

Surgical Management of Obstructive Sleep Apnea - A Review

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Abstract: *Obstructive sleep apnoea is a sleep associated breathing disorder in which breathing halts during sleep intermittently. It is a serious life threatening disorder in which airway is obstructed while sleeping. There are many types of sleep apnoea among that obstructive sleep apnoea is caused due to the relaxation of muscles of the pharynx and that will lead to affect breathing with or without oxygen deprivation. Risk factors for obstructive sleep apnoea include altered craniofacial anatomy due to genetic predispositions, obesity, medications that leads to muscle relaxation, endocrine disorders, smoking and nasal congestion. This review article is to enlighten various surgical management protocols for obstructive sleep apnoea.*

Keywords: Obstructive sleep apnoea, surgical management, sleep disorder, airway obstruction

1. Introduction

Obstructive sleep apnoea is a sleep associated breathing disorder in which breathing halts during sleep intermittently. There are many types of sleep apnoea among that obstructive sleep apnoea is caused relaxation of muscles of the pharynx and that will leads to affect breathing with or without oxygen deprivation ^[1]. Risk factors for obstructive sleep apnoea include altered craniofacial anatomy due to genetic predispositions, obesity, medications that leads to muscle relaxation, endocrine disorders, smoking and nasal congestion ^[2].

Sex Prediliction

Females have less prevalence of obstructive sleep apnoea disorder comparative to the males ^[3, 5]. Adipose tissue distribution in the female is more concentrated in the peripheral regions while in male is centrally distributed that in return will increase BMI ^[4]. During post menstrual stage of female or in woman who are under hormonal therapy would experience respiratory weakness ^[5, 6]. Co morbidities associated with obstructive sleep apnoea include myocardial infarction, stroke, diabetes mellitus, hypertension, congestive heart failure and depression ^[7].

Signs and Symptoms

Symptoms which arise due to the obstructive sleep apnea is as follows;

- 1) Day time sleep increases
- 2) Snoring
- 3) High blood pressure
- 4) Headache
- 5) Depression
- 6) Abrupt awakening from sleep due to choking or sore throat like sensations
- 7) Decrease in concentrations especially in day times
- 8) Unsatisfied sleep even after proper sleep timings
- 9) Decreased sex drive ^[1]

Etiopathogenesis

The upper airway is a flexible structure consisting of muscle and fat tissue and is usually only passively supported by bones. Therefore, it can be easily influenced by soft tissue factors like fat deposition in the parapharyngeal structures, edema/inflammation of the parapharyngeal region, hypertrophy of adenotonsillar tissues, or enlarged tongue.

The primary actor in the pathophysiology of OSA is the narrow, floppy upper airway. There is increased resistance of the upper airway due to anatomic factors that creates a negative airway pressure. This results in impaired function of airway-dilating muscles, thus increasing collapsibility.

During sleep, the loss of skeletal muscle tone narrows the upper airway, making it floppier, especially during rapid eye movement (REM) sleep when muscle relaxation is intense. This results in two significant actions:

- The turbulent flow patterns that occur lead to vibration of structures causing snoring.
- The pharynx collapses due to the Bernoulli effect. This causes an obstruction which could be partial or complete. This tends to persist until sleep is interrupted and muscle tone is restored.
- These interruptions usually last less than 15 seconds, and the individual is unaware of them. Sometimes, the obstruction results in an awakening and the individual complain of suddenly waking with a snort or a snore. Breathing is reestablished on arousal, and after a few breaths deeper sleep resumes with repetition of the cycle during muscle relaxation.
- Additional factors that can increase the severity of upper airway resistance during sleep are mouth opening or a supine posture which allows the gravitational forces to push the tongue and soft palate back. Upper airway resistance can occur anywhere from the nasopharynx to the hypopharynx but primarily involves the oropharynx.

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Screening Tools and Diagnosis

Epworth Sleepiness Scale

Eight level questionnaire that is used to determine self reported day time sleepiness which has four levels of dozing. Chances of dozing off scores;

- 1) No chance of dozing
- 2) Slight chance of dozing
- 3) Moderate chance of dozing
- 4) High chance of dozing

If Epworth Sleepiness Scale (ESS) score ranges from,

Less than 10 - Normal individuals
Greater than 10 - Obstructive sleep apnoea
Greater than 16 – Narcolepsy^[8].

STOP - BANG

This test is used to detect severity of obstructive sleep disorder by the analysis of snoring, daytime tiredness, observation of apnoea during sleep, blood pressure, Body Mass Index, age, neck circumference and gender^[9].

Polysomnography

Polysomnography (PSG-1100, Nihon Kohden) has recordings of six electro encephalogram channels;

- Bilateral Electro-Oculograms,
- Chin And Tibialis Electromyogram,
- Electrocardiogram,
- Airflow By Nasal Pressure Transducer
- Oronasal Thermocouples,
- Chest And Abdominal Wall Motion By Piezo Electrodes and
- Oxygen Saturation by Pulse Oximeter^[10].

