



The 44th Annual International Congress of the
EGYPTIAN SOCIETY OF
CARDIOLOGY
CardioEgypt2017



AF in Athletes

Abdallah Elshal, MD

Lecturer of Cardiology, Mansoura University

Agenda

- Introduction
- Pathophysiology of AF in athletes
- Clinical features of AF in athletes
- Treatment of AF in athletes



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Introduction

- AF is the most common cardiac arrhythmia in athletes, especially in middle-aged athletes.
- Athletes who engage in endurance sports such as runners and cyclists are more prone to AF than other athletes.





Introduction

- The reported prevalence of AF among athletes is quite variable, ranging from 0.3% to 12.8%, which reflects methodological biases such as differences between studies in subjects' age, training status or sports specialty.



Study Type	Number of subjects	Age/Gender	Type of exercise	Prevalence of AF in athletes/ controls (%)
Karjalainen et al ¹⁵	795	35-39 years/ Male	Cross country Running	5.3/0.9
Baldesberger et al ¹⁷	196	~66 years/ Male	Cyclists vs. golfers	10/0
Mont et al ⁸	216	<65 years/ Male + Female	Endurance athletes	63/15
Elosua et al ¹⁶	109	41-55 years/ Male	Endurance athletes	32/14
Heidbuchel et al ²²		60 years/83% Male, 17% Female	Cycling, running, or swimming	
Molina et al ¹⁸	557	48 years	Marathon runners vs. sedentary	5/0.7
Grimsmo et al ¹¹	78	54-62 years- Group I 72-80 years- Group II 87-92 years- Group III	Cross-country runners, skiers	12.8

Introduction

- Although AF is the most common tachyarrhythmia in both athletes and the general (non-athletic) population, there are likely differences in the etiology and clinical presentation and the treatment approach in the two conditions.

Pathophysiology

- The mechanisms by which exercise leads to AF are not well understood and are seemed to be multifactorial.



Triggers of AF

➤ Atrial Ectopy

- Atrial ectopy, particularly pulmonary vein ectopy, is a trigger for most episodes of paroxysmal AF in the general population.
- Increased sympathetic activity when participating in vigorous exercise can trigger atrial ectopy. However, this concept lacks convincing evidence.



Triggers of AF



➤ Sports Supplements

- Isolated cases of AF occur with heavy consumption of energy drinks and the use of anabolic steroids have been recently reported.
- There are no systematic data regarding risk of anabolic steroids or energy drinks in the initiation of AF.



Substrates for AF

➤ Cardiac Remodeling

- Endurance exercise is associated with both bi-atrial and ventricular enlargement may lead to development of AF



Substrates for AF

➤ Inflammation

- Several studies have shown an association between AF and elevated CRP. excessive training can induce chronic systemic inflammation which may induce high CRP levels that may lead to atrial electrical remodeling and development of AF.



Modulators of AF

➤ Autonomic Activation

- AF in athletes is mostly vagal-mediated
- A high vagal tone, which is found among endurance athletes, can lead to bradycardia, which is a major contributor to generation and propagation of AF.



Modulators of AF

➤ Electrolyte Abnormalities

- Athletes who are involved in vigorous exercise can have dynamic fluid shifts in the body which can lead to dehydration and alteration in pH and depletion of electrolytes including sodium, potassium and magnesium which may also contribute to AF.



Diagnosis and Clinical features

- AF in Athletes shares some common features.
 1. Starts as paroxysmal AF.
 2. Gender = men.
 3. Age \leq 60 years (mostly 40–60 years).
 4. Prolonged practice \geq 6 to 8 h/week with intensity greater than 60% of maximum heart rate, for at least 6 months.
 5. BMI \leq 25 kg/m², no HTN, smoker or DM.
 6. Usually carry parameters compatible with the 'Athlete's heart'.



