Introduction Primary pneumothorax has been defined as occurring in patients with no known lung disease but the assumption that the underlying lung is normal is increasingly contentious. The purpose of this case-control study is to evaluate lung structure and quantify the extent of any emphysema in patients with primary and secondary spontaneous pneumothorax compared with a control group without pneumothorax and to assess the influence of smoking on this process

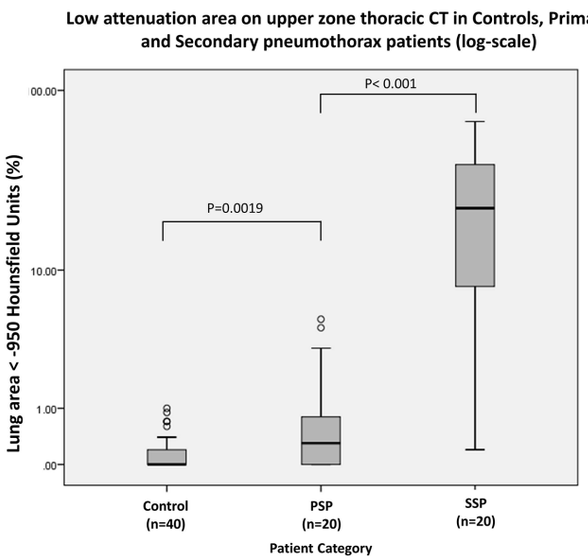
Methods 20 patients with primary pneumothorax (PSP), 20 patients with secondary pneumothorax (SSP) and 40 control patients with computed tomography scans suitable for quantitative analysis were evaluated. Demographics and smoking histories were collated. Quantitative evaluation of low attenuation areas of the lung was performed using semi-automated software. The percentage of segmented lung below the low attenuation threshold value of -950 Hounsfield units was calculated, based on a previously validated threshold.[1] The extent of emphysema-like destruction was also assessed visually by an experienced consultant chest radiologist.

Results The extent of emphysema and percentage low attenuation area was greater in PSP patients compared with controls matched for age and smoking history (Median 0.25 vs 0.00, p = 0.019) and was also higher in SSP compared with PSP patients (16.15 vs 0.25, p < 0.001). PSP patients who smoked had significantly greater low attenuation area than PSP non-smokers (0.7 vs 0.1, p = 0.034). No such difference was detected between smokers and non-smokers within the control group (0.0 vs 0.05, p = 0.798).

Conclusions The majority of patients with PSP had quantifiable evidence of parenchymal destruction and emphysema. The presented data is supportive of the hypothesis that there is likely to be a spectrum of lung damage ranging from 'normal patients' through to patients with SSP, and rather than a clear distinction between PSP and SSP these conditions exist on a continuum.

REFERENCE

1 Heussel CP, Herth FJ, Kappes J, *et al.* Fully automatic quantitative assessment of emphysema in computed tomography: comparison with pulmonary function testing and normal values. *Eur Radiol*. 2009;**19**(10):2391-402



Abstract S24 Figure 1

Sleep apnoea and hypoventilation: screening and treating high risk populations

S25 ESTABLISHING A NORMAL RANGE IN DRIVING SIMULATOR PERFORMANCE USING STANDARD DEVIATION OF LANE POSITION (SDLP) IN AN ADVANCED PC –BASED DRIVING SIMULATOR (MINIUOLDS)

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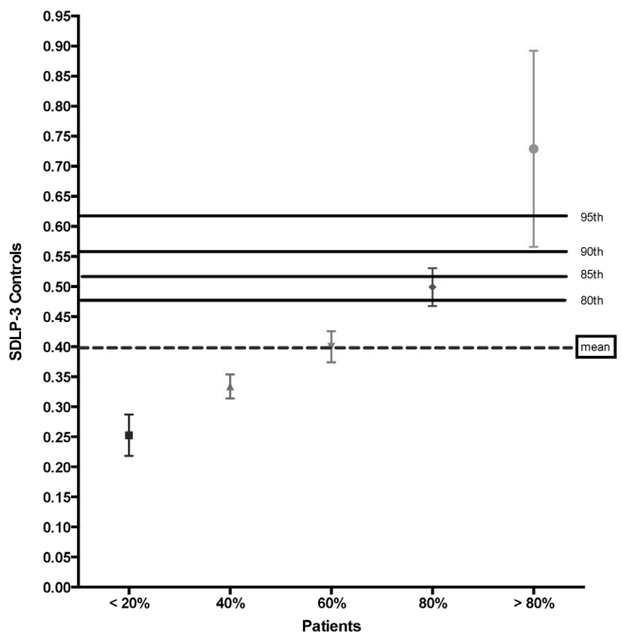
Introduction Some patients with OSAS are at higher risk of being involved in road traffic accidents. No objective tests have been shown to predict reliably whether an individual is safe to drive or not and there is significant variation in the advice given by the clinicians. Using a continuously measured variable (SDLP) on an advanced PC-based driving simulator the at risk patients can be identified with a high degree of accuracy. We have now compared driving performance based on SDLP in controls and untreated OSAS patients and have established a normal range.

Methods 129 untreated male OSAS patients (Age 53+/-12, ESS 14+/-5, ODI 41+/-26, BMI 36+/-8,) and 79 male controls (Age 56+/-15, ESS 4+/-3, BMI 28+/-8) were recruited in the study. All performed a simulator run after initial acclimatisation. The simulator run consisted of eight epochs and on average needed 7 min to complete one epoch driving at 70 miles per hour. The simulator layout was designed in line with the UK highways agency road standards. The mean SDLP in epoch-3 (SDLP3) was compared between the two groups using unpaired T-test. The SDLP3 in the patient group was evaluated and this was compared with the mean and 95th centile values of SDLP 3 among the controls.



