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Title: Inefficient cough in Duchenne muscular dystrophy (DMD)

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Body: In DMD, impaired cough secondary to muscle weakness leads to serious respiratory complications, namely atelectasis, ineffective airway clearance, pneumonia and tracheal intubations. In order to study which factors influence and determine inefficient cough in DMD we studied 36 DMD patients and 15 healthy controls (C,age:16.3±5.4 yrs). Peak cough flow (PCF) was measured at the mouth while rib cage (RC), abdominal (AB) and total chest wall (CW) volume variations were measured by opto-electronic plethysmography during quite breathing and maximal cough (supine position). PCF was <160 L/min in 15 patients (inefficient cough, I:age:17.6±5 yrs,FVC:33.7±20 %predicted) and>270 L/min in 9 (efficient cough, E:age:16.1±4 yrs,FVC:70.8±34 %predicted). Tidal volume (V_T) was similar in I, E and C. In I, RC, AB and CW inspired volumes preceding cough were significantly lower than controls and inspired AB volume was lower than E (panel A). Thoraco-abdominal asynchrony during cough, quantified by labored breathing index (LBI), and percentage abdominal contribution to V_T ($\%\Delta V_{AB}$) were respectively higher and lower in I group (panel B and C). In conclusion, in DMD inefficient cough is characterized by impaired inspiration, thoracoabdominal asynchony and lower abdominal contribution to volume variations due to diaphragmatic weakness. $\%\Delta V_{AB}$, that does not require patient's collaboration, seems to be a good predictor of inefficient cough.