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Original Research Article

Intraoperative Complications Following Lateral Suspension Uvulopalatopharyngoplasty in Obstructive Sleep Apnoea: A Prospective Observational Study with Literature-Based Comparison

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ABSTRACT

Background: Uvulopalatopharyngoplasty (UPPP) remains one of the most commonly performed surgical procedures for obstructive sleep apnoea (OSA). Despite its effectiveness, conventional UPPP and several contemporary pharyngoplasty procedures are associated with complications including intraoperative hemorrhage, airway compromise, need for ICU admission, and tracheostomy. Lateral suspension uvulopalatopharyngoplasty is a modified technique intended to improve lateral pharyngeal wall stability without extensive muscular reconstruction or use of barbed sutures.

Objective: To evaluate intraoperative complications following lateral suspension uvulopalatopharyngoplasty and compare the observed morbidity profile with complication rates reported in the literature for conventional and modified pharyngoplasty procedures.

Methods: A prospective observational study was conducted on 20 patients with severe obstructive sleep apnoea who underwent lateral suspension uvulopalatopharyngoplasty at a tertiary care centre. Patients were evaluated using a structured intraoperative assessment protocol documenting intraoperative events and transient postoperative morbidity.

Results: Transient laryngospasm during extubation occurred in one patient (5%) and was successfully managed using laryngeal mask ventilation without the need for reintubation or intensive care support. No patient developed intraoperative hemorrhage or airway compromise. Expected postoperative throat discomfort and odynophagia were observed during the immediate postoperative period and improved with conservative management.

Conclusion: Lateral suspension uvulopalatopharyngoplasty demonstrated low intraoperative morbidity in the present cohort. When compared with complication rates reported in the literature for conventional and modified pharyngoplasty procedures, the technique appears to provide an acceptable safety profile while offering a relatively simple method of lateral pharyngeal wall stabilization.

Keywords: Obstructive Sleep Apnoea, Uvulopalatopharyngoplasty, Lateral Suspension, Pharyngoplasty, Intraoperative Complications, Airway Surgery.

INTRODUCTION

Obstructive sleep apnoea (OSA) is a common sleep-related breathing disorder characterized by recurrent episodes of partial or complete upper airway collapse during sleep, resulting in intermittent hypoxia, sleep fragmentation, excessive daytime somnolence, impaired cognitive performance, and reduced quality of life. OSA is also associated with significant cardiovascular, metabolic, and neurocognitive morbidity.[1,2]

Continuous positive airway pressure (CPAP) remains the gold-standard treatment for moderate-to-severe OSA. However, long-term adherence remains suboptimal, with a substantial proportion of patients unable to tolerate prolonged CPAP use.[3] Consequently, surgical management continues to play an important role in carefully selected patients with anatomical upper airway obstruction.[4]

Uvulopalatopharyngoplasty (UPPP), originally described by Fujita and colleagues, remains one of the most commonly performed surgical procedures for OSA.[5] Although conventional UPPP effectively addresses retropalatal obstruction, growing understanding of OSA pathophysiology has demonstrated that lateral pharyngeal wall collapse is a major contributor to airway obstruction in many patients.[6] This has led to the development of several contemporary pharyngoplasty techniques, including relocation pharyngoplasty, expansion sphincter pharyngoplasty, and barbed reposition pharyngoplasty, all of which aim to improve lateral pharyngeal wall stability while preserving airway function.[7-9]

While surgical efficacy remains the primary determinant of success, perioperative safety is equally important when evaluating any novel surgical technique. Patients undergoing upper airway surgery for OSA frequently present unique anesthetic challenges because of altered upper airway anatomy, obesity, and increased risk of difficult airway management. Intraoperative complications such as difficult intubation, difficult ventilation, hemorrhage, airway trauma, oxygen desaturation, and laryngospasm may significantly influence surgical outcomes and perioperative morbidity.[10-11]

Lateral suspension uvulopalatopharyngoplasty is a modified technique that utilizes previously mobilized tonsillar pillar tissue to achieve lateral pharyngeal wall stabilization without extensive muscular reconstruction or specialized barbed sutures. By avoiding complex tissue rearrangement and preserving functional pharyngeal structures, the technique may potentially reduce operative morbidity while maintaining adequate airway enlargement.

In our previous prospective study evaluating functional outcomes following lateral suspension uvulopalatopharyngoplasty, significant improvements were observed in daytime sleepiness and sleep-related quality of life.[12] However, the intraoperative safety profile of this technique has not been specifically investigated.

