Review Article

Surgical Management of Sleep Apnoea

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Abstract

Obstructive sleep apnea syndrome (OSAS) is a common sleep related breathing disorder with high morbidity secondary to day time somnolence. The level of obstruction of airway classified by Fujita determines the intervention of the specialist. Both medical and surgical management have been in practice for OSAS. Medical management includes weight loss and CPAP. Surgical management pre dominantly includes oral and maxillofacial procedures. Combination of both yields good results.

Key words: Obstructive sleep apnoea, Maxillo mandibular advancement, Uvulopalato pharyngoplasty

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Introduction

Obstructive sleep apnoea (OSA) also called Pickwickian disease is a common sleep related breathing disorder of the present generation with an incidence of 1% -3% and up to 10- 24% in industrial workers[1,2]. It is the obstruction of the upper airway that will lead to apnoea episodes during Sleep. The airway obstruction can be at naso-pharyngeal or at the oro-pharyngeal level which can be due to central or peripheral causes. The central causes mainly involve the suppression of the respiratory centers of the brain that leads to a decrease in the muscle tonicity of the oro-pharyngeal muscles that will lead to the collapse of the airway. This is generally seen in patients on narcotics. The peripheral causes of obstructive sleep apnoea include obesity, enlarged adenoids, mandibular hypoplasia, macroglossia. Up to 18% of the obstructive apnoea episodes are secondary to the pathologies of the naso-pharynx and 50% of the obstructive apnoea cases could be secondary to the retroglossal airway obstruction.[3,4] This disease is characterized by presence of repetitive cycles of apnoea and hypoapnea during sleep. This not only disturbs the sleep pattern, but also leads to deleterious cardio respiratory problems. The patient presents with the main complaint of day time somnolence with snoring, headaches, decreased cognitive function. Clinical presentation of the patient with an average of 5 episodes of apnoea - hypoapnoea in a duration of one hour can be labeled as OSAS.

OSA can lead to potential cardiovascular complications like development of pulmonary hypertension which can potentially lead to right heart failure, tachy- brady syndrome, sinus bradycardia, ventricular ectopy etc. Pulmonary hypertension is due to increased amount of negative intra thoracic inspiratory pressures(less than 60 cm of Hg) which will increase the amount of venous return to the right side of the heart.[5,6,7] These side effects can be augmented by the ventilation – perfusion mismatch that occur due to the obstructive episodes. In these patients reduced oxygen tension will lead to polycythemia.

Clinical Diagnosis

The first step to the management of this disorder involves the identification of the level of obstruction. Clinical examination of the nasal cavity, tongue, mandible and the thyro - mental distance along with an endoscopic evaluation can give a fair idea to the level of obstruction. Mullers maneuver is also helpful to determine the same[3]. Obesity is an important factor that needs to be addressed for the successful management of the OSAS. Increase in the neck circumference due to obesity leads to deposition of the adipose tissue in the para pharyngeal areas causing floppiness of these walls resulting in upper airway obstruction. A neck circumference of greater than 17 inches has been proved to have a higher incidence of OSA[8]. (Table -1) Fujita had classified OSA based on the anatomic level of obstruction into

Type A: Associated with obstruction of the upper oro pharynx, Tonsils and adenoids,

Type B: A combination of upper and lower oro pharyngeal airway obstruction

Type C: obstruction at the level of the lower oro pharyngeal airway, epiglottis, hypopharynx and tongue base.

Radiographic evaluation of OSA includes lateral cephalograms, Mc. Namara's analysis, volumetric evaluation of the airway volume using computed tomograms. Polysomnography is considerd as a gold standard procedure in the evaluation of patients with OSA[6] which evaluates the type of obstruction (central/ peripheral/ mixed) and determines the pattern of the apnoea and hypoapnoea, facilitating the treatment plan.

Respiratory distress Index/ Apnoea – Hypoapnoea Index is calculated based on the number of the Apnoea – Hypoapnoea episodes in one hour's duration. An apnoea episode is defined as a cessation of airflow for greater than 10 seconds with persistent inspiratory effort. A Respiratory Distress Index (RDI) greater than 20 is associated with high mortality rates.

