SPONTANEOUS PNEUMOTHORAX
Supporting information

This guideline has been prepared with reference to the following:

Tschopp JM, Bintcliffe O, Astoul P et al. ERS task force statement: diagnosis and treatment of primary spontaneous pneumothorax. Eur Respir J. 2015;46:321-35

http://erj.ersjournals.com/content/46/2/321.long

MacDuff A, Arnold A, Harvey J. Management of spontaneous pneumothorax: British Thoracic Society pleural disease guideline 2010. Thorax 2010;65(Suppl 2):ii18-ii31

http://thorax.bmj.com/content/65/Suppl_2/ii18

Simple aspiration is successful in a high percentage of pneumothoraces?
A 2024 systematic review of RCTs (n=10, patients = 1044) concluded that the use of simple aspiration decreased the initial success rate but also decreased the duration of hospitalization and the need for operation compared with intercostal tube drainage [ITD] (Cheng, 2024). The incidence of adverse events did not differ between the two approaches. Compared with the ITD group, the simple aspiration group had a significantly lower the initial success rate of the procedure for the management of spontaneous pneumothorax (OR 0.63, 95% CI [0.47 to 0.86]). Moreover, simple aspiration was associated with a decreased duration of hospitalization (mean difference-2.05 days, 95% CI [-2.66 to -1.44]) and a decreased need for operation (P = 0.03). For frequently reported adverse events such as subcutaneous emphysema (P = 0.32), bleeding (P = 0.0.26) and wound infection (P = 0.07), no significant difference between the simple aspiration and ITD groups was found.
A 2017 systematic review of RCTs (n=7, patients=435) compared simple aspiration with ITD and found 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 (Carson-Chahhoud, 2017). The meta-analysis showed 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. 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).

Carson-Chahhoud KV, Wakai A, van Agteren JE et al. Simple aspiration versus intercostal tube drainage for primary spontaneous pneumothorax in adults. Cochrane Database Syst Rev. 2017 Sep 7;9:CD004479
https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD004479.pub3/full

Cheng J, Ma A & Liang G. Simple aspiration for spontaneous pneumothorax in adults: A systematic review and meta-analysis of randomized controlled trials. Am J Emerg Med. 2024:80:99-106

Evidence Level: I

There is a low recurrence rate of pneumothorax following successful aspiration?
A 2018 systematic review of 29 studies (13,548 patients) found the pooled 1-year and overall recurrence rates were 29.0% (95% CI 20.9 to 37.0%) and 32.1% (95% CI 27.0 to 37.2%), respectively (Walker, 2018). Female sex was associated with increased recurrence (OR 3.03, 95% CI 1.24 to 7.41), while smoking cessation was associated with a four-fold decrease in risk (OR 0.26, 95% CI 0.10 to 0.63).

Walker SP, Bibby AC, Halford P et al. Recurrence rates in primary spontaneous pneumothorax: a systematic review and meta-analysis. Eur Respir J. 2018;52:1800864

Evidence Level: II

The risk of worsening (further collapse) of a pneumothorax is higher in an aircraft (i.e. lower barometric pressure)?
A 2014 review found that reliable evidence was thin on the ground. The authors concluded that "pneumothorax and other forms of intrathoracic barotrauma related to air travel are rare. Patients with cystic lung diseases, recent pneumothorax or thoracic surgery, and chronic pneumothorax need

particular attention. The decision regarding air travel needs to be individualized by assessing risk based on specific disease-related issues and comorbidities while also taking into account patients' preferences and needs. Additional data are needed to better inform decisions regarding air travel for patients at risk for pneumothorax" (Hu et al, 2014).
A 2024 review concluded that "While the current recommendations from many major medical societies are that flight travel should be delayed until 1–2 wk after complete resolution of a pneumothorax, the best currently available evidence seems to disagree. Based on the evidence presented in this review, the current recommendations of waiting 1–2 wk after the resolution of a pneumothorax appears to be overly conservative. The recommendations of the Alaskan Native Medical Center, which gives flight clearance if a repeat chest x-ray 24–48 h after chest tube removal is stable seems like a reasonable approach to this question. However, these recommendations would be most appropriate for those otherwise healthy patients with adequate pulmonary reserve. For those patients with trouble oxygenating following their trauma or surgery, a different form of transportation may be beneficial" (Kashtan, 2024).

Hu X, Cowl CT, Baqir M et al. Air travel and pneumothorax. Chest. 2014;145:688-94
http://journal.publications.chestnet.org/article.aspx?articleid=1852898

Kashtan HW, Schulte SN & Connelly KS. Pneumothorax and Timing to Safe Air Travel. Aerosp Med Hum Perform. 2024;95:113-7

Evidence Level: IV

The underwater seal on a chest drain must be kept below the chest?
The seal must be below the level of the patient's chest in order to prevent air or water entering the patient's chest (Harriss, 1991). No outside air can enter the pleural cavity with inspiration because a negative pressure equal to the height of a column of water from the patient's bed to the floor would be required (Glotzer, 1971).

Glotzer DJ. Pseudopneumothorax with "underwater-seal" pleural drainage. N Engl J Med 1971;284:1388-9

Harriss DR, Graham TR. Management of intercostal drains. Br J Hosp Med 1991;45:383-6

Evidence Level: V

Clamping chest drain tubing when moving a patient is unnecessary?
Clamping is not recommended in UK guidelines (Miller, 1993) because it gives no advantage if the leak has stopped, whilst masking a possible deflated lung and subsequent tension pneumothorax if the leak is on-going. Without clamping, a continuing leak produces noticeable bubbling in the underwater drain (Miller, 1998). US practice differs, with guidelines authors believing that small air leaks may not cause obvious bubbling (Baumann, 1998), and that clamping for up to 4 hours is safe and effective (Baumann, 1997).

Baumann MH, Strange C. Treatment of spontaneous pneumothorax: the clinician's perspective on pneumothorax management. Chest 1998;113:1424-5
http://journal.publications.chestnet.org/data/Journals/CHEST/21750/822.pdf

Baumann MH, Strange C. Treatment of spontaneous pneumothorax: a more aggressive approach? Chest 1997;112:789-804
http://journal.publications.chestnet.org/data/Journals/CHEST/21750/789.pdf

Miller AC. Treatment of spontaneous pneumothorax: the clinician's perspective on pneumothorax management. Chest 1998;113:1423-4
http://journal.publications.chestnet.org/data/Journals/CHEST/21750/822.pdf

Miller AC, Harvey JE. Guidelines for the management of spontaneous pneumothorax. BMJ 1993;307:114-6
http://www.bmj.com/content/307/6896/114.full.pdf+html

Evidence Level: V

The risk of further episodes of pneumothorax increases with each recurrence?

A case control study in United States Air Force aircrew (Voge, 1986) found that 28% of men with a first spontaneous pneumothorax had a recurrence. Of that 28%, 23% had a second recurrence, but only 14% of that 23% had a third recurrence. The total recurrence rate was 35%.
An earlier study (Ruckley, 1966) found that risk of recurrence increased from 57% after a first, 62% after a second, to 83% after a third.

Ruckley CV, McCormack RJ. The management of spontaneous pneumothorax. Thorax 1966;21:139-44
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1673302/pdf/brmedj01450-0012a.pdf

Voge VM, Anthracite R. Spontaneous pneumothorax in the USAF aircrew population: a retrospective study. Aviat Space Environ Med 1986;57:939-49

Evidence Level: IV

Last amended September 2025
Last reviewed January 2026