

CORRESPONDENCE

Expiratory flow limitation during tidal breathing

To the Editor:

Dr KOULOURIS and co-workers [1] found that some patients with chronic obstructive pulmonary disease (COPD) and apparent expiratory flow-limitation during tidal breathing had increased expiratory flow during tidal breathing when negative pressure was applied to the airway. They concluded that flow could not have been limited during control tidal expirations. I thought that the shape of the flow-volume curve in such patients during tidal breathing indicates expiratory flow-limitation. That is, the tidal expiratory flow-volume curve is not half of an oval, which is the normal shape; instead, it has a flow peak early in expiration and decreases in parallel to the expiratory flow-volume curve of a forced vital capacity. The authors show a tidal breathing loop like this in their figure 2 [1]. Why should the tidal loop be chopped if flow is not limited? I suggest that the application of negative pressure to the airways moves the choke point back into slightly larger airways, with a resultant increase in flow. The increase in flow with application of negative pressure may not, therefore, prove the absence of flow-limitation. A much less likely explanation for chopped expiratory tidal breathing curves is that expiration is not flow-limited, but that the patients subconsciously brake expiratory flow rates just below actual flow-limitation

References

1. Koulouris NG, Valta P, Lavoie A, *et al.* A simple method to detect expiratory flow limitation during spontaneous breathing. *Eur Respir J* 1995; 8: 306–313.

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REPLY

Reply:

In reply to the letter from Dr Thomas, we wish to point out that, as indicated in our paper, the negative expiratory pressure (NEP) technique has been previously validated by concomitant measurement of isovolume flow-pressure relationships [1]. Dr Thomas, however, raises a valid point, namely that the shape of the tidal expiratory flow-volume curves may provide useful clues. As he indicated, the "normal" shape tends to be half of an oval, though even in normal individuals there is considerable variability [2]. Patients with severe chronic obstructive pulmonary disease (COPD), however, are not normal: as elegantly shown by NINANE *et al.* [3], they often exhibit a mechanically active expiration, which is characterized by abdominal activity during the latter part. This necessarily affects the shape of the expiratory flow-volume curve, making it concave with respect to the volume axis, even in the absence of expiratory flow-limitation *i.e.* similar to the control curve in our figure 2. Note that a similar curve is also seen in our figure 6a, depicting another COPD patient who was not flow-limited while seated at rest. In short, the presence of expiratory muscle activity in COPD patients at rest renders analysis of the shape of the flow-volume curve problematical. Accordingly, direct assessment of flow-limitation, such as provided by the NEP technique, is required. Nevertheless, further evaluation of the NEP technique is clearly required.

References

1. Valta P, Corbeil C, Lavoie A, *et al.* Detection of expiratory flow-limitation during mechanical ventilation. *Am J Respir Crit Care Med* 1994; 150: 1311–1317.
2. Shee CD, Ploy-song-sang Y, Milic-Emili J. Decay of inspiratory muscle pressure during expiration in conscious humans. *J Appl Physiol* 1985; 58: 1859–1865.
3. Ninane V, Yernault J-C, DeTroyer A. Intrinsic PEEP in patients with chronic obstructive pulmonary disease. *Am Rev Respir Dis* 1993; 148: 1037–1042.

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