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Pathophysiolgoly of Atrial Fibrillation

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Introduction

- Aging is an unavoidable human attribute which happens to everyone, some individuals age better than others. With the aging process, there comes increased health risks and a decline in one's health, particularly increased risk of heart disease and irregular heart rhythms (Heart.org, 2018). Included in health risks associated with advanced age is the evidence in clinical practice that the elderly are at increased risk for falls (Shah, 2013).
- Atrial Fibrillation (AFib) is the most common cardiac arrhythmia and its prevalence increases with age (Shah, 2013). Given the aging of the U.S. population, the incidence of Afib is expected to more than double over the next 50 years (Cutugno, 2015).
- Afib incidence is 25% in individuals by age 80 affecting one in every 10 individuals over age 80 (Spivak, 2015). Incidence doubles with each decade of life after age 50 (Shah, 2013).).
- Risk for stroke is five times higher in those with Afib and advanced age, and accounts for 25% of acute ischemic strokes (Alkhouli et al, 2018).The risk of stroke can be reduced if the patient meets criteria to be on oral anticoagulation (AC) (Heart.org, 2018).
- CHA2DS2-VASc (Figure 3) is a scoring system utilized to assess the need for AC to prevent stroke from Afib. AC is recommended for a CHA2DS2-VASc score of 2 or more (Hagerty and Rich, 2017). Once it has been determined a patient should be treated with AC, then consideration of clot formation or bleeding risks should be weighed. Not every patient is a candidate for anticoagulation (Spivak, 2015).
- HAS-BLED (Figure 1) is a scoring system used for assessing bleeding risks in patients (Hagerty and Rich, 2017). The HAS-Bled score has been used more widely in recent years (Hagerty and Rich, 2017).
- A clinician must heavily weigh the options of treatment for the patient with AF who is at risk for falls (Cutugno, 2015). Other options should be considered for patients that are unable to tolerate AC. Because thrombi typically occur in the left atrial appendage, left atrial appendage closer (LAAC) has emerged as an alternative in select patients (Reddy et al, 2017).
- Through education clinicians can provide patients and family members the knowledge of signs and symptoms, risk factors and the appropriate time for patients to consider treatment with AC or alternatives such as LAAC if appropriate.
- Afib was the chosen topic due to the prevalence of this particular arrhythmia and the potential adverse effects with increased risk of stroke. It is important for the nurse practitioner to recognize when patients present with Afib and create the appropriate plan of care to reduce risk of stroke, while at the same time reducing adverse effects from AC.

HAS-BLED	Points	HAS-BLED	Points
Hypertension	1	Abnormal renal function	1
Abnormal liver function	1	Stroke	1
Bleeding history	1	Labile INR	1
Elderly (age > 65)	1	Drugs	1
Alcohol	1		

Figure 1. Scoring system to determine risk of bleeding (Hagerty and Rich, 2017)

Patient Presentation

- 79 year old female with history of hypertension (HTN) presents to the clinic stating she has been more tired than usual. Patient states has felt palpitations in her chest and feels as though her heart is racing.
- Upon assessment and auscultation of the patient's heart, an irregular rhythm with a rate in the 120s is revealed.
- Electrocardiogram confirms the patient is in Atrial Fibrillation.
- Patient informs the nurse practitioner that she has been under a lot of stress with caring for her ill husband.
- Patient also admits she has fallen a couple of times but states it is because she is so tired all the time.

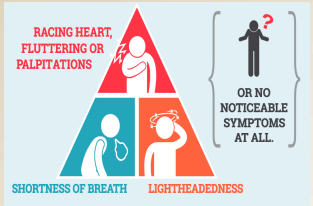

Figure 2. Representation of signs and symptoms of Afib (heart.org, 2018).

Signs and Symptoms

- Irregular and rapid heartbeat
- Heart palpitations or rapid thumping inside the chest
- Dizziness, sweating and chest pain or pressure
- Shortness of breath
- Tiring more easily
- Fainting (syncope)
- Can be asymptomatic

Risk Factors

- Prior heart attack or heart disease
- High blood pressure
- Diabetes
- Sleep Apnea
- Excessive alcohol, smoking, stress

CHA2DS 2-VASc Score and Risk Criteria

Congestive heart failure	1 point
Hypertension	1 point
Age ≥75 years	2 points
Diabetes mellitus	1 point
Stroke/TIA/Thromboembolic event	2 points
Vascular disease (MI, PAS, or aortic plaque)	1 point
Age 65 to 74 years	1 point
Sex category (i.e. female sex)	1 point

Figure 3. Scoring system to determine risk of clot formation with Afib (Emedicine, 2018)

Pathophysiology

- The heart's natural pacemaker is the sinus node (SN). SN makes electrical signals, which cause the heart to contract and pump blood (Heart.org, 2018). Unlike other cells, cardiac cells are capable of self-stimulation (Cutugno, 2015).
- In AFib, multiple atrial cells self-stimulate, behaving as individual pacemakers and competing with the SN for control of cardiac activity. Afib is a random electrical activity, where multiple atrial cells self-stimulate, behaving as individual pacemakers and compete with the SN for control of cardiac activity (Cutungo, 2015).
- Normal atrial contractions are replaced by rapid quivering movements and the atria stop contracting effectively (Cutungo, 2015). When the atria quiver, blood pools in the atria. Pooling of blood in atria can cause blood clots (Heart.org, 2018).

