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Title: Paradoxical motion time as an early indicator of nocturnal desaturation in adolescents with Duchenne muscular dystrophy (DMD)

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Body: In DMD there is a progressive loss of muscular strength that leads to the need of nocturnal noninvasive ventilation (NIV). We aimed to determine if analysis of chest wall (CW) movement could provide new predictors of nocturnal desaturation in DMD. We studied 37 DMD patients >14 years old (age 18.2±4.8) not yet on NIV, and 16 (age 22.3±11.3) male controls (CTR). Spirometry and nocturnal oxygen saturation (SpO₂) were measured in all DMD. Compartmental and total CW volumes were measured during quiet breathing (QB) in supine posture by opto-electronic plethysmography. Inspiratory and expiratory paradox time (%IPt, %EPt) were calculated as the % of total inspiratory (expiratory) time during which one compartment was moving paradoxically to total CW volume. No %IPt nor %EPt were found in CTR. While %IPt in DMD was similar to CTR, we found high values of abdominal %EPt (%EPtAB) and a strong difference with CTR (p<0.001). Interestingly DMD who spent at least 10% of the night time with SpO₂ < 95% (DeSat), showed a higher %EPt compared to DMD with normal SpO₂ (NonDeSat) (see fig). ROC analysis showed that the area under the curve (A) for %EPtAB was higher than that for the forced vital capacity (FVC) (see fig). Analysis of compartmental CW motion during QB in supine is a valid indicator of respiratory muscle dysfunction in DMD. Our results indicate that abdominal %EPt should be considered as an early indicator of nocturnal hypoxemia.