The present study was therefore undertaken to evaluate intraoperative complications and transient postoperative morbidity associated with lateral suspension uvulopalatopharyngoplasty in patients with severe obstructive sleep apnoea and to compare the observed safety profile with previously reported literature on conventional and modified pharyngoplasty procedures.

OBJECTIVES

Primary Objective

To evaluate intraoperative complications following lateral suspension uvulopalatopharyngoplasty in patients with severe obstructive sleep apnoea.

Secondary Objective

To evaluate transient postoperative morbidity associated with the procedure.

MATERIALS AND METHODS

Study Design

This prospective observational study was conducted in the Department of Otorhinolaryngology at K.R. Hospital, Mysore Medical College and Research Institute.

Ethical Clearance

Institutional ethical committee approval was obtained prior to commencement of the study, and informed consent was obtained from all patients.

Sample Size

Twenty patients diagnosed with severe obstructive sleep apnea who underwent lateral suspension uvulopalatopharyngoplasty between 2025–2026 were included in the study.

Inclusion Criteria
- Age greater than 18 years
- Clinical diagnosis of obstructive sleep apnea
- Apnea-Hypopnea Index (AHI) >30
- Patients willing to undergo surgery and follow-up

Exclusion Criteria
- Previous pharyngeal surgery
- Significant medical comorbidities precluding surgery
- Craniofacial anomalies
- Neuromuscular disorders affecting airway tone

Preoperative Evaluation

All patients underwent:
- Detailed clinical history
- General physical examination
- ENT examination
- Modified Mallampati grading
- Flexible nasopharyngoscopy with Müller maneuver
- Polysomnography
- Routine hematological investigations
- Anesthesia fitness evaluation

Baseline demographic parameters including age, sex, body mass index (BMI), and apnea-hypopnea index (AHI) were documented.

Outcome Measures

Primary Outcome

Occurrence of intraoperative complications:
- Difficult intubation
- Difficult ventilation
- Significant intraoperative hemorrhage
- Airway injury
- Laryngospasm

Secondary Outcome

Transient postoperative morbidity:
- Odynophagia
- Throat discomfort
- Foreign body sensation
- Mild transient dysphagia
- Temporary nasal speech
- Uvular edema

Surgical Technique

All procedures were performed under general anesthesia with orotracheal intubation. The patient was positioned supine with neck extension, and adequate oropharyngeal exposure was obtained using a Boyle–Davis mouth gag.

- **Step 1: Exposure and Infiltration**
  The tonsillar region and soft palate were adequately exposed. Local infiltration with a solution of Normal saline was administered in the peritonsillar plane to facilitate dissection.
- **Step 2: Tonsillar Dissection**
  A standard extracapsular tonsillectomy was initiated. The tonsil was dissected from the tonsillar fossa in the peritonsillar plane using blunt and sharp dissection. Particular attention was paid to continue the dissection inferiorly, ensuring complete mobilization of the tonsillar tissue along with associated mucosal and muscular attachments.
- **Step 3: Modified Tonsil Excision (Key Step)**
  Instead of conventional removal techniques such as snare excision, the fully mobilized tonsil was grasped using a Negus artery forceps. The tonsillar tissue was then excised using curved scissors. This step allows controlled handling of the tonsillar pillar tissues, which are essential for the subsequent suspension maneuver.
- **Step 4: Lateral Suspension Maneuver (Core Innovation)**
  Following tonsil excision: The clamped tonsillar pillar tissue (including mucosa and underlying muscular elements, particularly palatopharyngeal components) was gently retracted medially using the Negus forceps and a ligature was applied to this tissue under medial traction.
  This maneuver creates a tension-based repositioning of the lateral pharyngeal wall, effectively reducing its tendency to collapse inward. The same steps were repeated on the contralateral side.
- **Step 5: Completion of Uvulopalatopharyngoplasty**
  Following bilateral lateral suspension: Redundant soft palate mucosa and uvular tissue were assessed. Appropriate trimming and reshaping of the soft palate were performed. Palatal closure was completed as per standard UPPP principles.
  Care was taken to avoid excessive tissue removal to preserve function and reduce postoperative complications.
- **Step 6: Hemostasis and Final Inspection**
  Hemostasis was secured. The oropharynx was inspected for symmetry and adequate airway widening. The lateral walls appeared stabilized and lateralized.

