Fetal Counseling Provider Information
Last Updated: 09/15/2020
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DIAGNOSIS

Supraventricular Tachycardia

Supraventricular tachycardia (SVT) is an abnormal fast heart rhythm, usually with rates greater than 200 bpm and with little variability in ventricular rate.

Incidence

- SVT affects 0.5% pregnancies, and is an important cause of in utero cardiomyopathy, cardiac failure, hydrops fetalis, premature delivery, and fetal demise.
- May be ***INTERMITTENT*** (less than 50% of the time) or ***SUSTAINED*** (present greater than 50% of the time or uninterrupted for a period of 12 hours or more).
    - Sustained tachycardia may be associated with hydrops and in utero demise.

Subtypes

A. *Short VA tachycardia/reentrant SVT (most common)*

Characteristics:

- Onset typically 24-32 weeks gestation
- Long AV and short VA intervals (VA interval <1/2 of the VV interval)
- Rate ≥ 180 bpm (210-320 bpm); sudden onset and termination
- 1:1 atrioventricular (AV) conduction; AV node is part of the arrhythmia circuit and tachycardia
- Usually terminates with a non-conducted atrial beat

Differential diagnosis:

- Atrioventricular reciprocating tachycardia/orthodromic reciprocating tachycardia (AVRT/ORT)
- Atrioventricular nodal reentrant tachycardia (AVNRT)

B. *Long VA tachycardia*

Characteristics:

- Short AV and long VA intervals (VA interval >1/2 of the VV interval)
- AV node is NOT part of the circuit and tachycardia
- usually terminates with a ventricular beat

Differential diagnosis:

- Ectopic atrial tachycardia (EAT)
    - Rates ≥ 170 bpm with 1:1 or variable conduction; usually <200 bpm
    - May see gradual increase/decrease in rate at onset and termination of tachycardia
- Permanent junctional reciprocating tachycardia (PJRT)
    - Rates ≥170 bpm with 1:1 atrioventricular conduction.

C. *Atrial Flutter*

- Onset usually >28 weeks gestation
- Atrial rates >300 bpm with variable AV conduction (usually 2:1, range 1:1 to 4:1)
- Ventricular rates usually 180-220 bpm

- Can be associated with reentrant SVT/accessory pathways, myocarditis, congenital heart disease, or autoimmune-mediated (anti-Ro/SSA) carditis

D. *Differential Diagnosis*
- Sinus tachycardia due to maternal disease states (thyrotoxicosis), infection (myocarditis, chorioamnionitis), maternal stimulant use, fetal anemia
- Other arrhythmias (ventricular tachycardia, junctional ectopic tachycardia)

Fetal Imaging Predictors of Postnatal Interventions/Outcomes

METHODS OF RHYTHM ASSESSMENT REQUIRE EVALUATION OF:
- Atrial and ventricular rates
- Relationship between atrial and ventricular contractions (1:1, 2:1, 3:1…); VA and AV intervals
- Onset and termination of tachycardia
- Fetal compensation

TOOLS IN RHYTHM ASSESSMENT:
- Simultaneous inflow-outflow pulse wave Dopplers (mitral valve inflow/aortic valve outflow)
- Simultaneous M-mode through an atrium and a ventricle (right atrium/left ventricle)
- Color M-mode optimizing atrial signals and substituting color flow mapping for outflow signals
- Simultaneous venous and arterial pulse wave Dopplers (SVC-aorta, innominate vein-transverse aorta, pulmonary vein-pulmonary artery); the venous reverse *a* wave should remain visible regardless of fetal heart rate and allow assessment of VA and AV intervals
- Hepatic venous Doppler signals allow confirmation of atrial rates (regular or irregular atrial rates) but not of atrioventricular relationships

Available Fetal Interventions

Management of fetal tachycardia is currently the subject of an international, multicenter, randomized control trial: Fetal Atrial Flutter & Supraventricular Tachycardia (FAST) Therapy Trial. Whether to undertake transplacental medical therapy and what therapy to use currently varies among centers and may be based on gestational age, tachycardia rate and mechanism, whether tachycardia is sustained or intermittent, whether there is evidence of fetal hydrops or ventricular dysfunction, and maternal risk factors.

Many recommend starting therapy in the hospital to allow serial monitoring of maternal well-being, serum electrolytes, cardiac rhythm, and EKG and to allow monitoring of fetal well-being with heart rate monitoring, frequent BPPs, Doppler, and ultrasound.
Consider obtaining the following maternal baseline labs prior to antiarrhythmic treatment:
- BMP with magnesium and calcium
- TSH/fT4; 25(OH)
- Vitamin D levels—low levels can contribute to QTc prolongation

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Intermittent SVT without hydrops or incessant/sustained SVT <200 bpm without hydrops or ventricular dysfunction

- Observe without therapy but with at least weekly fetal heart rate monitoring; also consider home fetal heart rate monitoring

Sustained SVT (≥ 200 bpm) with/without hydrops or intermittent SVT with hydrops or ventricular dysfunction: >36 weeks EGA→deliver <36 weeks EGA→drug therapy

Antiarrhythmic Choice Based on SVT Type:

Short VA Tachycardia: Digoxin or Flecainide

Long VA Tachycardia: Flecainide or Sotalol

Atrial Flutter: Sotalol or Digoxin

**In the setting of hydrops, consider combination therapy: Digoxin + Sotalol OR Digoxin + Flecainide.

Antiarrhythmic Drugs—Doses and Monitoring:

1. **Digoxin**
   - Oral loading dose: 375 micrograms po q8 x 3 doses (or 500 micrograms po bid x 4 doses)
   - Oral maintenance dose: 250-500 micrograms po bid
   - Goal drug level: 1.5-2.5 ng/mL
   - Common side effects: nausea, vomiting, fatigue, blurred vision, sinus bradycardia, 1st/2nd degree AV block, nocturnal Wenckebach
2. **Flecainide**
   a. 300 mg/day (range 200-400 mg/day) divided in 2 or 3 doses
   b. Goal drug level: 0.4-1 µg/mL
   c. Check a trough prior to the 4th new dose; follow daily EKGs in the hospital
   d. Side effects: headache, dizziness, visual disturbances, fetal demise, QT prolongation, IVCD/bundle branch block, 1st degree AV block
   e. If using a combination of digoxin and flecainide, decrease digoxin dose by 50%
3. **Sotalol**
   a. 80-120 mg bid (range 80-320 mg/day; max dose 480 mg/day—160 mg tid)
   b. Common side effects: nausea, dizziness, fatigue, hypotension, bradycardia, QRS widening (IVCD), QT prolongation, 1st degree AV block
   c. Fetal/neonatal side effects: hypoglycemia, IUGR, small placenta, neonatal bradycardia and respiratory distress
   d. Discontinue other QTc-prolonging drugs, such as antiemetics

Prognosis

SURVIVAL

- Non-sustained SVT is generally excellent

- Sustained SVT may be associated with fetal demise
    - With hydrops, has a mortality rate as high as 30%

POSTNATAL OUTCOMES

- About 50% of infants who have fetal SVT do not require antiarrhythmic treatment postnatally and even more outgrow their need for medications by 1 year of age

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