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Editorial

Exploring suture pharyngoplasty outcomes in OSA: A tertiary hospital experience

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ABSTRACT

The study evaluates the efficacy of suture pharyngoplasty in managing obstructive sleep apnea (OSA) through a case series of 25 patients. OSA, characterized by recurrent upper airway collapse during sleep, results in fragmented sleep, intermittent hypoxia, oxygen desaturation, and systemic complications. Despite continuous positive airway pressure (CPAP) being the standard treatment, its poor tolerance necessitates alternative approaches. Suture pharyngoplasty, combined with lifestyle modifications, was assessed as a minimally invasive surgical solution targeting lateral pharyngeal wall collapse.

Patients aged 18–60 with mild to moderate OSA underwent preoperative assessments, including polysomnography, Epworth Sleepiness Scale (ESS), and STOP-BANG criteria. Postoperative evaluations at three and six months revealed significant reductions in the Apnea-Hypopnea Index (AHI) and oxygen desaturation episodes. Notable improvements in oxygen saturation, ESS scores, and STOP-BANG scores were observed, reflecting enhanced sleep quality and reduced disease severity. The procedure demonstrated a favorable safety profile, with no major complications and only minor, transient postoperative discomfort. The results affirm the potential of suture pharyngoplasty in effectively reducing OSA severity, improving patient-reported outcomes, and achieving sustained benefits with minimal risk. This series aligns with existing literature, supporting the procedure as a viable alternative for carefully selected patients. The findings underscore the role of suture pharyngoplasty as a promising addition to OSA management strategies, emphasizing the need for further validation in broader patient populations.

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1. Introduction

Obstructive sleep apnea (OSA) is a sleep-disordered breathing condition characterized by repeated episodes of upper airway collapse during sleep leading to apnea (complete obstruction) or hypopnea (partial obstruction).^{1,2} These episodes cause oxygen desaturation and fragmented sleep, intermittent hypoxia contributing to systemic complications such as hypertension, atrial fibrillation, heart failure, stroke, and pulmonary hypertension.^{3,4}

The pathogenesis of OSA is multifactorial and anatomical abnormalities playing a central role.⁵ Common

etiologies include obesity, thickened pharyngeal walls, nasal congestion, an enlarged uvula and conditions such as micrognathia, macroglossia, and tonsillar hypertrophy. The nasopharynx is frequently identified as the primary site of obstruction.^{6,7}

Diagnosis is typically confirmed through polysomnography (PSG), the gold standard for evaluating OSA.⁸ PSG measures parameters such as respiratory effort, oxygen saturation, and sleep stages to calculate the apnea-hypopnea index (AHI), with an AHI >5 indicating OSA. For broader accessibility, screening tools such as the STOP-BANG questionnaire and Epworth Sleepiness Scale (ESS) provide effective, though less definitive, assessments.^{9,10}

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While continuous positive airway pressure (CPAP) therapy remains the mainstay of OSA management, it is commonly poorly tolerated.¹¹ Suture pharyngoplasty offers a minimally invasive surgical alternative for patients with mild to moderate OSA, particularly in cases involving lateral pharyngeal wall collapse. By stabilizing the pharyngeal walls and targeting obstructions at the velum, this single-stage procedure enhances airway patency and reduces dependence on CPAP. When combined with lifestyle modifications, suture pharyngoplasty has been seen to achieve significant and sustained improvements in OSA outcomes.¹²

2. Materials and Methods

This observational study was conducted in the Department of ENT at MGMCRI. Patients aged 18–60 years with mild to moderate obstructive sleep apnea (OSA) (Apnea-Hypopnea Index [AHI] between 5–30) and significant lateral pharyngeal wall collapse were included after informed consent. Exclusion criteria included pregnant or lactating women, patients with severe psychiatric illnesses, and those with morbid obesity (BMI >35). (Figure 2)

2.1. Preoperative assessments

Baseline evaluations included:

1. *Clinical Assessments:* STOP-BANG questionnaire and Epworth Sleepiness Scale (ESS) to assess OSA severity and daytime sleepiness.
2. *Polysomnography (PSG):* Confirmation of OSA diagnosis, recording AHI, oxygen saturation, and sleep parameters
3. *Cardiovascular Assessments:* ECG, ambulatory blood pressure monitoring, and 2D echocardiography to rule out associated comorbidities.

