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Research Article

ATRIAL FIBRILLATION (DIAGNOSIS & MANAGEMENT)Abdulaziz hussain abdullah almakfor¹, Sultan Alzahrani², Hassan Alzahrani³,Ayed AL Jahrash³, Ahmed Mohammed Asiri³¹ Aseer central hospital - Aseer² King Fahad Armed force hospital – Jeddah³ King Khalid Hospital – Najran

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Abstract :

Introduction : Atrial fibrillation(AF) is the rapid and irregular beating of the atrial muscles that bypasses the natural heart rate and rhythm. This abnormal twitching of the atrium may increase heart rate and cause a drop in stroke volume leading to symptoms of heart failure. Irregular flow of blood also causes blood stasis in atria, leading to clot formation and subsequent emboli development. This review will discuss in brief various diagnostic and management modalities of atrial fibrillation.

Aim of Work: The aim of this study is to discuss the diagnosis and management of atrial fibrillation

Materials and methods: This review is a comprehensive search of PUBMED from the year 2003 to 2021.

Conclusion:

This review briefly discusses atrial fibrillation, its diagnosis, and treatment modalities. In atrial fibrillation, asynchronous and abnormal contractions of atrial cardiac muscles lead to abnormal rate and rhythm of heartbeats. This often leads to symptoms of heart failure and episodes of stroke. Factors that predispose to AF are cardiac diseases, diabetes, smoking, and excessive alcohol consumption. Diagnosis of AF requires a thorough history and physical examinations, laboratory evaluations, electrocardiogram, and certain imaging such as MRI and CT. Various treatment modalities are cardioversion, antiarrhythmic drugs, cardiac ablation therapy, and certain surgical procedures like maze surgery & left atrial appendage obliteration

Keywords: Atrial fibrillation, arrhythmia, electrocardiogram, cardioversion, cardiac ablation.

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INTRODUCTION:

Atrial fibrillation is the rapid twitching of atrial muscle fibers without any synchrony. Normally atrioventricular node electrically connects the atria to the ventricles, which makes the heart beat in coordination. In atrial fibrillation, ectopic and abnormal electrical impulses override the natural pacemaker of the heart tissues, which loses rhythm control of the heart. The resulting pathologies from an insufficient and uncoordinated pump of atria is the inadequate amount of blood being pumped to the body by the ventricles, which leads to symptoms of heart failure. Some unpumped blood also gets left behind in the atria leading to clot formation and resulting emboli. ^[1]

Abnormally fast contractions from the atrial cardiomyocytes results in various signs and symptoms. Some of the symptoms include arrhythmias, palpitation, tiredness, shortness of breath, and dizziness. AF is strongly associated with several cardiovascular diseases, such as cardiac failure, coronary artery disease, congenital heart diseases, and atrial ischemia. Other associated causes are increased age, sedentary lifestyle, diabetes, genetics, increased alcohol consumption, and smoking. AF can be classified by disease persistence: ^[2]

- paroxysmal AF: spontaneously terminating or with intervention within seven days of onset
- persistent AF: AF lasting at least seven days and terminating with cardioversion
- long-standing persistent AF: sustained AF for 12 months with a rhythm control strategy
- permanent AF: When doctor and patient decide to stop intervening with sinus rhythm. ^[2]

Diagnosis**History & Physical exam**

A thorough diagnosis always starts with a complete history of presenting illness. AF can present itself with

a range of being asymptomatic to devastating consequences such as ischemic stroke to cardiogenic shock. A detailed history must record any symptoms of palpitations, shortness of breath, tiredness, swelling in the legs, and dizziness. History of all risk factors such as valvular, ischemic, or structural heart diseases, family history, smoking & alcohol consumption, etc. must be noted. ^[3]

Physical examination is focused on identifying the potential etiology and extent of disease progression. Airway, breathing, circulation, and vitals must be recorded first. Hands and legs must be evaluated for signs of edema. Signs of peripheral vascular disease such as skin breakdown and hair loss must not be missed. The pulmonary examination evaluates for asthma, chronic obstructive pulmonary disease, and other signs of heart failure. Hepatomegaly and abdominal distention may also indicate heart failure. All four heart chambers must be auscultated, and apical impulse palpated to identify underlying valvular pathology. Care examination of the nervous system might also reveal episodes of transient ischemic attack for other cerebrovascular accidents. ^[3]

Evaluation

Laboratory works such complete blood picture is advised to evaluate any infections, and a basic metabolic panel for electrolytes evaluation is necessary. Tests for thyroid abnormalities, blood glucose levels, liver & kidney function tests, and chest x-rays for thorax evaluation are a must. ^[4]

Electrocardiogram (ECG) is a critical component in the diagnosis of atrial fibrillation. A 12 lead ECG shows loss of normal P wave and replacement with fibrillatory waves. Uncoordinated activation of ventricles leads to an irregularly rapid heart rate (90 to 170 beats per minute) and shows a narrow QRS complex. If ECG results come normal, but suspicion of AF persists, a Holter monitor (24-hour recording) or event monitor (seven- to 30-day recording) may be used ^[5]

