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Title: Relationship between upper airway structures and pathogenesis in obesity hypoventilation syndrome (OHS)

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Body: Background Abnormal fat distribution and mechanical loading on the upper airway is thought important in the development of daytime hypercapnia in obesity hypoventilation syndrome (OHS). The volume of the lateral parapharyngeal fat pads, tongue and lateral pharyngeal walls have been shown to be predictive of the presence of OSA. The objective of this study was to investigate upper airway soft tissues structure in OHS. Methods: A cross sectional study was performed on an obese group of subjects (BMI >30) without and with OHS, the latter arbitrarily defined for this analysis as an arterial base excess >2 mmol/l. Each patient underwent MRI as part of a study of upper airway anatomy. Results See Table below

Upper airway volumes in a range of eucapnic or hypercapnic obese patients

Eucapnic obese				OHS n = 7		
Variable	Mean	IQR	100% Range	Mean	IQR	100% Range
BMI (kg/m ²)	44	9	39 ;53.8	49	9	34.8 ; 62.8
PaCO ₂ (mmHg)	37	14	36 ; 39	47	7.5	38 ; 72
HCO ₃ ⁻ (mmol/l)	25	1.6	24.2 ; 25.9	28.8	3	26.2 ;33.3
Base excess (mmol/l)	1.33	1.45	0.3; 2	5.3	3.4	2.1 ;12.7
Neck circumference (cm)	42.8	9.43	38 ; 47	47.5	10	40 ;55
Apnea-Hypnoea Index (AHI)	25.7	32.6	7 ; 47.9	22.2	42.0	1.5 ;56.3
Lateral pharyngeal wall (LPW) (cm ³)	7.14	12.6	2.3;10.1	6	3.4	2.9;11.8
Tongue (cm ³)	8.86	5.79	8.19;9.57	9.37	2.8	7.2;12.1

Fat pads (cm3)	8.52	5.79	7.56;1.27	9.29	2.063	6.869;12.9
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Conclusion These early results suggest very little difference between the LPW, tongue and fat measurements in eucapnic obese subjects and OHS subjects. This result in conjunction with the AHI indicates that the upper airway distribution of fat may not contribute to the development of daytime hypercapnia in obesity.