for prevention and treatment of atrial fibrillation is controversial. The aim is to systematically review current evidence on the efficacy of atrial anti-tachycardia pacing (a-ATP) and atrial prevention (APP) algorithms in the reduction of atrial fibrillation (AF) burden in patients with implantable dual chamber pacemakers.

Atrial Anti-tachycardia Pacing (a-ATP)

Delivering a pacing stimulus to the heart between the end of the refractory period and the next depolarisation, 8 defined as the excitable gap, may capture the site of origin of an arrhythmia. This is atrial pacing at a high frequency, marginally faster than the atrial arrhythmia rate (shorter cycle length) [4].

Atrial Preference Pacing (APP)

APP provides constant overdrive atrial pacing. It periodically lowers the rate for a pre-set amount of search beats [22]. This is to analyse the underlying intrinsic rhythm and ensure that the atrial pace interval is shorter [4].

Methods

The following electronic database searches identified articles relevant to this review subject

Scopus (2006-2017). Keywords: atrial anti-tachycardia pacing, atrial ATP, pacemaker, DDD, atrial fibrillation, AF, atrial flutter, advisa, enrhythm..

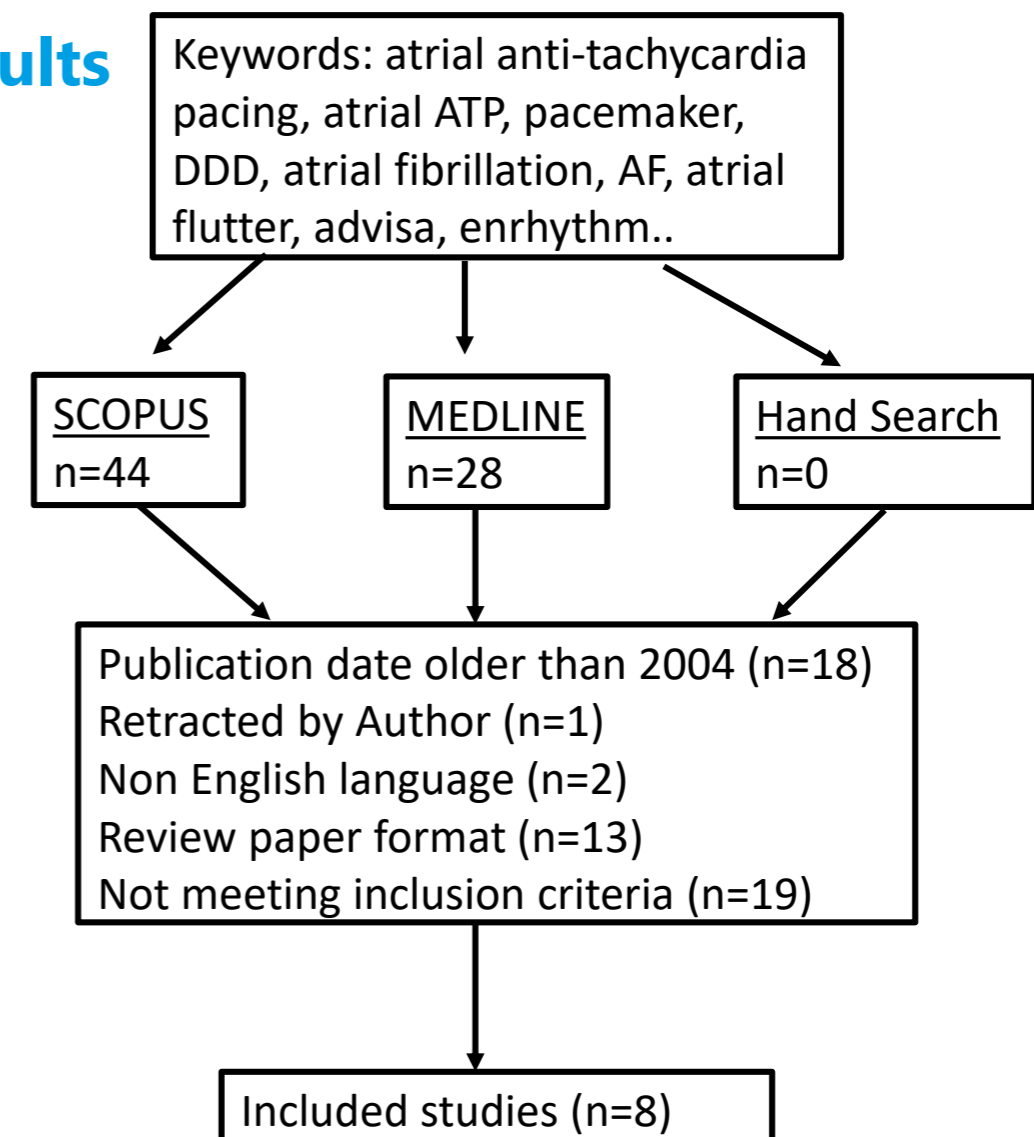
Medline Ovid (1946 to 7th November 2017). Keywords: atrial anti-tachycardia pacing, atrial therapy, atrial preference pacing.

Inclusion criteria: controlled trials investigating the efficacy of atrial anti-tachycardia pacing and/or preventative pacing algorithms in patients with pacemakers.

Exclusion criteria: studies involving specific subgroup population, review articles, dated before 2005, duplicates, retracted articles.

Secondary searches using the reference lists of relevant articles did not reveal any new papers. A catalogue search was performed using the keywords 'pacing' and 'cardiac or pacing'.

Results



Controlled trials investigating the efficacy of a-ATP and/or APP algorithms in pacemakers for the reduction of AF were included. The van Tulder score was used to assess the methodological quality of the papers.

Conclusions

Eight papers reviewed were of good to high methodological quality.

Findings were mildly in favour of the efficacy of atrial prevention (APP) algorithms and moderately against atrial anti-tachycardia pacing (a-ATP).

However, when programmed in combination, there is good evidence to demonstrate a reduction in atrial fibrillation (AF) burden.

Further research is needed to assess the algorithms independently and to identify the clinical characteristics of the sub-group of patients that may benefit.

References/Authors

1. National Institute for Health and Care Excellence. Atrial fibrillation: management. Manchester: National Institute for Health and Care Excellence; 2014
2. Kirchhof P, Benussi S, Kotecha D, et al. 2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS. European Heart Journal 2016; 37(38)
3. Arrhythmia Alliance. AF Association global aware week (AF-A GAWAW). Chipping Norton: Arrhythmia Alliance; 2018
4. Ricci RP, Boriani G, Grammatico A, et al. Optimization of pacing algorithms to prevent and treat supraventricular tachyarrhythmias. Pacing and Clinical Electrophysiology 2006; 29(Suppl 2): S61-72.