Intravenous Diltiazem for Supraventricular Tachycardia

Success of CCBs versus adenosine for chemical conversion of supraventricular tachycardia

Marissa Antoniuk, MD
Department of Emergency Medicine, Max Rady College of Medicine, University of Manitoba, Winnipeg, Manitoba

INTRODUCTION
Paroxysmal supraventricular tachycardias (SVTs) affect all age groups, including healthy patients without structural heart disease. SVT is a broad term used locally to refer to re-entrant tachycardias arising above Bundle of His, including atrioventricular nodal reentry tachycardia (AVNRT) and atrioventricular reentry tachycardia (AVRT).

Common precipitants are caffeine, alcohol, drugs and toxins, psychological stress, menstruation and pregnancy, and infections. Heart rates range from 160-220 beats per minute, with episodes lasting minutes to hours. These are generally non-life threatening. Cardioverting medications act by prolonging the refractory period in the antegrade limb of AV nodal reentry circuit. There are multiple agents available.

METHOD

Literature Search
- Publications accessed from MEDLINE and EMBASE during January to March 2023
- Filtered to last 15 years, English language, humans
- Terms included atrioventricular nodal reentry tachycardia, atrioventricular-nodal-reentry tachycardia, as well as the acronyms SVT, PSVT, and AVNRT
- Diltiazem and adenosine as the intervention and comparison, respectively
- Difficult to exclude articles which included verapamil as an intervention

RESULTS

Search Results
One hundred fifty two publications were identified through database searches, with 4 found by other means. After screening and removal of duplicates, 22 publications remained for full text review. Ultimately, 20 publications were included for qualitative analysis and narrative review. Final publications included traditional reviews, observational studies, randomized controlled trials, systematic reviews, meta-analyses, and national/international practice guidelines.

Conversion Rates
There is varying data from multiple publications. Traditional reviews cite that an initial adenosine 6mg dose has successful conversion around 55-57%, and a follow-up dose of 12mg can have 93%. European guidelines cite greater than 90% overall.

There are multiple dosing strategies when administering IV diltiazem, but generally boluses of 15-20mg over 2 min have 71.4-90% success. An infusion rate of 2.5mg/min IV up to 50mg has approximately 98% success. European practice guidelines state success rates anywhere from 64-98%.

Safety and Side Effect Profiles
Calcium channel blockers can cause profound hypotension due to their vasodilatory action, with verapamil having higher reported rates than diltiazem. Patients do not usually report negative side effects while receiving the medication.

Adenosine can safely be used in patients with left ventricular dysfunction and/or structural heart disease but should be used cautiously in patients with severe reactive airway disease as it can potentiate acute bronchospasm.

Practice Applications
Adenosine is more commonly used by Winnipeg emergency physicians for conversion of SVT. There are resource barriers as policy states that physicians must be present while the medication is pushed, and patients must have cardiac monitoring and electrode pads on their chests. Administering intravenous diltiazem does not require physician supervision or defibrillators in place.

Shared decision making can occur with patients at the bedside based on their co-morbidities and comfort levels with each medication.

Adenosine can lead to avoidance when patients are in acute SVT because of the uncomfortable and undesirable feeling after administration. Diltiazem and verapamil do not have many reports of patient dissatisfaction in the current literature. This may be an area of further research.

CONCLUSION
There is no statistically significant difference between adenosine and diltiazem when achieving successful rates of cardioversion. Results should be taken into consideration by physicians, and allow for patient-centred care when considering safety and effect profiles.

REFERENCES