

Graham L Hall, Peter J Franklin, Catherine Gangell, Stephen M Stick, School of Paediatric and Child Health, University of Western Australia, Perth, Australia

Peter D Sly, Takayoshi Fukushima, Mercè M Kusel, Hilary Patterson, Stephen M Stick, Telethon Institute for Child Health Research, Centre for Child Health Research, University of Western Australia, Perth, Australia

This study was funded by the National Health and Medical Research Council, Australia, Department of Education, Western Australia, Austrian National Fund and the Asthma Foundation WA. The study sponsors had no involvement in the collection, analysis, and interpretation of data; in the writing of the report; or in the decision to submit the paper for publication.

Competing interests: None.

REFERENCES

- Oostveen E, MacLeod D, Lorino H, et al. The forced oscillation technique in clinical practice: methodology, recommendations and future developments. *Eur Respir J* 2003;**22**:1026–41.
- Pellegrino R, Viegi G, Brusasco V, et al. Interpretative strategies for lung function tests. *Eur Respir J* 2005;**26**:948–68.
- Duiverman EJ, Clement J, van de Woestijne KP, et al. Forced oscillation technique. Reference values for resistance and reactance over a frequency spectrum of 2–26 Hz in healthy children aged 2.3–12.5 years. *Bull Eur Physiopathol Respir* 1985;**21**:171–8.
- Hordvik NL, König P, Morris DA, et al. Normal values for forced oscillatory respiratory resistance in children. *Pediatr Pulmonol* 1985;**1**:145–8.
- Hantos Z, Daroczy B, Gyurkovits K. Total respiratory impedance in healthy children. *Pediatr Pulmonol* 1985;**1**:91–8.
- Ducharme FM, Davis GM, Ducharme GR. Pediatric reference values for respiratory resistance measured by forced oscillation. *Chest* 1998;**113**:1322–8.
- Lebecque P, Desmond K, Swartebroeckx Y, et al. Measurement of respiratory system resistance by forced oscillation in normal children: a comparison with spirometric values. *Pediatr Pulmonol* 1991;**10**:117–22.
- Solyman L, Aronsson PH, Bake B, et al. Respiratory resistance and impedance magnitude in healthy children aged 2–18 years. *Pediatr Pulmonol* 1985;**1**:134–40.
- Stanescu D, Moavero NE, Veriter C, et al. Frequency dependence of respiratory resistance in healthy children. *J Appl Physiol* 1979;**47**:268–72.
- Hellinckx J, De Boeck K, Bande-Knops J, et al. Bronchodilator response in 3–6.5 years old healthy and stable asthmatic children. *Eur Respir J* 1998;**12**:438–43.
- Klug B, Bisgaard H. Specific airway resistance, interrupter resistance, and respiratory impedance in healthy children aged 2–7 years. *Pediatr Pulmonol* 1998;**25**:322–31.
- Malmberg LP, Pelkonen A, Poussa T, et al. Determinants of respiratory system input impedance and bronchodilator response in healthy Finnish preschool children. *Clin Physiol Funct Imaging* 2002;**22**:64–71.
- Frei J, Jutla J, Kramer G, et al. Impulse oscillometry: reference values in children 100 to 150 cm in height and 3 to 10 years of age. *Chest* 2005;**128**:1266–73.
- Landser FJ, Nagles J, Demedts M, et al. A new method to determine frequency characteristics of the respiratory system. *J Appl Physiol* 1976;**41**:101–6.
- Frey U. Forced oscillation technique in infants and young children. *Paediatr Respir Rev* 2005;**6**:246–54.
- Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet* 1986;**1**:307–10.
- Klug B, Bisgaard H. Measurement of lung function in awake 2–4-year-old asthmatic children during methacholine challenge and acute asthma: a comparison of the impulse oscillation technique, the interrupter technique, and transcutaneous measurement of oxygen versus whole-body plethysmography. *Pediatr Pulmonol* 1996;**21**:290–300.
- Ducharme FM, Davis GM. Respiratory resistance in the emergency department: a reproducible and responsive measure of asthma severity (see comment). *Chest* 1998;**113**:1566–72.
- Bisgaard H, Klug B. Lung function measurement in awake young children. *Eur Respir J* 1995;**8**:2067–75.
- Beelen RM, Smit HA, van Strien RT, et al. Short and long term variability of the interrupter technique under field and standardised conditions in 3–6 year old children. *Thorax* 2003;**58**:761–4.
- Ducharme FM, Davis GM. Measurement of respiratory resistance in the emergency department: feasibility in young children with acute asthma. *Chest* 1997;**111**:1519–25.
- Marchal F, Mazurek H, Habib M, et al. Input respiratory impedance to estimate airway hyperreactivity in children: standard method versus head generator. *Eur Respir J* 1994;**7**:601–7.
- Mazurek H, Willim G, Marchal F, et al. Input respiratory impedance measured by head generator in preschool children. *Pediatr Pulmonol* 2000;**3**:47–55.

PULMONARY PUZZLE

doi: 10.1136/thx.2007.082578a

Answer

It was felt the patient's ocular signs were most suggestive of sarcoidosis; however, in view of his ethnic origin tuberculosis was also considered. His Tuberculin Heaf test result was grade 3, and chest x ray showed left upper zone shadowing. Bronchial washings grew acid fast bacilli. He was commenced on anti-tuberculous chemotherapy. He has completed treatment and his eye symptoms have resolved.

Retinal vasculitis associated with tuberculo-protein hypersensitivity is not new.¹ Eales' disease is a syndrome of retinal and vitreous haemorrhage and was first described in 1880.² Although multiple theories of origin have been proposed, its cause continues to be unknown and its diagnosis relies on exclusion of other causes of retinal vasculopathy.

Eales' disease can be associated with current or previous *Mycobacterium tuberculosis* infection. It most commonly affects healthy men in their 20s and 30s, and is prevalent in India.³ Treatment is usually with corticosteroids. Complications include retinal detachment. Although presentation in this manner is more common in the Indian subcontinent, because of ever increasing population migration this is a diagnosis all respiratory physicians should be aware of.

From the question on page 520

REFERENCES

- Renie WA, Murphy RP, Anderson KC, et al. The evaluation of patients with Eales' disease. *Retina* 1983;**3**:243–8.
- Eales H. Primary retinal hemorrhage in young men. *Ophthalmol Rev* 1882;**1**:41–6.
- Helm CJ, Holland GN. Ocular tuberculosis. *Surv Ophthalmol* 1993;**38**:229–56.