Variable	Value
Number of patients	20
Mean age	35.1 ± 13.6 years
Male	10
Female	10
Mean BMI	24.6 ± 2.7 kg/m²
Mean AHI	45.6 ± 10.2 events/hour

Table 1. Baseline Characteristics

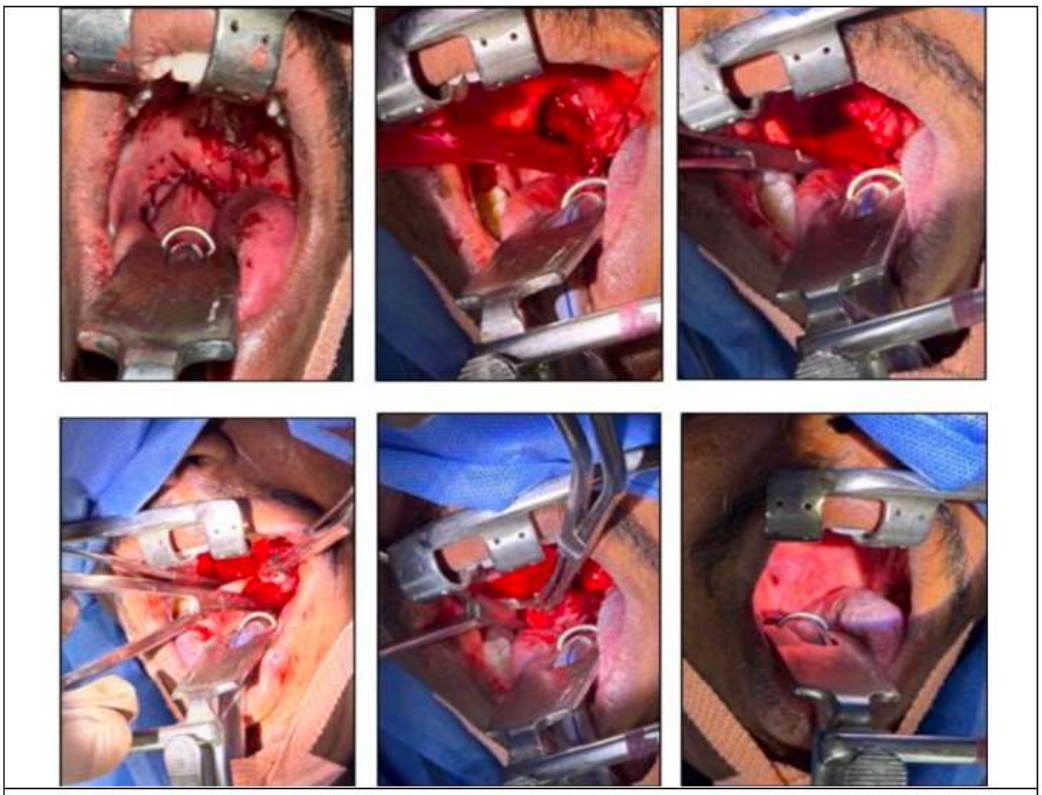


Figure 1. Intraoperative steps of lateral suspension uvulopalatopharyngoplasty demonstrating oropharyngeal exposure using Boyle–Davis mouth gag, tonsillar dissection with grasping of the tonsil using Dennis Brown tonsil holding forceps and lateral clamping of the inferior pedicle using Negus artery forceps, excision of the tonsil using curved scissors, ligation of the inferior pedicle to achieve lateral pharyngeal wall suspension, and the final operative field following completion of uvulopalatopharyngoplasty with lateral suspension

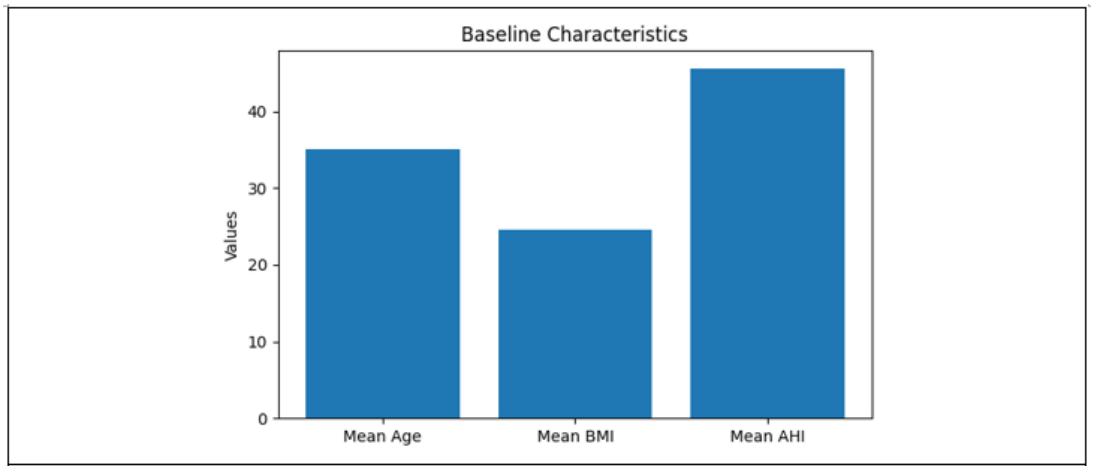


Figure 2. Bar graph showing baseline demographic and polysomnographic characteristics of the study population including mean age, body mass index (BMI), and apnea-hypopnea index (AHI)

