A comparison of endotracheal intubation and use of the laryngeal mask airway for ambulatory oral surgery patients

Todd D W

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The use of laryngeal mask airway (LMA) as general anaesthesia for ambulatory oral surgery patients. Propofol at a dose of 2.5 to 3.0 mg/kg was used to induce anaesthesia. This is a slightly higher dose than is standard for adults, because a deeper level of anaesthesia is required for placement when no paralytic agent is used.

Type of intervention
Other: general anaesthesia.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients undergoing outpatient general anaesthesia for dentoalveolar surgery, who were classified as Class I or Class II according to the American Association of Anesthesiologist (ASA).

Setting
The setting was a private dental practice. The economic study was performed at Lakewood, New York, USA.

Dates to which data relate
The dates to which the effectiveness data, resource utilisation and costs related were not reported. The price year was not given.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing appears to have been undertaken retrospectively on the same patient population as that used in the effectiveness study.

Study sample
The sample size was not determined by power calculations in the planning phase of the study. The patients were included in the study because they underwent ambulatory oral surgery in the private office where the study was conducted. The study sample was not shown to be representative of the study population. In total, 107 patients were considered in the LMA group and 50 in the ETI group. There were 42 males and 65 female in the LMA group, with an average age of 22.6 years. There were 18 males and 32 females in the ETI group, with an average age of 17.6 years.
The author reported that LMA was used when the anticipated procedure time was less than 10 to 15 minutes, and that either ETI or LMA was used for cases longer than 10 to 15 minutes.

**Study design**
A retrospective cohort study was performed, based in a single centre. The duration of follow-up was until discharge, which was approximately one to two hours after the surgical intervention. The patients were discharged when they presented stable vital signs, an absence of nausea and vomiting, and the ability to ambulate with only minor assistance, as judged by the nursing staff and the patient. The author did not report any loss to follow-up.

**Analysis of effectiveness**
The basis for the effectiveness analysis (intention to treat or treatment completers only) was not stated. The primary health outcomes assessed in the study were the overall procedure time (range and average) and recovery time (range and average) for LMA and ETI. The author did not report any statistical analysis to show that the groups were comparable at analysis in terms of age and gender. In order to explore whether different procedures would affect the outcomes obtained with either anaesthesia procedure, the outcomes were also reported considering only those patients who had 4 impacted third molars extracted (in total, 26 patients in the ETI group, and 68 patients in the LMA group).

**Effectiveness results**
The procedure time ranged from 15 minutes to 1 hour and 35 minutes. The average procedure time was 44 minutes for ETI and 40 minutes for LMA.

The recovery time ranged from 30 minutes to 1 hour and 45 minutes. The average recovery time was significantly shorter for LMA (54 minutes) than for ETI (67 minutes), (p=0.001).

When only patients who had 4 impacted third molars extracted were considered, the average procedure time was 39 minutes (range: 25 - 55) for ETI and 39 minutes (range: 26 - 60) for LMA. The average recovery time was significantly higher for ETI (68 minutes, range: 25 - 105) than for LMA (54 minutes, range: 30 - 75), (p=0.001). The patients recovered significantly faster when general anaesthesia was given by means of LMA, compared with ETI. Differences in the procedure time do not seem to have affected this result.

**Measure of benefits used in the economic analysis**
The outcomes were left disaggregated and, as such, a cost-consequences analysis was performed. Therefore, no summary measure of benefit was used in the economic analysis (see the 'Effectiveness Results' section).

**Direct costs**
The resource quantities and the costs were, to some extent, reported separately. The direct costs included in the analysis were those related to the procedure. These included the agents used for both ETI (propofol, fentanyl, alfentanil, mivacurium, rocuronium, robinol, neostigmine) and LMA (propofol), the tube used for ETI, and the costs associated with LMA (taking into account its longevity and the number of cases that could be completed in this time). The cost data appear to have been collected from the private office. The cost of the LMA per patient was calculated from the evidence about replacement, as given by the private office. Discounting was not performed, which was appropriate given the short duration of the interventions considered at analysis. The author reported the cost ranges for both ETI and LMA. The price year was not given.

