Laryngeal mask airways have a lower risk of airway complications compared with endotracheal intubation: a systematic review

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CRD summary
The review concluded that for patients who received general anaesthesia, use of laryngeal mask airway resulted in a statistically and clinically significant lower incidence of laryngospasm during emergence, postoperative hoarse voice and coughing compared with endotracheal intubation. Given the lack of quality assessment and the clinical and methodological differences between studies, caution is warranted when interpreting the authors' conclusions.

Authors' objectives
To determine whether patients who underwent general anaesthesia and were provided with a laryngeal mask airway (LMA) had a lower risk of airway-related complications than those who underwent endotracheal intubation.

Searching
MEDLINE, EMBASE and The Cochrane Library were searched for articles in English up to 2009. Search terms were reported. The cited reference search feature in Web of Knowledge was used. Reference lists of relevant articles and reviews were searched.

Study selection
Randomised controlled trials (RCTs) that compared LMA with endotracheal tube in adult patients who received general anaesthesia for any non-emergency elective surgical procedure conducted by an experienced clinician were eligible for inclusion. Trials had to report on airway complication outcomes such as hoarse voice, laryngospasm during emergence, regurgitation, coughing, vomiting, nausea, sore throat and success of insertion at first attempt. Crossover studies and studies of tracheotomy procedures were excluded. Studies with inexperienced personnel and studies that used the resuscitation model were excluded.

The included trials studied patients who underwent various surgeries (such as breast, cataract, gynaecological, ophthalmic, orthopaedic, oral, peripheral and cholecystectomy). The type of anaesthetic used included enflurane, isoflurane, desflurane, sevoflurane, volatile gas and halothane. The type of ventilation was mainly mechanical; spontaneous was also reported. Some trials included female patients only. Patient age, where reported, ranged from 17 to 80 years. American Society of Anaesthesiologists grade ranged from I to III.

Two reviewers independently performed study selection. Disagreements were resolved by discussion.

Assessment of study quality
The authors did not state that they assessed study validity.

Data extraction
Data were extracted on complication outcomes (greatest number of complications at any given time point) and used to calculate relative risks (RR) and 95% confidence intervals (CIs).

The authors did not state how many reviewers performed data extraction.

Methods of synthesis
Fixed-effect and random-effects meta-analysis was undertaken to obtain pooled relative risks and 95% CIs. Statistical heterogeneity was estimated using $I^2$ and $X^2$. Publication bias was assessed with funnel plots. Sensitivity analysis excluded the study with the greatest weight in each analysis and one study that might not have been randomised.

Results of the review
Twenty-nine RCTs were included in the review (n=2,961 patients, range 20 to 381).

A random-effects model showed that compared with endotracheal tube, LMA had statistically significantly lower rates of laryngospasm during emergence (RR 3.16, 95% CI 1.38 to 7.21, I²=0%; n=741), hoarse voice (RR 2.59, 95% CI 1.55 to 4.34, I²=1%; n=457), cough (RR 7.12, 95% CI 4.28 to 11.84, I²=48%; n=882) and sore throat (RR 1.67, 95% CI 1.33 to 2.11, I²=66%; n=2,396). There was no statistically significant difference between LMA and endotracheal tube in terms of success of insertion on first attempt, regurgitation, nausea and vomiting (random effects).

Results were generally more significant or became statistically significant (for nausea) when using the fixed-effect model. Exclusion of the study with the greatest weight from each analysis and exclusion of one study that might not have been randomised did not alter the statistical significance of results. Asymmetry in the forest plots for cough and sore throat indicated publication bias.

Authors’ conclusions
For patients who received general anaesthesia, use of LMA resulted in a statistically and clinically significantly lower incidence of laryngospasm during emergence, postoperative hoarse voice and coughing compared with endotracheal tube.

CRD commentary
Inclusion criteria for the review were clearly defined. Three relevant data sources were searched. There was potential for language bias, as only articles in English were included. Publication bias was assessed and could not be ruled out for some outcomes, but the reliability of assessing publication bias with fewer than 10 studies is limited. Attempts were made to reduce reviewer error and bias during study selection; it was unclear whether such attempts were made for data extraction. It appeared that no quality assessment was undertaken, which made the quality of the included trials difficult to determine. There were clear methodological/clinical issues with the included studies: some had small sample sizes, wide confidence intervals for certain outcomes, reported no use of anaesthesia and/or reported a small number of events for outcomes such as laryngospasm. There were other clinical and methodological differences between studies. A random-effects meta-analysis was undertaken for all trials and outcomes, which appeared more appropriate than fixed-effect given the differences in procedures and patients. There was unexplained statistical heterogeneity in some analyses.

Given the lack of quality assessment and the clinical and methodological differences between studies, caution is warranted when interpreting the authors’ conclusions and recommendations.

Implications of the review for practice and research
Practice: The authors stated that the number of studies and consistent results supported use of LMA for airway management in adult patients without airway compromise who underwent elective surgical procedure.

Research: The authors stated that future studies that compared LMA with endotracheal tube should focus on paediatric patients. Comparative studies are needed for different types of LMA and different surgical procedures. Studies should report on patient quality of life, surgeon ratings of ease of surgical care, anaesthesiologists’ ratings of ease of anaesthesia care and costs of care delivery. Safety and efficacy of LMA in patients who received general anaesthesia for office-based oral and maxillofacial surgery were needed.

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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.