ACOUSTIC PHARYNGOMETRY AS A PREDICTOR MEASURE IN SUBJECTS WITH OBSTRUCTIVE SLEEP APNEA

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Abstract

Objective: is to evaluate the role of acoustic pharyngometry as a tool to assess the precise narrowing site of the upper airway in obstructive sleep apnea syndrome (OSAS) patients to plot a predictor diagnostic curve, if would be, and to choose the proper management technique. Study design: a prospective, clinical trial. Methods: Thirty adult patients of both sexes with OSA who had at least 2 of 3 major symptoms of snoring, daytime somnolence, and apnea with witness were recruited in this study. Another 30 healthy adult, non obese individuals (as volunteers) of both sexes without OSA from the same locality, as a control group, were included. Assessment of the dynamic changes in the upper airway (UA) for the control group by acoustic pharyngometry in upright sitting, supine, right and left lateral positions were done. The mean pharyngogram for each patient was compared with the normal standard curve for young healthy adult citizen of the control group. Setting: Bertha Teaching Hospital. Results: A significant difference in parameters were observed between sleep disordered patients with apnea and the control group, especially in the amplitude of the A-B wane (significantly lower in patients with macroglossia), the extension and the amplitude of the O-P segment and the hypopharyngeal area. Patients with severe OSAS had significantly narrower cross-sectional area at the level of uvula in expiration, more inferiorly positioned hyoid bone, and thicker soft palate compared with patients with mild/moderate OSAS (p <0.05) and the control group (p <0.05). Also, severe OSAS patients had bigger neck circumference than those in the control group (p <0.05). Conclusions. Although not a standard test, acoustic pharyngometry was proved to be a useful method
both in the diagnosis of the severity of obstructive sleep apnea and in post-operative monitoring of upper airway surgery in patients with sleep disorders.

Introduction

Computed tomography, ultrasound, fiber-optic endoscopy and methods based on the physical principle of acoustic reflection such as rhinometry and acoustic pharyngometry are diagnostic investigations in otorhinolaryngology (Shepard et al., 1991). Acoustic pharyngometry assesses the geometry of the oropharyngeal cavity (Gosepath et al., 2000) by using a reflected acoustic signal (filtered click) emitted from a device and sent into the oropharynx. Computer processing of the incident and reflected sound waves from the airways provides an area distance curve representing the lumen from which minimal cross-sectional area and volume can be derived. Consequently, reductions in the anatomical space- in particular the diameter- will produce changes in the intensity of the reflected wave and in the time taken for the reflected wave to return from a given anatomical structure to the microphone Kama (2001).

Fredberg, et al. (1980) hypothesized the possibility of using acoustic reflection into the mouth to study the airway geometry and to define reproducible, accurate and variable parameters for acoustic pharyngometry. D’Urzo and his colleagues (1988) compared acoustic pharyngometry with computed tomography in patients with obstructive sleep apnea (OSA) without statistically significant difference between them. Bradley & Philipson (1985) suggested that the upper airway size and functional dynamics are significant factors modulating airflow. As such, acoustic pharyngometry was considered a valid, non invasive and easily reproducible tool to study the permeability of upper airways.

The aim of this study was to assess pharyngometric parameter variations with obstructive sleep apnea or with snoring. Clinical, anthropometric and instrumental data were evaluated to define whether acoustic pharyngometry could become a reliable diagnostic