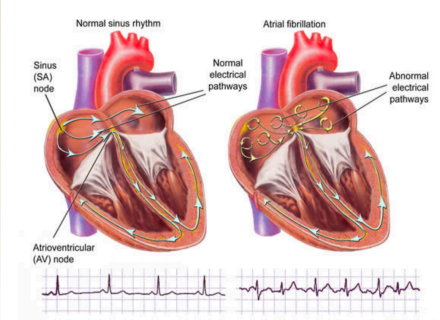

Figure 4. Normal heart compared to heart in Afib (Holdright, 2010).

Significance of Pathophysiology of Afib

- Afib predisposes a patient to develop blood clots (Heart.org, 2018). Because Afib causes a lack of coordinated atrial contractions, it can result in one of the most common complications of atrial fibrillation, thrombi formation (Cutugno, 2015).
- The formation of thrombi on the atrial walls and within the left atrial appendage (LAA) occurs when ineffective emptying allows blood to pool in these chambers. Commonly referred to as mural thrombi, these clots can dislodge and cause strokes and other systemic thrombi (Cutugno, 2015).
- Blood clots can then dislodge and travel to the brain to cause a stroke (Spivak, 2015). Numerous large, randomized studies have shown that anticoagulation reduces the risk of stroke by about two-thirds in patients with Afib (Hagerty and Rich, 2017).
- Patients with Afib are often prescribed anticoagulation to decrease risk of blood clots (Spivak 2015). Patients at risk for bleeding may be too high risk to be on anticoagulation. Other options need assessed for high risk bleeding and high CHA2DS2-Vasc score.

Implications for Nursing Care

- Educate patients and family members on the risk factors and sign and symptoms of Afib.
- Recognize patients at increased risk for stroke from Afib through use of the CHA2DS-2-Vasc score for indications of AC.
- Recognize patients at risk for bleeding (e.g. patients at risk for falls) with use of the HAS-BLED score.
- Know alternative options for those at risk of falls or bleeding such as a LAAC (e.g. Watchman device).
- Educate patients and family members to develop a collaborative healthcare plan.
- Current guidelines primarily support the use of AC in patients to prevent thromboembolism and control symptoms in the high risk patient with Afib. Guidelines also stress the importance of patient adherence to treatment plans in achieving improved outcomes. There is evidence that nursing interventions in patient education and in care coordination, can improve patient outcomes and decrease costs (Cutugno, 2015).
- In considering the patient presented, the 79 year old female with HTN has a CHA2DS 2-VASc score of 4, increasing her risk of stroke. Because she has a score of > 2, the patient is a candidate for AC. The patient admits to falling. This places her at an increase risk of bleeding per the HAS-BLED score, if AC is initiated. A plan of care should be developed with the patient's family weighing her risk of stroke versus risk of bleeding with providing potential alternatives with a LAAC device.

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Conclusion

- Balancing the risk of stroke against the risk of bleeding related to falls Is a commonly encountered conundrum in older patients with Afib (Hagerty and Rich, 2017).
- People with untreated or undertreated atrial fibrillation are at high risk for thromboembolism; to lower that risk, anticoagulation therapy is recommended. This increases the risk of bleeding complications and a potentially devastating outcome. Risk stratification for both stroke and bleeding can help guide informed decision making (Cutugno, 2015).
- CHA2DS-VASc Score is a convenient tool for stratifying risk in patients with Afib and determining the need for AC (Spivak, 2015).
- If it is determined that patients are high risk for bleeding, such as the elderly at risk for falls, then an alternative form of treatment may be chosen if desired after proper education. The LAAC is an emerging device that will block off the left atrial appendage and decrease the risk of clot formation from Afib (Reddy et al, 2018).
- Because there is such a high risk of developing a blood clot in the patient with AF, anticoagulation is the most common course of treatment. When the risk of bleeding outweighs the benefit of oral anticoagulation, the nurse practitioner will need to look at alternative treatment, for left atrial appendage closure (Reddy et al, 2018).

Picture retrieved from Heart.org, 2018.

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