Critical Review Form
Meta-analysis

Simple aspiration versus intercostal tube drainage for primary spontaneous pneumothorax in adults, *Cochrane Database Syst Review 2007; Issue 1. Art No. CD004479*

Objectives: **"To identify and evaluate all randomized controlled trials (RCT) comparing simple aspiration and intercostal tube drainage in the management of PSP" (primary spontaneous pneumothorax); and "to compare the clinical efficacy and safety of simple aspiration and intercostal tube drainage in the management of PSP". (p. 3)**

Methods: **Two investigators conducted a review of 1239 publications identified by structured search of CENTRAL, MEDLINE, EMBASE, Science Citation Index, SIGLE*, ZETOC*, scientific abstracts and reference bibliographies without language bias to identify all RCT's of adults with primary spontaneous pneumothorax treated in one-arm with simple aspiration.**

A priori **they had planned RevMan meta-analysis with both fixed-effect and random-effect model evaluating heterogeneity with Cochran's Q-statistic and I^2, as well as publication bias with a funnel plot.**

* Grey literature sources.

Guide	Question	Comments
I	***Are the results valid?***	
1.	Did the review explicitly address a sensible question?	Yes – can simple aspiration (SA) offer similar outcomes for PSP as the traditional thoracostomy tube?
2.	Was the search for relevant studies details and exhaustive?	Yes. Using well-defined search terms (p. 14-16) and multiple electronic search engines, hand-searching and evaluation of the non-published "gray" literature the investigators guarded against publication bias.
3.	Were the primary studies of high methodological quality?	Only one RCT met inclusion criteria and was assigned a Grade A on the Cochrane assessment of allocation of concealment scale.

4.	Were the assessments of the included studies reproducible?	Probably – used valid and reliable Cochrane scale.
II.	***What are the results?***	
1.	What are the overall results of the study?	▪ Among 1239 citations, six potentially relevant studies were reviewed and only one included in this SR (Noppen 2002 – see PGY-1 review). ▪ No modeling, heterogeneity, or publication bias statistical assessment necessary since only one study included. ▪ The single study included demonstrated the following: o **No significant difference in immediate success rate for SA compared with chest tubes** (RR = 0.93, 95% CI 0.62 – 1.40) o **No significant differences in early failure rates** (RR = 1.12, 95% CI 0.59 – 2.13), 1-year success rates (1.02, 95% CI 0.75 – 1.38) or length of hospital stay (WMD 1.09; 95% CI 2.18 to 0 days). o **Less patients hospitalized** in SA (RR 0.52, 95% CI 0.36 – 0.75). o No reported assessment of cost, chest tube complications, mortality, pain scores, or daily dyspnea scores. ▪ The investigators conducted a non-planned sensitivity analysis by combing Noppen and Andrivet data and noted no significant differences in immediate success (RR = 0.80; 95% CI 0.64 – 1.01)
2.	How precise are the results?	Single study so "it is possible that the results of this study do not reflect the true effect measure of these interventions." (p. 7)
3.	Were the results similar from study to study?	Only one study included.

III.	***Will the results help me in caring for my patients?***	
1.	How can I best interpret the results to apply them to the care of my patients?	"Considering that simple aspiration is relatively easier to perform, this finding validates existing guidelines which recommend simple aspiration as the first line treatment for all primary spontaneous pneumothoraces requiring intervention". (p. 6)
2.	Were all patient important outcomes considered?	No. "The included study reported no complication associated with simple aspiration, but did not explicitly state whether there were any or no complications associated with intercostal tube drainage. Poor reporting of complications is found in other randomized clinical trials comparing simple aspiration with intercostal tube drainage in PSP in adults (Andrivet 1995; Harvey 1994); although potentially fatal penetration of major organs or blood vessels have been reported with both intercostal tube drainage (Holden 1982; Daly 1985; Miller 1987; Symbas 1989; Iberti 1992) and simple aspiration (Rawlins 2003). Other reported complications of intercostal tube drainage include pleural cavity infection (empyema; with a reported incidence of 1%) (Chan 1997) and surgical emphysema (Maunder 1984)". (p. 6)
3.	Are the benefits worth the costs and potential risks?	No costs were analyzed in this or any other study to date. However, with over 20,000 primary spontaneous pneumothorax cases in the US each year costing $130 million annually, any options to reduce unnecessary hospitalizations while relieving patient procedural discomfort is beneficial.

Limitations

1) **Only one high-quality RCT eligible so unable to perform meta-analysis. This SR ought to be reported by 2011 to re-assess the state of the evidence.**

2) **All studies analyzed had incomplete reporting of complications, particularly chest-tube related complications.**

Bottom Line

Based upon a single multi-center RCT, there is no difference in immediate success rates between simple aspiration and tube thoracostomy. Further large randomized controlled trials are needed to assess the effect of simple aspiration vs. chest tube for PSP while addressing multiple important secondary outcomes: complications, mortality, procedural pain, patient satisfaction, average daily dyspnea score, and cost.