Epidemiology of pneumothorax – finally something solid out of thin air

R J Hallifax, N M Rahman

Pneumothorax is a common pathology. Primary spontaneous pneumothorax (PSP) conventionally refers to patients with no underlying lung disease, while those with established lung pathology are classified as secondary spontaneous pneumothorax (SSP). Commonly quoted estimates of incidence of spontaneous pneumothoraces are based on studies that are often many years old and from single centres 45 years ago in the USA[1] and 30 years ago in Sweden:[2] with a reported overall incidence of 18–24 per 100 000 cases per annum for men and 1.2–6 per 100 000 for women and that of PSP as 7.4–18 cases (age-adjusted incidence) and 1.2–6 cases per 100 000 population per year for men and women, respectively.[1 2] More recently, Gupta *et al*[3] published the largest epidemiological dataset based on General Practice Research Database and Hospital Episode Statistics over 4 years in the UK. Mortality data were based on the Office of National Statistics data from 1950 to 1997 for all deaths from pneumothorax.[3] The combined hospital admission rates for PSP and SSP in this study were 16.7 per 100 000 for men and 5.8 per 100 000 for women, with corresponding mortality rates of 1.26 per million and 0.62 per million per annum.[3] There have been no large-scale epidemiological publications since, with most subsequent data being case series based.

Into this void, in *Thorax*, Bobbio *et al*[4] present 4 years' data (2008–2011) from the French national dataset: "Programme de Médicalisation des Systèmes d'Information". Based upon nearly 60 000 hospital admission episodes, this represents the largest epidemiological study of pneumothorax to date, and the authors should be congratulated on this large piece of precise epidemiological work. The authors report an annual rate of pneumothorax of 22.7 per 100 000 population, with a male-to-female ratio of 3.3:1, consistent with previous studies. A lack of seasonality to pneumothorax admissions was once again observed.[4]

One striking finding was a relative lack of SSP (14% of all spontaneous pneumothoraces). Previous data would lead us to expect up to 50% SSP.[1 5 6] The International Coding and Diagnostics codes, routinely used in epidemiological data, do not distinguish between these two types of pneumothorax and therefore rely on comorbidities also being coded. The authors state that financial incentives 'favours adequate reporting of comorbidities'. Two peaks of incidence for spontaneous pneumothorax 20–30 years and >55 years old were seen in the previous UK data;[3] the latter peak assumed to be due SSP. These data from France show a similar initial peak at around 20 years but are followed by a gradual decline in incidence, with a markedly less pronounced peak in later life. One reason that the two graphs of incidence look different could be that Gupta *et al*[3] plot incidence rate (per million) while Bobbio *et al*[4] plot 'percentage' (presumably of total). Patients with SSP were more likely to be treated on a surgical ward, require surgical intervention or require an intensive or intermediate care unit.[4] This seems contrary to the fact that, by definition, patients with SSP have greater comorbidity[3 7] and would be less likely to be fit for surgery. These findings could be due to differing populations, differing medical and surgical practice between countries or simply differing coding techniques, but as yet is not fully explained. The necessary methodology employed by the authors in conducting this important study does not allow us to differentiate these factors. It may be that the somewhat arbitrary separation between primary and secondary pneumothorax should now be reconsidered, and in its place a more risk-stratified model assessing initial risk of prolonged air leak, and then risk of recurrence over a clinically meaningful timeframe. Data do not exist to allow this currently, but this should be an area of future research to allow more refined treatment.

Recurrence rates for PSP are often quoted as approximately 30%,[8] but individual studies report a wide range of estimates of 17% and 49%.[8–10] Accurate data on SSP are more scarce, but recurrence rates may be comparable to PSP.[7 11] Bobbio *et al*[4] report that 28% of patients had more than one pneumothorax-related hospital stay over the 4 years, although their data would suggest that 'rehospitalisations' were as high as 49% (48% in PSP, 52% in SSP)—it is unclear how these two statements tally. Nevertheless, these high rates once again raise the controversial topic of whether intervention is justified at first presentation. Current international guidelines only advocate surgical intervention at second occurrence or on ongoing/non-resolving air leak.[12–14] However, opinions vary,[15 16] with thoracic surgeons being more likely to advocate management of first occurrence with surgical pleurodesis.[15] Two review articles suggested that initial video-assisted thoracic surgery for PSP may be beneficial from cost-effectiveness and quality-of-life perspectives: increased cost being offset by reducing length of stay, as well as recurrence rate.[17 18] More recently, a randomised controlled trial compared pleurodesis (using minocycline) to chest tube drain drainage alone for medically managed patients with first episode of PSP found a significant reduction in recurrence rates (29% vs 49%) at 1 year.[9]