Abstract S25 Figure 1

Results There was a significant difference in SDLP3 between OSAS patients and controls (0.44 v/s 0.39, P = 0.03). 10% of patients had worse SDLP3 than the 95th centile among controls (Figure 1).

Conclusions Worse SDLP is a marker of poor driving performance and this is significantly worse in untreated OSAS patients as compared to controls. The choice of 95% is arbitrary but is consistent with the approach taken to establish a normal range. Establishing where a patient lies in comparison to controls may be useful in advising patients whether they are at increased risk of an accident due to OSAS. Defining a normal range based on continuously measured variable in MiniUoLDS holds promise and is a step ahead towards developing an objective test in evaluating the at risk OSAS patients.

S26 IS THE "TIME SPENT WITH SATURATIONS BELOW 90%" ON SLEEP STUDY HELPFUL IN IDENTIFYING OBESITY HYPOVENTILATION SYNDROME IN THE SLEEP CLINIC?

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Introduction Obesity Hypoventilation Syndrome (OHS) is defined as sleep disordered breathing, obesity, and daytime hypercapnia, without another cause of ventilatory impairment.[1] Recent studies have shown that a raised base excess (≥2) or raised venous bicarbonate without daytime hypercapnia, represents a subgroup with OHS without overt respiratory failure.[2] A readily available sleep study parameter indicating the presence of OHS rather than requiring biochemistry would be ideal. We assessed the use of time spent with oxygen saturations ≤90% from standard sleep study data and its relationship with a biochemical diagnosis of OHS.

Methods We prospectively collected data on sleep clinic patients referred for assessment of possible obstructive sleep apnoea. Patients underwent sleep studies as per standard practice, and the%time spent with saturations <90% was noted (more or less than 30% of the night). Venous bicarbonate or arterial blood gas was checked. Those with evidence of OHS on blood testing had assessment to exclude co-existent respiratory disease.

Results Data was collected from 190 patients, 71% male, average age 31 (10.8, range 25–75) and mean BMI 39 kg/m^2 (8.7, 25–76). There was biochemical evidence of OHS in 54 patients (22%) (Venous bicarbonate >27, BE≥2, pCO_2 ≥6kPa). Four patients were excluded: COPD (2), Myasthenia gravis (1) and thoracic scoliosis (1).

Table 1 shows the results. Saturations of ≤90% for ≥30% of night had a sensitivity for diagnosing OHS of 59%, specificity 47%. The positive predictive value was 31% and negative predictive value was 74%.

Conclusions The parameter of "time spent with saturations below 90%" on sleep study is not particularly sensitive or specific for identifying patients with OHS in isolation. We cannot find other literature which has assessed this variable. It does not seem that it can replace blood biochemical measurement in the diagnosis of OHS. This condition still has many unanswered questions remaining including best method of diagnosis and management.

Abstract S26 Table 1 Patient numbers for those with and without OHS, showing time spent with saturations less then 90%

		OHS (on biochemistry)	
		Saturations ≤90% ≥30% of night	Saturations ≤90% ≤30% of night
No OHS (on biochemistry)	Saturations ≤90% ≥30% of night	32 TRUE POSITIVE	22 FALSE NEGATIVE
	Saturations ≤90% ≤30% of night	72 FALSE POSTIVE	64 TRUE NEGATIVE

REFERENCES

1 Mokhlesi B, Tulaimat A. Recent advances in obesity hypoventilation syndrome. *Chest* 2007;**132**(4):1322–36

2 Manuel A, Hart N, Stradling J. Is a raised bicarbonate, without hypercapnia, part of the physiological spectrum of obesity-related hypoventilation? *Thorax* 2014;**69** (Suppl 2): A29

S27 PREDICTIVE PERFORMANCE OF STOPBANG QUESTIONNAIRE FOR DIAGNOSIS OF SLEEP APNOEA IN A CARDIAC SURGICAL COHORT

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Introduction and objectives Questionnaires to assess the risk of obstructive sleep apnoea (OSA) prior to surgery could reduce the need for screening sleep studies. STOPBANG questionnaire is user friendly and was previously validated in a general surgical population. A high risk of OSA has been defined as a score of ≥3 and low risk as a score 0–2. We aimed to validate the STOPBANG against nocturnal oximetry in a population undergoing major cardiac surgery and assessed its prognostic value for post-operative outcomes.

Methods Patients were screened for high risk of OSA with the STOPBANG questionnaire. The presence of sleep apnoea (SA), prior to surgery, was assessed with overnight oximetry. SA was defined as mild with a 4% oxygen desaturation index (ODI) of 5–14/hr, moderate with ODI of 15–29/hr and severe ODI ≥30/hr. Predictive performance of STOPBANG against nocturnal oximetry was assessed for diagnosis of mild and moderate SA by assessing the area under curve receiver operating characteristic (AUC-ROC) and sensitivity and specificity were calculated. A multiple-logistic regression model was used to assess association of STOPBANG and post-operative outcomes.

Results The AUC-ROC for mild SA was low 0.57 (95% CI = 0.47–0.67). Good performance was observed for moderate SA with AUC-ROC 0.82 (95% CI = 0.69–0.95) (Figure 1) but specificity of STOPBANG at the conventional cut of value of ≥3 for moderate SA was very low at 5% whilst sensitivity was 100%. The best predictive STOPBANG cut-off value for moderate SA was ≥6 with sensitivity and specificity of 75% and 77% respectively. Assessing predictive value for severe SA was not possible due to the lack of severe SA cases in our cohort. STOPBANG was not found to be an independent predictor of worse post-operative outcomes.