

- Postop, including ICP due to loss autoregulation
- Delayed awakening, especially with depressed consciousness preop
- Postexcision brain swelling; seizures
- Postop arterial Htn/bleeding
- Postop endocrine problems, diabetes insipidus

Awake Craniotomy

- Awake craniotomy with mapping to remove tumors near motor strip or speech centers

- Good communication
- Controlled sedation, short-acting medications, and LMA for lost airway
- Scalp blocks, one side, bilateral, long-acting medication, pins sites, specific scalp nerves, ring block, and possible high doses
- Methods: Awake, sedated/awake/sedated, asleep/awake/sedated

- Mapping: Speech, reading, counting, motor, observed movements or EMG, sensory

Complications

- Seizures, cold irrigation, short-acting medications
- Vomiting, hypoxemia, respiratory depression
- Air embolism
- Nose itching, dry mouth, and urinary urgency (males)

Supraventricular Tachycardia (Tachyarrhythmias)

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Risk

- SVT is associated with advancing age and significant cardiac and pulm disease.
- PSVT is associated with WPW, congenital heart disease, and mitral valve prolapse. It is more common in younger pts. The mechanism is reentrant in nature.
- AAT may be automatic, triggered, or reentrant. It is seen more commonly in children and those with a Hx of prior atrial surgery. It is rare in adults, although it can be associated with digitalis toxicity and hypokalemia.
- MAT is seen in adult pts with critical illness or advanced pulm disease.

Perioperative Risks

- Myocardial ischemia associated with tachycardia and resulting coronary insufficiency.
- Circulatory compromise.
- Increased risk of atrial thrombus.
- Chronic sustained tachycardia can result in irreversible cardiomyopathy.

Worry About

- Lyte and acid-base balance (K⁺, Mg, alkalosis)
- Digitalis toxicity

Overview

- Tachycardia (HR >100 in adults) with origin above the bundle of His in sinus node, atrial, or junctional tissue. It may be reentrant, automatic, or triggered in origin.
- SVT may be paroxysmal (PSVT) or gradual in onset (sinus tachycardia, atrial tachycardia, or multifocal atrial tachycardia). Tachycardia mechanisms vary (reentrant vs. triggered and automatic); treatment varies accordingly.
- PSVT is a reentrant arrhythmia usually seen more commonly in children. The reentrant circuit usually involves an accessory conducting pathway and the AV node.
- AAT is more commonly seen in the pediatric population owing to the enhanced automaticity seen in children.

Etiology

- PSVT is due to reentry, which generally involves the AV node and an accessory pathway. Accessory pathways are relatively common in children. It is also assoc with WPW and LGL.

- AAT is much more common in children and thought to stem from areas of enhanced automaticity of sites, which are usually found at the mouth of either atrial appendage, the orifices of the pulm veins, or the crista terminalis.

Usual Treatment

- PSVT: Drugs, which alter the refractoriness of tissue within the reentrant circuit, may terminate tachycardia. Adenosine delivered by IV push is commonly used to terminate tachycardias. Other agents that may be used include procainamide, propafenone, amiodarone, sotalol, esmolol, and verapamil.
- PSVT may also be terminated by cardioversion or rapid atrial pacing; includes placement of a pacemaker.
- AAT may be treated using amiodarone, sotalol, flecainide, or beta blockers.
- MAT may be managed using beta blockers or calcium-channel blockers to slow the ventricular rate and improve cardiac function. Underlying cardiopulmonary disease must be addressed as well.
- Consider cath ablation in recurrent symptomatic conditions.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
CV	Arrhythmia LV function Ischemia	Palpitations, presyncope or syncope, angina, dyspnea Failure to thrive (pediatrics) CHF, exercise intolerance Angina	Regular (PSVT, AAT) or irregular pulse (MAT) Signs of CHF (S ₃ , rales, edema, wheezing) Diaphoresis	ECG, Holter, EP study CXR, ECHO Angiogram Scintigram
RESP	CHF, COPD	Dyspnea, orthopnea, cough	S ₃ , rales, wheezing	CXR, PFTs
GI	Hypoperfusion	Abdominal discomfort, diarrhea		
RENAL	Hypoperfusion	Oliguria, polyuria	UO	BUN/Cr, FENa

Key References: Thompson A, Balsler JR: Perioperative cardiac arrhythmias. *Br J Anaesth* 93(1):86–94, 2004; Price A, Santucci P: Electrophysiology procedures: weighing the factors affecting choice of anesthesia. *Semin Cardiothorac Vasc Anesth* 17(3):203–211, 2013; Page RL, Joglar JA, Caldwell MA, et al: 2015 ACC/AHA/HRS guideline for the management of adult patients with supraventricular tachycardia: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *Circulation* 133(14):e506–e574, 2016.

Perioperative Implications

Preoperative Preparation

- PSVT: Adenosine, esmolol, and amiodarone should be available.
- AAT: Check and optimize electrolyte (K⁺, Mg) and acid-base status. Rule out digitalis toxicity.
- MAT: Optimize status of various organ systems including cardiac, pulm, renal, and metabolic.
- Check pacemaker function.

Monitoring

- ECG, ST-segment analysis.
- Ability to monitor pacemaker if appropriate.
- Consider arterial pressure or PAC monitoring depending on anticipated case and pt status.

Induction

- In the setting of LV dysfunction or cardiomyopathy, aim for hemodynamically stable induction.

- AAT and MAT: Use caution with medications or situations that increase pt's heart rate (ketamine, pancuronium, desflurane, beta agonists, light anesthesia).

Maintenance

- Volatile agents with the possible exception of desflurane are not thought to increase the incidence of PSVT, AAT, or MAT.
- Prophylactic beta blockade may be useful intraop if the pt is able to tolerate it.

Extubation

- Avoid excessive sympathetic stimulation around the time of extubation because this increases the incidence of tachyarrhythmias. Strategies aimed at mitigating airway stimulation and hyperdynamic circulation are helpful in this regard.

Adjuvants

- Avoid use of beta agonists and histamine-releasing drugs if at all possible

Postoperative Period

- Ensure adequate sedation and pain control.
- Use of beta blockers as tolerated will reduce incidence of MAT and AAT postop.
- Optimize cardiopulmonary and metabolic status.

Anticipated Problems/Concerns

- PSVT: Be prepared to treat atrial fibrillation/flutter with rapid ventricular rate or ventricular fibrillation with cardioversion and/or defibrillation, particularly in pts with WPW or LGL.
- Cardioversion of AAT or MAT may result in life-threatening arrhythmias.