Original Article

Perception of surgical treatments for obstructive sleep apnea among sleep medicine physicians: A cross-sectional study

Mohammed R. Algethami[1], Firas A. Addas[1], Hazim A. Khatib[1], Faris F. Alhejaili[2], Siraj O. Wali[2]

[1]Faculty of Medicine, King Abdulaziz University, Jeddah, [2]Sleep Medicine and Research Center, King Abdulaziz University Hospital, Jeddah, Saudi Arabia

Abstract

Background: Obstructive sleep apnea (OSA) is a common sleep disorder associated with significant morbidities and mortality if untreated. Continuous positive airway pressure is the gold standard treatment for OSA, but poor adherence significantly limits its use. However, there is evidence to support the effectiveness of surgical treatments for OSA. **Objectives:** This study aimed to assess the experience of sleep physicians in Saudi Arabia in treating OSA using surgical options. **Materials and Methods:** This cross-sectional study featured an electronic survey that was sent to all sleep physicians across the Kingdom of Saudi Arabia between January 2018 and March 2018. The questionnaire contained questions on the demographics of the physicians and the types of surgical referral for patients with OSA. **Results:** Twenty-six physicians completed the questionnaire. More than two-thirds of the physicians preferred to refer their patients to otolaryngologists (69.23%), while the remainder preferred to refer their patients to oral and maxillofacial surgeons (23.07%). More than half of the physicians indicated that maxillomandibular advancement (MMA) was the most effective surgical procedure (53.8%), followed by adenotonsillectomy (19.2%), then uvulopalatopharyngoplasty (UPPP) (11.5%). Four physicians (15.4%) chose "none" as the best answer. More participants indicated that the benefits outweighed the risks for MMA (53.84%) than for UPPP (19.23%). **Conclusion:** Based on the opinions of sleep physicians in Saudi Arabia, MMA is the best surgical option for the treatment of moderate to severe OSA. Otolaryngologists are the preferred surgeons because they are more available than oral and maxillofacial surgeons physicians, who are scarce in Saudi Arabia.

Keywords: Cross-section, maxillomandibular advancement, obstructive sleep apnea, oral and maxillofacial surgery, sleep physicians

Introduction

Obstructive sleep apnea (OSA) is a common sleep-disordered breathing condition.[1] It is characterized by frequent episodes of complete or partial collapse of the upper respiratory passage during sleep.[2] It can lead to life-threatening conditions such as stroke, cardiovascular mortality and morbidity, daytime hypersomnolence, diabetes mellitus, and depression.[1,3] The prevalence of OSA is estimated to be 2–14% in the general population.[1] A recent study conducted in Saudi Arabia revealed the estimated prevalence of clinically significant OSA to be 8.5% in the Saudi population (12.8% in males and 4.8% in females).[4]

The standard management of OSA varies between surgical and non-surgical therapies depending on the severity of the disease

Address for correspondence: Dr. Faris F. Alhejaili, Sleep Medicine and Research Center, King Abdulaziz University Hospital, Jeddah 80215, PO BOX 21589, Saudi Arabia.
E-mail: falhejaili@kau.edu.sa

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and individual characteristics.[5] Continuous positive airway pressure (CPAP) is considered the gold standard treatment for moderate to severe OSA.[1] CPAP prevents OSA by pneumatically splinting the upper airway, preventing pharyngeal collapse during sleep.[6] This treatment approach has been shown to have a significant impact on quality of life, lowering blood pressure and decreasing the incidence of cardiac arrhythmia and stroke in patients with OSA.[1] Despite the proven effectiveness of CPAP, poor adherence significantly limits its benefit.[1,5,7]

According to a systematic review, there is sufficient evidence indicating that surgical options for OSA are effective.[1] Maxillomandibular advancement (MMA) is an invasive surgical alternative for the treatment of OSA.[8] The purpose of this surgery is to expand the facial skeletal framework and extend the anteroposterior and medial-lateral dimensions of the upper airway.[8] MMA approach is indicated in patients who have difficulty tolerating CPAP and are considered good surgical candidates.[8] A meta-analysis that reviewed nine studies involving MMA surgery noted a reduction in the average apnea-hypopnea index (AHI) in approximately 87% of subjects (95% CI 80–92%), with a mean postoperative AHI of 7.7 and a cure rate of 43.2%.[9] Another meta-analysis found that the surgical success rate of MMA was 85.5% in 455 patients with OSA, with a reduction in AHI of more than 50%.[9] Based on its favorable outcomes, Rotenberg *et al.* suggested that MMA could be an appropriate first-line therapy for OSA.[10]

Uvulopalatopharyngoplasty (UPPP) is another potential surgical therapy for OSA that is performed in patients with severe OSA who cannot tolerate CPAP.[7,10] The purpose of UPPP is to remove the excess tissue in the throat to expand the patient's airway.[11] UPPP may reduce the AHI by 33% in patients with OSA.[5] In one study, UPPP surgery successfully lowered the AHI, defined as lowering of the apnea index by ≥60% or achieving a postoperative apnea index of ≤4 apneas/hour, in 80% of the 60 patients with OSA syndrome studied.[12] Although UPPP is sometimes used for severe OSA, its role is still controversial, and long-term success has been shown to occur in only 50% of cases.[11]

