Atrial Fibrillation: Diagnosis and Treatment

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Abstract

Atrial fibrillation (AF) is caused by multiple factors disturbing normal atrial electrophysiology and promoting focal electro-activity and re-entry activity. Most frequently AF starts as paroxysmal and tends to progress to permanent AF. Current treatment options for AF include pharmacological treatment, electro cardioversion (ECV), ablation therapy and surgical treatment. Two strategies for pharmacological treatment of AF can be distinguished, rate control and rhythm control. ECV combined with anti arrhythmic drugs is more effective compared to ECV alone. Catheter ablation is a good alternative for patients not responding to or not tolerating anti arrhythmic drugs. Symptomatic patients who do not respond to pharmacological therapy, in whom catheter ablation has not been effective, can be treated surgically. AF is associated with a 1.5-fold (men) to 2-fold (women) increased risk of all-cause mortality, such as heart failure or stroke.

Atrial Fibrillation

Diagnosis

Atrial fibrillation (AF) is caused by multiple factors disturbing normal atrial electrophysiology and promoting focal electro-activity and re-entry activity [1]. Diagnosis is based on the electrocardiogram, where no distinct P-waves are detectable in combination with irregularity of the RR-interval. A lasting period of 30 seconds is the diagnostic cut-off for calling AF non-sustained (<30s) or sustained. AF is classified into different subgroups: new onset, paroxysmal, persistent, long-lasting persistent and permanent. The classification of non-valvular versus valvular AF is being used less, where valvular AF refers mostly to patients with AF and valvular disease [2]. Most frequently AF starts as paroxysmal and tends to progress to permanent AF [2]. Management of AF involves treatment of symptoms and improving prognostic outcome, such as prevention of thromboembolic complications [2].

AF Treatment

Current treatment options for AF include pharmacological treatment, electro cardioversion (ECV), ablation therapy and surgical treatment [2,3]. Depending on duration of symptoms and reaction to treatment, choices for individual patients are being made.

Rate control versus rhythm control

Two strategies for pharmacological treatment of AF can be distinguished, rate control and rhythm control [2,4]. It is assumed that both strategies are evenly effective. The beneficial effect of converting to and maintaining in sinus rhythm might be limited by the adverse effects of the medication used for this goal [4,5].

NEW ONSET AF

Patients often need rate control in acute new onset AF [2]. In hemodynamically stable patients rate control can be achieved by pharmacological treatment with beta-blockers, calcium channel blockers (diltiazem and verapamil), digoxin, or combination therapy [2,6]. Drug choice and target rate will depend on patient characteristics, symptoms, left ventricular ejection fraction (LVEF) and hemodynamics [2]. Beta-blockers are contraindicated in patients with acute cardiac failure and calcium channel blockers are contraindicated in patients with a LVEF < 40% [2]. Beta-blockers and calcium channel blockers are more fast-acting compared to digoxin. Digoxin is preferred in patients with a LVEF < 40% but are not appropriate for patients with an accessory pathway or in patients with hypertrophic cardiomyopathy with left ventricular outflow tract obstruction [2]. Amiodarone infusion is indicated in critically ill patients and patients with a severely impaired LVEF [2,7,8]. Propafenone infusion is a good alternative in patients without any structural heart disease and a normal or slightly reduced LVEF [7,8]. Restoration of sinus rhythm with ECV is performed immediately in hemodynamically unstable patients [2]. In hemodynamically stable patients ECV can be done safely after transesophageal...
anticoagulation versus the risk of thromboembolic complications weighs the risk of bleeding as a consequence of the use of antiarrhythmic drugs is more effective compared to ECV alone [2].

Paroxysmal and persistent AF

Long term rate control with beta-blockers is accepted as a first line treatment in AF [2]. In hemodynamically stable patients, long term antiarrhythmic drugs are used if patients prefer medication over ECV. Long term rate control is also indicated when multiple attempts of ECV were unsuccessful [2,6]. In persistent AF, pharmacological conversion to sinus rhythm is only effective in 10 to 30% [6]. Catheter ablation is an alternative for patients not responding to or not tolerating antiarrhythmic drugs [2,3,6], and is a first line treatment in patients with paroxysmal AF with symptomatic pauses (tachy-brady syndrome) [9]. Catheter ablation uses energy sources such as cryo-energy and radiofrequency to create lesions in the atrium resulting in the prevention of focal activity and re-entry activity [3]. Recurrence of AF, one year post catheter ablation treated patients, is 20 to 30% in patients who had paroxysmal AF and 60% in patients who had persistent AF [10]. Often, more than one ablation is needed [2]. Contraindication for catheter ablation are a thrombus in the left atrium (absolute CI) and LVEF < 50% or enlarged atria [11].

Long lasting persistent and permanent AF

Symptomatic patients who do not respond to pharmacological therapy, patients in whom catheter ablation has not been effective or who are not candidates for a catheter-based approach, or patients having a low chance of success with a single catheter procedure can be treated surgically [12]. AF surgery is being performed as a stand-alone procedure or concomitant in cardiac surgery. The stand-alone procedure can be done minimally invasive with 69–91% freedom from arrhythmias one year postoperative [2,3]. Concomitant AF surgery should be considered in all patients with AF undergoing cardiac surgery because of more freedom from AF, atrial flutter and atrial tachycardia [2,3,13]. In the Cox-Maze procedure a maze is created resulting in scar tissue interrupting abnormal electrical circuits [2].

Prevention of thrombosis

AF is associated with a 1.5-fold (men) to 2-fold (women) increased risk of all-cause mortality, especially cardiovascular mortality such as heart failure or stroke [2].

CHA2DS2-VASc score

The CHA2DS2-VASc (congestive heart failure; hypertension; age ≥ 75 years [doubled]; type 2 diabetes; previous stroke, transient ischemic attack, or thromboembolism [doubled]; vascular disease; age 65 to 75 years; and sex category) score weighs the risk of bleeding as a consequence of the use of anticoagulation versus the risk of thromboembolic complications and is used to determine whether treatment with anticoagulation is needed [2]. In men, a CHA2DS2-VASc score ≥ 2 and in women a score ≥ 3 indicates for anticoagulation therapy [2].

Anticoagulation and left atrial appendage closure

Patients with AF have an increased risk on developing atrial thrombi leading to stroke. Patients with valvular disease (30% of AF patients) are at higher risk [2]. Using anticoagulants reduces ischemic stroke by two-thirds compared with placebo and is thereby reducing mortality [14]. Non-vitamin K antagonist oral anticoagulants (NOACs) are preferred over vitamin K antagonists in patients without contra-indications, such as mechanical valves and moderate-severe mitral valve stenosis [2]. In addition to pharmacological stroke prevention or when anti-coagulation is contraindicated, surgical left atrial appendage closure might be considered as a stand-alone procedure or as a concomitant procedure in open heart surgery [2]. Whether occluding the appendix concomitant to cardiac surgery is currently under investigation in the Left Atrial Appendage Occlusion Study (LAAOS) III. This is a large randomized controlled trial evaluating the efficacy of stroke prevention in patients with AF [15].

REFERENCES


