Open or closed diagnostic peritoneal lavage for abdominal trauma: a meta-analysis

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Authors' objectives
To compare the closed and open techniques of diagnostic peritoneal lavage (DPL) in trauma patients, in order to determine whether there are any differences in outcomes.

Searching
MEDLINE was searched from 1977 to 1999 using the search terms 'diagnostic peritoneal lavage', 'trauma' and 'randomized controlled trials'. Additional relevant studies were identified by searching the Cochrane Library (Volume IV, year not stated) and examining bibliographies. Unpublished studies were not sought. The search was limited to English language publications.

Study selection
Study designs of evaluations included in the review
RCTs were included.

Specific interventions included in the review
Studies comparing closed and open DPL were included.

Reference standard test against which the new test was compared
No reference standard was specified as the review only included randomised controlled trials (RCTs) comparing two diagnostic tests.

Participants included in the review
Trauma patients were included.

Outcomes assessed in the review
The primary outcome assess was the major complication rate. Major complications were defined as any solid organ, hollow viscus or vascular injury. The secondary outcomes were technical difficulty (difficulty of catheter insertion or placement, poor fluid return, or both), technical failures, false-positive and false-negative rates, and mean procedure time.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
Study quality was assessed using the 5-point scale of Jadad et al. (see Other Publications of Related Interest). Two reviewers independently assessed study quality and resolved any discrepancies by consensus.

Data extraction
Two reviewers independently extracted the data and resolved any discrepancies by consensus. The data were double-entered to confirm accuracy.

Methods of synthesis
How were the studies combined?
Pooled odds ratios (ORs) with 95% confidence intervals (CIs) were calculated using the Mantel-Haenszel fixed-effect model. Heterogeneous data were analysed using a random-effects model. The weighted mean difference, along with
95% CIs, was calculated for continuous data, i.e. procedure times. The relative risk reduction, absolute risk reduction and the number-needed-to-treat were also calculated and reported.

How were differences between studies investigated?
The qualitative and quantitative homogeneity of the studies was assessed. Clinical homogeneity was based on patient demographics, i.e. age, gender and mechanism of injury, and comparable techniques across studies. Quantitative homogeneity was assessed using the chi-squared statistic. Sensitivity analyses were performed by omitting the largest trial, then omitting each trial in turn and recalculating the summary statistic. The data were re-assessed using the random-effects model.

Results of the review
Seven RCTs with 1,126 participants were included in the review.

The overall quality of the studies was poor (mean score 2.47). Quality assessments revealed inappropriate randomisation methods (i.e. alternate weeks) for three of the trials. Heterogeneity was not statistically significant (P>0.05), except in the analysis of technical difficulty (chi-squared 8.73, P<0.05). The results for technical difficulty were reported using the random-effects model.

Major complications did not differ significantly between the closed and open techniques (OR 0.65, 95% CI: 0.15, 2.92). Technical failures and difficulties were significantly higher in the closed group; the OR values were 4.33 (95% CI: 1.96, 9.56) and 5.11 (95% CI: 1.72, 15.19), respectively.

The accuracy of closed and open DPL was comparable: there were no statistically significant differences in the false-negative or false-positive rates between the two techniques.

Procedure time was consistently lower in the closed technique. The mean procedure time was 17.8 minutes in the closed group versus 26.8 minutes in the open group. Sensitivity analyses did not significantly change the summary statistic for all outcomes. The results remained statistically significant for major complications, technical failures and difficulties, irrespective of the inclusion or exclusion of pseudo-randomised trials. The reanalysis using data from only high-quality trials, i.e. those with a Jadad score greater than 3, also did not significantly change the summary statistic.

Authors' conclusions
The closed DPL technique was comparable to the standard open DPL technique in terms of accuracy and major complications. The advantage of reduced time to perform closed DPL was offset by the increased technical difficulties and failures of this group. Any significant benefit of routine closed DPL in improving outcomes can, therefore, be excluded on the basis of pooled data, rather than on individual trials.

CRD commentary
The authors stated a clear research question and described the study design, participants, outcomes and interventions in the inclusion and exclusion criteria. The search strategy was limited, unpublished data were not sought, and the search was limited to English language publications. It is possible that additional relevant studies may have been missed. The authors did not describe how the papers were selected for the review, although they did describe the quality assessment and data extraction processes. A well-known quality scoring system was used for the quality assessment, although this 5-point scale assessed only blinding, randomisation and loss to follow-up.

Statistical pooling was performed, and heterogeneity was assessed and discussed in the review. Further sensitivity analyses, which addressed the effects of heterogeneity, were also conducted. Although the comparative accuracy and false-positive and false-negative rates of the two techniques were discussed, it was unclear how a true diagnosis was established.

This was a fair review and the authors' conclusions appear to follow from the results.
Implications of the review for practice and research
Practice: The authors stated that with more emphasis on the use of ultrasound in assessing blunt abdominal trauma, the utility of DPL may become limited. However, its high sensitivity and overall accuracy in detecting haemoperitoneum are indisputable. Open DPL should be the standard of care since it offers significantly lower failure rates and technical complications than the closed technique.

Research: The authors did not state any implications for future research.

Bibliographic details

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Abdominal Injuries /diagnosis; Multiple Trauma /diagnosis; Odds Ratio; Peritoneal Lavage /methods; Randomized Controlled Trials as Topic

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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.