Previous study was found in all over the world that OSA is under-recognized and the same results showed in Saudi Arabia.[13,14] also, study was done by Pagel *et al.* reveal that the importance of the diagnosis and treatment of OSA in PHC will minimize the morbidity and mortality, moreover will improve quality of life in the patients.[15]

Therefore based on the experience of sleep physicians in Saudi Arabia, our study aimed to determine the following: (1) the surgical specialty to which patients with OSA requiring upper airway surgery should be referred; (2) the most surgical intervention preferred by sleep physicians for treating patients with OSA; and (3) if sleep physicians consider MMA or UPPP or other procedures for OSA patients who are suitable surgical candidates.

Materials and Methods

Selection and description of participants: In this cross-sectional study, an Internet link containing a survey was sent via email to all sleep physicians across the Kingdom of Saudi Arabia during the period from January 2018 to March 2018. The link contained a description of the questionnaire and explained the aim of the survey. The questionnaire was designed using Google (Mountain View, CA, USA) forms. The distribution and collection of survey response data were performed using Google spreadsheets. The survey was distributed on December 8, 2017, and responses were collected on January 8, 2018. The anonymity of the respondents was preserved. Ethical approval was obtained from the institutional review board under the name "The perceptions of sleep medicine physicians on the surgical treatment of obstructive sleep apnea, a cross sectional study" (study ID 553-17) 04/12/2017.

Permission was acquired to use the questionnaire by Swope *et al.*[5] The questionnaire contained a consent for participation and eight multiple choice questions. Participants were asked about their sex, number of years in practice, and specialty. These questions were followed by questions regarding the physician's preference regarding the referral of patients with OSA for surgical treatment. The survey included questions on the type of surgical specialty preferred by the physician, the procedure preferred by the physician (i.e., MMA or UPPP), patient improvements noted by the physician following either procedure, and the physician's recommendation of either type of procedure for patients for whom medical treatment failed. A scale ranging from 1–10 was used to determine the strength of opinion, with one being strongly negative, five being neutral, and ten being strongly positive.

Statistical analysis

Descriptive statistics were used in the analysis of the data. The Statistical Package for the Social Sciences version 20 was used for all statistical tests (IBM, Armonk, NY, USA). *P* values < 0.05 were considered statistically significant.

Results

Of the 31 sleep medicine consultants that received the survey, 26 completed the questionnaire, for an overall response rate of 83.9%. Of the 26 responders, 20 (76.9%) were men. More than one-third of the participants (nine [34.61%]) had 1–5 years of experience in sleep medicine and seven (26.92%) had more than 15 years of experience [Table 1]. However, there was no association between the number of years in practice and the referral preference for the type of surgery ($P = 0.9$).

Table 2 shows the responses of the questionnaire participants. More than two-thirds (18 [69.23%]) of the participants preferred referring patients with OSA who may be surgical candidates to otolaryngologists, while six (23.07%) preferred referring them to oral and maxillofacial surgeons (OMFS). More than

Table 1: Demographic data

Variable	*n*	%
Specialty		
Sleep medicine	26	100.0
Gender		
Male	20	76.92
Female	6	23.07
Years of experience		
1-5	9	34.61
6-10	6	23.07
11-15	4	15.38
>15	7	26.92

Table 2: Participants' responses

Variable	*n*	%
For patients with OSA who may be surgical candidates, I refer?		
Otolaryngology (ENT)	18	69.2
Oral and Maxillofacial surgery (OMFS)	6	23.1
Other	2	7.7
For patients with moderate to severe OSA who have failed non-surgical therapy, do you recommend Maxillomandibular Advancement (MMA)?		
Never	1	3.8
Rarely	8	30.8
Sometimes	10	38.5
Very often	2	7.7
Always	5	19.2
Do you feel that the benefits (average improvement in daytime somnolence) outweigh the risks/morbidity associated with MMA?		
Favorable >5	14	53.8
Neutral=5	8	30.8
Unfavorable <5	4	15.4
For patients with moderate to severe OSA who have failed non- surgical therapy, do you recommend Uvulopalatopharyngoplasty (UPPP)?		
Never	11	42.3
Rarely	10	38.5
Sometimes	4	15.4
Very often	1	3.8
Always	0	0
Do you feel that the benefits (average improvement in daytime somnolence) outweigh the risks/morbidity associated with UPPP?		
Favorable >5	5	19.2
Neutral=5	6	23.1
Unfavorable <5	15	57.7
Which surgery has the best results in reducing the pathophysiology of OSA?		
None	4	15.4
MMA	14	53.8
UPPP	3	11.5
Adenotonsillectomy	5	19.2

