Neck circumference, a bedside clinical feature related to mortality of acute ischemic stroke

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Summary

Objective: The aim of this study was to evaluate clinical/demographic factors, sleep alterations and one year mortality in acute ischemic stroke. **Methods:** This was a prospective study of 89 consecutive patients (mean age 64.39 ± 8.51 years) with acute ischemic stroke. High risk of obstructive sleep apnea (OSA) was evaluated by the Berlin questionnaire, daytime somnolence by the Epworth Sleepiness Scale (> 10) and subjective sleep quality by the Pittsburgh Sleep Quality Index (> 5). Clinical and anthropometric data including body mass index, hip-waist ratio, neck circumference (NC) were obtained. Increased NC was defined if > 43 cm in men and > 38 cm in women. Stroke severity was estimated by the Barthel Index and the modified Rankin Scale. The end-point was death after 12 months follow-up. **Results:** One-year mortality was 8.9%. Non-survivors were older (p = 0.006) and had larger NC (p = 0.02). Among all cases, large NC was related to high risk of OSA, diabetes and hypertension (Fisher's exact test). Compared to men, women showed relatively larger NC. Overall, family history of stroke (74.2 %), diabetes (33.7%) and hypertension (78.6%) were frequent; obesity (11.2%) was uncommon. Daytime sleepiness (34.8 %), poor sleep quality (65.2%) and risk of OSA (58.42%) were frequently found. **Conclusion:** Poor sleep quality, excessive daytime sleepiness and high risk of OSA are frequent in this sample with acute ischemic stroke. One-year mortality was related to older age and large NC. As obesity is uncommon in acute stroke patients, a large NC should be taken as a significant clinical sign related to mortality.

Keywords: Sleep; stroke; sleep apnea; neck circumference; mortality.

Resumo

Perímetro cervical, uma medida à beira do leito relacionada com a mortalidade no acidente vascular cerebral isquêmico

Objetivo: O objetivo do estudo é avaliar em pacientes com acidente vascular cerebral (AVC) isquêmico, os fatores clínico/demográficos, alterações do sono e a mortalidade após um ano. **Métodos:** Trata-se de estudo prospectivo envolvendo 89 pacientes consecutivos (64,39 ± 8,51 anos) com AVC isquêmico agudo. Foram avaliados o risco elevado de apneia obstrutiva do sono (AOS) (questionário de Berlin), a sonolência diurna (Escala de Sonolência Epworth > 10) e a qualidade subjetiva do sono (Índice de Qualidade de Sono Pittsburgh > 5). O índice de massa corpórea, a relação cintura-quadril e o perímetro cervical (PC) foram estudados: PC aumentado foi definido se > 43 cm (homens) e > 38 cm (mulheres). Estimou-se a gravidade da doença pelo Índice de Barthel e pela Escala de Rankin modificada. O desfecho final foi o óbito após 12 meses. **Resultados:** A mortalidade após um ano foi de 8,9%. Os pacientes que foram a óbito eram mais idosos (p = 0,006) e apresentavam PC aumentado (p = 0,02). O PC aumentado relacionou-se com a presença de diabetes, hipertensão arterial e risco elevado de AOS (teste exato de Fisher). As mulheres apresentavam, relativamente, maior PC. Entre todos, história familiar de doença cerebrovascular (74,2%), diabetes (33,7%) e hipertensão (78,6%) foram frequentes; obesidade (11,2%) foi incomum. Sonolência diurna (34,8%), má qualidade do sono (65,2%) e risco de AOS (58,42%) foram frequentes. **Conclusão:** Alterações do sono são frequentes no AVC isquêmico agudo. Mortalidade foi mais comum em pacientes mais idosos e com maior PC. No AVC isquêmico, o PC aumentado relaciona-se com a mortalidade e provavelmente constitui-se uma medida clínica importante a ser considerada.

Unitermos: Sono; acidente vascular cerebral; apneia do sono; perímetro cervical; mortalidade.

