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Pneumothorax and Air Travel

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Abstract

Presentation

A 44-year-old male presented with acute onset of right sided chest discomfort and dyspnoea, on a background of a previous left sided pneumothorax

Diagnosis

A right sided pneumothorax was seen on chest radiograph. Subsequent CT imaging demonstrated presence of subpleural blebs.

Treatment

He underwent a right VATs bullectomy and pleurectomy for definitive management with an uncomplicated recovery. He flew to Florida less than two weeks later.

Conclusion

This case highlights a personalised approach to the management of pneumothorax and provides evidence for safe air travel post definite treatment.

Introduction

Pneumothorax is defined as air in the pleural space and is commonly categorised as spontaneous or traumatic. Spontaneous pneumothoraces are further categorised as primary (PSP) or secondary (SSP), depending on whether underlying lung disease is present. Worldwide, PSP has an annual incidence rate of 7.4 per 100,000 in males, with smoking being the most important risk factor. [1] Air travel poses a risk to patients with a closed pneumothorax due to in-flight pressure changes. During ascent, altitude increases with a fall in ambient barometric pressure, which (as per Boyles law) at typical cruising altitudes can cause expansion of gas within the pleural cavity by 25-38%. In a closed untreated pneumothorax, this may result in symptoms, tension pneumothorax or death. [2, 3]

Case Report

A 44-year-old male current smoker (22 pack-years) presented with acute onset of right-sided chest discomfort and dyspnoea. He was due to fly to Florida (USA) in three weeks' time. His background history was significant for a left-sided PSP occurring 20 years previous while on holidays in Spain, which was treated with chest drain drainage, followed by air ambulance repatriation.

On admission, the examination was notable for an elevated respiratory rate (24 b/min) and oxygen saturation of 92% on room air. Reduced air entry was noted on the right. Chest x-ray showed a large right-sided pneumothorax. An 18 French chest drain was inserted via Seldinger technique with partial re-expansion. A prolonged air leak prompted a computed tomography (CT) of the thorax (Figure 1), which demonstrated subpleural blebs (Figure 1, asterisk).

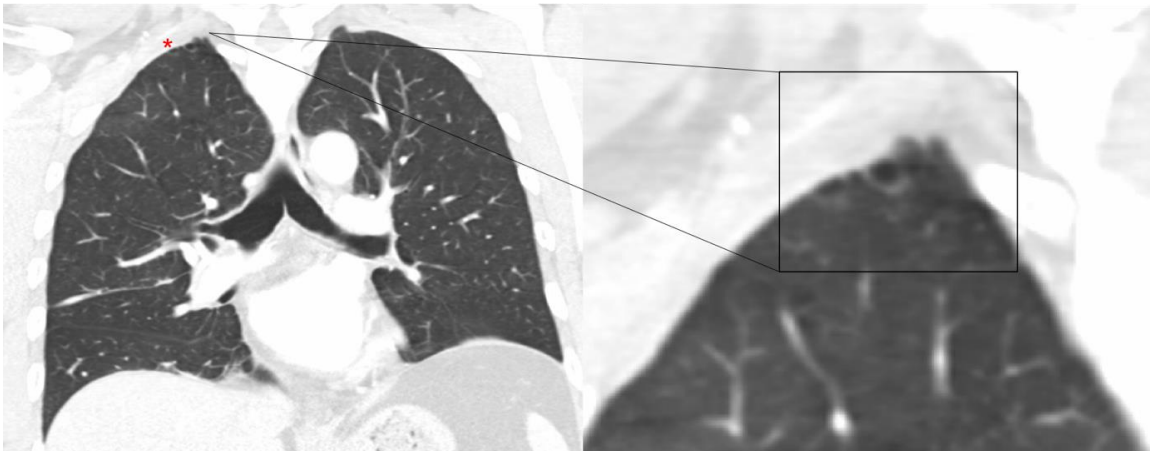

Figure 1. On coronal sections of a computed tomography (CT) thorax, subpleural blebs were noted (red asterisk). A magnified view of the subpleural blebs are also shown (black box).

He proceeded to right video assisted thoracoscopic surgery (VATS) bullectomy and pleurectomy (Figure 2). Histology demonstrated subpleural emphysematous change, subpleural bulla formation and background respiratory bronchiolitis. He was discharged on day 10 and flew to Florida without any complications, two weeks later.

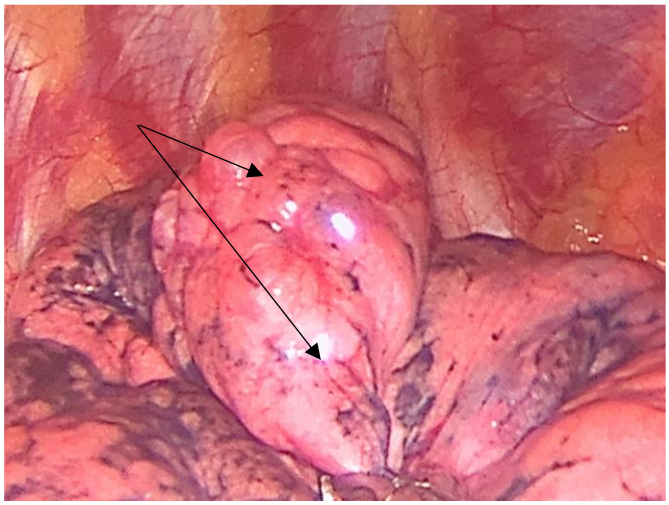

Figure 2. Intraoperative imaging of subpleural blebs (arrows).

