Focal Atrial Tachycardia

Background
1. Definition: A type of atrial tachycardia
   o Regular rhythm
   o Constant rate of >100 beats/min originating outside of sinus node
   o Considered form of supraventricular tachycardia (SVT) with increased automaticity
   ▪ Etiology in 10% of cases of SVT
   o Relatively uncommon
   o Can be difficult to treat medically
   ▪ Long term success with catheter ablation

Pathophysiology
1. Pathology of Disease
   o Type of SVT with generalized increased automaticity.\(^1,2\)
   o Arises from **single** site within left or right atrium
   ▪ Atrial flutter and atrial fibrillation involve **multiple** sites or larger circuits.\(^1,2\)
   o Common locations: adjacent to crista terminalis in right atrium or ostia of pulmonary veins in left atrium.\(^1,2\)

2. Incidence, Prevalence
   o SVT Incidence – 35/100,000 (not including atrial fibrillation/flutter, and multifocal AT).
   o SVT Prevalence – 2.29/1,000\(^11\)
   ▪ 50-60% is AVNRT (Atrioventricular Nodal Re-entrant Tachycardia)
   ▪ In children, AVRT (Atrioventricular Re-entrant Tachycardia) most common\(^12\)

Diagnostics
1. History
   o Usually asymptomatic or minimally symptomatic
   o Common:
   ▪ Chest discomfort/ pressure, dyspnea, fatigue, dizziness, palpitations\(^1,2\)
   o Uncommon:
   ▪ Severe chest pain, diaphoresis, nausea, syncope
   o Early childhood onset
   o Triggers:
   ▪ Caffeine, stress, lack of sleep, febrile illness.\(^1,2\)

2. Physical Examination
   o Check for murmur
   ▪ Congenital or acquired anomalies can cause focal atrial tachycardia
   ▪ If murmur present, consider ECHO
   o Hemodynamic instability or febrile illness\(^1,3\)
   o Orthostatic blood pressure\(^1,2\)
3. Diagnostic Testing
   - Electrocardiogram:
     - Long RP interval most common
     - P-wave shape/polarity variable
4. Laboratory evaluation
   - Check for other causes:
     - Complete Blood Count: anemia, infection.
     - Thyroid Stimulating Hormone: hyperthyroidism
     - Basic Metabolic Panel: electrolyte imbalance
     - B-type Natriuretic Peptide: congestive heart failure
     - Cardiac enzymes: myocardial ischemia/infarction
5. Diagnostic imaging
   - Chest X-Ray: congestive heart disease or pulmonary pathology
   - Holter monitor or Event recorder: capture aberrant rhythm, frequency, duration to determine type of tachyarrhythmia
   - Graded exercise test: pre-excitation or aberrant rhythm determines type of tachyarrhythmia
   - Echocardiography: structural or valvular disease evaluate for structural causes and possible surgical intervention.

Differential Diagnosis
1. Atrial flutter
2. Multi-Focal Atrial Tachycardia
3. AVNRT
4. AVRT
5. Ventricular Tachycardia
6. Wolf-Parkinson-White Syndrome

Therapeutics
1. Acute Treatment
   - Maneuvers to increase vagal tone, decrease heart rate such as carotid sinus massage
   - Pharmacologic management: intravenous adenosine or verapamil.
     - Recent reviews show calcium channel blockers have slightly higher conversion rate.
     - Adenosine has overall conversion rate of 60-80% at 6mg dose, and up to 90% with subsequent 12mg dose
     - Calcium channel blocker infusion has shown over 95% conversion rate.
   - If hemodynamically unstable, electrocardioversion.
2. Long-Term Care
   - Treatment based on multiple factors:
     - Frequency and intensity of episodes
     - Overall impact on quality of life
     - Risks of chosen therapy
     - Discussion of these issues with the patient to determine the optimal treatment strategy.
• If symptoms are infrequent without severe detrimental effect:
  • Continue vagal maneuvers or rescue medication for episodic symptoms.
• If symptoms are frequently persistent and/or intensify:
  • Prophylactic treatment with beta blockers, verapamil, diltiazem, digoxin, or combination.
• Consider electrophysiologic testing and catheter ablation as cure.6,7

3. Indications for Cardiology/Electrophysiology referral:
   o Symptoms not controlled by medications
   o Medications not tolerated
   o Worsening symptoms
   o Hemodynamic instability
   o High-risk occupation (pilot, truck driver, heavy equipment operator) or recreational activities (rock climbing, sky or scuba diving)
   o Clinical judgment of primary care physician (PCP)
   o Pre-excitation present on electrocardiography (ECG), or atrioventricular reciprocating tachycardia suspected
   o Supraventricular tachycardia accompanied by syncope
   o Wide QRS complex present on ECG

4. Further Recommendations14
   o Intravenous adenosine or verapamil safe and effective treatment choices for terminating SVT
     • Verapamil more effective for rhythm suppression over time. (SOR:B)3,4
   o Radiofrequency ablation safe, effective, and cost-effective method for suppressing SVT
     • Improves patient quality of life compared with medical treatment of SVT. (SOR:B)3,7
   o Vagal maneuvers effective first-line treatment option for SVT in younger patients who are hemodynamically stable
     • Can also be diagnostic for nodal-dependent SVT. (SOR:C)3
   o Adenosine may be used as diagnostic or therapeutic agent in patients with undifferentiated wide complex tachycardia. (SOR:C)10

Prognosis
1. Radiofrequency catheter ablation: experienced electrophysiology laboratories routinely achieve success rates of 95 percent in the ablation of accessory pathways
   o Recurrence rates of less than 5 percent8
   o Current rate of symptomatic heart block 0.5 to 1 percent.9

Follow-up
1. Regular annual follow-up with primary care physician or cardiologist depending on symptoms and severity.3,4
2. Any interval changes or new development of symptoms should see primary care physician with referral to cardiology.3,4,13
Patient Education

1. Monitor symptoms,\textsuperscript{3,4,13}
2. Pregnancy - premature atrial beats common (50%) during pregnancy; usually asymptomatic and resolves on own.
   - Sustained arrhythmia requires cardiology investigation and medication
   - Treatment should be decided depending on pregnancy effect risks and benefits.\textsuperscript{4}
3. Congenital heart disease increases chance of developing SVT.
4. Quality of life - ablation has shown to improve quality of life and cost effective compare to other treatment.

References

1. Marchlinski F. The Tachyarrhythmias. Harrison’s Online Principles of Internal Medicine, 18e. Chapter 233.


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