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[Intervention Review]

Simple aspiration versus intercostal tube drainage for primary spontaneous pneumothorax in adults

Kristin V Carson-Chahhoud¹, Abel Wakai², Joep EM van Agteren³, Brian J Smith⁴, Grainne McCabe⁵, Malcolm P Brinn⁶, Ronan O'Sullivan^{7,8}

¹School of Health Sciences, The University of South Australia, Adelaide, Australia. ²Emergency Care Research Unit (ECRU), Division of Population Health Sciences (PHS), Royal College of Surgeons in Ireland (RCSI), Dublin 2, Ireland. ³College of Medicine and Public Health, Flinders University, Adelaide, Australia. ⁴Respiratory Medicine Unit, The Queen Elizabeth Hospital, Central Adelaide Local Health Network, Adelaide, Australia. ⁵Mercer Library, Royal College of Surgeons in Ireland, Dublin, Ireland. ⁶Habit Research Group, School of Public Health, The University of Queensland, Brisbane, Australia. ⁷Cork University Hospital, Cork, Ireland. ⁸National Children's Research Centre, Our Lady's Children's Hospital Crumlin, Dublin, Ireland

Contact address: Kristin V Carson-Chahhoud, School of Health Sciences, The University of South Australia, City East Campus, Frome Road, Adelaide, 5001, Australia. kristin.carson-chahhoud@unisa.edu.au.

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ABSTRACT

Background

For management of pneumothorax that occurs without underlying lung disease, also referred to as primary spontaneous pneumothorax, simple aspiration is technically easier to perform than intercostal tube drainage. In this systematic review, we seek to compare the clinical efficacy and safety of simple aspiration versus intercostal tube drainage for management of primary spontaneous pneumothorax. This review was first published in 2007 and was updated in 2017.

Objectives

To compare the clinical efficacy and safety of simple aspiration versus intercostal tube drainage for management of primary spontaneous pneumothorax.

Search methods

We searched the Cochrane Central Register of Controlled Trials (CENTRAL; 2017, Issue 1) in the Cochrane Library; MEDLINE (1966 to January 2017); and Embase (1980 to January 2017). We searched the World Health Organization (WHO) International Clinical Trials Registry for ongoing trials (January 2017). We checked the reference lists of included trials and contacted trial authors. We imposed no language restrictions.

Selection criteria

We included randomized controlled trials (RCTs) of adults 18 years of age and older with primary spontaneous pneumothorax that compared simple aspiration versus intercostal tube drainage.

Data collection and analysis

Two review authors independently selected studies for inclusion, assessed trial quality, and extracted data. We combined studies using the random-effects model.



Main results

Of 2332 publications obtained through the search strategy, seven studies met the inclusion criteria; one study was ongoing and six studies of 435 participants were eligible for inclusion in the updated review. Data show a significant difference in immediate success rates of procedures favouring tube drainage over simple aspiration for management of primary spontaneous pneumothorax (risk ratio (RR) 0.78, 95% confidence interval (CI) 0.69 to 0.89; 435 participants, 6 studies; moderate-quality evidence). Duration of hospitalization however was significantly less for patients treated by simple aspiration (mean difference (MD) -1.66, 95% CI -2.28 to -1.04; 387 participants, 5 studies; moderate-quality evidence). A narrative synthesis of evidence revealed that simple aspiration led to fewer adverse events (245 participants, 3 studies; low-quality evidence), but data suggest no differences between groups in terms of one-year success rate (RR 1.07, 95% CI 0.96 to 1.18; 318 participants, 4 studies; moderate-quality evidence), hospitalization rate (RR 0.60, 95% CI 0.25 to 1.47; 245 participants, 3 studies; very low-quality evidence), and patient satisfaction (median between-group difference of 0.5 on a scale from 1 to 10; 48 participants, 1 study; low-quality evidence). No studies provided data on cost-effectiveness.

Authors' conclusions

Available trials showed low to moderate-quality evidence that intercostal tube drainage produced higher rates of immediate success, while simple aspiration resulted in a shorter duration of hospitalization. Although adverse events were reported more commonly for patients treated with tube drainage, the low quality of the evidence warrants caution in interpreting these findings. Similarly, although this review observed no differences between groups when early failure rate, one-year success rate, or hospital admission rate was evaluated, this too needs to be put into the perspective of the quality of evidence, specifically, for evidence of very low and low quality for hospitalization rate and patient satisfaction, respectively. Future adequately powered research is needed to strengthen the evidence presented in this review.

PLAIN LANGUAGE SUMMARY

Simple aspiration versus intercostal tube drainage for primary spontaneous pneumothorax in adults

Why is this comparison important?

Air that collects between the lung and the chest wall (the pleural space) is described as a pneumothorax. A pneumothorax may be caused by trauma or lung disease, but sometimes it happens spontaneously and has no obvious cause. When this happens, the lungs cannot expand properly, making it difficult to breathe effectively. The person can become breathless and may have chest pain. It is important to treat the pneumothorax by removing collected air and allowing healing of the pleura - a thin membrane that covers the lungs and acts as a lining for them within the chest. For initial management when medical intervention is needed, air can be removed by drawing it out through a thin tube (simple aspiration), or by inserting a much larger chest tube into the space between the ribs (intercostal tube drainage).

How did we gather evidence for this comparison?

We searched the medical literature (January 2017) and identified seven studies that met the inclusion criteria; one study was ongoing and six studies were eligible for inclusion in the updated review.

What did we find?

The six included studies comprised a total of 435 participants with primary spontaneous pneumothorax; 208 of these underwent simple aspiration and 227 underwent intercostal tube drainage. Study results show that tube drainage produced a better rate of immediate treatment success when compared with simple aspiration for primary spontaneous pneumothorax. However, simple aspiration was associated with shorter duration of hospitalization and may have led to fewer adverse events. Researchers noted no significant differences between the two treatments with regard to hospitalization rate, early failure rate, one-year success rate, or patient satisfaction. However, the quality of evidence presented in this review ranged between very low and moderate, making it difficult for review authors to come to definitive conclusions.

Conclusions

Results of this review indicate that tube drainage has a better immediate success rate than simple aspiration for treating people with primary spontaneous pneumothorax. However, simple aspiration results in a shorter hospital stay and, although the evidence presented for this outcome is of low quality, may lead to fewer adverse events than are reported with tube drainage. The overall quality of evidence ranges from very low to moderate, and future research is needed to strengthen the evidence presented in this review.