Propofol versus traditional sedative agents for gastrointestinal endoscopy: a meta-analysis

CRD summary
This review compared the complication rates of propofol with traditional sedative agents used during gastrointestinal endoscopy. The authors concluded that the risk of cardiopulmonary complications appeared lower during colonoscopy, but there was no difference in complications for other endoscopic procedures. The authors’ conclusions should be treated with caution as their results only pertain to hypoxia and hypotension, not all cardiopulmonary complications.

Authors’ objectives
To compare the complication rates of propofol with other traditional sedative agents used during gastrointestinal endoscopy.

Searching
MEDLINE (1966 to October 2004), EMBASE (1980 to October 2004) and the Cochrane Controlled Trials Register (1980 to October 2004) were searched for studies reported in the English language; the search terms were stated. In addition, the reference lists from included studies were checked for relevant articles.

Study selection
Study designs of evaluations included in the review
Controlled trials were eligible for inclusion. All included studies were randomised controlled trials (RCTs); the majority were single-centre studies.

Specific interventions included in the review
Studies that compared propofol with other sedative agents used during gastrointestinal endoscopy were eligible for inclusion. Studies that used propofol with another agent simultaneously were excluded from the review. All included studies used midazolam as the control sedative agent, with some studies additionally giving the control group fentanyl or meperidine.

Participants included in the review
Patients aged over 18 years undergoing gastrointestinal endoscopy were eligible for inclusion. No further details of the participants in the included studies were reported. Gastrointestinal endoscopic procedures were separated into three groups: oesophagogastroduodenoscopy (EGD), colonoscopy and endoscopic retrograde cholangiopancreatography/endoscopic ultrasonography (ERCP/EUS).

Outcomes assessed in the review
The studies had to report at least one complication as actual frequencies, rather than percentages, to be eligible for inclusion. Complications were grouped into the following four categories: hypoxia, if oxygen saturation dropped below 90%; hypotension, if systolic blood-pressure dropped below 90 mmHg; arrhythmias, if the heart rhythm changed from the patient’s usual rhythm; and apnoea, if there was a cessation of respiratory activity for more than 10 seconds. Given the low reporting rate of arrhythmias and apnoea, only hypoxia and hypotension were assessed in the review.

How were decisions on the relevance of primary studies made?
Two reviewers independently screened the studies and reached consensus on the final studies to include.

Assessment of study quality
Two reviewers assessed the quality of the included studies using the following five criteria: randomisation, double-blinding, withdrawals and drop-outs, randomisation generation and allocation concealment. The included studies were given a score of between 0 and 5; a high score signified high quality.
Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Odds ratios (ORs), with associated confidence intervals (CIs), were calculated from the numbers of complications reported in each study; 0.5 was added to zero cells.

Methods of synthesis
How were the studies combined?
Pooled ORs were calculated using the random-effects model of DerSimonian and Laird. Funnel plots were used to evaluate publication bias.

How were differences between studies investigated?
The Q statistic was used to assess heterogeneity, while forest plots were provided for a visual inspection of heterogeneity. Sensitivity analysis was performed, excluding one study at a time, to assess the effect of each study on the overall OR.

Results of the review
Twelve RCTs (n=1,161) were included in the review.

The median quality score (according to endoscopic procedure) was 1.75 for all included studies, 1 for EGD studies, 2 for colonoscopy studies and 3 for ERCP/EUS studies.

No statistically significant heterogeneity between trials was identified.

Hypoxia.

There was no statistically significant difference between the propofol and control groups for all endoscopic procedures (OR 0.76, 95% CI: 0.43, 1.35; 12 RCTs).

Hypotension.

There was no statistically significant difference between the propofol and control groups for all endoscopic procedures (OR 1.06, 95% CI: 0.53, 2.09; 11 RCTs).

Hypoxia or hypotension.

There was no statistically significant difference between the propofol and control groups for all endoscopic procedures (OR 0.74, 95% CI: 0.44, 1.24; 11 RCTs).

There was a statistically significant reduction in the propofol group compared with the control group for colonoscopy (OR 0.40, 95% CI: 0.20, 0.79; 5 RCTs).

There was no statistically significant difference between the propofol and control groups for ERCP/EUS (OR 1.07, 95% CI: 0.38, 3.01; 3 RCTs).

The sensitivity analysis showed that one study had a large effect on the overall pooled results (OR 0.55, 95% CI: 0.36, 0.83; 10 RCTs), whilst the removal of 2 studies in the colonoscopy group resulted in a non significant OR. Funnel plots did not reveal any pronounced publication bias.
Authors' conclusions
The risk of cardiopulmonary complications when using propofol sedation compared with traditional sedative agents appeared lower during colonoscopy. There was no difference in the risk of cardiopulmonary complications for other gastrointestinal endoscopic procedures.

CRD commentary
The review question was clear in terms of the study design, participants, intervention and outcomes. The authors searched relevant databases, over a reasonable timeframe, and the search terms were stated. The authors made little attempt to identify unpublished studies, however, publication bias was assessed using funnel plots. Only studies published in English were included, thereby introducing the potential for language bias. Two reviewers independently selected studies and reached consensus on the studies to include. However, the methods used to extract the data were not described, so the potential for reviewer error and bias could not be assessed. Two reviewers assessed the validity of the studies using defined criteria, which appeared appropriate, and the results were summarised.

There was adequate information on the included studies. The quality of the included studies was assessed as moderate, at best, owing to the general absence of double-blinding, allocation concealment and the management of drop-outs and withdrawals. The authors also acknowledged that many of the included studies appeared underpowered. Statistical heterogeneity was assessed and the data synthesis appeared appropriate. However, only hypoxia and hypotension complications could be assessed. A sensitivity analysis was performed and the authors discussed potential sources of heterogeneity between the studies.

This was a reasonably well-conducted review. While the authors' conclusions appear to follow from the results, they should be treated with caution given the limitations of the included studies. In addition, the results only pertain to hypoxia and hypotension complications, not to all cardiopulmonary complications as reported in the conclusion.

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

Research: The authors stated that a large RCT was needed to assess the effectiveness of propofol over traditional sedatives for gastrointestinal endoscopy.

Bibliographic details

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MeSH
Anoxia /chemically induced; Apnea /chemically induced; Arrhythmias, Cardiac /chemically induced; Cholangiopancreatography, Endoscopic Retrograde /adverse effects; Colonoscopy /adverse effects; Endoscopy, Digestive System /adverse effects; Endoscopy, Gastrointestinal /methods; Endosonography /adverse effects; Fentanyl /adverse effects; Humans; Hypnotics and Sedatives /adverse effects; Hypotension /chemically induced; Meperidine /adverse effects; Midazolam /adverse effects; Odds Ratio; Propofol /adverse effects

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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.