Management of emergency department patients with primary spontaneous pneumothorax: needle aspiration or tube thoracostomy?

Zehtabchi S, Rios C L

CRD summary
This review compared the effectiveness of needle aspiration versus tube thoracostomy for unilateral, primary spontaneous pneumothorax in haemodynamically stable patients. It concluded that needle aspiration is a reasonable alternative to tube thoracostomy, offering equivalent or improved outcomes. Overall, this review was poorly reported and the conclusions should therefore be treated with caution.

Authors' objectives
To compare the effectiveness of needle aspiration versus tube thoracostomy for unilateral, primary spontaneous pneumothorax in haemodynamically stable patients.

Searching
MEDLINE (1966 to December 2006), EMBASE (1980 to December 2006), the Cochrane Library (2006), Emergency Medical Abstracts, BestBETs and clinical trial registries were searched; the search terms were reported. In addition, the bibliographies of three systematic or brief reviews and all included studies were reviewed for eligible trials.

Study selection
Eligible studies for this review were defined as randomised controlled trials (RCTs) directly comparing needle aspiration versus tube thoracostomy for unilateral, primary spontaneous pneumothorax in haemodynamically stable patients of any age. Patients were excluded if they had concurrent pleural effusion or haemothorax, or if they had aspiration catheters and Heimlich valves which were not immediately removed. The included studies were all RCTs of the relevant interventions in adult populations (age not reported); they were carried out in Kuwait, Belgium and the UK. The outcomes of interest were pre-specified as length of hospital stay, failure rate, recurrence rate, patient comfort and complications. The included studies reported data on success rates, length of hospital stay and recurrence rates. Each study measured discomfort in a variety of ways.

The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
Validity was assessed using published guidelines based on the following criteria: randomisation, concealment, intention-to-treat analysis, comparability at baseline, blinding, follow-up and cointervention.

The authors did not state how the validity assessment was performed.

Data extraction
For each primary study, the rate of hospitalisation, immediate failure, 1-week failure and 1-year recurrence were extracted as both percentages and raw figures per intervention group. Data on length of hospital stay was extracted as the mean (standard deviation) number of days by intervention group. Data from the primary studies were presented as individual relative risks (RRs) with associated 95% confidence intervals (CIs) for dichotomous data, and as mean differences with 95% CIs for data on the length of hospital stay. The number-needed-to-treat was reported where a statistically significant difference was found.

The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
A narrative synthesis was performed, with accompanying illustrative forest plots presented.

**Results of the review**

Three RCTs (n=270) were included in this review.

Overall, the trials were judged to be of fair methodological quality: all were randomised, although only one had clear allocation concealment. Blinding was not practical given the intervention, but no studies reported the use of blinded assessors.

Two trials (n=197) reported on hospitalisation and indicated that needle aspiration significantly reduced the need for hospital admission (RR 0.26, 95% CI: 0.17, 0.39; RR 0.51, 95% CI: 0.36, 0.74).

Two trials (n=197) reported on 1-week failure rates and suggested that these were comparable between the two intervention groups (RR 0.86, 95% CI: 0.34, 2.18; RR 0.49, 95% CI: 0.10, 2.33).

All 3 trials (n=270) found no significant differences in 1-year recurrence rates between the two intervention groups (RR 1.04, 95% CI: 0.58, 1.89; RR 0.95, 95% CI: 0.41, 2.22; RR 0.54, 95% CI: 0.21, 1.43).

All 3 trials (n=270) reported on the duration of hospital stay in those patients who were hospitalised and suggested that overall needle aspiration resulted in a shorter hospital stay. Two trials reported a significant reduction in duration of hospital stay.

All 3 trials reported patient comfort and analgesia use in different ways, giving rise to conflicting results (details provided).

**Authors' conclusions**

The evidence suggests that needle aspiration is at least as safe and effective as tube thoracostomy for pneumothorax. Outcomes for needle aspiration are equivalent to or better than tube thoracostomy.

**CRD commentary**

This review addressed a clear clinical question with detailed inclusion criteria and reasonable coverage of the relevant databases. The searches do not appear to have addressed the unpublished literature and it was unclear if any language restrictions were applied, thus potentially introducing publication and language bias. An appropriate validity assessment was conducted. Overall, the methods of this review were poorly reported, making it difficult to assess to what extent error and/or bias might have been introduced at the study selection, validity assessment and data extraction stages. A narrative synthesis was carried out, but the authors gave no reason for not carrying out a meta-analysis despite the lack of obvious clinical heterogeneity. Such an analysis could have supported the authors' overall conclusions. Overall, this review was poorly reported, therefore the conclusions should be treated with caution as we cannot be sure they are reliable.

**Implications of the review for practice and research**

Practice: The authors stated that physicians should consider needle aspiration as a valid alternative to tube thoracostomy for primary spontaneous pneumothorax, as the former intervention is less invasive and results in fewer hospital admissions, less discomfort and pain, and similar rates of failure and recurrence.

Research: The authors stated that future research could consider 'expertise-based' RCTs.

**Funding**

Not stated.

**Bibliographic details**

PubMedID
18166436

DOI
10.1016/j.annemergmed.2007.06.009

Indexing Status
Subject indexing assigned by NLM

MeSH
Biopsy, Fine-Needle /adverse effects; Chest Tubes; Emergency Medical Services; Humans; Length of Stay; Pneumothorax /therapy; Randomized Controlled Trials as Topic; Recurrence; Risk; Thoracostomy /adverse effects

AccessionNumber
12008009310

Date bibliographic record published
30/09/2008

Date abstract record published
23/12/2008

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.