Diagnostic Accuracy of Nocturnal Oximetry for Detection of Sleep Apnea Syndrome in Stroke Rehabilitation

Justine A. Aaronson, MSc; Tijs van Bezeij, MD; Joost G. van den Aardweg, MD, PhD; Coen A.M. van Bennekom, MD, PhD; Winni F. Hofman, PhD

Background and Purpose—Sleep apnea syndrome (SAS) is a common sleep disorder in stroke patients and is associated with decreased recovery and increased risk of recurrent stroke and mortality. The standard diagnostic test for SAS is polysomnography, but this is often not feasible in stroke rehabilitation settings. This study investigated the diagnostic value of nocturnal oximetry for screening SAS in stroke rehabilitation.

Methods—Fifty-six stroke patients underwent nocturnal polygraphy and oximetry. Sensitivity, specificity, and positive and negative predictive values for the oxygen desaturation index were calculated. Patient and sleep characteristics were used to develop a predictive model of apnea–hypopnea index.

Results—Forty-six percent of the stroke patients had SAS. The majority of SAS patients was male, older, and had a higher body mass index than patients without SAS. Sensitivity, specificity, and positive and negative predictive values for the oxygen desaturation index were, respectively, 77%, 100%, 100%, and 83%. Oxygen desaturation index predicted 87% of the variance in the apnea–hypopnea index. Patient characteristics did not add significantly to the prediction model.

Conclusion—Nocturnal oximetry is an accurate diagnostic screening instrument for the detection of SAS in stroke patients. (Stroke. 2012;43:2491-2493.)

Key Words: methodology ■ polygraphy ■ pulse oximetry ■ rehabilitation ■ sleep apnea ■ sleep disorders ■ stroke
Results

We obtained sleep recordings of 67 stroke patients. Ten patients who met the exclusion criteria and 1 outlier were omitted from further analysis. Fifty-six patients were included in the final analysis (Table 1).

Sixty-two percent of the patients were male. Mean age was 55.6 years (±10.3; range, 26–74). The average duration from stroke onset was 30.3 days (±27.1). Seventy-three percent of the patients had an ischemic stroke and 88% had a stroke in the supratentorial region. Sixteen patients were moderately disabled, 26 had a moderately severe disability, and 14 had a severe disability. Twenty-three percent of the patients were overweight and 18% were obese.

Forty-six percent of the stroke patients had SAS diagnosed. All SAS patients had predominantly obstructive apneas. The majority of SAS patients were male (78% vs 22% female), older, and had higher BMI and ODI than patients without SAS. SAS patients did not differ from patients without SAS in stroke subtype, stroke location, or degree of disability. Excessive daytime sleepiness (Epworth Sleepiness Scale ≥10) was reported by one-third of patients with and without SAS.

The ODI correlated strongly with the AHI ($r=0.92$; $P<0.01$). The sensitivity and specificity of pulse oximetry are presented in Table 2. With ODI ≥15, the sensitivity for SAS was 77% (CI, 56%–90%), with 100% specificity (CI, 86%–100%). A lower ODI cut-off (≥5) increased the sensitivity to 96% (CI, 79%–100%), but the specificity declined to 43% (CI, 26%–62%). The diagnostic accuracy of ODI for SAS is represented by the receiver-operator characteristic curve in Figure.
the Figure. Given a 46% prevalence of SAS in stroke, the positive predictive value of oximetry was 100% (CI, 80%–100%), with a negative predictive value of 83% (CI, 67%–93%).

The clinical variables age, gender, and BMI correlated significantly with AHI. The regression model showed that age and BMI were significant predictors, explaining 51% of the variance in AHI. When ODI was added to the regression analysis, 87% of the variance in AHI was explained, with ODI being the only significant predictor. The resultant regression equation is: predicted AHI = 2.66 + 0.94*ODI.

Discussion
In the current study, 46% of the stroke patients had SAS diagnosed. We found that nocturnal oximetry is an accurate predictor for SAS, with a sensitivity of 77% and a specificity of 100%. Given the high prevalence of SAS in stroke, a positive oximetry result increased the likelihood of SAS to 100%, whereas a negative result lowered the probability to 17%.

The majority of the SAS patients were male. In addition, SAS patients were older, with a higher BMI than patients without SAS.

Oximetry was the best predictor of SAS, explaining >80% of the variance in AHI. Clinical variables such as age, gender, and BMI did not significantly add to the predictive value of oximetry. Further validation of oximetry in larger samples is required to determine whether our findings can be generalized to other stroke samples.

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Disclosures
None.

References
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