**Statistical analysis of costs**
No statistical analysis of the costs was reported.

**Indirect Costs**
No indirect costs were reported.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analysis was reported.

**Estimated benefits used in the economic analysis**
See the 'Effectiveness Results' section.

**Cost results**
The costs for ETI ranged from $35 to $80 per case, while those for LMA ranged from $20 to $30 per case.

**Synthesis of costs and benefits**
Not applicable due to the cost-consequences approach adopted. From the results, the intervention appeared to be dominant in that it had better clinical outcomes and was less costly.

**Authors’ conclusions**
Laryngeal mask airway (LMA) offers advantages over endotracheal intubation (ETI) for outpatients receiving general anaesthesia for dentoalveolar surgery in terms of recovery time. In addition, it can be used as least as cost-effectively as ETI.

**CRD COMMENTARY - Selection of comparators**
The comparator was justified on the ground that it was the actual practice before the implementation of LMA. You should decide if this is a widely used health technology in your own setting.

**Validity of estimate of measure of effectiveness**
The analysis used a retrospective cohort study, which seems to have been appropriate for the study question. However, it is associated with a number of limitations such as bias and confounding. The study sample is likely to have been representative of the study population, although details of the ASA classifications were not provided. The age and gender of both groups were compared, but no statistical analysis was performed to show whether the groups were comparable at analysis. The time required for the process of induction and insertion of the airway, the time taken to secure the airway, and the time taken to remove it once surgery was completed, were not considered at analysis. These parameters would appear to be necessary if the alternative anaesthesia procedures are to be compared appropriately. Moreover, it was not reported which factors determined the variability in the pharmacology of ETI. The author reported one limitation in that the patients were not discharged until the surgeon could evaluate them personally. This may have lengthened the discharge time in some cases. However, it was stated that this fact affected both groups equally and, therefore, it should not have influenced the results. Nevertheless, the retrospective nature of the study introduced uncertainty into the reliability of these effectiveness results.

**Validity of estimate of measure of benefit**
The author did not derive a summary measure of health benefit. The analysis was therefore categorised as a cost-consequences study and the remarks above are relevant to the (implied) benefits.
Validity of estimate of costs
The author did not report the perspective adopted, although it seems to have been that of the private office. The reporting of the costs was rather brief and some relevant costs were omitted from the study, such as the personnel costs for both LMA and ETI, and the costs associated with the maintenance of LMA. The author stated that this exclusion was not likely to have affected the results, as the increase in the costs for LMA associated with maintenance may have been balanced by the decreased personnel costs due to faster recovery of the patients. The resource quantities were, to some extent, reported separately from the costs. However, it would be difficult to generalise the results to other settings because, as the author reported, the costs depended to a large extent on the agents used, and there was variability between the agents used according to the anaesthetic procedure. No statistical analyses of the resource quantities and costs were performed and the price year was not reported. These factors introduce uncertainty into the reliability of the conclusions and hinder the generalisability of the results to other settings. Discounting was unnecessary due to the short duration of the procedures considered at analysis.

Other issues
The author did not compare his findings with those from other studies. The issue of the generalisability of the results to other settings was not addressed. The scope of the analysis was reflected in the author’s conclusions. The author reported some advantages presented by LMA, and also some contraindications to this anaesthesia procedure.

Implications of the study
The study is helpful in the sense that it demonstrates the safe use of LMA for office-based surgery. Caution should be exercised when interpreting the results due to the caveats highlighted.

Source of funding
None stated.

Bibliographic details

PubMedID
11756995

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM
MeSH
Adolescent; Adult; Ambulatory Surgical Procedures /instrumentation; Anesthesia Recovery Period; Anesthesia, Dental /economics /instrumentation; Anesthesia, General /economics /instrumentation; Child; Drug Costs; Female; Humans; Intubation, Intratracheal /economics; Laryngeal Masks /economics; Male; Middle Aged; Oral Surgical Procedures /instrumentation; Retrospective Studies; Time Factors

AccessionNumber
22002000187

Date bibliographic record published
30/04/2003

Date abstract record published
30/04/2003