

Atrial Fibrillation

Atrial fibrillation is one of the most common tachyarrhythmias.^[1] There is paroxysmal or persistent form. Paroxysmal form has spontaneous beginning and spontaneous end of fibrillation. In the opposite, persistent form can be ended only by using special therapy (pharmacotherapy or electrical cardioversion).^[2]

It can be presented at normal healthy persons but it is quite frequent in patients with^[1]:

- Atrial dilatation
- Mitral stenosis
- IHD (ischemic heart disease)
- Sick sinus syndrome
- Myocarditis
- Pericarditis
- Thyreotoxicosis
- COPD
- Pulmonary embolism

Pathophysiology

This kind of arrhythmia is based on focal source of impulses and reentry phenomenon. Focal source is usually localized in left atrium, or in one of pulmonary veins. It leads to unorganized atrial activity with very high rate (400-800/min^[1]). Atrial contraction becomes ineffective. Ventricular response is irregular, because not every atrial repolarization is conducted to ventricles (concealed conduction). Common ventricular rate in atrial fibrillation is 150-200/min^[1]. In result the heart rate of the patient is not based on physical activity. There is tachycardia at rest and bradycardia in enhanced physical activity.

Symptoms

- palpitations
- dyspnea
- tiredness
- heart failure
- pulmonary edema
- or no symptoms...
- ECG – there is no P wave, in fact P wave is replaced by many F waves with rate 400-800/min, QRS complex is normal but RR distance is irregular (heart rate is irregular).



ECG with atrial fibrillation (F waves, irregular heart rate) - compare with normal ECG (P waves, regular heart rate)

Complications and Consequences

Typical complication in AF is thromboembolic disease. Thrombus can be formed in left atrium with risk of peripheral embolization, especially stroke. Excessive ventricular rate can cause^[3]:

- systemic hypotension;
- lung congestion;
- angina pectoris (shortened diastole leads to shortened perfusion of coronary arteries → myocardial ischemia);
- tachycardia induced cardiomyopathy.

Therapy

Therapy of AF is based on:

1. therapy of AF paroxysm (sinus rhythm restoring) → pharmacotherapy or electrical cardioversion,
2. prevention of AF paroxysm (with therapy of cause of AF) → antiarrhythmics,
3. ventricle rate modification → β -blockers
4. prevention of thromboembolic disease.^[1]

Pharmacotherapy

- **β -blockers** - effect: AV node refractory period prolongation and conduction slowing, they are preferred if we can not stop AF paroxysm. e.g. metoprolol
- **antiarrhythmics** are used for sinus rhythm restoring and new AF paroxysm prevention:
 - propafenone (IC)
 - sotalol (III)
 - amiodarone (III)

Propafenone or sotalol are drugs of the first choice.

Electrical Cardioversion

Cardioversion is one of methods, how to stop AF paroxysm. There are some conditions to performed it:

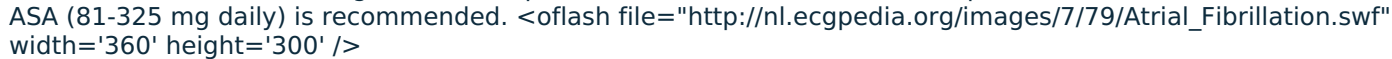
- AF paroxysm less than 24(-48) hours;
- no trombus in left atrium (transesophageal echocardiography);
- anticoagulant therapy.

Note: Presence of thrombus in left atrium means high risk of stroke after cardioversion!

Catheter Ablation

Catheter ablation is a method preferred in younger patient resistant on pharmacotherapy with no structural defect in atrial or ventricular myocardium. Then we expect the source of AF in pulmonary veins which will be isolated by catheter ablation.^[2]

Prevention of Thromboembolic Disease

Anticoagulation therapy is indicated in patients with CHADS2 score of 1 or more. New generation of oral anticoagulants, such as direct thrombin inhibitor dabigatran and direct factor Xa inhibitor rivaroxaban, are now first line drugs for stroke prevention in atrial fibrillation. Warfarin is second line drug, often used when first line drugs are contraindicated, for example, in patients with advanced renal failure. Please note that neither dabigatran nor rivaroxaban has been approved in patients with mechanical heart valves, although clinic studies are under way. For now, warfarin is still the drug of choice in patients with mechanical valves. In patients with CHADS2 score of zero, ASA (81-325 mg daily) is recommended. Flash movie courtesy of ECGpedia.org

Flash movie courtesy of ECGpedia.org

Links

Related articles

- Electrocardiography

References

1. KOLÁŘ, Jiří – KAUTZNER, Josef. *Základy elektrokardiografie*. 1. edition. Prague. 2010. ISBN 978-80-86232-09-3.
2. ČEŠKA, Richard, et al. *Interna*. 1. edition. Prague : Triton, 2010. pp. 101-103. ISBN 978-80-7387-423-0.
3. KASPER, Dennis L – FAUCI, Anthony S – LONGO, Dan L, et al. *Harrison's principles of Internal Medicine*. 16th edition. New York : McGraw-Hill Companies, Inc, 2005. 2607 pp. pp. 1374-1375. ISBN 0-07-139140-1.