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Atrial Fibrillation

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Introduction

- Atrial Fibrillation (AF) is the most diagnosed heart arrhythmia with future projections estimating that 12.1 million people in the United States will be diagnosed with AF by 2030 (Coilla et. al., 2013).
- Patients who develop AF are at increased risk for stroke, heart failure, hospitalization, and death (Ganz & Spragg, 2021).
- 15% to 25% of stroke patients have AF as a risk factor (McCance & Huether, 2018).
- Cardiologist rate AF as one of the most difficult arrhythmias to treat (Jacob, 2017).
- AF was selected as a poster topic as education for clinicians and patients is essential in diagnosing, treating, and preventing AF.

Signs and Symptoms

- Irregular heartbeat and pulse
- Heart palpitations
- Dizziness
- Lightheadedness
- Fatigue
- Shortness of breath
- Chest Pain
- Possibly asymptomatic (CDC, 2020)

Risk Factors

- Advanced age
- Hypertension (most common risk factor) (Jacob, 2017)
- Obesity
- European ancestry
- Diabetes
- Heart failure
- History of myocardial infarction
- Hyperthyroidism
- Chronic kidney disease
- Alcohol abuse
- Smoking (CDC, 2020)

Diagnosis

- Diagnosis of AF is based off confirmed ECG characteristics. ECG Characteristics include:
 - No p waves
 - Low-amplitude fibrillatory waves
 - Irregularly irregular R-R interval (McCance & Huether, 2018)

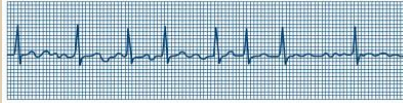


Figure 1 retrieved from <https://my.clevelandclinic.org/health/diseases/16765-atrial-fibrillation-afib>

- Identification of patients who are asymptomatic is challenging and may be improved through increased and improved community screening (McCance & Huether, 2018).
- A diagnosis of AF increases the patient's risk for AF by 5 times. Interestingly, every 5th stroke that is diagnosed can be attributed to AF (Bielecka et. al., 2021).
- The CHA₂DS₂-VAS_c scale can be used to assess risk for thromboembolism in patients diagnosed with AF. A score on the scale of ≥2 for men and ≥3 for women indicates that the patient should be considered for oral anticoagulation therapy to prevent risk of stroke (Bielecka et. al., 2021).

CHA ₂ DS ₂ -VAS _c Scale		
C	Congestive heart failure	1
H	Hypertension	1
A ₂	Age ≥ 75 years	2
D	Diabetes	1
S ₂	History Stroke/ TIA/ thromboembolism	2
V	Vascular disease	1
A	Age of 65-74 years	1
S _c	Sex = female	1

Figure 2 adapted from (Bielecka et. al., 2021)

- There are four classifications of AF diagnosis based on how often the rhythm occurs and how it responds to treatment. (National Heart, Lung, and Blood Institute, n.d)
 - Paroxysmal AF: brief occurrences of AF that may last up to a week but go away on their own. Patient may display symptoms or be asymptomatic.
 - Persistent AF: continuous AF that lasts greater than a week.
 - Long-term persistent AF: last longer that a year without going away.
 - Permanent AF: does not go away even after treatments.

Underlying Pathophysiology

- In normal physiology, electrical transduction from the heart starts in the SA node and travels down to the AV node before conducting an impulse across the ventricles. In AF, the electrical transduction in the atria is chaotic and unorganized due to several possible reasons such as atrial remodeling, elevated atrial pressures, and inflammation of the atria (Ganz, 2021).
- Atrial remodeling can be divided into three different types including structural, electrical, and autonomic (Wysokiński et. al., 2020).
- Structural remodeling of the atria is caused when there is a dissociation between the electric activity of the atria and the muscle fibers. This can be caused by fibrosis and cellular hypertrophy of the cardiomyocytes (Wysokiński et. al., 2020).
- Electrical remodeling in the atria can cause AF by shortening the resting membrane potential and refractory periods of the cardiomyocytes (Wysokiński et. al., 2020). One of the main "triggers" of rapidly discharging and unorganized electrical impulses can come from the pulmonary veins (Hassanabad et. al., 2019).
- Increased levels of atrial natriuretic peptide, angiotensin II, and transforming growth factor are all neurohormonal changes related to the pathophysiology of AF (Wysokiński et. al., 2020).

