



Case report

Should patients be advised not to fly post thoracentesis?

S. Walker^{a,*}, N. Smith^{b,1}^a Nevill Hall Hospital, Brecon Road, Abergavenny NP7 7EG, UK^b Respiratory Department, Wellington Regional Hospital, Private Bag 7902, Wellington 6242, New Zealand

A B S T R A C T

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Air travel poses a risk to patients with a pneumothorax due to in-flight pressure changes and guidance is available providing advice on air travel in patients with a pneumothorax. Pneumothorax is a recognised complication of pleural thoracentesis, however chest radiographs have been shown to have limited sensitivity in diagnosing pneumothoraces and small pneumothoraces may not be recognised. There is, therefore a risk post thoracentesis, of exacerbating an unrecognised pneumothorax by air travel. This case outlines the presentation of a 55 year old lady, with a normal chest radiograph after an uncomplicated simple needle aspiration for a pleural effusion, who developed a large pneumothorax during air travel.

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Case

A 55 year old woman presented to the pleural disease clinic, with a unilateral left pleural effusion, detected incidentally on a CT abdomen performed for pancreatitis 4 months prior. She was asymptomatic, however there was concern this could be an infected collection, so a diagnostic aspiration was performed, under bedside ultrasound guidance, using a 22 gauge needle, with a single pass. The tap was slightly blood-stained, however no air was aspirated and the patient remained asymptomatic throughout. She had a routine post procedural chest x-ray 20 min later, which showed no pneumothorax. She was booked into clinic the following week to discuss the results.

In bed, 11 h later, she developed some mild inspiratory chest pain. The following morning she travelled by commercial airline on a 55 min domestic flight. During the flight the pain increased in severity and she developed some mild dyspnoea. She attended the local hospital, where she was diagnosed with a large pneumothorax, had a chest drain inserted, which remained in place for 5 days. Follow-up x-ray showed complete resolution (Pictures 1 and 2).

The pleural fluid was transudative, and considered to be a reactive effusion, secondary to her previous colitis.

Discussion

There is no guidance on what air travel advice should be given to patients following uncomplicated thoracentesis. However, as this case demonstrates, these patients may have a silent slow air leak, which could be exacerbated by air travel.

Current guidelines focus on patients with a known pneumothorax, with recommendations that patients should be made aware of the danger of air travel in the presence of a current closed pneumothorax and should be cautioned against commercial flights at high altitude until full resolution has been confirmed by a chest X-ray. Previously many commercial airlines arbitrarily advised a 6-week interval between the pneumothorax event and air travel, but this has since been amended to a period of 1 week after full resolution.

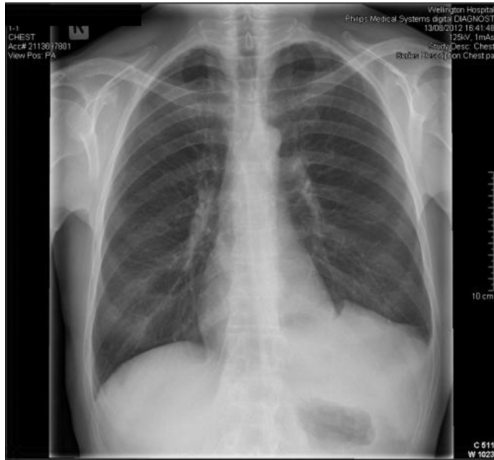
Air travels poses a risk to patients with a pneumothorax due to pressure changes. As altitude increases, barometric pressure decreases exponentially. This is limited to an extent by cabin pressurization, which on commercial airlines is usually adjusted to be equivalent to the barometric pressure found at an altitude of 1500–2500 m above sea level.

This drop in barometric pressure, as well as decreasing the partial pressure of arterial oxygen (from about 95 mm Hg to about 56 mm Hg in healthy passengers), will affect the volume of pneumothorax.

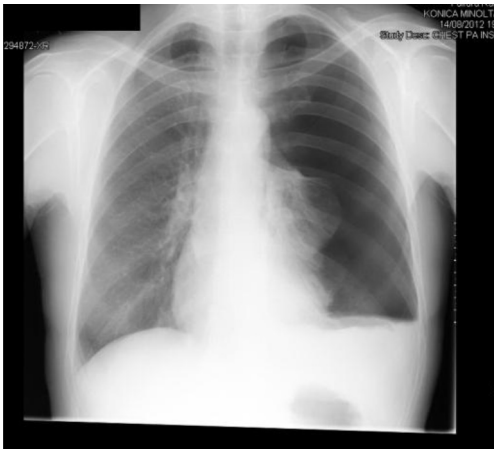
Boyle's law states that the volume of a gas is inversely proportional to the pressure to which it is exposed. Thus, as barometric pressure falls in the aircraft cabin during the ascent, trapped air in the pleural cavity will expand. A cabin pressure equivalent to the

* Corresponding author. Tel.: +44 01873 732732.

E-mail addresses: stevenwalker@doctors.org.uk, stevenwalker@yahoo.co.uk (S. Walker), nicola.smith@ccdhb.org.nz (N. Smith).¹ Tel.: +64 44 3855999.



Picture 1. No visible pneumothorax on CXR 20 min post-procedure.



Picture 2. Large pneumothorax 25 h later, post air travel.

pressure at an altitude of 1500 m results in expansion of air or gas volume by up to 30 per cent [1].

The overall risk of pneumothorax post thoracentesis is 6.0% [2]. Pneumothorax is more likely following therapeutic thoracentesis (OR, 2.6; 95% CI, 1.8–3.8) or in conjunction with periprocedural symptoms (OR, 26.6; 95% CI, 2.7–262.5) [2].

The risk in asymptomatic patients is lower with several studies showing low rates in situations where a pneumothorax is not expected. In study of 278, of the 15 patients in whom the physician suspected a post-procedure pneumothorax, nine were

subsequently found to have a pneumothorax, all of which had air aspirated during procedure. Of the patients not suspected to have a pneumothorax only 2.3–3.3% were subsequently found to have one, and all of these cases used a vacuum bottle to aspirate the pleural effusion [3]. In another study of 178 patients, 3 of the 8 pneumothoraces that occurred were unsuspected, and only one of these required intervention [3]. A prospective cohort study showed that only 1% (5 of 488) of asymptomatic patients had a pneumothorax on post thoracentesis chest radiograph, with one requiring chest tube drainage [4].

Accordingly the BTS guidelines on pleural procedures (2010) recommended that a chest X-ray after a simple pleural aspiration is not required unless air is withdrawn, the procedure is difficult, and multiple attempts are required or the patient becomes symptomatic [3].

Chest X-ray has been shown to have limited sensitivity in diagnosing pneumothorax. A meta-analysis of 20 studies, in patients with traumatic pneumothoraces, showed a sensitivity and specificity of 0.52 and 1.00, respectively, for chest radiograph, as compared to CT [5]. There has been no study which has looked at the incidence on pneumothoraces post pleural procedure on CT, i.e. the true rate of post-procedure pneumothorax.

Conclusion

The rate of unsuspected pneumothorax post pleural aspiration is low. However, it is possible for an iatrogenic pneumothorax cause by aspiration not to be detected on CXR, especially if the CXR is done shortly after the procedure and with no studies to show true incidence of iatrogenic pneumothorax on CT, the actual incidence will be higher. Most of these pneumothoraces are small and would not require management, but as this case shows, air travel may exacerbate the size and symptomatology of the pneumothorax.

We suggest that patients who have undergone a thoracentesis should be made aware of the risks and advised against air travel for one week.

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