The relative efficacy of adenosine versus verapamil for the treatment of stable paroxysmal supraventricular tachycardia in adults: a meta-analysis

Delaney B, Loy J, Kelly AM

CRD summary
This review concluded that adenosine and verapamil had similar efficacy in treating paroxysmal supraventricular tachycardia. Adenosine had a higher rate of overall adverse events than verapamil but verapamil had a higher rate of hypertension. Conclusions on efficacy are likely to be reliable although generalisability is unclear; there is more uncertainty surrounding the adverse events, particularly for hypotension.

Authors' objectives
To assess the relative effectiveness of adenosine compared to verapamil for the treatment of stable paroxysmal supraventricular tachycardia in adults.

Searching
MEDLINE, EMBASE, CINAHL, Cochrane databases and clinical trial registers were searched from inception to April 2010. Search terms were specified. There were no language restrictions. Similar systematic reviews were searched and PubMed's related articles function were checked for all indexed eligible trials.

Study selection
Randomised controlled trials that enrolled adult patients with physician defined stable paroxysmal supraventricular tachycardia in an acute setting and compared parenterally administered adenosine (or adenosine compounds) with verapamil were eligible for inclusion. Only peer reviewed studies that presented rates of reversion were included. Rate of reversion to sinus rhythm was the primary outcome. Secondary outcomes included adverse events, time to reversion and effects of second line therapy.

Half of the studies used adenosine triphosphate and half used adenosine. Verapamil regimens ranged from 5mg to 20mg bolus over two to 15 minutes.

Two reviewers assessed study eligibility and resolved discrepancies by consensus or with reference to a third reviewer.

Assessment of study quality
The Jadad scale was used to assess the validity of included studies.

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Data extraction
Numbers of reversions and adverse events were tabulated to enable calculation of odds ratios (OR) and associated 95% confidence intervals (CI).

Two reviewers extracted data and resolved discrepancies by consensus or with reference to a third reviewer.

Methods of synthesis
Effects were pooled using Mantel-Haenszel random-effects meta-analysis. Heterogeneity was quantified using $I^2$ and $X^2$.

Results of the review
Eight trials (692 patients) were eligible. Trial quality appeared poor to moderate with a median Jadad score of 2 out of a possible 5.

There was no significant difference between adenosine and verapamil for conversion of supraventricular tachycardia (OR 1.27, 95% CI 0.63 to 2.57; eight trials). There was moderate heterogeneity ($I^2$= 26%).
The odds of reported adverse events were higher with adenosine than verapamil (OR 11.49, 95% CI 2.01 to 65.66) but the precision of the effect was low and heterogeneity was substantial ($I^2=88\%$). Hypotension was reported as a discrete adverse event in seven studies and was more prevalent in patients treated with verapamil (3.7\%) than adenosine (0.6\%). This difference was statistically significant ($p=0.016$).

Results were reported for other outcomes.

**Authors' conclusions**
Adenosine and verapamil had similar efficacy in treating paroxysmal supraventricular tachycardia. Adenosine had a higher rate of overall adverse events than verapamil but verapamil had a higher rate of hypotension.

**CRD commentary**
This review utilised appropriate methods to minimise bias in searching for studies and assessing their eligibility and validity. Data extraction was performed in duplicate (best practice). Methods of synthesis were appropriate but it was not clear why hypotension was not analysed as a meta-analysis with stratification by trial. Heterogeneity was moderate to substantial. The number of trials was limited. The generalisability of the results was difficult to assess, particularly with respect to adverse events. Limited reporting of patient characteristics and heterogeneity for dosing strategies added to this complexity. The internal validity of trial data resulted in some uncertainty.

Nonetheless, the conclusions reflect the evidence and appear to be reliable except for the increased rate of hypotension (which broke randomisation as it did not pool trial specific effects).

**Implications of the review for practice and research**

**Practice:** Decisions between the two agents should be made on a case by case basis and involve informed discussion with the patient where appropriate.

**Research:** The authors did not state any implications for research.

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