Discussion

Diverse treatment options, variable clinical guidance [4, 5] and consideration of the morbidity and mortality risks of a potential recurrence [6] have led to a heterogeneous approach to pneumothorax management. Moreover, management is now personalised and principally informed by risk of recurrence, which is dependent on patient factors, radiological findings [4-7] and by presence or absence of an air leak. [6]

Risk factors for pneumothorax recurrence include; history of pneumothorax, smoking, blebs/bullae on CT and large initial size. [5-8] Management with oxygen therapy, observation, aspiration or chest tube placement maybe therapeutic but will not prevent recurrence. In this case, the patient proceeded directly to chest drain insertion and surgical intervention. The rationale was based on a high risk of recurrence and planned air travel necessitating definitive intervention.

Definite surgical options include thoracotomy and VATS. Surgery is indicated for patients presenting with a second ipsilateral PTX, first contralateral PTX (this case) or a persistent air leak (3-5 days). [4] Optimal surgical management differs between surgeons and institutions. VATS is associated with less pain and a shorter hospital stay. [9] However, a systematic review found a four-fold increase in recurrence rates of pneumothorax when surgery is undertaken with a VATS approach compared with an open thoracotomy, which needs consideration when deciding on optimal treatment. [10]

CT is the gold standard radiological investigation for the work up of pneumothorax. [1] On CT, a bleb appears as a thin-walled cystic air space contiguous with the pleura. [8] Blebs are found in up to 85% of patients with a PSP. [8] CT is useful in the preoperative period as it allows identification of emphysematous bullae/blebs appropriate for surgical intervention and can guide care. Blebs/bullae are known risk factors for recurrence [8] and increasingly CT confirms evidence of lung abnormalities in patients with PSP, which may help stratify patients as high risk of recurrence who may benefit from definitive treatment. [6]

Air travel post resolution or definitive treatment of a pneumothorax is now considered safe. [3] However, the optimal length of time to wait after resolution of a pneumothorax is not known. [2, 3] Nonetheless post definitive surgical intervention, the risk of recurrence is small. [10] The decision to travel should be individualised, considering the presence of underlying lung disease, type of treatment, patient preference, CT findings and more recent evidence suggesting that flying within 2 weeks is safe. [2-4]

In conclusion, this case highlights a personalised approach to the management of PSP, identifies risk factors for recurrence, illustrates causative aetiology, explores the role of CT and adds supportive evidence for safe air travel within two weeks of definitive management.

Declaration of Conflicts of Interest:
The authors declare no conflicts of interest in preparing this article.

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References:

1. Sahn SA, Heffner JE. Spontaneous pneumothorax. N Engl J Med. 2000;342(12):868-74.
2. Hu X, Cowl CT, Baqir M, Ryu JH. Air travel and pneumothorax. Chest. 2014;145(4):688-94.
3. Ahmedzai S, Balfour-Lynn IM, Bewick T, Buchdahl R, Coker RK, Cummin AR, et al. Managing passengers with stable respiratory disease planning air travel: British Thoracic Society recommendations. Thorax. 2011;66 Suppl 1:i1-30.
4. MacDuff A, Arnold A, Harvey J. Management of spontaneous pneumothorax: British Thoracic Society Pleural Disease Guideline 2010. Thorax. 2010;65 Suppl 2:ii18-31.
5. Baumann MH, Strange C, Heffner JE, Light R, Kirby TJ, Klein J, et al. Management of spontaneous pneumothorax: an American College of Chest Physicians Delphi consensus statement. Chest. 2001;119(2):590-602.
6. Bintcliffe OJ, Hallifax RJ, Edey A, Feller-Kopman D, Lee YC, Marquette CH, et al. Spontaneous pneumothorax: time to rethink management? Lancet Respir Med. 2015;3(7):578-88.
7. Walker SP, Bibby AC, Halford P, Stadon L, White P, Maskell NA. Recurrence rates in primary spontaneous pneumothorax: a systematic review and meta-analysis. Eur Respir J. 2018;52(3).
8. Casali C, Stefani A, Ligabue G, Natali P, Aramini B, Torricelli P, et al. Role of blebs and bullae detected by high-resolution computed tomography and recurrent spontaneous pneumothorax. Ann Thorac Surg. 2013;95(1):249-55.
9. Sedrakyan A, van der Meulen J, Lewsey J, Treasure T. Video assisted thoracic surgery for treatment of pneumothorax and lung resections: systematic review of randomised clinical trials. Bmj. 2004;329(7473):1008.
10. Barker A, Maratos EC, Edmonds L, Lim E. Recurrence rates of video-assisted thoracoscopic versus open surgery in the prevention of recurrent pneumothoraces: a systematic review of randomised and non-randomised trials. Lancet. 2007;370(9584):329-35.