Impact of the intubation model on the efficacy of rocuronium during rapid sequence intubation: systematic review of randomized trials

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CRD summary
This well-conducted review assessed the impact of the intubation model on the efficacy of rocuronium compared with succinylcholine for rapid sequence intubation (RSI). The authors concluded that, where a true RSI model was used, rocuronium could be as effective as succinylcholine, but this was also dose- and induction-agent dependent. The conclusions are likely to be reliable.

Authors' objectives
To determine the impact of the intubation model (true or modified) on the efficacy of rocuronium compared with succinylcholine during rapid sequence intubation (RSI).

Searching
MEDLINE, EMBASE, CINAHL, HealthSTAR and the Cochrane Controlled Trials Register were searched, without language restrictions, up to December 2006; the search terms were reported. References were checked and locally available anaesthesia journals were screened.

Study selection
Studies that assessed a true or modified RSI procedure were eligible for inclusion. A true procedure involved intravenous induction with hypnotic; intravenous administration of succinylcholine or rocuronium immediately; apnoea period of no more than 60 seconds; and orotracheal intubation. A modified procedure was defined as for 'true', but with a variable interval between loss of consciousness and muscle relaxant administration. Eligible studies were randomised trials that compared rocuronium with succinylcholine for these procedures. The included studies used doses of rocuronium ranging from 0.6 to 1.2 mg/kg. The hypnotics used were propofol or thiopental. Some included studies used fentanyl or alfentanil for induction. Trials in which apnoea periods varied between patient groups, or which were otherwise imperfectly controlled, were excluded from the review. The principal review outcomes were good or excellent intubation conditions, and eligible studies assessed intubation conditions using a 3- or 4-point score.

Two reviewers independently assessed studies for inclusion in the review.

Assessment of study quality
Validity was assessed using a 7-point scale based on the following criteria: randomisation, allocation concealment, blinding and description of withdrawals.

Four reviewers independently assessed the validity of the studies.

Data extraction
The numbers of patients with good or excellent conditions for intubation were extracted and the relative risk (RR) with 95% confidence interval (CI) calculated. The doses of intervention and control were extracted; 0.6 to 0.7 mg/kg rocuronium was arbitrarily designated as a conventional dose and 0.9 to 1.2 mg/kg designated as a high dose.

Two reviewers independently extracted the data using standardised forms, which additional reviewers checked.

Methods of synthesis
The studies were combined in a fixed-effect meta-analysis. Separate analyses were employed for trials using true and modified RSI procedures, and using propofol or thiopental as hypnotics. Subgroup analyses based on conventional versus high doses of rocuronium were also performed. Sensitivity analyses assessed the impact of opioid use in some
trials and combining data from trials using different doses of rocuronium.

Results of the review
Twenty-one randomised controlled trials (n=1,811) were included in the review: 12 assessed a true RSI procedure (n=1,471) and 9 assessed a modified RSI procedure (n=340).

The median validity score of the included studies was 4 (range: 2 to 7).

True RSI procedure.

The number of patients with good or excellent intubation conditions was not statistically significantly different from those treated using succinylcholine for any groups where propofol was the induction agent (conventional dose rocuronium: RR 0.95, 95% CI: 0.90, 1.00; high-dose RR 0.96, 95% CI: 0.92, 1.01). When thiopental was the induction agent, there was no statistically significant difference between the groups for high doses of rocuronium (RR 0.99, 95% CI: 0.95, 1.03), but the outcomes were worse for conventional doses of rocuronium (RR 0.69, 95% CI: 0.61, 0.78).

Modified RSI procedure.

There were no statistically significant differences between the groups in the number of patients with good or excellent intubation conditions. For propofol only, conventional doses of rocuronium were used (RR 0.98, 95% CI: 0.91, 1.06). Where thiopental was the induction agent, the RR was 0.97 (95% CI: 0.92, 1.02) for conventional doses and 1.00 (all patients had good or excellent intubation conditions) for high doses.

Subgroup analyses revealed no effect of opioid administration on the comparisons.

Authors' conclusions
The efficacy of rocuronium for RSI is affected by both the induction agent and intubation model. During a true RSI it is possible to achieve onset and intubation conditions with rocuronium that are comparable to succinylcholine, if propofol or thiopental are used.

CRD commentary
The review question and the inclusion criteria were clear. The authors searched a number of relevant databases without language restrictions and also searched additional sources. However, they did not report seeking unpublished trials, which might have increased the possibility that some relevant trials were not included in the review. The authors used appropriate methods to minimise bias and error in the selection of studies for the review, the extraction of data and the assessment of study validity, which was conducted using appropriate criteria. The decision to employ meta-analysis appears appropriate. The authors' conclusions are likely to be reliable.

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

Research: The authors stated that investigators assessing alternatives to succinylcholine for RSI should use a true RSI model. In such trials, both intubation scores and actual intubation successes or failures should be documented.

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Bibliographic details

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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.