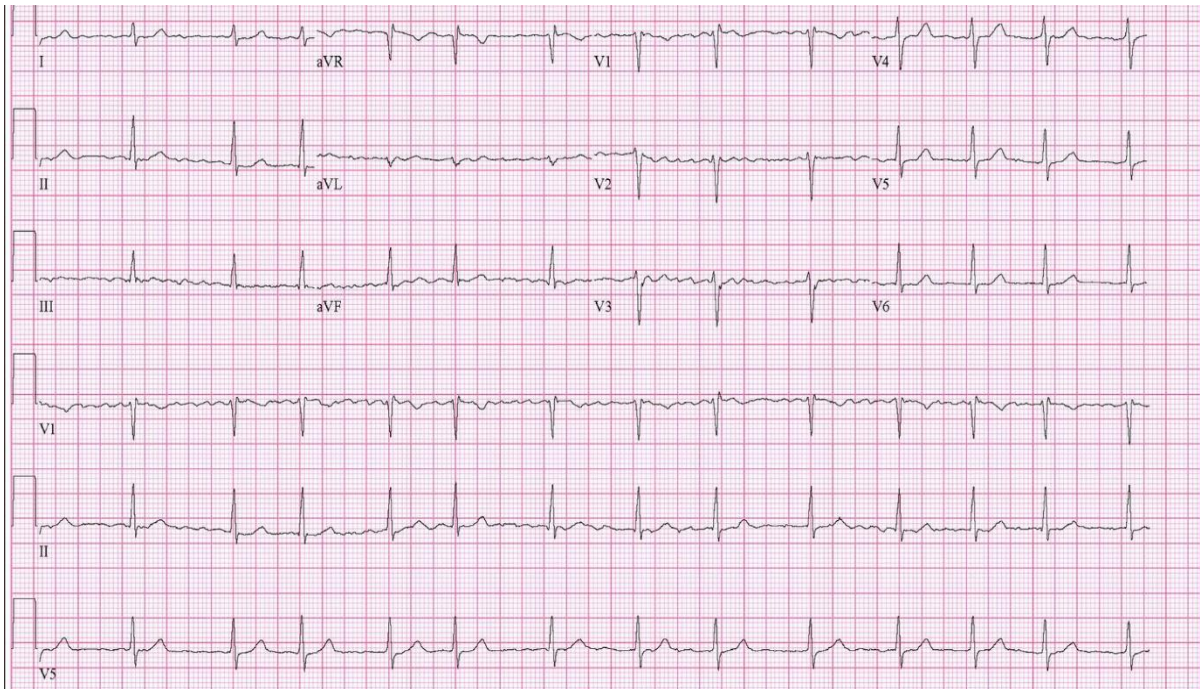


Figure: ECG showing atrial fibrillation. Note the absence of distinct P wave, the chaotic activity of atria, and irregular R-R intervals with a narrow QRS complex. [5]

Imagings

Various imaging modalities such as cardiovascular magnetic resonance, multidetector-row computer tomography, and transthoracic & transesophageal echocardiography can be used to assess the atrial size and function. They can also be used to assess various cardiac pathologies such as valvular, coronary, congestive, and congenital heart diseases. These imaging modalities can also be used in pre, intra, and post radiofrequency catheter ablation procedures. [6]

Management

Cardioversion

Cardioversion is the treatment of choice in hemodynamically unstable individuals or those unresponsive to drugs. It is a medical procedure that converts cardiac arrhythmias to a normal rhythm using either electricity or drugs. Typically, four weeks of anticoagulation therapy is recommended both before and after cardioversion unless done emergently. In electric cardioversion, one or more shocks of 200-300 joules are given. Cardioversion can also be achieved by using antiarrhythmic drugs such as ibutilide, flecainide, and propafenone, but they do carry a risk of triggering ventricular arrhythmias. Either form of cardioversion is contraindicated in cases of atrial thrombus or digitalis toxicity. [7]

Rate control

Controlling the rate of ventricular contraction via drugs is an important intervention in AF patients that

have no symptoms of arrhythmias. Beta-blockers and nondihydropyridine calcium channel blockers are used to achieve heart rate goals of 60 to 100 beats per minute. Heart rate control decreases myocardial oxygen demand and improves coronary perfusion and mechanical function. [8]

Anticoagulation

AF and cardioversion do carry a significant risk of embolic stroke. Anticoagulant therapy is essential in preventing this risk, although the risk of bleeding also exists. The CHA₂DS₂-VASc (congestive heart failure; hypertension; age 75 years or older [doubled]; diabetes; prior stroke, transient ischemic attack, or thromboembolism [doubled]; vascular disease; age 65 to 74 years; sex category) scoring system assesses the risk of stroke in AF patients. AF patients are recommended anticoagulants if their CHA₂DS₂-VASc score is at least 2 without any contraindications. Common anticoagulants used are warfarin (target INR 2-3) and aspirin + clopidogrel for people who cannot tolerate anticoagulation. [9]

Cardiac Ablation Therapy

Near the ostia of the pulmonary vein in the left atrium, certain areas have been identified that cause atrial fibrillation. Electrophysiological radiofrequency ablation (catheter-based procedure) aims to isolate and possibly destroy the abnormal areas causing AF. Patients are required to be on anticoagulation therapy both before and after ablation therapy. Ablation

therapy is indicated in individuals who are intolerant of antiarrhythmics and patients with unsatisfactory pharmacologic rhythm control. ^[10]

Surgery

The common surgical procedure in cases of AF are maze procedure and left atrial appendage obliteration. The maze procedure involves scarring the cardiac tissue with a scalpel so that ectopic and faulty electrical signals are blocked. The left atrium has a pouch-like appendage where blood clots reside and are like to embolize in AF patients leading to stroke. Left atrial appendage obliteration involves ligation or placement of a plug to stop blood clots from embolizing. ^[11]

CONCLUSION:

Asynchronous and abnormal contractions of atrial cardiac muscles lead to abnormal rate and rhythm of heartbeats. This often leads to symptoms of heart failure and episodes of stroke. Factors that predispose to AF are cardiac diseases, diabetes, smoking, and excessive alcohol consumption. Diagnosis of AF requires a thorough history and physical examinations, laboratory evaluation, electrocardiogram, and certain imaging such as MRI and CT. Various treatment modalities are cardioversion, antiarrhythmic drugs, cardiac ablation therapy, and certain surgical procedures like maze surgery & left atrial appendage obliteration.

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