The timing of tracheotomy: a systematic review
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Authors' objectives
To examine the impact of the timing of tracheotomy on the duration of mechanical ventilation, the secondary changes to the trachea, and the clinical course of critically ill patients in the intensive care unit (ICU).

Searching
MEDLINE (1966 to December 1996) was searched electronically using the MeSH terms and textwords ‘tracheotomy’ and ‘tracheostomy’. Additional studies were identified through searching the bibliographies of retrieved articles. Other investigators were not contacted and no attempts were made to locate unpublished data.

Study selection
Study designs of evaluations included in the review
All study designs were considered.

Specific interventions included in the review
Early and late (as defined by the individual studies) tracheotomy. All methods of tracheotomy were considered including open and percutaneous procedures.

Participants included in the review
Mechanically ventilated patients in ICUs. All of the included studies look at adult populations.

Outcomes assessed in the review
Duration of mechanical ventilation; duration of hospitalisation; airway trauma sustained; and the incidence of ventilator-associated pneumonia.

How were decisions on the relevance of primary studies made?
Two reviewers independently searched the literature for relevant articles. In all instances where either reviewer thought the titles might be relevant, the papers were obtained. The papers were then reviewed and considered for inclusion in the review. The level of agreement between the reviewers was reported using the kappa statistic and disagreements were resolved through discussion.

Assessment of study quality
Validity was assessed using the following 10 criteria:

1. Clarity of objectives.
2. Search methods.
5. Description of statistical analysis.
6. Inclusion/exclusion criteria.
7. Similarities of patients between groups.
10. Reporting of secondary outcomes.

Two reviewers independently assessed the validity of studies using the 10 pre-defined quality criteria. Items were scored using 2 points for yes, 1 point for partial and 0 points for no. For items relating to randomisation, a score of 0 was assigned if the study was not randomised and not blinded. All other possible responses to these criteria were assigned a score of 1. The possible range of scores was 0 to 18. The scores were calculated for each reviewer and any disagreements resolved through discussion.

Data extraction
Two reviewers extracted the data using a customised data form. Information was collected relating to the method of randomisation, the population of interest, study population comorbidities, definitions of timing of tracheotomy (i.e. early vs late), method of tracheotomy, length of ventilation, hospitalisation, ICU morbidities and mortality, and the length of follow-up.

Methods of synthesis
How were the studies combined?
A narrative description was used.

How were differences between studies investigated?
The authors do not state how differences between the studies were investigated.

Results of the review
Five studies including 3 quasi-RCTs (n=232 participants) and 2 retrospective studies (n=164 participants).

The weighted kappa statistics (kappa=0.87) showed a high degree of agreement between the two reviewers in terms of their decisions about the relevance of studies. The methodological scores of the five studies ranged from 8 to 12 (possible range 0 to 18). None of the articles was blinded. The results of the two retrospective studies were at odds with each other. The three randomised studies all randomised to either ‘early’ or ‘late’ tracheotomy, but used substandard ‘quasi’ methods of randomisation. Also only two of the studies had complete follow-up. All of the quasi-RCTs differed in their conclusions.

Authors’ conclusions
There is insufficient evidence to support that the timing of tracheotomy alters the duration of mechanical ventilation or extent of airway injury in critically ill patients.

CRD commentary
This is a well-presented review with clearly defined inclusion/exclusion criteria. A detailed description of the review methodology is presented and the studies are subjected to a rigorous validity assessment. In view of the heterogeneity between studies the use of a descriptive narrative to synthesise the results is appropriate. Relevant data may have been missed though through only searching one database, and by not attempting to locate unpublished material, the possibility of publication bias cannot be ruled out. However, considering the data presented and the lack of relevant studies, the authors comments and conclusions would appear to be valid.

Implications of the review for practice and research
The authors stated that ‘this review of the literature indicates a lack of rigorous controlled studies to support the
recommendations of the 1989 Consensus Conference'; 'in the future randomised trials must focus on functional outcomes of dyspnea and voice, as well as provide for surveillance endoscopy during the randomisation process in order to ensure quality control'; 'a randomised trial would require a tight study design with specific inclusion and exclusion criteria, stratification where deemed appropriate, and standardised weaning practices'; 'a randomised, prospective study is required to examine the need for and the timing of tracheotomy in patients requiring prolonged mechanical ventilation. The findings of such a study would have to have significant impact on clinical practice and hospital costs. Until that time, physicians can approach the problem only on an individual, case-by-case basis and with anecdotal information'.

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