Correlation Between Retropalatal Collapse as Observed During Muller's Maneuver to Severity of OSA

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Abstract Objective of the study was to evaluate the reliability of Muller's maneuver (MM) with the severity of obstructive sleep apnea (OSA) at the retropalatal level. Case series of 58 adult patients diagnosed to have OSA. Sleep apnoea clinic in a tertiary referral center in south India. Fifty-eight adult OSA patients underwent outpatient based MM under local anaesthesia. Collapse of hypopharynx and the retroglossal regions were assessed during a maximal inspiratory effort against the closed mouth and sealed nose (reverse valsalva). Correlation coefficient was used to compare MM grade with apnea–hypopnea index (AHI) scores. Severity of OSA based on AHI scores were compared with the results of Muller's maneuver at the retropalatal level. The correlation coefficient was 0.213, hence no correlation was found, p value was 0.019, which was not statistically significant. MM is an useful tool for evaluation of upper airway collapse. The advantages include simplicity, cost-effectiveness, relatively easy to perform, thorough evaluation of upper airway. The pitfalls of the procedure includes the subjectiveness of the procedure and the fact that it is performed on awake patients and therefore remains an indirect estimation of obstruction that occurs during sleep. In our study, we did not find correlation between the severity of OSA based on the AHI scores and the collapse at the retropalate level assessed by the Muller's maneuver.

Keywords Obstructive sleep apnea · Polysomnography · Muller's maneuver

Introduction

Obstructive sleep apnea (OSA) is a challenging and an increasingly recognized condition which we come across in our daily practice. OSA primarily results from collapse of the upper airway during sleep. The understanding of the pathophysiology of OSA has evolved over the last several decades but it is not fully understood. The cause and mechanisms of this collapse are now thought to be multifactorial and multilevel, hence the evaluation of the upper airway plays a central role in assessing the patient [1].

These methods include manometry, radiographic studies including computed tomography, dynamic MRI, fluoroscopy and cephalometry and office procedure such as the Muller's maneuver (MM) [2]. MM has been used widely by clinicians during the pre operative evaluation of patients diagnosed with OSA. A review of literature shows positive correlation between MM and retro palatal collapse [2, 3]. Trudo et al. have demonstrated that retropalatal airway volume is significantly reduced during sleep, retroglossal volume remains unchanged in comparisons of sleep and wakefulness [4].

The present study aims to confirm the reliability of MM with the severity of OSA at the retropalatal level.

Materials and Methods

Subjects

Prospective analysis of 58 adult patients diagnosed to have OSA were included in the study. The cases were worked up as per the Sleep apnoea protocol followed by the Department of Otolaryngology and Head and Neck Surgery at St John's Medical College Hospital, Bangalore, Karnataka. Demographic data including age, sex, weight and height were

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recorded. The Apnea–Hypopnea index (AHI) scores was compared to the grade of upper airway collapse during MM.

Polysomnography

All patients underwent overnight polysomnography (PSG) in our hospital sleep laboratory. Data were recorded for stages of sleep, oxygen saturation and number of events of hypopnoea and apnea per hour. Apnea was defined as cessation of breathing for more than 10 s and hypopnoea was defined as 50 % reduction in airflow for more than 10 s associated with more than 4 % decrement in the oxygen saturation. The AHI was defined as sum of number of events of apnea and hypopnoea per hour. Oxygen saturation of more than 90 % was considered normal.

Muller's Maneuver

MM was performed in awake patients and in supine position with the topical nasal anesthesia using 4 % lignocaine and nasal decongestant (0.1 % xylometazoline). A flexible fibre optic nasopharyngoscope (Olympus ENT Type T₃) was inserted into the anesthetized nasal cavity to the lower oropharynx. Collapse of hypopharynx and the retroglossal regions were assessed during a maximal inspiratory effort against the closed mouth and sealed nose (reverse valsalva). The nasopharyngoscope was withdrawn to a level just cephalad to Passavant's ridge. Collapse of the retropalate area was assessed again during a maximal inspiratory effort against the closed mouth and sealed nose.

The collapse at each levels were graded from 0 to 4 in which 0 = no collapse, 1 = 25 % collapse, 2 = 50 % collapse, 3 = 75 % collapse and 4 = complete collapse.

