

Possibilities for Increasing the Success Rate in Sleep Surgery

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Sleep surgery for the treatment of obstructive sleep apnea (OSA) has been controversial, due to the many aspects of sleep surgery that remain unknown. Sleep medicine doctors and sleep surgeons may have different viewpoints on the subject, but their goals should be the same: to treat their patients. No one treatment method is the only method for treating all OSA patients. Sleep surgery has many limitations, such as imperfect evaluation methods for finding obstruction sites, the lack of exact indicator for each surgery, etc. Overcoming these limitations should increase sleep surgery's success rate. In this paper, I discuss the nature of these limitations and what the focus of study should be regarding sleep surgery. **Sleep Med Res 2011;2:33-34**

Key Words Sleep surgery, Success, Limitations.

Sleep surgery is an important option in the treatment of patients with obstructive sleep apnea (OSA), particularly for those who have failed or cannot tolerate non-surgical treatments, such as positive airway pressure (PAP) therapy or oral appliances. Surgery aims to anatomically reduce upper airway obstruction in the whole upper airway, as in PAP therapy. However, surgery can fail to sufficiently widen the entire upper airway because surgery cannot be adjustable after postoperative state, as in PAP therapy. Surgery also includes the possibility of complications, which can be mild or severe. Nevertheless, surgery is still an important option because of the low compliance and inevitability of lifelong treatment in non-surgical treatment.

The "Box and Contents" theory provides a simple anatomical explanation of the concepts in surgical treatment. The "box" means the bony and cartilaginous framework of the upper airway, and the "contents" include all the soft tissue filling the upper airway. When the box is not adequate to contain the contents, upper airway obstruction can occur, especially during sleep. However, no consensus or conclusive evidence exists on whether these OSA patients have problems the box, the contents, or some combination.

Beside these anatomical factors, functional factors affect surgical treatment, such as the critical muscle tone and surface tension of the upper airway mucosa, etc.¹ Surgery cannot address these factors, because surgery usually cannot correct them. However, surgery may also affect these factors, though no one has published evidence of such results.

Numerous methods have been used to identify obstruction sites in OSA patients. All such techniques have methodological limitations, such as these procedures' invasiveness, with concomitant sleep disruption in optical and manometric evaluations during polysomnographic studies, or the time limitations and drug-induced sleep in dynamic sleep endoscopic and radiologic procedures. Each method may inform the physician about different things.

Early investigations had indicated each OSA patient only had one particular obstruction site location, whereas studies that are more recent have demonstrated multiple obstruction sites, saw-sawing obstruction patterns, and even a propagation of obstruction sites in one individual. Technologic advances in the methods using by physicians to detect the obstruction sites in OSA patients have demonstrated that the upper airway is more dynamic than originally thought. The variable obstruction sites involve a complex underlying pathogenesis of upper airway obstruction, which many factors can affect, including neck anatomy, adipose tissue distribution, anes-

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thetics, sleep stage, and a variety of other components yet unknown, and result in varying obstruction types within the same individual and, consequently, difficulties in evaluating obstruction sites. However, the attempts to evaluate obstruction sites are still quite important for decisions regarding type of surgery and for the indications for each surgery.

Procedures addressing nasal obstruction include septoplasty; various kinds of turbinoplasty, including radiofrequency ablation (RFA), microdebrider procedure, etc.; and removal of any obstructing mass, such as polypectomy and tumor excision. Surgical procedures at the retropalatal level include tonsillectomy; uvulopalatopharyngoplasty (UPPP); uvulopalatal flap; laser-assisted uvulopalatoplasty; and the conservative procedures, such as RFA of the soft palate and palatal implant.

Surgery at the hypopharyngeal or retrolingual level addresses an enlarged tongue or, more commonly, maxillomandibular deficiency. Surgeries in these cases are aimed at reducing the tongue base's bulk, increasing tension in the tongue muscles, or providing more space for the tongue in the oropharynx, to limit posterior collapse during sleep. These procedures include RFA of the tongue, midline glossectomy or lingualplasty, genioglossus advancement (GA), hyoid myotomy suspension (HMS), and tongue base suspension with a sling.

These palatal and tongue base procedures may be performed separately (unilevel surgery) or combined (multilevel surgery), for example, UPPP plus GA or UPPP plus HMS. Multilevel surgery seems to have a higher success rate than unilevel surgery has.² However, the special indications for the higher success rates of these surgical procedures have not been revealed according to various evaluation methods, as in UPPP.

Maxillomandibular advancement (MMA) employs a different conceptual approach, whole upper airway reconstruction, because MMA can widen the entire upper airway with one procedure. However, MMA may not be suitable as the first step in surgical treatment of OSA, because MMA is the most aggressive of all sleep surgeries, with the concomitant possibilities of morbidity, airway compromise, and facial shape alteration.³

Successful surgery depends on proper patient selection, choice of surgical procedure, and the surgeon's experience. Proper patient selection is the most controversial issue in sleep surgery, due to its many limitations. Little information exists regarding the correct indications for each surgical procedure. Surgery should make the airway wider, but the surgeon cannot be sure that the amount by which any particular surgical procedure widens the upper airway is enough to prevent airway collapse during the patient's sleep, even when the upper airway shape looks amply wide when the patient is awake or sleeping. The sleep surgeon faces another difficult issue regarding proper surgical procedure selection, because no standard methods for reveals obstruction site(s) exist. All meth-

ods for evaluating the upper airway to find the obstruction site(s) have their own limitations, with handicaps the surgeon's decision regarding the correct surgical level to employ.⁴

Most published results of surgical treatments are not enough to prove the efficacy of each such surgical procedure.⁵ Moreover, most surgeries are performed in combination, so that proving the results of individual surgical procedures is not easy. The majority of surgeons perform palatal surgeries only, which may not be enough to widen an OSA patient's whole upper airway.⁶

Surgical technique and experience for each surgeon in each surgical procedure is also very important factor for successful surgery. The name of surgery, such as UPPP, may not be the same surgery in each surgeon because of the modification of procedure by each surgeon. And tongue base surgery is really tricky to be performed in fresh surgeon. The surgeon's experience should make the procedure different. These indicate that the result of surgery can be very variable by the experience and technique of surgeon.

In spite of limitations in sleep surgery, surgery remains an important therapeutic consideration and inevitable treatment option in many patients. Therefore, to achieve increased success rates for surgical treatments, future studies must focus on evaluation methods for finding the obstruction site(s) and on addressing the complex interactions of the numerous factors that cause airway obstruction. The search for more precise indication for each surgical method in each evaluation method should also result in better surgical success rates. In addition, experts in sleep surgery need to educate and encourage the beginners in sleep surgery for them to do right and effective surgery. These may be the only, or at least the best, ways to increase success rates and avoid unnecessary procedures in OSA patients.

Conflicts of Interest

The author has no financial conflicts of interest.

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