Medical and surgical treatment of parapneumonic effusions: an evidence-based guideline


Authors' objectives
To evaluate the effectiveness of surgical and medical management approaches for patients with parapneumonic effusions (PPE) at moderate or high risk of poor outcomes, by conducting qualitative and quantitative reviews of the medical literature.

Searching
The authors searched MEDLINE from inception to April 1, 1998 using the search terms provided in the article. Searches were restricted to human studies published in the English language. Additional material was identified by searching the reference lists of retrieved articles and the authors' personal files.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs), retrospective cohort studies and case series designs, all with at least 20 adult patients, were included. Two primary studies reported using a blinded outcome assessment.

Specific interventions included in the review
PPE management included: no drainage therapeutic thoracentesis; tube thoracostomy; fibrinolytics requiring tube thoracostomy for drug administration (250,000 IU streptokinase daily, variable duration; 100,000 IU urokinase daily, duration unreported); video-assisted thoracoscopic surgery (VATS) including postprocedure tube thoracostomy; and surgery including thoracostomy with or without decortication and rib resection. Comparisons between intervention types were made in individual studies. All management approaches included appropriate treatment of the underlying pneumonia, such as the use of systemic antibiotics.

Participants included in the review
Male and female in-patients were categorised as being at moderate or high risk of a poor outcome according to the authors' method of risk categorisation, which was based upon pleural space anatomy, pleural fluid bacteriology and pleural fluid chemistry. Participants' age, gender, duration of pre-diagnosis symptoms, and co-morbid conditions were presented where primary studies reported sufficient information to do so. Patients with pleural effusion complicating trauma, post-operative pleural effusions, pre-existing pleural effusions and chylous pleural effusions were excluded.

Outcomes assessed in the review
The proportion of total deaths and/or the proportion of patients requiring a second intervention to manage PPE.

How were decisions on the relevance of primary studies made?
Reviewers read abstracts and full papers where necessary and selected studies on the basis of predefined criteria. The authors do not state whether the reviewers were blinded to study details or how many reviewers were involved in retrieval.

Assessment of study quality
Validity was assessed according to six design features: inclusion of consecutive patients, active follow-up of outcomes, blinded assessments of outcomes, compliance to the treatment protocol, sample size calculations, and adequate description of criteria for performing rescue procedures. The authors reported that at least two reviewers made independent quality judgements, and any differences were reconciled by independent methodologists. The authors do not state whether reviewers were blinded to study details.

Data extraction
At least two independent reviewers performed the data extraction using forms developed according to predefined criteria. Any differences were reconciled independently by methodologists. Separate forms were designed for case series, retrospective cohort studies and RCTs. Data were extracted for the categories of: study design (including quality assessment), setting, patient characteristics, diagnostic testing, treatments and outcomes. The proportion of patients either dying or requiring a second intervention, along with 95% confidence intervals (CIs), were calculated according to type of PPE management for each cohort within each study. The authors do not state whether reviewers were blinded to any study details.

Methods of synthesis
How were the studies combined?
The pooled proportions of deaths and the numbers of patients needing a second intervention were calculated, along with 95% CIs. The authors did not report which method was used to pool data, although it appeared that proportions were calculated from total patient numbers within each management approach. No methods were reported for the assessment of publication bias.

How were differences between studies investigated?
No statistical tests of heterogeneity were performed as the authors stated that visual inspection of the results revealed considerable differences between the studies.

Results of the review
Twenty-four studies were included in the review: 3 RCTs (94 participants), 2 retrospective cohort studies (85 participants) and 19 case series designs (778 participants).

The analysis revealed higher proportions of deaths for no drainage (6.6%, 95% CI: 1.8, 16.0), therapeutic thoracentesis (10.3%, 95% CI: 6.2, 15.8) and tube thoracostomy (8.8%, 95% CI: 6.3, 12.0) management approaches, than for the fibrinolytic (4.3%, 95% CI: 1.2, 10.5), VATS (4.8%, 95% CI: 0.6, 16.2) and surgical approaches (1.9%, 95% CI: 0.6, 16.2). However, the 95% CIs showed considerable overlap and did not support the reported differences between the two groups of approaches.

The proportions of patients requiring a second intervention was also higher for no drainage (49.2%, 95% CI: 36.1, 62.3), therapeutic thoracentesis (46.3%, 95% CI: 38.7, 54.0) and tube thoracostomy (40.3%, 95% CI: 35.7, 45.1) management approaches, than for the fibrinolytic (14.9%, 95% CI: 8.4, 23.7), VATS (0.0%, 95% CI: 0.0, 8.4) and surgical (10.7%, 95% CI: 6.3, 16.6) approaches. The two groups of management approaches were distinguishable, as indicated by the absence of overlapping 95% CIs.

Quality was assessed through six design features. Few studies fulfilled the majority of the criteria, and thus the authors suggest that selection and treatment biases may have been introduced.

Authors' conclusions
The authors conclude that the included studies examining the management of PPE contain methodological limitations. Nevertheless, they suggest several recommendations on the basis of the trends apparent in the pooled data and consensus opinion.

CRD commentary
The authors stated their review question clearly. The inclusion criteria were adequate, although there was a considerable degree of overlap between treatments, making it potentially difficult to distinguish treatment effects. In addition, detail concerning decisions to include studies in the review were lacking, and the risk categorisation approach to define patients has not yet been standardised. The authors state that the descriptions of patient levels of risk used in the primary studies were also not consistent, and thus the reliability and validity of patient inclusion criteria must be questioned. The authors should have reported more detail of the process employed in making eligibility decisions. Without this information it is not possible to eliminate the possibility of selection bias affecting
the findings.

The literature search may be questioned. Firstly it was restricted to the MEDLINE database, and secondly, only 
English language publications were retrieved. Therefore, eligible studies may have been missed. Thirdly, there was no 
try to identify unpublished material or to assess publication bias.

The method used to assess quality was well described and appeared appropriate. Although the authors summarised 
their findings, the specific results of this assessment were unclear and the authors failed to reflect these results when 
pooling the data.

The study details were well reported in both tables and text.

The authors pooled results despite the heterogeneity of the included studies; in particular, studies using different 
designs were pooled. This was unlikely to yield meaningful information. It may have been useful to conduct a 
sensitivity analysis, possibly incorporating the results of the quality assessment to investigate the results of the data 
pooling. The authors provided a narrative synthesis of the studies.

The authors' conclusions appear in accordance with the findings.

Implications of the review for practice and research
Practice: The authors present the following recommendations based upon their review (other recommendations are 
presented based upon consensus opinion and as such are beyond the scope of this review).

1. In all patients with acute bacterial pneumonia, the presence of a PPE should be considered.

2. Drainage is recommended for management of category 3 or 4 PPE.

3. Therapeutic thoracentesis or tube thoracostomy alone appear to be insufficient treatment for managing the majority 
of patients with category 3 or 4 PPE.

4. Fibrinolytics, VATS and surgery are acceptable approaches for managing patients with category 3 and 4 PPE.

The authors are right to caution against rigid adoption of these recommendations considering the quality of the 
evidence.

Research: More methodologically rigorous research is required in this area in order to clarify the current findings.

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