3. Surgical Procedure

The patients were positioned in supine position under general anaesthesia. Tonsillectomy was performed. The pterygoid hamulus was identified medial and posterior to the last molar and confirmed by palpation. Using 2-0 prolene round bodied needle, suture is placed starting from the pterygoid hamulus passing submucosally through the soft palate through the anterior pillar and then to the posterior pillar and the back in the reverse direction through the anterior pillar and ends at the pterygoid hamulus thus stabilising the lateral pharyngeal wall. The same procedure is repeated on the opposite side. (Figure 1)

3.1. Postoperative follow-up

Follow-up evaluations were conducted at:

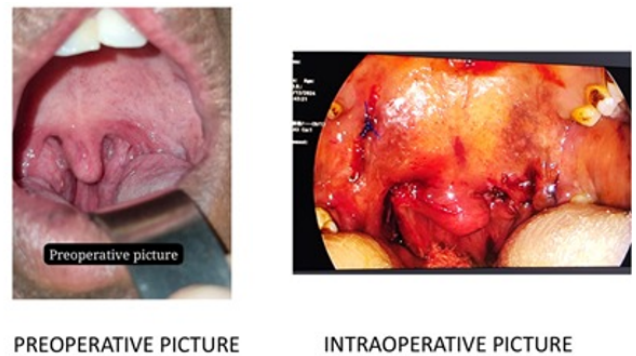


Figure 1: Preoperative and intra operative pictures

1. *Three months:* Assessment using the STOP-BANG questionnaire and ESS
2. *Six months:* Repeat assessments of STOP-BANG, ESS, polysomnography (AHI and oxygen saturation), and cardiovascular parameters (ECG, blood pressure, and 2D echocardiography).

3.2. Outcome measures

The primary focus was the reduction in AHI at six months, while secondary outcomes included improvements in oxygen saturation, STOP-BANG and ESS scores, and patient-reported quality of life.

This streamlined approach ensured a comprehensive evaluation of the procedure's effectiveness and safety.

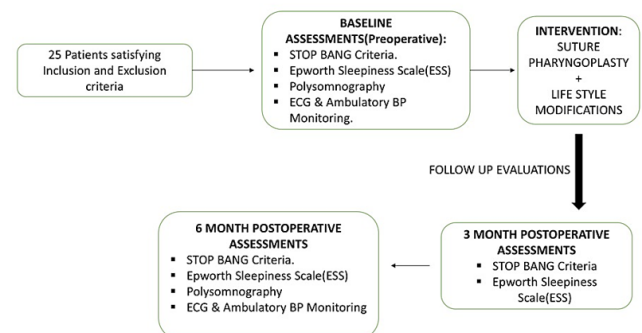


Figure 2: Study materials and methodology flow chart

4. Results

Postoperatively, the Apnea-Hypopnea Index (AHI) showed a 60% reduction, reflecting a substantial alleviation of upper airway obstruction during sleep. The frequency of nocturnal oxygen desaturation events decreased from an average of 15 events per hour preoperatively to 6 events per hour postoperatively. Additionally, the occurrence of critical desaturation events (oxygen saturation falling below 90%) was notably minimized.

Subjective assessments indicated marked improvements in daytime sleepiness and quality of life. The mean Epworth Sleepiness Scale (ESS) score decreased from 16 preoperatively to 8 postoperatively, demonstrating a reduction in daytime fatigue and enhanced alertness. Similarly, STOP-BANG scores dropped from an average of 6 preoperatively to 3 postoperatively, signifying a reduction in OSA severity.