Surgical Management

Failure of non surgical management and preferable patient's anatomy leads to surgical management. Surgical approaches according to the site obstruction involves;

Nasal cavity - Septoplasty, Turbinate reduction

Maxilla- Maxillary advancement

Mandible- Mandible advancement, Genioglossal advancement

Tongue- Lingual tonsillectomy, Posterior midline glossectomy, Tongue suspension, hyoid myotomy and suspension

Nasopharynx- Adenoidectomy

Larynx- Supraglottoplasty

Oropharynx- Tonsillectomy, uvuloplasty pharyngoplasty
Trachea- Tracheostomy^[10]

2. Discussion

Rana M et al stated that Continuous Positive Airway Pressure (CPAP) is the first line of treatment in the pediatric obstructive sleep apnoea patients

Dieltjens M et al concluded his study as combined use of chest worn sleep position trainer (SPT) and mandibular advancement device (MAD) is the most efficient treatment protocol in residual supine dependent obstructive sleep apnoea^[11].

Kang KT et al stated that for children having obstructive sleep apnoea disorder caused by lingual tonsil hypertrophy, lingual tonsillectomy is the most effective surgical management^[13].

3. Conclusion

Obstructive sleep disorder is sleep deprived disorder mainly increasing now a day because of life style modifications that leads to obesity. Even though much treatment procedure for the management of obstructive sleep apnoea, Continuous Positive Airway Pressure (CPAP) is considered to be the first line of treatment in mild to severe cases. Treatment plan for obstructive sleep apnoea patients have to start from the nonsurgical management to the surgical management thereby it improves the quality of life of the patient.

References

- [1] Obstructive sleep apnea basic Jessica Vensel Rundo, MD, MS Cleveland Clinic Journal of Medicine September 2019, 86 (9 suppl 1) 2-9; DOI: <https://doi.org/10.3949/ccjm.86.s1.02>.
- [2] Young T, Skatrud J, Peppard PE. Risk factors for obstructive sleep apnea in adults. JAMA. 2004 Apr 28;291(16):2013-6. doi: 10.1001/jama.291.16.2013. PMID: 15113821.
- [3] Bonsignore MR, Saaresranta T, Riha RL. Sex differences in obstructive sleep apnoea. Eur Respir Rev. 2019 Nov 6; 28 (154):190030. doi: 10.1183/16000617.0030-2019. PMID: 31694839.
- [4] White UA, Tchoukalova YD. Sex dimorphism and depot differences in adipose tissue function. Biochim Biophys Acta 2014; 1842: 377–392.
- [5] Franklin KA, Lindberg E Obstructive sleep apnea is a common disorder in the population – a review on the epidemiology of sleep apnea. J Thorac Dis 2015; 7: 1311–1322.
- [6] Saaresranta T, Aittokallio T, Polo-Kantola P, et al. Effect of medroxyprogesterone on inspiratory flow shapes during sleep in postmenopausal women. Respir Physiol Neurobiol 2003; 134: 131–143.
- [7] Shahar E, Whitney CW, Redline S, Lee ET, Newman AB, Nieto FJ, O'Connor GT, Boland LL, Schwartz JE, Samet JM. Sleep-disordered breathing and cardiovascular disease: cross-sectional results of the Sleep Heart Health Study. Am J Respir Crit Care Med. 2001 Jan; 163 (1): 19-25. doi: 10.1164/ajrccm.163.1.2001008. PMID: 11208620.

- [8] Manzar MD, Salahuddin M, Alamri M, Albougami A, Khan MYA, Nureye D, Spence DW, Pandi-Perumal SR. Psychometric properties of the Epworth sleepiness scale in Ethiopian university students. *Health Qual Life Outcomes*. 2019 Feb 7;17(1):30. doi: 10.1186/s12955-019-1098-9. PMID: 30732633; PMCID: PMC6367806.
- [9] Oshita H, Ito N, Senoo M, Funaishi K, Mitama Y, Okusaki K. The STOP-Bang Test Is Useful for Predicting the Severity of Obstructive Sleep Apnea. *JMA J*. 2020 Oct 15;3(4):347-352. doi: 10.31662/jmaj.2020-0002. Epub 2020 Oct 2. PMID: 33225107; PMCID: PMC7676986.
- [10] Rana M, August J, Levi J, Parsi G, Motro M, DeBassio W. Alternative Approaches to Adenotonsillectomy and Continuous Positive Airway Pressure (CPAP) for the Management of Pediatric Obstructive Sleep Apnea (OSA): A Review. *Sleep Disord*. 2020 Jul 4;2020:7987208. doi: 10.1155/2020/7987208. PMID: 32695520; PMCID: PMC7355373.
- [11] Dieltjens M, Vroegop AV, Verbruggen AE, Wouters K, Willemsen M, De Backer WA, Verbraecken JA, Van de Heyning PH, Braem MJ, de Vries N, Vanderveken OM. A promising concept of combination therapy for positional obstructive sleep apnea. *Sleep Breath*. 2015 May;19(2):637-44. doi: 10.1007/s11325-014-1068-8. Epub 2014 Oct 22. PMID: 25335642; PMCID: PMC4873543.
- [12] Phan NT, Wallwork B, Panizza B. Surgery for adult patients with obstructive sleep apnoea: A review for general practitioners. *Aust Fam Physician*. 2016 Aug;45(8):574-8. PMID: 27610447.
- [13] Kang KT, Koltai PJ, Lee CH, Lin MT, Hsu WC. Lingual Tonsillectomy for Treatment of Pediatric Obstructive Sleep Apnea: A Meta-analysis. *JAMA Otolaryngol Head Neck Surg*. 2017 Jun 1; 143 (6):561-568. doi: 10.1001/jamaoto.2016.4274. PMID: 28208178; PMCID: PMC5824231.