Efficacy of slow infusion CCB v adenosine in treatment of SVT in the ED

Clinical Bottom Line
It would be reasonable to consider the use of CCBs in appropriate patients in SVT (those whom are hemodynamically stable, not on beta blockers and without a history of CHF) in lieu of adenosine for termination of SVT.

PICO question
P - Patients who presented to the ED with stable SVT
I - Slow infusion CCB (Verapamil or diltiazem)
C - Rapd bolus adenosine
O - Termination of SVT and Blood Pressure (more specifically, do the medications cause a drop in blood pressure?)

Background
SVT is a common tachydysrhythmia seen in the Emergency Department. The AHA guidelines currently recommend adenosine as first line treatment in stable SVT due to its hemodynamic stability. However adenosine administration is often accompanied with significant discomfort (i.e. chest pain, shortness of breath, flushing, etc). Rapid bolus CCBs had previously been first line agents for stable SVT but fell out of favor due to its associated hypotension. Recent studies have shown that a slow infusion of CCBs has equivocal conversion success rates without the associated hypotension. With that in mind, should slow infusion CCBs be considered an alternative treatment to adenosine for stable SVT? We explore two studies which compare the efficacy and safety of adenosine v slow-infusion CCBs in the treatment of stable SVT to help guide us in this topic.

Trial 1

Lim, S.h., et al. “Slow infusion of calcium channel blockers compared with intravenous adenosine in the emergency treatment of supraventricular tachycardia.” Resuscitation, vol 80, no. 5, 2009, pp 523-528


Validity Rating: Low risk of Bias

The Basics:
Prospective, RCT which studied 206 patients who presented to ED with stable SVT. Patient’s had EKG diagnosis of SVT and had not converted with vagal maneuvers or carotid massage. Patients divided into 4 treatment arms listed below. If SVT had not converted at the end of the protocol, synchronized cardioversion performed if unstable or further pharmacotherapy at the discretion of the treating physician was pursued.
UAMS Journal Club Summary
November 2017
Drs Baker and Pampolina
Faculty Advisor: Dr. C Eastin

1. Verapamil infusion → Adenosine
2. Diltiazem infusion → Adenosine
3. Adenosine → Verapamil infusion
4. Adenosine → Diltiazem infusion

Exclusion Criteria:
1. Patients with signs of impaired cerebral perfusion (i.e. altered mental status) or acute pulmonary edema
2. Patients with later diagnosis of arrhythmias other than SVT
3. Pregnancy by history

Primary Outcomes:
1. Conversion of SVT
2. Blood Pressure (Did intervention cause a drop in blood pressure? If so, how many were hypotensive?)

Secondary Outcomes:
1. Recurrence of SVT

Follow Up:
After successful conversion, patients monitored for the next 30 minutes (VS measured at 1 min, 5 min, 10 min, 15 min, and 30 minutes). If remained stable, monitored for 2 hours in the ED under telemetry. If recurrence, patients treated under physician discretion. If no recurrence within the 2 hour period, patients were discharged home with 1 week Cardiology Clinic follow-up. Cardiology follow-up records reviewed for a 1 year period.

Results:
The CCBs were statistically better than adenosine at converting patients back to normal sinus rhythm (98% v 86.5%, p = 0.002, rR 1.13, 95% CI 1.04-1.23).

The initial mean change in blood pressure after conversion in the CCB group was -13.0/-8.1 (Verapamil) and -7.0/-9.4 (diltiazem) and 2.6/-1.7 for adenosine. In majority of cases, drop in blood pressure was transient. Only one patient in the CCB group developed hypotension, and none in the adenosine group.

Limitations/Bias:
1. Excludes unstable SVT (though these patients should be treated with synchronized cardioversion initially)
2. Examiners not blinded (difficult to do given side effects of adenosine)
3. Single center study performed in Singapore with small study population [n = 206] (how applicable are these results to our population? Limited information listed on demographics table)
4. Did not measure patient satisfaction after conversion (would patients prefer side effects of adenosine to length of time it took to convert to NSR with CCBs)

**Trial 2**


**Validity Rating:**
Valid, blinding would be difficult

**The Basics:**
Standard Cochrane methodological procedures were used to collect data. Seven RCTs with 622 participants were included. Several studies included used adenosine versus diltiazem, and others utilized adenosine versus verapamil (some slow infusion, some bolused).

**Exclusion Criteria:**
Most studies excluded patients < 18 while one study included participants > 10 years old. Hemodynamic instability was a universal exclusion criteria (in all studies that reported exclusion criteria).

**Primary Outcomes:**
1. Rate of reversion to sinus rhythm
2. Major adverse effects of adenosine and CCBs (cardiac arrest, prolonged hypotension)

**Secondary Outcomes:**
1. Time to reversion to sinus rhythm
2. Rate of relapse to SVT within 2 hours
3. Minor adverse events

**Follow Up:**
Varied between the studies

**Results:**
No difference in effects of adenosine and CCBs for SVT treatment on reverting to sinus rhythm, based on moderate quality evidence (89.7% vs 92.9%; OR 1.51, 95% confidence interval (CI) 0.85 to 2.68). No appreciable differences in hypotension incidence based on low quality evidence (0.66% vs 0%; OR 3.09, 95% CI 0.12 to 76.71).
Limitations/Bias:

1. No studies reported blinding of participants, caregivers, nor investigators.
2. Patient satisfaction and hospital length of stay were not reported in the studies.