Management

Medical and surgical management modalities have been in practice for the management of OSA. The medical management involves weight loss, change in the sleeping position, use of continuous positive airway pressure (CPAP) and Bi level Positive airway pressure (Bi- PAP). CPAP is a standard successful medical management modality that has success rates of 80%. Application of continuous positive pressure to the pharynx acts as a pneumatic splint that will prevent the collapse of the airway. This procedure is not patient compliant. Bi- PAP application has shown better compliance compared to the CPAP. Surgical treatment modalities are reserved for patients with Respiratory Distress Index (RDI) greater than 20. The type of surgical intervention is determined based on the level of obstruction and the RDI. The Stanford protocol based on the above indices is in practice for the management of these cases (Table I). A uvulopalatopharyngoplasty is indicated in patients with an RDI less than 5 with Fujita's Type A obstruction.[3] This involves the correction of the uvular and the soft palatal length with correction of the redundant tonsillar tissue. The Type B obstruction pattern with RDI between 5- 20 are treated by maxillo-mandibular advancement. An RDI after 6 months post operatively would be a determining factor to assess the indication of a uvulopalatopharyngoplasty. Cases with Type C pattern of obstruction are treated by definite maxillo-mandibular advancement. Advancement of the maxilla pulls the soft tissues of the palate forward leading to increased space in the upper oro-pharynx. mandibular advancement along with pulling the tongue forward relieves retroglossal airway obstruction. The impact of the mandibular advancement can be augmented by advancement genioplasty (fig.4). Isolated procedures to decrease the tongue volume in cases of macroglossia involves the removal of excessive tongue tissue with an elliptical/ rhomboid shaped incision from the midline of the tongue. Direct hyoid suspension with fascia lata slings to the mandible have shown variable results.A combination of the surgical and medical interventions have shown good results. The surgical interventions for OSAS are

1. Uvulopalatopharyngoplasty (Fig .1)
2. Single jaw surgery maxilla (or) mandible (Fig. 2)
3. Bimaxillary Surgery – Lefort 1 for maxilla, sagittal split for mandible (Fig. 3)
4. Genioplasty and its modifications (Fig.4)

Conclusion

OSA is a common sleep related disorder with high morbidity secondary to the day time somnolence that needs attention. A combination of Medical and surgical management have shown good results. The condition has to be seen as a wholesome problem and a multi speciality treatment protocol has to be evolved. Change in the sleeping position, use of continuous positive airway pressure (CPAP), Bi level Positive airway pressure (Bi- PAP) and appropriate surgical procedures may give immediate relief.