one-third (10 [38.46%]) of the participants reported that they occasionally recommended MMA to patients with moderate to severe OSA for whom non-surgical therapy had failed, and eight (30.76%) reported that they rarely did so. Regarding the benefits of MMA, 14 (53.84%), 8 (30.76%), and 4 (15.38%) of the participants stated that the balance between the benefits of MMA and the risk of morbidity was favorable (i.e., >5), neutral, and unfavorable, respectively, with a mean score of 6.1. For patients with moderate to severe OSA for whom non-surgical therapy failed, 11 (42.30%) of the participants reported that they never recommended UPPP and 10 (38.46%) reported that they rarely did so. Regarding the benefits of UPPP, 15 (57.69%), 6 (23, 07%), and 5 (19.23%) of the participants stated that the balance between the benefits of UPPP, and the risk of morbidity was unfavorable (i.e., < 5), neutral, and favorable, respectively, with a mean score of 3.8. More than half of the participants 14 (53.84%) reported that MMA was the best surgical approach for reducing the pathophysiology of OSA, while five (19.23%) reported that adenotonsillectomy was the best approach [Table 2].

Discussion

This study revealed that the majority of sleep physicians in Saudi Arabia preferred to refer patients with OSA to otolaryngologists instead of OMFS. More than half of the sleep physicians considered MMA to be the best surgical treatment for patients with OSA; however, five reported that adenotonsillectomy had a more significant impact in reducing the pathophysiology of OSA.

In this study, 18 (69.23%) of the sleep medicine physicians reported that they refer their patients to an otolaryngologist for MMA. On the other hand, six (23.07%) of the physicians preferred to refer their patients to OMFS. This result was consistent with the study performed by Swope *et al.*, which showed that 52% of the sleep physicians surveyed preferred to refer their patients to otolaryngologists despite OMFS being the specialty that more commonly performs MMA.[5] However, in Saudi Arabia, it has been reported that many otolaryngologists are now performing procedures to treat OSA and are showing increasing interest in the surgical options for the management of this disease.[16]

More than half of the sleep physicians considered MMA to be the best surgical treatment for patients with OSA. Indeed, the success rate of MMA in achieving a lower AHI is overwhelming when compared with other surgical options, as has been consistently demonstrated by several meta-analyses and systematic reviews.[5] Nonetheless, the majority (53.84%) of participants reported the balance between the benefits of MMA and its associated morbidity and complications to be favorable (>5). The survey was not specifically designed to reveal the reasons behind the variations in responses; therefore, it is unknown whether they could be attributed to unsatisfactory benefits post-MMA or the well-known associated morbidities. The American Academy of Sleep Medicine (AASM) recommends MMA as the best surgical treatment for patients with OSA for whom mandibular advancing oral appliances are ineffective or for those who cannot use or tolerate positive airway pressure. Moreover, the AASM has reported that the AHI of patients with moderate to severe OSA does not improve following UPPP.[17]

Sleep medicine physicians tend to choose MMA over other modalities and consider it a highly beneficial surgical approach for the management of severe OSA. Even though MMA is associated with many risks, these risks did not outweigh the benefits of MMA in our study, which may explain why most physicians were confident in recommending it. Thus, this evidence may explain why MMA is considered a good baseline alternative for the treatment of OSA when conventional therapy fails and surgical approaches are the only remaining option. The interventional surgical technique related to MMA, known as orthognathic surgery, has been shown to be effective and safe, as it significantly decreases subjective sleepiness, diastolic blood pressure, and AHI.[18-21] The participants' experiences regarding the satisfactory results of MMA are concordant with previous findings, which include low complication rates and high patient satisfaction.[18-22] On the other hand, UPPP is more prone to causing complications and does not always produce a significant effect in patients with OSA.[22]

The strength of our study includes its high response rate of 83.9% of all sleep physicians in the country. The number of sleep physicians is low in Saudi because the sleep medicine specialty only began to develop in the late 1990s.[16] The survey was short and electronic, which made it easier and less time-consuming for the physicians, thereby encouraging them to participate in the study.

Our study had several limitations. The survey did not assess the factors that may assist in determining the appropriate candidates for surgery. Furthermore, the survey was subjective regarding symptomatology, as it used somnolence as a point of comparison. Moreover, no other types of treatment for OSA apart from MMA and UPPP were discussed.

In conclusion, our study showed that the current trends in the management and referral of patients with OSA by sleep physicians in Saudi Arabia are consistent with those reported in the literature. The majority of sleep physicians in Saudi Arabia believe that MMA is the best surgical option for the treatment of moderate to severe OSA, as the benefits outweigh the risks to a greater extent than in UPPP. Although this procedure is usually performed using OMFS specialists, sleep physicians in Saudi Arabia prefer to refer patients to otolaryngologists, who are more available than OMFS physicians in Saudi Arabia. Based on our results, we recommend that OMFS be included in the management of OSA patients who are candidates for surgery. Further studies on the benefits and complications of MMA should be performed, as the current literature is scarce regarding this procedure.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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