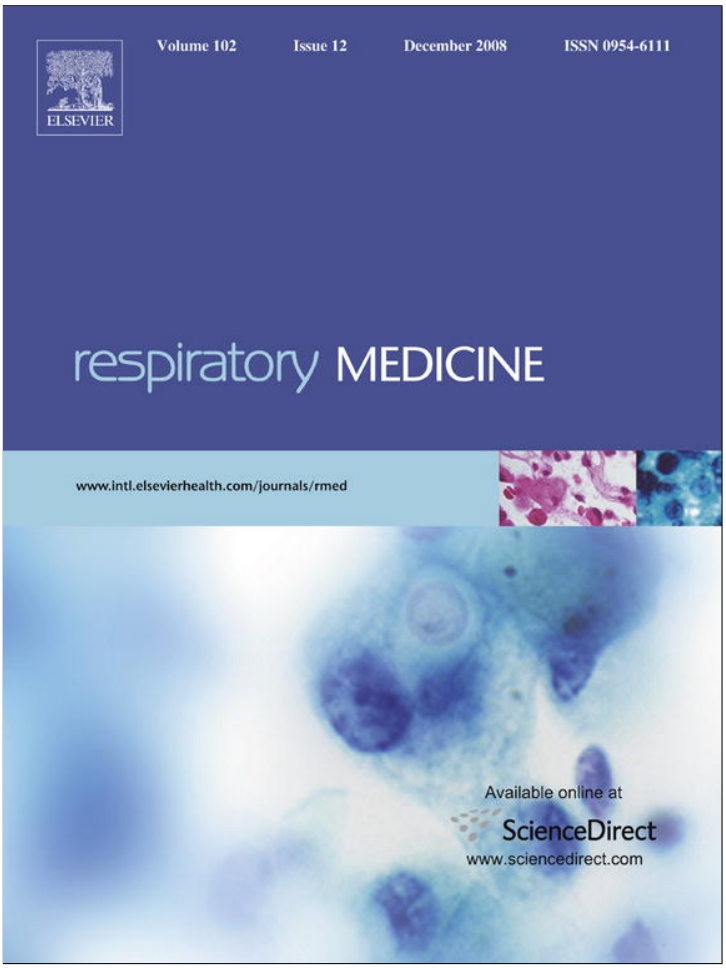

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SHORT COMMUNICATION

Comparison of size classification of primary spontaneous pneumothorax by three international guidelines: A case for international consensus?

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Summary
Objective: The aim of this study was to compare classification of pneumothoraces into size groups for treatment using the British Thoracic Society [BTS], American College of Chest Physicians [ACCP] and Belgian Society of Pulmonology [BSP] guidelines and the range of pneumothorax sizes in each group calculated using the volumetrically-derived Collins' method.
Method: This was a retrospective cohort study. Participants were patients with primary spontaneous pneumothorax [PSP] attending emergency departments of two teaching hospitals between 1996 and 2005. Participants were identified from a pre-existing database. Data collected included demographics, side of PSP and interpleural distances for size classification based on BTS, ACCP, BSP and Collins' method requirements measured on inspiratory X-rays. The outcome of interest was comparison of classification into size groups according to each guideline. Analysis was by descriptive statistics, overall agreement and Kappa analysis for agreement between guideline pairs.
Results: Forty-nine episodes [44 patients] were studied. Median age was 22 years; 66% of patients were male. Median PSP size [Collins' method; inspiratory films] was 24%; range 5–100%. Based on inspiratory films, the BTS guideline classified 10% of PSP as large compared with 47% by the BSP guideline and 49% by the ACCP guideline. The three guidelines agreed in their classification in only 47% of cases.
Conclusion: Size classification of PSP based on available treatment guideline definitions shows poor agreement. This goes some way to explain management variation between regions and limits comparability of reported outcomes. There is a strong case for international agreement

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in size classification/estimation in order to facilitate high-quality studies into optimal management approaches.

Introduction

Primary spontaneous pneumothorax [PSP] is an uncommon condition affecting otherwise well, usually young people. Management options include observation, aspiration, thoracostomy drainage [with traditional or small bore catheters] and surgery.[1] There are three guidelines developed by expert professional groups for management of PSP available in the international literature: the British Thoracic Society [BTS] guideline[2] [also adopted by Australia], the American College of Chest Physicians [ACCP] guideline[3] and the guideline of the Belgian Society of Pulmonology [BSP].[4] For clinically compromised patients, all agree that drainage is required. For clinically well patients, each bases its recommendations on pneumothorax size, dividing PSP into 'small' and 'large', however, they use different methods to define size groups. They agree that small PSP can usually be managed conservatively but differ in their recommendations for large PSP [Table 1].

The aim of this study was to compare classification of pneumothoraces into size groups using the three guidelines and the range of pneumothorax sizes in each group calculated using the volumetrically-derived Collins' method.[5]

Methods

This was a sub study of a retrospective cohort study undertaken to compare size variation between expiratory and inspiratory X-rays in a cohort of adult patients with PSP. Participants were identified from a pre-existing database of patients treated for PSP at two metropolitan teaching hospital emergency departments [ED] between 1996 and 2005. Patients for whom matched inspiratory and expiratory initial X-rays could not be found were excluded.

