A Prospective Cohort Study Comparing Drug Induced Sleep Endoscopy And Dynamic Magnetic Resonance Imaging As A Diagnostic Tool In Obstructive Sleep Apnea Syndrome

Jerry Jacob, DNB; Vijayakrishnan P., DLO DNB; Mohan Kameswaran, MS

Introduction

Obstructive sleep apnea syndrome (OSAS) is a common medical problem in adults characterized by prolonged partial upper airway obstruction or intermittent complete pharyngeal obstruction that disrupts normal ventilation and sleep continuity.¹

Polysomnography, Drug Induced Sleep Endoscopy (DISE), and Dynamic MRI (DMRI) have become invaluable tools to assess OSAS.²

DISE is a visual inspection of the upper airway during a drug-induced sleep that can identify likely sites of obstruction during sleep.³

DMRI can define the dynamic characteristics of airway obstruction with excellent resolution in the supine position.⁴

Results

Of the 60 diagnosed cases of OSAS that were included in this study, 53 patients (88.33%) were males and 7 (11.67%) were females

Two patients were early adults (age= 18 – 25), 24 adults (26 – 40), 31 were middle aged (41 - 60) and 3 were elderly (more than 60).

Of the 60 patients, 6 (10.0%) had mild OSA with an average AHI of 11.50, 14 (23.3%) patients had moderate OSA with an average AHI of 22.44 and 40 (66.7%) patients had severe OSA with an average AHI of 62.83.

On comparing the ability of DISE and Dynamic MRI in diagnosing the various levels of obstruction using Chi Square test, a p value of >0.8 was obtained.

LEVELS OF UPPER AIRWAY COLLAPSE	Total	DISE		DMRI	
	n=60	Diagnosed	Wrongly diagnosed	Diagnosed	Wrongly diagnosed
Palate	32	32	4	32	8
Tongue base	0	0	0	0	0
Epiglottis	1	1	0	1	0
Palate+Tongue base	2	2	0	1	1
Palate+Tongue base+Epiglottis	16	13	3	13	3
Palate+Epiglottis	7	5	2	4	3
Palate+Epiglottis+Arytenoid	1	1	0	1	0
Palate+Tongue base+Epiglottis+Arytenoid	1	1	0	0	1

Discussion

DISE and DMRI have equal propensity in diagnosing the levels of collapse in OSAS.

In diagnosing single level collapse, DISE and Dynamic MRI have equal specificity whereas, DISE is more specific than Dynamic MRI in diagnosing multilevel collapse.

Retropalatal site was the most common site of obstruction followed by retrolingual site. Single level obstruction was more common than multilevel.

Patients with a multilevel collapse had a higher AHI when compared to single level collapse.

On comparing the mean of AHI of single and multilevel collapse, it was found that AHI did not vary with the level of collapse.

Methods and Materials

This was a prospective cohort study done from June 2015 to May 2017 in a tertiary ENT center in South India. Ethical Clearance for the study was obtained. A consecutive series of 60 patients with obstructive sleep apnea were chosen for this study.

Inclusion Criteria included adult patients with age of 18 and above, Apnea Hypopnea Index (AHI) $\geq$ 5.

Exclusion Criteria included parasomnias, central sleep apnea and syndromic patients.

Following a thorough history taking, patients underwent complete ear, nose and throat examination, anthropometric measurements, and an overnight polysomnography to diagnose OSAS. All the candidates All patients underwent both DISE and DMRI.

In DISE, patients were induced to sleep with a loading dose of 1mcg/kg/10mins of dexmedetomidine followed by a maintenance dose of 0.7mcg/kg/hour in a controlled and monitored setting. Once the patient started snoring, the flexible fiber optic endoscope was introduced and the type, level and degree of obstruction were ascertained

In DMRI, patients underwent a 90 minute sleep MRI nap conducted in a high definition GE open 2.0 Tesla system to identify the type and level of obstruction.

VOTE system for DISE and Fujita classification for DMRI were used to classify patients based on the level of obstruction. The results of both DISE and DMRI were tabulated, quantified and then compared using Chi Square test.

Conclusions

- The introduction of Drug Induced Sleep Endoscopy and Dynamic Sleep MRI into our investigatory armament has given us better understanding about the level and degree of obstruction for OSA patients and hence a clearer picture in deciding a treatment protocol for each.

Future Directions

Analyzing whether findings change in various stages of sleep

Understanding whether the results of these tests change when done in a natural sleep or in an induced sleep

Post treatment findings.

Contact Information

Dr. Jerry Jacob
Medical ENT research Foundation
jryjcb@gmail.com

References

- Guilleminault C, Stoohs R, Clerk A, Cetel M, Maistros P. A cause of excessive daytime sleepiness: the upper airway resistance syndrome. Chest 1993;104:781–7.
- Donnelly LF, Surdulescu V, Chini BA, Casper KA, Poe SA, Amin RS. Upper airway motion depicted at cine MR imaging performed during sleep: comparison between young patients with and those without obstructive sleep apnea. Radiology 2003;227:239–245.
- Croft CB, Pringle MB. Sleep nasendoscopy: a technique of assessment in snoring and obstructive sleep apnoea. Clin Otolaryngol Allied Sci 1991; 16:504–509 Sleep Rev 1987; 16:186.
- Barrera JE, Holbrook AB, Santos J, Popelka GR. Sleep MRI: novel technique to identify airway obstruction in obstructive sleep apnea. Otolaryngol Head Neck Surg 2009;140:423–425.