The absence of clear information on incidence, recurrence rate and natural history has hampered the development of more up-to-date, precise and patient-tailored guidelines, which itself may lead to a 'one size fits all' treatment approach. The data published in *Thorax* are much needed—and confirm the clinical view that pneumothorax remains an important clinical entity. This is perhaps more the case when one considers that the typical 'primary' pneumothorax patient will suffer absence from work and loss of productivity from their illness, and treatment of these patients on a general ward requiring intercostal drainage and hospital admission may seem archaic. The majority of patients with PSP are younger with fewer comorbidities,[3 7] who could, if haemodynamically stable, potentially be managed on an ambulatory outpatient pathway, rather than remain as an inpatient until their pneumothorax resolves. At present, there exists no high-quality prospective data to support safe ambulatory management, nor a predictive model to determine which patients will resolve spontaneously, who will require surgical intervention and which patients will have recurrence. Risk stratification of

Oxford Respiratory Trials Unit, University of Oxford, Churchill Hospital, Oxford, UK

Correspondence to Dr R J Hallifax, Oxford Respiratory Trials Unit, University of Oxford, Churchill Hospital, Oxford OX3 7LJ, UK; robhallifax@yahoo.com

patients at baseline may help identify subgroups at higher risk of recurrent pneumothorax who would benefit from early intervention to prevent recurrence.

Provenance and peer review Commissioned; internally peer reviewed.

To cite Hallifax RJ, Rahman NM. *Thorax* 2015;**70**:921–922.

Published Online First 16 July 2015

► http://dx.doi.org/10.1136/thoraxjnl-2014-206577

Thorax 2015;**70**:921–922.
doi:10.1136/thoraxjnl-2015-207438

REFERENCES

1 Melton LJ, Hepper NGG, Offord KP. Incidence of spontaneous pneumothorax in Olmsted County, Minnesota: 1950 to 1974. *Am Rev Respir Dis* 1979;102:1379–82.
2 Bense L, Eklund G, Wiman LG. Smoking and the increased risk of contracting spontaneous pneumothorax. *Chest* 1987;92:1009–12.
3 Gupta D, Hansell A, Nichols T, *et al*. Epidemiology of pneumothorax in England. *Thorax* 2000;55:666–71.
4 Bobbio A, Dechartres A, Bouam S, *et al*. Epidemiology of spontaneous pneumothorax: gender-related differences. *Thorax* 2015;70:653–8.
5 Weissberg D, Refaely Y. Pneumothorax: experience with 1,199 patients. *Chest* 2000;117:1279–85.
6 Primrose WR. Spontaneous pneumothorax: a retrospective review of aetiology, pathogenesis and management. *Scott Med J* 1984;29:15–20.
7 Tanaka F, Itoh M, Esaki H, *et al*. Secondary spontaneous pneumothorax. *Ann Thorac Surg* 1993;55:372–6.
8 Schramel FM, Postmus PE, Vanderschueren RG. Current aspects of spontaneous pneumothorax. *Eur Respir J* 1997;10:1372–9.
9 Chen JS, Chan WK, Tsai KT, *et al*. Simple aspiration and drainage and intrapleural minocycline pleurodesis versus simple aspiration and drainage for the initial treatment of primary spontaneous pneumothorax: an open-label, parallel-group, prospective, randomised, controlled trial. *Lancet* 2013;381:1277–82.
10 Massongo M, Leroy S, Scherpereel A, *et al*. Outpatient management of primary spontaneous pneumothorax: a prospective study. *Eur Respir J* 2014;43:582–90.
11 Shields TW, Oilschlager GA. Spontaneous pneumothorax in patients 40 years of age and older. *Ann Thorac Surg* 1966;2:377–83.
12 MacDuff A, Arnold A, Harvey J, BTS Pleural Disease Guideline Group. Management of spontaneous pneumothorax: British Thoracic Society Pleural Disease Guideline 2010. *Thorax* 2010;65(Suppl 2):ii18–31.
13 Baumann MH, Strange C, Heffner JE, *et al*, AACP Pneumothorax Consensus Group. Management of spontaneous pneumothorax: an American College of Chest Physicians Delphi consensus statement. *Chest* 2001;119:590–602.
14 De Leyn P, Lismonde M, Ninane V, *et al*. Guidelines Belgian Society of Pneumology. Guidelines on the management of spontaneous pneumothorax. *Acta Chir Belg* 2005;105:265–7.
15 Baumann MH, Strange C. The clinician's perspective on pneumothorax management. *Chest* 1997;112:822–8.
16 Janssen JP, Cuesta MA, Postmus PE. [Treatment of spontaneous pneumothorax: survey among Dutch pneumonologists]. *Ned Tijdschr Geneeskd* 1994;138:661–4.
17 Chambers A, Scarci M. In patients with first-episode primary spontaneous pneumothorax is video-assisted thoracoscopic surgery superior to tube thoracostomy alone in terms of time to resolution of pneumothorax and incidence of recurrence? *Interact Cardiovasc Thorac Surg* 2009;9:1003–8.
18 Morimoto T, Fukui T, Koyama H, *et al*. Optimal strategy for the first episode of primary spontaneous pneumothorax in young men. A decision analysis. *J Gen Intern Med* 2002;17:193–202.