Clinical features

- Since the main characteristics of these patients converge in a common profile, we consider that paroxysmal AF in young and middle-aged athletes might be framed as a new syndrome: **the PAFIYAMA syndrome**



Major criteria

1. Onset as paroxysmal AF
2. Age usually ≤ 60 years, male sex
3. Prolonged practice of SEE (≥ 6 to 8 h/week with intensity greater than 60% of maximum heart rate, for 6+ months)
4. Preserved ejection fraction ($\geq 55\%$)

Minor criteria

1. ST-segment elevation at the J-point (STE) ≥ 0.1 mm in 2 leads
2. T-wave inversion in 2 leads
3. Increased vagal tone (sinus bradycardia, prolonged PQ time, first degree AV-block)
4. LA enlargement
5. LV hypertrophy
6. Increased LV wall thickness and LV mass
7. Normal, or even supranormal, diastolic function

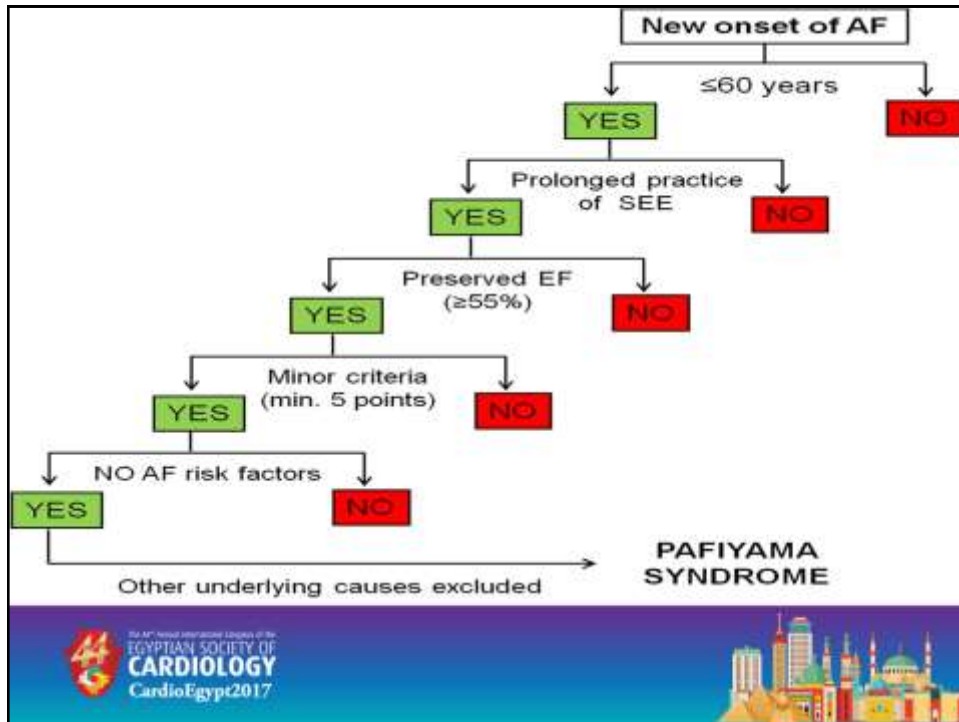
Absence of common AF-risk factors

1. No overweight (BMI > 25 kg/m²) or obesity (BMI > 30 kg/m²)
2. No arterial hypertension at rest
3. No smoking habits
4. No diabetes

Other underlying causes to exclude

1. Metabolic or hormonal diseases (hyperthyroidism, pheochromocytoma)
2. Dilated or hypertrophic cardiomyopathy
3. Pericarditis
4. Coronary artery disease
5. Wolff-Parkinson-White syndrome, Brugada syndrome, long QT syndrome, arrhythmogenic cardiomyopathy or catecholaminergic ventricular tachycardia
6. Performance-enhancing agents or illicit drug use
7. Obstructive sleep apnea
8. Electrolyte abnormalities





Management of AF in Athletes

- A careful history of all the potential contributing factors should be taken.
- Medical conditions should be ruled out.
- Consumption of alcohol, caffeine, sports supplements, or drinks should be investigated.
- Metabolic panel, a thyroid function and TTE. Cardiac monitoring devices such as a Holter monitor, an implantable loop recorder may be used, both basal and stress ECG

Management options

- Exercise volume reduction.
- Pharmacological treatment.
- Direct cardioversion.
- Catheter ablation of the pulmonary vein.
- Anticoagulation.



