

Prevention of stroke in patients with atrial fibrillation by an atrial assistance device – an upstream therapy?

Atrial fibrillation (AF) is the most common cardiac arrhythmia, with over 4.5 million cases in Europe. It is a major source of morbidity and mortality, associated with diminished left ventricular function, exercise tolerance and quality of life. Patients with AF present a twofold increase in cardiac mortality which is linked to the severity of the underlying heart disease. The rate of thromboembolic complications with non-rheumatic AF, resulting in ischaemic stroke, is four- to sevenfold [1]. Additionally, strokes constitute a major financial burden on the community [2]. One in every six strokes occurs in patients with AF. Left atrial thrombus formation can be explained by the deterioration of atrial mechanical function, which favours thrombus formation in zones of stasis within the left atrial appendage in particular. The risk of thromboembolic complications increases with advancing age, an effect which is multifactorial. In patients with AF aging is associated with left atrium enlargement, reduced left atrial appendage flow velocity and spontaneous echo contrast, all of which predispose to left atrium thrombus formation. The majority of patients with AF are elderly, with 83% over 65. Recent data indicate that AF is also significantly associated with an increased prevalence of dementia and cognitive impairment in the elderly [3]. For all these reasons, restoration and maintenance of sinus rhythm are important therapeutic goals in patients with AF. However, it should be borne in mind that AF is not a single disease but a wide spectrum of diseases with heterogeneity in clinical presentation and mechanisms.

Antiarrhythmic drugs (AADs) have been the therapeutic mainstay in recent decades, but unfortunately none of the AADs is entirely optimal in terms of efficacy and safety. Relief of symptoms and improvement of quality of life can be achieved in a significant percentage of patients by catheter ablation. However, success rates in terms of AF recurrence are highly dependent on the mode and intensity of rhythm monitoring [4]. It is important to realize that there is still a lack of trial-based information on the achievement of hard endpoints such as delayed onset of heart failure or reduced rates of hospitalisation, stroke and mortality. In well selected patients successful catheter ablation may greatly improve quality of life. A worldwide survey of 90 centres performing AF ablation procedures in a total of 8745 patients reported mean success rates of 52% without

AADs and 75% with AADs [5]. Of these 8745 patients 2389 (27.3%) required more than one procedure in securing these success rates. Exclusion of the left atrial appendage may reduce the risk of stroke in AF. Although surgical interventions to seal the left atrial appendage have been performed to prevent thromboembolic events, an actual reduction in the incidence of stroke has never been demonstrated. Further studies with large patient populations and clinical endpoints is required in order to emphasise the effectiveness of these surgical interventions. Percutaneous transcatheter techniques for left atrial appendage exclusion have recently been employed with encouraging results [6]. A current ongoing randomised trial is comparing percutaneous left atrial appendage exclusion with long-term oral anticoagulation therapy [7]. However, until conclusive data become available oral anticoagulation should remain the standard of care for stroke prevention in patients with AF.

In a recent meta-analysis of clinical trials involving stroke prevention in patients with non-valvular AF [8], adjusted-dose warfarin reduced the stroke risk by 64% (6 trials) and antiplatelet agents reduced stroke risk by 22% (8 trials). Adjusted-dose warfarin is more effective than antiplatelet therapy, but doubles the risk of major extracranial and intracranial haemorrhage (12 trials). However, the rates of these serious adverse events were only 0.2% per year, i.e. the absolute increase in major extracranial haemorrhage was less than the absolute reductions in stroke. Vitamin K antagonists are currently the only oral anticoagulants available for stroke prevention in patients with AF. New antithrombotic agents that are easier to administer and present better benefit-to-risk ratios are being introduced in clinical trials (e.g. dabigatran, an oral thrombin inhibitor and idraparinux, a long-acting indirect inhibitor of factor Xa which can be administered parenterally once a week). Thus, the goal of safer and more convenient anticoagulation may be within reach. The implementation of patient self-management may help to reduce the side effects of oral anticoagulation [9].

In the present issue Abdelnour-Berchtold et al. present a novel approach to restoration of atrial pump function in AF [10]. They describe the use of a motorless volume-displacing device based on artificial muscle technology, positioned on the external surface of the atrium (Atripump).

The approach was tested in 5 non-anticoagulated sheep; in 2 animals thrombi were washed out using the device and the atrial assistance also enhanced atrial ejection fraction. The concept of artificially restoring the atrial pump function in AF is promising and raises hopes of abandoning anti-coagulation therapy. The potential of a device of this kind in enhancing atrial ejection fraction also holds promise for improvement of global heart

function in heart failure patients. However, long-term animal studies are needed before the applicability and safety of this novel concept can be investigated in humans.

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