A further comment on Point:Counterpoint “Airway smooth muscle is/is not useful”

Jere Mead

TO THE EDITOR: Lincoln Ford (1) has added two more excuses for airway smooth muscle action. The alarm system makes sense, and the postulate of salvation by peristalsis is intriguing. As for the last sentence in his remarks, I offer a further possible contribution of airway smooth muscle.

Consider an obstructed bronchus. Its peripheral tree and its central extent to the next branch mouthward have zero gas flow. The lumen pressure acting on the peripheral surface of the obstruction is alveolar pressure and that at its central surface is that within the next branch mouthward. The net axial force operating on the obstruction is zero when lung volume is constant. This is nearly the case initially during a cough. With sudden glottic opening, for a brief instant the pressure at the central surface of the obstruction falls more rapidly than that at its peripheral surface, and the net force on the obstruction is mouthward. Now, at last, we get to an additional role for airway smooth muscle. By increasing airway flow resistance, it retards the fall in alveolar pressure and in essence changes the cough from a “snap” to a “thud.” And generalized bronchial constriction, including that of the obstructed branch tree, would work. It would transmit alveolar pressure right up to the blast out! Both salvation by peristalsis and the amplification of cough effectiveness can be tested. Lincoln Ford or a willing colleague could have a dense round radio-opaque solid (with string attached!) bronchoscopically wedged in a bronchus and examine the outcome radiographically. In my case, I can have a search made for a stably productive cougher and see if the production decreases during bronchodilatation.

REFERENCE