Study conducted at Hospital Fernandes Távora, Fortaleza, CE, Brazil

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Introduction

Identifying factors associated with stroke mortality is of great clinical importance. Some clinical characteristics such as age, gender, diabetes and systemic arterial hypertension are known to influence stroke risk[1-4]; however, their ability to predict outcome is limited. Previously, it has been demonstrated that obstructive sleep apnea (OSA) is associated with increased mortality in stroke[5]. Obesity and the distribution of body fat are of utmost importance for the risk OSA[6]. It has been said that "obesity increases the risk of OSA by approximately 10-fold from a range of 2 to 4% in the general adult population, to up to 20 to 40% in those with a body mass index (BMI) > 30"[7]. Traditionally, the BMI was used as a measure to diagnose obesity. Other types of measures have been shown to predict the distribution of body fat: waist circumference, hip circumference, waist to hip ratio and neck circumference (NC) have all been associated with increased body fat. Recently, NC has been associated with the severity of OSA independently of visceral obesity, especially in non-obese patients[8].

Obstructive sleep apnea is associated with increased cardiovascular risk and systemic hypertension and has been confirmed as an independent risk factor for stroke[5,9-11]. A cohort study involving a large number of patients showed that OSA significantly increases the combined risk of stroke or death from any cause, and this increase is independent of other risk factors, including hypertension[5]. Therefore, although OSA and stroke-related death have been previously related, the mechanisms of OSA on stroke-related death remain unclear.

Other factors such as hypertension, diabetes, in addition to OSA severity might play differential roles on death rates reported so far. Moreover, other important aspects regarding the relationship between sleep abnormalities and stroke still need to be addressed. For instance, excessive daytime sleepiness has been shown to influence mortality in a large population of elderly patients[12]. This brings up the question whether OSA or other sleep disturbances are on the basis of excessive daytime sleepiness in these cases. It should be noted that in many centers, stroke patients do not routinely undergo sleep studies and although polysomnography has been increasingly more available, OSA has not been sufficiently evaluated.

Evaluating the association between measures such as the BMI and larger NC with mortality in stroke may be clinically useful. The aim of this study was to investigate clinical/demographic factors, sleep disturbances and mortality one-year after ischemic stroke.

Methods

Study design and participants

This is a prospective study of consecutive patients of both genders with diagnosis of acute stroke admitted for in-hospital care. All cases were recruited from a tertiary general hospital in Fortaleza – CE over a period of one year (January to December, 2009). Inclusion criteria were clinical diagnosis of ischemic stroke and age from 45 to 80 years. Exclusion criteria were dementia, loss of the ability to communicate, stupor or coma, cancer, severe lung, hepatic or renal diseases, and/or unwillingness to participate in the study. None of the included patients refused to participate in the initial evaluation. Among 96 stroke patients, seven were lost to follow-up: 89 individuals completed the study. All cases were examined within the first 15 days after stroke. The main outcome was death from any cause during 12 months of follow-up. The protocol was approved by the local research ethics committee and subjects gave informed consent (COMEPE 002.02.07).

Procedures

A purpose-built questionnaire was used to obtain demographic data, habits, relevant family medical history and comorbidities, such as type 2 diabetes and systemic arterial hypertension. Special emphasis was put on the use of alcohol drinking and smoking. Heavy alcohol consumption was considered present if, on a daily basis, more than 4 drinks for men and 3 drinks for women were reported, or on a weekly basis, more than 14 drinks for men and more than 7 for women were consumed[13]. The definition of smoking used in this research was "smoked during one or more days in the last 30 days" prior to the questionnaires, without taking into account the degree of nicotine dependence. Full medical examination was performed on all subjects. Anthropometric measures including the waist-hip ratio, NC (cm) and BMI were obtained. Neck circumference was obtained at a point just below the larynx (Adam's Apple) and perpendicular to the long axis of the neck: it was considered large if > 43 cm in men and > 38 cm in women[14,15]. Body mass index was calculated as the ratio between weight (kg) and squared height (m^2). Ancillary test results were obtained from medical chart review.

High risk of OSA was evaluated by the Berlin questionnaire[16]. Daytime somnolence was assessed by the Epworth Sleepiness Scale (ESS), a questionnaire containing eight items that ask for expectation of dozing in eight hypothetical situations[17]. Epworth Sleepiness Scale score greater than 10 indicates excessive daytime somnolence. Subjective sleep quality was evaluated by the Pittsburgh Sleep Quality Index (PSQI)[18]. Pittsburgh Sleep Quality Index has seven components, each one dealing with a major aspect of sleep: 1) subjective quality of sleep; 2) sleep onset latency; 3) sleep duration; 4) sleep efficiency; 5) presence of sleep disturbances; 6) use of hypnotic-sedative medication; and 7) presence of daytime disturbances, as an indication of daytime alertness. Individuals with total PSQI score of six or more were considered poor sleepers. The Berlin questionnaire, PSQI and Epworth Sleepiness Scale