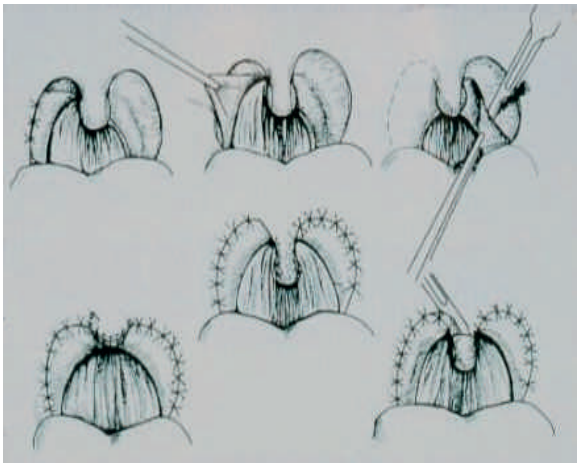

Fig. 1 Fujita type A - Uvulopalatopharyngoplasty

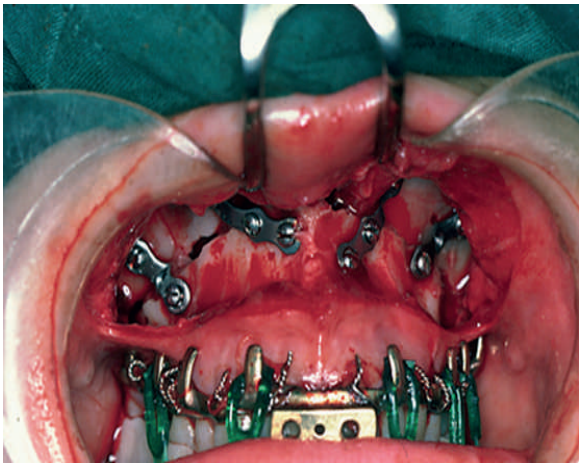

Fig. 2 Lefort 1 for maxilla for maxillary advancement

Fig. 3 Sagittal split for mandible for mandibular advance ment

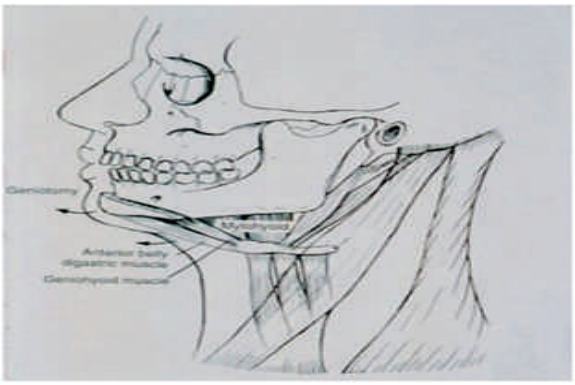

Fig.4 Genioplasty and its modifications for enhancing mandibular advancement

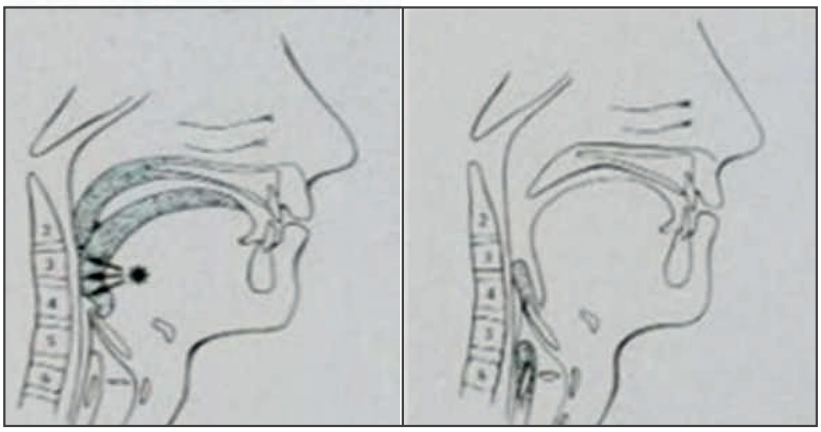

Fig .6, 7 Fujita's Anatomic type B & C patterns of obstruction are treated by definite Maxillo-Mandibular advancement. Advancement of the maxilla pulls the soft tissues of the palate forwards that will increase the space in the upper oro-pharynx. This accompanied by Mandibular advancement pull the tongue forward and relieves the retroglossal airway obstruction.

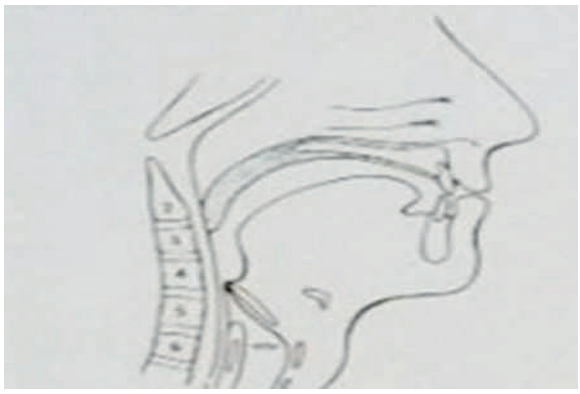

Fig.5 Fujita's Anatomic type A obstruction. This involves the correction of the uvular and the soft palatal length with correction of the redundant Tonsillar tissue.

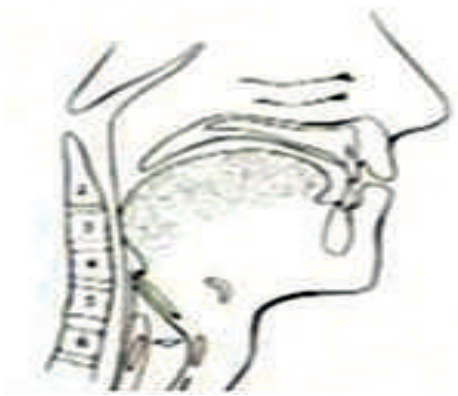

Fig. 8 This is fujita type C requiring only mandibular advancement.

Table I: Stanford Protocol

Fujita's Anatomic type	RDI Index	Treatment
Type A (fig.5)	5-20	Uvulopalatopharyngoplasty(fig. 1)
Type B (fig.6)	20-40	Maxillo Mandibular Advancement +/- (fig.2)Uvulopalatopharyngoplasty
Type C(fig.6,7,8)	>40	Maxillo mandibular advancement (fig.3)

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Magic Seven for Mental Health!
10 Oct 2012

Is there a simple way for humans to find happiness and sound mental health? When confronted with this profound question, economists and researchers from the University of Warwick knew exactly where to look for the answer; what the people ate. In a study done in collaboration with Dartmouth College, USA, they analysed the eating habits of 80,000 people in Britain. They found that the mental well-being was the highest in those consuming 7 portions (each portion is equal to 80 g) of fruits and vegetables every day. This is higher than what the western governments currently recommend (5-a-day) as a protection against cancer and cardiovascular disease risk. The authors do not specify which type of fruits and vegetables are to be consumed. The study is due to be published in Social Indicators Research. (www2.warwick.ac.uk/newsandevents/pressreleases/7-a-day_for_happiness/)

- Dr. K. Ramesh Rao

Cancer & Coloured Spots
12 Oct 2012

According to evolutionary biologists, the last common ancestor of humans and fruit flies (Drosophilidae) existed some 600 million years ago. Actually we share most of the body-building genes with lowly fruit fly. That is a disturbing thought for all those who believe that we are unique, hand-crated creations of a sky-daddy. Actually sharing genes with fruit fly helps us to study some human diseases in them. It also helps us to understand how genes behave in different environments and genetic pathways. Thomas Werner and Komal Kumar Bollepogu Raja of Michigan Technological University found that three proto-oncogenes that produce cancer in humans produce clearly identifiable coloured spots on the belly fruit fly. It is as if the old genes learn new tricks when they are placed in a new environment and genetic pathway. Authors feel that this discovery might help us in understanding the genetic pathways that cause cancer and in developing targeted gene therapies. (http://www.sciencedaily.com /releases/2012/10/121012143746)

- Dr. K. Ramesh Rao