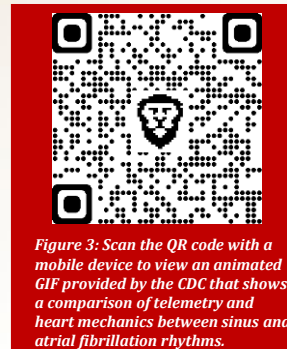


Figure 3: Scan the QR code with a mobile device to view an animated GIF provided by the CDC that shows a comparison of telemetry and heart mechanics between sinus and atrial fibrillation rhythms.

Significance of Pathophysiology

- Due to blood not flowing as well as it should because of the chaotic and quivering atria, a patient with AF is at a significantly increased risk to develop an atrial thrombus which could cause stroke (CDC, 2020).
- Assessing the need for oral anticoagulation to decrease risk of stroke is essential. The CHA₂DS₂-VAS_c scale can be used to evaluate this risk (Bielecka et. al., 2021).
- Neurohormonal changes that attribute to AF are due to a number of reasons including hypertension. Prevention of hypertension leads to decreased risk of developing AF (Wysokiński et. al., 2020).

Treatments

- For acute AF, first treat the underlying problem such as electrolyte disturbances, decrease adrenergic medications, treat blood pressure, treat pain and anxiety.
- Management of AF focuses on four things including management of cardiovascular risk factors, rate control, rhythm control, and anticoagulation if the patient is at risk for thromboembolism (Jacob, 2017).
- Rate control aims to lower the ventricular response in AF by slowing AV nodal conduction with agents such as beta blockers, calcium channel blockers, and digoxin (Depoorter et. al., 2019).
- Rhythm control aims to restore and maintain sinus rhythm of the heart with the use of antiarrhythmic medications, electrical cardioversion, percutaneous catheter ablation, or other surgical procedure (Kumar, 2021).
- Thromboembolism prophylaxis with direct acting oral anticoagulants should be considered for patients with AF based on their CHA₂DS₂-VAS_c scale score and overall clinical picture (Bielecka et. al., 2021).

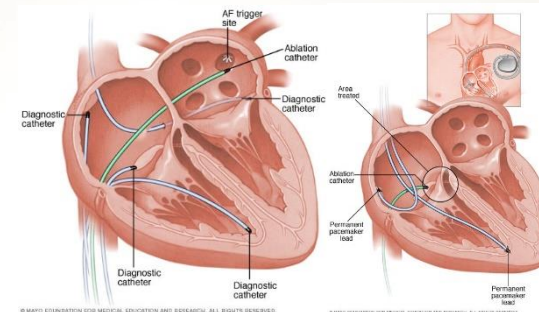


Figure 4 shows catheter ablation technique to isolate the pulmonary veins on the left and AV node ablation on the right for the treatment of AF. Images retrieved from <https://www.mayoclinic.org/diseases-conditions/atrial-fibrillation/diagnosis-treatment/drc-20350630>

Nursing Implications

- It is important to be able to identify AF on telemetry and to make clinical decisions that decrease the risks associated with the diagnosis.
- Educate patients on decreasing health risk factors that could lead to the development of AF.
- Understand that prevention of thromboembolism with anticoagulants is important in patients with AF.
- Studies have not determined whether rate control vs rhythm control produces better outcomes in patients with AF (Depoorter et. al., 2019).

Conclusion

- Overall, AF has a huge impact on healthcare and the importance of education for the prevention, diagnosis, and treatment for clinicians and patients cannot be overstated.
- Prevention of thromboembolism is essential in preventing stroke since patients with AF are at a significantly increased risk.
- Risk factor management is key in decreasing the incidence of AF and for preventing complications caused by AF. Nurse-led community clinics have been found to prevent hospitalizations from AF by allowing for improved risk factor management, improved coordination among healthcare providers, and improved management of patients with the diagnosis (Jacob, 2017).

References



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