Meta-analysis of the differences in the time to onset of action between rocuronium and vecuronium

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CRD summary
This review found that the onset of action of rocuronium is at least 20 seconds and up to 70 seconds faster than vecuronium. Although the review was generally well conducted, limitations of the literature search and a failure to report adequate details of the included studies mean that the reliability of these conclusions is uncertain.

Authors' objectives
To determine the difference in onset of action between rocuronium and vecuronium.

Searching
PubMed (1966 to December 2003), EMBASE: Drugs and Pharmacology (1991 to 2003) and the Cochrane Library (Issue 4, 2003) were searched; the search terms were reported. No language restrictions were applied.

Study selection
Study designs of evaluations included in the review
Comparative studies were eligible for inclusion; further details on study design were not provided.

Specific interventions included in the review
Studies in which separate groups were given an intravenous bolus dose of rocuronium or vecuronium were eligible. Studies evaluating any other neuromuscular-blocking agents in addition to the two agents of interest were included if they also evaluated both these agents. The dose of rocuronium ranged from 300 to 1,200 microg/kg, while that of vecuronium ranged from 40 to 100 microg/kg.

Participants included in the review
Inclusion criteria were not defined in terms of the participants. The studies were conducted primarily adults, although studies with children and elderly patients were also included.

Outcomes assessed in the review
Studies in which the outcome of 'onset time' or 'time to onset of action' (T-max) for the two interventions was measured using electromyography, mechanomyography or acceleromyography at the adductor pollicis were eligible for inclusion. The definition of T-max as time to 90, 95 or 100% or maximum neuromuscular blockade, as defined by the included studies, was accepted. Studies in which a tourniquet was applied to one of the patient's arms were included if the outcome was assessed in the arm without any manipulation. Studies had to report means and standard deviations or errors to be included.

How were decisions on the relevance of primary studies made?
Three reviewers assessed studies for relevance. Any disagreements were resolved through consensus.

Assessment of study quality
One reviewer assessed the quality of the studies using the 3-item Jadad scale.

Data extraction
Two reviewers extracted data on T-max. The difference in T-max between the rocuronium and vecuronium groups, together with 95% confidence intervals (CIs), were calculated for each study.

Methods of synthesis
How were the studies combined?
A meta-analysis was conducted using a random-effects model to calculate the weighted mean difference and its 95%
How were differences between studies investigated?
Heterogeneity was assessed using the Q test. The studies were grouped and pooled according to age, gender, neuromuscular monitoring method, and dose of rocuronium or vecuronium.

Results of the review
Twenty-one studies reporting 29 effect sizes were included (923 patients).

The Jadad scores ranged from 0 to 2 (median 1).

All but two of the comparisons suggested that rocuronium is faster acting than vecuronium. Rocuronium had a T-max that was on average 57.9 seconds faster acting (95% CI: 44.3, 71.4) than vecuronium. However, there was strong evidence of heterogeneity (p<0.0001).

T-max was faster for rocuronium than vecuronium for all subgroup analyses undertaken; the smallest pooled difference between the two agents was 19.1 seconds (95% CI: 0.13, 38.1) for the subgroup analyses restricted to two studies of children. The largest difference between the two agents was 68.3 seconds (95% CI: 39.3, 97.2) for the subgroup analyses restricted to the eight studies that used mechanomyography as the neuromuscular monitoring method.

Cost information
The authors stated that in Mexico the cost of rocuronium can be up to 7-fold that of vecuronium.

Authors' conclusions
The onset of action of rocuronium is at least 20 seconds and up to 70 seconds faster than vecuronium.

CRD commentary
The review addressed a focused question that was supported by defined inclusion criteria. The literature search was limited to electronic databases, with no additional attempts made to locate unpublished studies; the review may therefore be subject to publication bias. Although appropriate steps were taken to minimise bias and error in the study selection and data extraction processes, the same steps were not taken for the validity assessment. Study quality was assessed using the Jadad scale, but as it is unclear whether the included studies were randomised controlled trials the appropriateness of this tool cannot be determined.

Very few details of the included studies were provided, especially in relation to study design and participants, thus the applicability of these results remains unclear. The methodology for the data synthesis and subgroup analysis were appropriate, however, given the high level of heterogeneity between the studies, the appropriateness of pooling the results is questionable. The authors' conclusions are supported by the data presented, but their reliability is uncertain given the limitations of the search and lack of details about the included studies.

Implications of the review for practice and research
The authors did not state any implications for practice or further research.

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Bibliographic details
Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.