Statistical Analysis

Statistical Package for Social Services (SPSS) version 16.0 was used for statistical assessment of the results. Correlation coefficient was used to compare MM grade with AHI scores. The AHI scores ranged from 1 to 4 in which 1 = (AHI <5) no clinical significant OSA, 2 = (AHI 5–20) mild OSA, 3 = (AHI 20–40) moderate OSA, 4 = (AHI >40) severe OSA. Correlation co-efficient of >0.5 was considered good correlation and p value of <0.05 was considered statistically significant.

Results

Fifty-eight consecutive patients were examined from August 2008 to December 2010. The mean age was 42.3 years. The gender distribution of the cases in our study was 53 (91 %)

males and 5 (9 %) females. Severity of OSA included 3 (5.1 %) patients who had mild OSA, 9 (15.51 %) patients who had moderate and 46 (79.39 %) patients who had severe OSA. The mean AHI scores were 74.7.

The MM at the retropalate level showed, 12 patients (20.68 %) had grade 1 collapse, 23 patients (39.65 %) had grade 2 collapse, 22 patients (37.93 %) had grade 3 collapse and 1 patients (1.72 %) had grade 4 collapse.

Severity of OSA based on AHI scores were compared with the results of MM at the retropalatal level. The correlation coefficient was 0.213, hence no correlation was found, p value was 0.019, which was not statistically significant.

Patient Demographics

Sex

Male	53	91 %
Female	5	9 %

Age

Range—17–68 years.

Mean—42.3 years.

Symptom Distribution

Grade of Muller's Maneuver at Retropalate Level

AHI Scores

Discussion

MM was first described by Borowiecki and Sassin [5] for the preoperative assessment of OSA. The MM is a subjective test that consists of making the subject to perform a forced inspiratory effort against an obstructed airway with the endoscopic visualization of the upper airway. The upper airway collapse is mainly assessed at three different levels. They are the hypopharynx, base of tongue and retropalate. The degrees of collapse are graded from 0–4.

Sher et al. [6] were the first investigators who attempted to improve the surgical outcome of uvulopalatopharyngoplasty (UPPP) by preoperatively identifying patients in whom the greatest degree of collapse was in the region of retropalate. They assessed 30 patients with the MM and found significant collapse at the retropalate (75 %) and moderate to minimal collapse at the base of tongue (50 %) and were selected for UPPP. Comparison of preoperative and postoperative PSG revealed a statistically significant improvement in the severity of OSA following UPPP. They concluded that preoperative selection of patients with OSA using MM increases the likelihood of success of UPPP.

Thong et al. [3] in their study, compared MM with severity of OSA in Eighty patients (14 female, 66 male), with a mean age of 42.9 years (range 22–66). The degree of upper airway collapse during MM correlated with AHI severity.

In a study of 180 patients done by Terris et al. [2] checked the reliability of Muller's in OSA. The authors concluded that despite the subjective nature of the MM, the five-point scale can be used by independent examiners to achieve an evaluation of the upper airway that is reproducible. The preoperative severity of sleep-disordered breathing based on the AHI is moderately correlated with the MM score.

Contrary to these studies, Tuncel et al. [7] studied on 221 patients on the effectiveness of MM in detecting multilevel obstruction and found no correlation of MM with the severity of OSA based on PSG findings. They concluded that MM in an awake patient might reflect the levels of the obstruction in sleep conditions even though insufficient for figuring out the severity of OSA.

The present study was intended to find whether MM at the retropalate level correlated with the severity of OSA based on AHI scores obtained by PSG.

Conclusion

MM is a useful tool used by the clinicians in the evaluation of upper airway collapse. The advantages include simplicity, cost-effectiveness, relatively easy to perform, thorough evaluation of upper airway and widespread availability [8].

There are certain potential criticisms of the procedure which includes the subjectiveness of the procedure and the fact that it is performed on awake patients and therefore remains an indirect estimation of obstruction that occurs during sleep [8].

In our study, we did not find correlation between the severity of OSA based on the AHI scores and the collapse at the retropalate level assessed by the Muller's maneuver.

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