Meta-analysis of randomized clinical trials of colorectal surgery with or without mechanical bowel preparation

Slim K, Vicaut E, Panis Y, Chipponi J

CRD summary
This review assessed the value of mechanical bowel preparation before elective colorectal surgery. The authors concluded that bowel preparation using polyethylene glycol should be omitted before such surgery, but that further research is needed to evaluate other bowel preparations. The conclusions of this well-conducted review are likely to be reliable.

Authors' objectives
To assess whether mechanical bowel preparation should be omitted before colorectal surgery.

Searching
The search for published studies (full paper or abstract) had no language restrictions. The Cochrane Library, a Centre for Reviews and Dissemination database, EMBASE, LILACS, Medical Editors Trials Amnesty, MEDLINE, Pascal Biomed and SciSearch were searched to March 2003; no search terms were reported. The authors also handsearched major surgical journals (the six issues prior to March 2003) and the proceedings of major meetings from 1995 to March 2003. Further studies were sought through contact with experts in colorectal surgery and by checking the reference lists of retrieved papers.

Study selection

Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion.

Specific interventions included in the review
Studies comparing bowel preparation with no preparation prior to elective colorectal surgery were eligible for inclusion. The included studies used either polyethylene glycol (PEG), mannitol or sodium picophosphate solutions for bowel preparation. In all studies the participants also received prophylactic antibiotics. In one study all rectal surgery patients were given a fleet enema, but in all other studies the no-preparation group received no rectal cleansing.

Participants included in the review
Studies of patients undergoing elective colorectal surgery were eligible for inclusion. One of the included trials included children, while two included patients without anastomosis.

Outcomes assessed in the review
No inclusion criteria for the outcomes were stated. The primary outcome in the review was the overall anastomotic leakage. The secondary outcomes were abdominal and extra-abdominal septic complications and other non-septic complications. In all of the included studies anastomotic leakage was only confirmed after being suspected clinically.

How were decisions on the relevance of primary studies made?
Two reviewers independently selected studies for the review.

Assessment of study quality
A validated scale was used to assess randomisation, blinding and participant withdrawal to give an overall score out of 5. A score of 2 or less was taken to represent poor methodological quality. Two reviewers independently assessed study quality. Any disagreements were resolved by consensus.
Data extraction
Two reviewers independently extracted the data. The authors of studies published in abstract form were contacted for further details. Data were extracted on an intention-to-treat basis.

Methods of synthesis
How were the studies combined?
The studies were combined using the Peto fixed-effect model to give a summary odds ratio (OR) with 95% confidence intervals (CIs) for each outcome of interest. Publication bias was assessed with a funnel plot.

How were differences between studies investigated?
Heterogeneity between studies was assessed using the Q-statistic. Sensitivity and subgroup analyses were performed to assess the impact of methodological quality, publication type, bowel preparation protocol and level of anastomosis on the results.

Results of the review
The review included 7 RCTs involving 1,454 participants in total.

Two of the 7 studies were judged to be of a poor methodological quality (each scoring 2 points).

Anastomotic leakage (7 RCTs).
There was a statistically significant higher rate of leakage in the bowel preparation group than in the no-preparation group (OR 1.74, 95% CI: 1.05, 2.90). There was no evidence of heterogeneity (Q=4.41). When the poor-quality RCTs were removed from the analysis, the results still favoured no preparation but were no longer statistically significant (OR 1.55, 95% CI: 0.82, 2.92). A subgroup analysis of the 4 RCTs using PEG for bowel preparation found a significantly higher rate of leakage in comparison with no preparation (OR 1.92, 95% CI: 1.03, 3.60), whereas the difference between preparation and no preparation in studies using other methods was not statistically significant (OR 1.43, 95% CI: 0.59, 3.45). The funnel plot for anastomotic leakage was symmetrical, which suggests no evidence of publication bias.

Other outcomes.
The bowel preparation group had higher rates of wound infection (OR 1.33, 95% CI: 0.88, 2.30; 7 RCTs), other extra-abdominal septic complications (OR 1.12, 95% CI: 0.69, 1.83; 3 RCTs), post-operative mortality, reoperation and non-septic complications, but none of these differences were statistically significant. These results were not substantially altered by the removal of the poor-quality RCTs.

Authors' conclusions
There was good evidence to suggest that mechanical bowel preparation using PEG should be omitted before elective colorectal surgery. Further research is needed to evaluate other bowel preparations.

CRD commentary
The review addressed a clear question and inclusion criteria were specified for the intervention and study design. The search for primary studies was thorough and there were no language restrictions. Although unpublished studies were not included, the review did include conference abstracts and publication bias was assessed. Steps were taken to minimise the introduction of errors and bias during the review process. The methodological quality of the included studies was assessed and the impact of study quality on the summary results was investigated in sensitivity analyses. Appropriate meta-analytic methods were used to pool studies and to investigate heterogeneity between the studies. The conclusions of this well-conducted review are likely to be reliable.
Implications of the review for practice and research
Practice: The authors stated that the evidence suggests mechanical bowel preparation using PEG should be omitted before elective colorectal surgery.

Research: The authors stated that further large randomised trials are needed to evaluate other bowel preparations.

Bibliographic details

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Other publications of related interest

This additional published commentary may also be of interest: Andrews L. Review: bowel preparation before elective colorectal surgery increases anastomotic leakage more than no preparation. Evidence Based Nursing 2005;8:85.

Indexing Status
Subject indexing assigned by NLM

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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.