Critical Review Form
Meta-analysis

PGY-2

HYPERLINK "http://pmid.us/28881006"Carson-Chahhoud KV, Wakai A, van Agteren JE, Smith BJ, McCabe G, Brinn MP, O'Sullivan R. Simple aspiration versus intercostal tube drainage for primary spontaneous pneumothorax in adults. Cochrane Database Syst Rev. 2017 Sep 7;9(9):CD004479.

Objectives: **"To compare the clinical efficacy and safety of simple aspiration versus intercostal tube drainage for management of PSP [primary spontaneous pneumothorax]." (p. 5)**

Methods: **This systematic review and meta-analysis sought to include studies involving adult patients (18 years of age or older) with PSP who were randomized (or quasi-randomized) to initial management with simple aspiration or intercostal tube drainage. Only studies in which aspiration catheters were removed immediately after aspiration were included. The primary outcome was the immediate success of the procedure, as defined by individual study authors. Secondary outcomes included early failure, cost effectiveness, one-year success rates, adverse events, hospital utilization (ICU admission, length of stay), patient satisfaction, and dyspnea scores.**

The authors searched the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, and Embase in January of 2017. They also searched the World Health Organization International Clinical Trial Registry Portal (WHO ICTRP) and Clinicaltrials.gov for ongoing trials, the reference lists of included studies and primary publications, and raw data from published trials, and sought additional trials from clinical experts. Data were pooled using a random-effects model for all studies deemed similar enough to be pooled.

There were 2332 unique citations identified in the primary search with 99 citations identified by search of secondary sources. Of these, 11 potential studies were identified among 14 citations, one of which was ongoing. Of the 10 completed studies, 4 were deemed ineligible, leaving 6 studies in the final analysis comprising 435 participants. These studies were conducted in France, Kuwait, the UK, Singapore, Belgium, and the Netherlands.

Guide	Question	Comments
I	***Are the results valid?***	
1.	Did the review explicitly address a sensible question?	Yes. Management of spontaneous pneumothorax remains controversial. While guidelines from the British Thoracic Society recommend aspiration as first-line management of primary spontaneous pneumothorax in patients 50 years of age or younger, similar guidelines from the American College of Chest Physicians recommend either aspiration or chest tube placement. At our institution, chest tube placement is considered standard of care and typically recommended by our thoracic surgery colleagues. A review of the literature comparing outcomes with aspiration and chest tube placement would be beneficial to guide our management of these patients.
2.	Was the search for relevant studies detailed and exhaustive?	Yes. The authors searched multiple relevant clinical databases, including databases for ongoing studies. They searched reference lists and sought additional studies from experts. They did not search conference abstracts for unpublished data and did not search the grey literature.
3.	Were the primary studies of high methodological quality?	The overall quality of the studies appears to have been moderate. Understandably, none of the studies blinded patients or personnel, but also none of the studies blinded outcome assessors. The majority of the studies did not adequately report methods of sequence generation or allocation concealment, and did not repot sufficient data to adequately judge selective reporting.
4.	Were the quality assessments of the included studies reproducible?	Yes. Study quality was assessed six predefined characteristics (random sequence generation, allocation concealment, blinding or participants, blinding of outcome assessors, incomplete outcome data, selective reporting) and assessment of "other bias."
II.	***What are the results?***	
1.	What are the overall results of the study?	• There was a statistically significant difference in immediate success rates favoring chest tube drainage (RR 0.78, 95% CI 0.69 to 0.89; $I^2 = 0\%$). • There was no difference in early failure rate between simple aspiration and chest tube drainage (RR 1.24, 95% CI 0.91 to 1.68; $I^2 = 0\%$). • There was no difference between simple aspiration and chest tube drainage in one-year success rates (RR 1.07, 95% CI 0.96 to 1.18; $I^2 = 0\%$). • The authors were unable to pool results for adverse events due to differences in reporting between

		studies. There were no deaths reported in any study, and gross narrative reporting on adverse events shows no major differences between groups. ● There was no statistically significant difference between the two interventions regarding the need for hospital admission among 3 studies which reported on this outcome, though there was a trend toward decreased need for admission among patients undergoing simple aspiration (RR 0.60, 95% CI 0.25 to 1.47; $I^2 = 90.67\%$). ● Among 5 studies reporting hospital length of stay, this was significantly shorter among patients undergoing simple aspiration compared to chest tube drainage (mean difference -1.66 days, 95% CI -2.28 to -1.04; $I^2 = 0\%$). ● There was no difference in patient satisfaction (reported in one study) and no studies reported dyspnea scores.
2.	How precise are the results?	See above.
3.	Were the results similar from study to study?	Mostly yes. For most outcomes (early success rate, early failure rate, one-year success rate, and length of stay), I^2 values were 0%, suggesting a low degree of heterogeneity between studies. The I^2 value for need for hospitalization was 90%, suggesting a high degree of heterogeneity.
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?	Simple aspiration for primary spontaneous pneumothorax was associated with decreased immediate success rates when compared to chest tube drainage, with associated decrease in mean hospital length of stay of 1.66 days.
2.	Were all patient important outcomes considered?	Yes. The authors were unable to assess dyspnea scores as these were not measured in any of the included studies.
3.	Are the benefits worth the costs and potential risks?	Potentially. While aspiration was somewhat less likely to be immediately successful, it was nonetheless associated with decreased hospital length of stay. Shared decision making with the patient regarding the risk of failure with simple aspiration, and possible need for chest tube placement, but the potential to spend less time in the hospital would be useful to assess patient preferences and guide clinical management.

Limitations:

1. **This systematic review and meta-analysis was conducted in 2017 and included just over 400 patients. Since then, 3 additional randomized controlled trials have been conducted which include a total of nearly 600 patients. An update of this review, including these additional studies, would be helpful to guide therapeutic decisions.**

2. **The included studies were of moderate quality; there was no blinding of personnel, patients, or outcome assessors in any study and multiple issues with reporting of methodology and handling of incomplete data.**

3. **The authors did not search conference abstracts for unpublished data and did not search the grey literature (publication bias).**

Bottom Line:

This systematic review and meta-analysis comparing simple aspiration with chest tube placement for primary spontaneous pneumothorax included 6 studies with a total of 435 patients. The pooled results revealed that aspiration was associated with a lower initial success rate (as defined in the individual studies) with a relative risk of 0.78 (95% CI 0.69 to 0.89; $I^2 = 0\%$), but shorter overall length of hospital stay (mean difference -1.66 days, 95% CI -2.28 to -1.04; $I^2 = 0\%$).