Cardiovascular evaluations highlighted additional benefits. Systolic blood pressure reduced from an average of 140 mmHg preoperatively to 130 mmHg postoperatively. Postoperative cardiac evaluations, including ECG and 2D echocardiography, showed no new abnormalities, confirming the procedure's cardiovascular safety.

The procedure was well-tolerated, with no reports of major complications such as airway obstruction, bleeding, or infection. Minor adverse events included transient throat discomfort in 16% of patients and mild pharyngeal edema in 12%, both resolving within two weeks with conservative management.

In summary, suture pharyngoplasty led to significant improvements in both objective measures (AHI and oxygen saturation) and subjective outcomes (ESS and quality of life) with minimal complications, reinforcing its safety and efficacy.

5. Discussion

This study demonstrates the effectiveness and safety of suture pharyngoplasty in managing mild to moderate obstructive sleep apnea (OSA).

The observed 60% reduction in the Apnea-Hypopnea Index (AHI) aligns with findings from Inoue et al. (2021), who reported similar reductions in AHI, oxygen desaturation events, and improved sleep quality post-surgery.¹³ The marked decline in critical desaturation events (intermittent hypoxia) and enhanced oxygen saturation levels postoperatively further the effectiveness of this intervention in stabilizing the upper airway.

Subjective improvements, including reduced daytime sleepiness and enhanced alertness, as indicated by the significant reduction in Epworth Sleepiness Scale (ESS) and STOP-BANG scores, are consistent with previous reports by Edward et al. (2011). These findings highlight the positive impact of suture pharyngoplasty on patients' overall quality of life, emphasizing its role as a viable alternative for individuals unable to tolerate continuous positive airway pressure (CPAP) therapy.

The observed reduction in systolic blood pressure postoperatively aligns with Wang et al. (2021), who demonstrated significant cardiovascular benefits following surgical interventions for OSA.¹⁴ While the primary aim of this study was to evaluate the impact of suture pharyngoplasty on OSA parameters, the cardiovascular

improvements noted in this cohort underscore the broader systemic benefits of addressing airway obstruction.

The safety profile of suture pharyngoplasty was favourable, with no major complications reported. Minor issues such as transient throat discomfort and mild pharyngeal edema were self-limiting, reflecting the minimally invasive nature of the procedure. This aligns with the findings of Inoue et al. (2022), who noted minimal morbidity associated with pharyngoplasty techniques.¹³

These findings reinforce the role of suture pharyngoplasty as a targeted surgical option for managing OSA, particularly in patients with significant lateral pharyngeal wall collapse.

6. Conclusion

This case series highlights the efficacy and safety of suture pharyngoplasty as a minimally invasive surgical option for managing mild to moderate obstructive sleep apnea (OSA). The significant reduction in the Apnea-Hypopnea Index (AHI), oxygen desaturation events, intermittent hypoxia and improvements in daytime sleepiness and quality-of-life metrics affirm its potential to address key challenges in OSA management, particularly for patients unable to tolerate continuous positive airway pressure (CPAP) therapy. In summary, suture pharyngoplasty led to significant improvements in both objective measures (AHI and oxygen saturation) and subjective outcomes (ESS and quality of life) with minimal complications, reinforcing its safety and efficacy.

The procedure demonstrated a favourable safety profile, with only minor, transient postoperative discomfort and no major complications, further supporting its viability as an alternative treatment. Additionally, observed reductions in systolic blood pressure and cardiovascular stability highlight its broader systemic benefits.

While the findings align with existing literature, the study's small sample size and limited follow-up period necessitate further research. Larger, multicentric trials with extended follow-up are crucial to validating these outcomes and establishing suture pharyngoplasty as a standard intervention in OSA care. Nonetheless, this study reinforces its role as a promising addition to the therapeutic arsenal for OSA, emphasizing the importance of individualized, patient-centric approaches in improving sleep-disordered breathing outcomes.

7. Source of Funding

None.


8. Conflict of Interest

None.

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