

Paramedic – Evidence Based Medicine (P-EBP) Program

Paramedic CAT (Critically Appraised Topic) Worksheet

Title: Intravenous adenosine versus intravenous calcium channel antagonist for the treatment of supraventricular tachycardia

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Clinical Scenario:

A 33 yo female is found unresponsive following an episode of chest discomfort, palpitations and shortness of breath. Attending paramedics discover the patient is in supraventricular tachycardia (SVT) and begin administering general standards of care. History gathered from a family member reveals the patient had been experiencing symptoms for approximately 4 hours prior to becoming unresponsive but refused to call EMS, citing fear of receiving treatment with adenosine and hopes that symptoms would naturally resolve, as they had in the past. Considering the adverse effects of adenosine administration is the administration of an intravenous bolus of a calcium channel blocker as effective in converting SVT to sinus rhythm?

PICO (Population-Intervention-Comparison-Outcome) Question:

In patients who experience episodes of supraventricular tachycardia is the administration of adenosine as effective when compared to the administration of a calcium channel antagonist in converting SVT to sinus rhythm?

Search Strategy:

(adenosine) and (versus) and (calcium channel blockers) and (supraventricular tachycardia)

Search Outcome:

108 search results

Relevant Papers:

Author, Date	Population: Sample Characteristics	Design (LOE)	Outcomes	Results	Strengths/Weaknesses
Alabed 2017	<p>Patients with supraventricular tachycardia</p> <p>622 subjects in 7 trials</p>	<p>A systematic review of 7 randomized control trials</p> <p>The review contained trials with level 2 and level 3 evidence</p>	<p><u>Primary:</u> Reversion to sinus rhythm</p> <p>Major adverse effects (cardiac arrest, prolonged hypotension, symptomatic bradycardia, acute cardiac failure)</p> <p><u>Secondary:</u> Time to conversion</p> <p>Rate of relapse to SVT within two hours</p> <p>Length of stay in hospital</p> <p>Minor adverse events (defined as any reported adverse events other than those defined above)</p> <p>Patient satisfaction as measured on any validated scale</p> <p>https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD005154.pub4/full#CD005154</p>	<p>Moderate-quality evidence shows no differences in the number of people reverting to sinus rhythm who were treated with adenosine or CCA (89.7% vs 92.9%; OR 1.51, 95% confidence interval (CI) 0.85 to 2.68; participants = 622; studies = 7; I2 = 36%).</p> <p>Low-quality evidence suggests no appreciable differences in major adverse event rates between CCAs and adenosine. Researchers reported only one case of hypotension in the CCA group and none in the adenosine group (0.66% vs 0%; OR 3.09, 95% CI 0.12 to 76.71; participants = 306; studies = 3; I2 = 0%).</p> <p>https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD005154.pub4/full#CD005154-sec1-0005</p>	<p>Heterogeneity of 36%</p> <p>Low risk of selection bias due to random sequence generation and allocation concealment</p> <p>Low risk of reporting bias due to selective reporting</p> <p>Review does not account for the length of stay in hospital or patient satisfaction</p> <p>High risk of performance bias due to lack of blinding of participants and practitioners</p> <p>High risk of detection bias due to lack of blinding of the assessment outcome</p>

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Lim 2009	Patients with spontaneous Supraventricular Tachycardia	RCT	Reversion to sinus rhythm	<p>A total of 206 patients with spontaneous SVT were analysed. Of these, 102 were administered calcium channel blockers (verapamil=48, diltiazem=54) and 104 were given adenosine. The conversion rates for the calcium channel blockers (98%) were statistically higher than the adenosine group (86.5%), p=0.002, RR 1.13, 95% CI 1.04-1.23. The initial mean change in blood pressure post-conversion in the calcium channel blocker group was -13.0/-8.1 mmHg (verapamil) and -7.0/-9.4 mmHg (diltiazem) and 2.6/-1.7 mmHg for adenosine. Only one patient in the calcium channel group (0.98%) (95% CI 0.025-5.3) developed hypotension, and none in the adenosine group.</p> <p>https://www.ncbi.nlm.nih.gov/pubmed/19261367</p>	Prospective RCT No assessment of patient satisfaction was provided

Comments:

The review found no appreciable evidence of differences in the efficacy of adenosine and CCB's for converting SVT, while the study by Lim et al found that conversion rates were statistically higher when CCB's were administered . The results from the review are based on moderate-quality evidence. Adenosine was

found to convert the SVT faster but was found to induce more frequent minor adverse effects such as chest pain. Adenosine appears to be more appropriate in unstable patients in whom an immediate intervention is required. As unstable patients are treated with electrical cardioversion prehospitally, this becomes an irrelevant finding. Calcium channel antagonists are recommended in patients where a slight delay in treatment is not likely to result in negative outcomes and in patients who have received adenosine in the past and have had a distressing experience. CCB's did, however, produce one episode of clinically significant hypotension while adenosine produced none. The review also mentions that adenosine is relatively more expensive.

Consider:

As the studies failed to find data regarding length of hospital stay and patient satisfaction, it may be haphazard to change current prehospital administration guidelines. While the efficacy of the reviewed medications was found to be comparable, studies comparing patient experiences and adverse events are needed to fully determine whether one treatment is preferable in the management of SVT.

Clinical Bottom Line:

Current prehospital guidelines recommend adenosine as the first-line treatment for stable SVT however the systematic review could not confirm its superiority to calcium channel antagonists. The study by Lim et al did, however, find a statistical superiority in CCB administration.

References:

Alabed S, Sabouni A, Providencia R, Atallah E, Qintar M, Chico TJA. Adenosine versus intravenous calcium channel antagonists for supraventricular tachycardia. Cochrane Database of Systematic Reviews 2017, Issue 10. Art. No.: CD005154. DOI: 10.1002/14651858.CD005154.pub4.
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Lim S, Anantharaman V, Teo WS, Chan YH

Slow infusion of calcium channel blockers compared with intravenous adenosine in the emergency treatment of supraventricular tachycardia. US National Library of Medicine National Institutes of Health 2009. Slow infusion of calcium channel blockers compared with intravenous adenosine in the emergency treatment of supraventricular tachycardia Lim, S.H. et al. Resuscitation, Volume 80, Issue 5, 523 - 528

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