Data collected included demographics, side of PSP and interpleural distances for size classification based on BTS, ACCP, BSP and Collin's method requirements. Inspiratory and expiratory X-rays were independently measured by two trained researchers [one clinician and one research assistant] in random order. The average of their measurements at each measurement location was taken as the true value.

The outcome of interest was comparison of classification into size groups [upon which treatment is recommended] according to each guideline. Secondary outcomes were the size ranges calculated by Collins' method for the size groups in each classification.

Analysis is by descriptive statistics, overall agreement and Kappa analysis for agreement between guideline pairs. Agreement in measurement by data collectors was evaluated by intraclass correlation. The study was approved under the NHMRC [Australia] quality assurance project guidelines.

Results

Forty-nine episodes of PSP in 44 patients were studied. Median age was 22 years [IQR 19—29] and 66% of patients were male. 71% of PSP were on the left side. Median PSP size on inspiratory films was 24% [IQR 14—31%, range 5—100%] and on expiratory films 37% [IQR 26—40%, range 5—100%]. Intraclass correlation for measurements between the data collectors was 0.961.

The proportion of PSP classified as large according to each guideline and the corresponding estimated PSP size are shown in Tables 2 and 3. The guidelines agreed in their classification in 23 cases on inspiratory films [47%] and in 18 cases [37%] on expiratory films. Pair-wise Kappa for agreement on inspiratory films was BTS vs ACCP 0.21, BTS vs BSP 0.23 and ACCP vs BSP 0.39. Pair-wise Kappa for agreement on expiratory films was BTS vs ACCP 0.04, BTS vs BSP 0.21 and ACCP vs BSP 0.49.

Discussion

There have been few changes to the management of PSP in recent decades and the evidence base for current management strategies, in particular the use of thoracostomy tube drainage and the limited use of conservative management, is being challenged.[6,7] There is a dearth of

Table 1 Comparison of guideline definitions of 'large' pneumothorax

Guideline	Definition of large PSP	Recommended initial treatment strategy
BTS[2]	Presence of a visible rim of 2 cm between lung and chest wall	Aspiration
ACCP[3]	More than 3 cm apical interpleural distance	Intercostal catheter drainage
BSP[4]	Pleural gap along the entire length of the lateral chest wall	Aspiration or small bore catheter thoracostomy drainage

Table 2 Comparison of guideline classifications regarding size of PSP

Guideline	% of PSP defined as 'large' [*N*]	Size of PSP defined as 'large': median, IQR, range
BTS[2]	10 [5/49]	95%, 81—100%, 45—100%
ACCP[3]	49 [24/49]	31%, 28—58%, 21—100%
BSP[4]	47 [23/49]	31.5%, 28—51%, 12—100%

Table 3 Comparison of guideline classifications regarding size of PSP on expiratory films

Guideline	% of PSP defined as 'large' [*N*]	Size of PSP defined as 'large': median, IQR, range
BTS[2]	14 [7/49]	100%, 71—100%, 43—100%
ACCP[3]	63 [31/49]	40%, 36—56%, 23—100%
BSP[4]	59 [29/49]	41%, 36—55%, 23—100%

high-quality studies to inform the debate. One of the problem points is that specialist groups from different international regions have adopted different methods, each based on measurements of X-rays and their assumed relationship with PSP volume, to classify patients into size groups to guide treatment decisions. But is what is classified as a 'small' PSP the same between regions? Lack of comparability challenges comparisons of reported outcomes. It also poses a threat to international multicentre randomised trials.

This study found poor agreement between the BTS, ACCP and BSP size classification methods for PSP. This is the first such direct comparison. Even for the ACCP and BSP methods, that have similar median PSP size and proportion classified as 'large', the classification agreement was poor. This implies that comparison between outcomes of patients with 'large' or 'small' PSP classified under the different guidelines are not comparing like groups. Further it implies that integration of studies [eg for reviews, meta-analyses] using the different classification methods is seriously flawed. This is a real challenge to the progress of research in PSP management and makes a strong case for international agreement on this issue.

An interesting finding from this study is that the PSP classified as 'large' by the BTS guideline had a median size of 95% on inspiratory films with a range of 45—100%. Looking at the justification for the BTS size cut-off, it uses the Light method[8] which assumes that the volume of the lung and of the hemithorax are roughly proportional to the cube of their diameters. The BTS guideline authors chose the 2 cm rim as being roughly equivalent to 50% PSP volume. Recently the Light method has been reported to be inaccurate, under-estimating pneumothorax size particularly for moderate and large pneumothoraces.[9] Based on inspiratory films, the BTS guideline identified 5 of 8 cases [63%] where the calculated PSP size was more than 50%.

This study has some limitations that should be considered when interpreting the results. It is a relatively small sample from a single health service so generalisability is not assured. Participants were identified from a patient management database so miscoding could have resulted in missed cases. Only patients for whom matched inspiratory and expiratory X-rays at presentation could be located were included in this sub study. Although this potentially introduces an element of bias, the bias is not systematic and thus unlikely to materially impact the findings.

Conclusion

Size classification of PSP based on available treatment guideline definitions shows poor agreement. This goes some way to explain management variation between regions and limits comparability of reported outcomes. There is a strong case for international agreement in size estimation in order to facilitate comparable high-quality studies into optimal management approaches.

Conflict of interest statement

The authors have no conflicts of interest.

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Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.rmed.2008.07.026.

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