Exercise volume reduction

- Studies showed that up to 30% of athletes experienced fewer episodes of AF by reducing sport activity.
- According to the Study Group on Sports Cardiology of the European Association for Cardiovascular Prevention and Rehabilitation, athletes with paroxysmal AF should discontinue training for 2 months to stabilize sinus rhythm.



Pharmacological treatment

- Rate control agents such as beta-blockers or calcium channel blockers may decrease performance and should be avoided.
- Therefore, a rhythm control strategy is the preferred means of treatment in athletes.
- Flecainide may be used regularly or as a “pill in the pocket” for athletes with vagal-mediated paroxysmal AF in the absence of structural heart disease.



Pharmacological treatment

- Disopyramide, was shown to be effective in vagal-mediated and bradycardia-dependent AF but it is poorly-tolerated due to antimuscarinic properties and proarrhythmic effects.
- Amiodarone is a potent rhythm control medication. Caution is required due to long-term toxic effects.



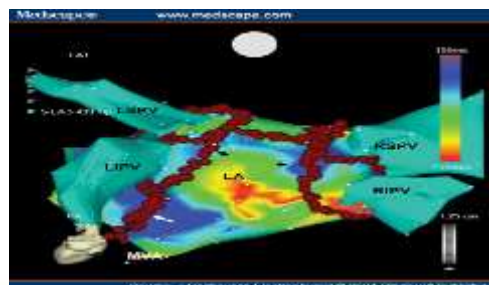
Direct cardioversion

- Direct-current cardioversion may be an option in younger athletes with disabling symptoms. Anticoagulation management is the same as in the general population



Ablation of the pulmonary vein

- CPVA, appears to be one of the best options for athletes with severe symptoms or for those determined to continue training for maximal sports performance.



Ablation of the pulmonary vein

- Pulmonary vein isolation should be considered as a first-line therapy in endurance athletes with atrial fibrillation for arrhythmia-free survival, improvement in exercise capacity so that one can resume endurance sports practices. A redo-ablation procedure may be considered with recurrence



Anticoagulation

- Most athletes will have a low CHA2DS2-VASc score, therefore anticoagulation will rarely be necessary.
- If anticoagulation is used, athletes should be restricted from participating in high-impact contact sports because of the high risk of bleeding



Recommendations for physical activity in patients with atrial fibrillation			
Recommendations	Class ^a	Level ^b	Ref ^c
Moderate regular physical activity is recommended to prevent AF, while athletes should be counselled that long-lasting intense sports participation can promote AF.	I	A	214, 898, 900–902, 905, 906
AF ablation should be considered to prevent recurrent AF in athletes.	IIa	B	908, 909
The ventricular rate while exercising with AF should be evaluated in every athlete (by symptoms and/or by monitoring), and titrated rate control should be instituted.	IIa	C	
After ingestion of pill-in-the-pocket flecainide or propafenone, patients should refrain from sports as long as AF persists and until two half-lives of the antiarrhythmic drug have elapsed.	IIa	C	620



Take home message

- AF is the most common cardiac arrhythmia in athletes, especially in middle-aged athletes.
- Athletes who engage in endurance sports such as runners, cyclists and skiers are more prone to AF than other athletes.
- Triggers of AF in athletes may include atrial ectopy and sports supplements.
- Substrates for AF in athletes include atrial remodeling, fibrosis, and inflammation.



Take home message

- Modulators of AF in athletes include autonomic activation and electrolyte abnormalities.
- Paroxysmal AF in young and middle-aged athletes (PAFIYAMA) might be framed as a new syndrome: the PAFIYAMA syndrome.
- Management of AF in athletes with rate-controlling agents and antiarrhythmic drugs remains a challenge and can be associated with impaired athletic performance. The value of catheter ablation is emerging and should be considered in suitable athletes with AF.



THANK
YOU!