Complication	Number	Percentage
Laryngospasm	1	5%
Difficult intubation	0	0%
Difficult ventilation	0	0%
Significant hemorrhage	0	0%
Airway injury	0	0%

Table 2. Intraoperative Complications

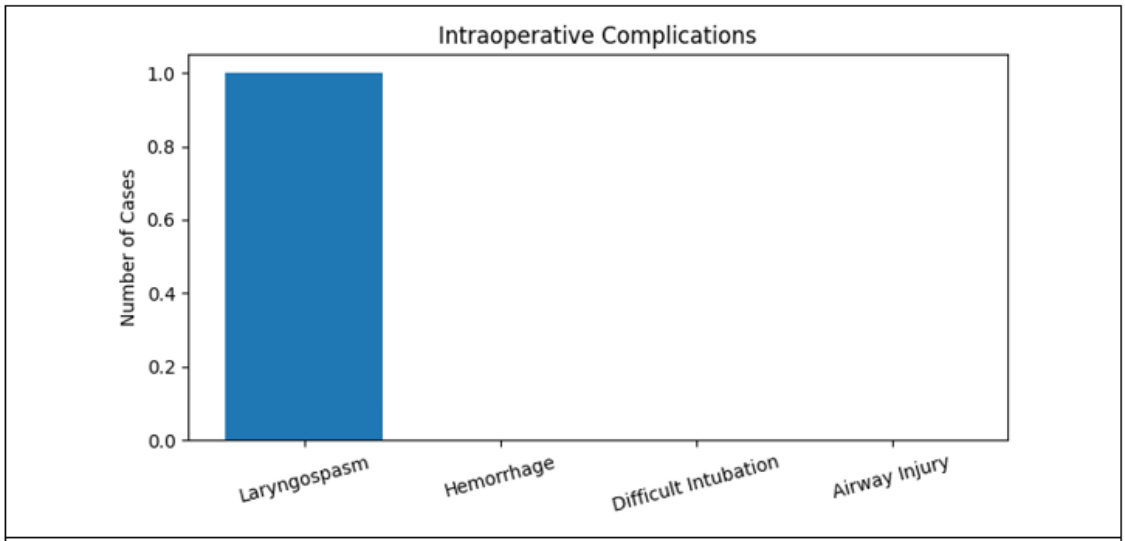


Figure 3. Bar graph demonstrating intraoperative complications observed during lateral suspension uvulopalatopharyngoplasty. Transient laryngospasm during extubation was observed in one patient, while no cases of significant intraoperative hemorrhage, difficult intubation, or airway injury were encountered

RESULTS

Intraoperative Complications

Among the 20 patients included in the study, only one intraoperative complication was observed.

A single patient developed transient laryngospasm during extubation. The episode was promptly recognized and successfully managed using laryngeal mask ventilation. Oxygen saturation remained stable and no patient required reintubation, emergency tracheostomy, or postoperative intensive care monitoring.

No cases of difficult intubation, difficult mask ventilation, significant intraoperative

hemorrhage, or airway injury were encountered.



Figure 4. Postoperative clinical photograph of the patient who developed transient laryngospasm during extubation following lateral suspension uvulopalatopharyngoplasty. The episode was successfully managed intraoperatively using laryngeal mask ventilation without requirement for reintubation or intensive care admission



Figure 5. Preoperative clinical photograph of the patient who developed transient laryngospasm during extubation following lateral suspension uvulopalatopharyngoplasty. The patient demonstrated features commonly associated with obstructive sleep apnoea, including increased body habitus and a potentially challenging airway. The episode was successfully managed with laryngeal mask ventilation without reintubation or intensive care admission

Symptom	Number	Percentage
Odynophagia	20	100%
Throat discomfort	20	100%
Uvular edema	5	25%
Foreign body sensation	4	20%
Mild transient dysphagia	2	10%
Temporary nasal speech	2	10%

Table 3. Transient Postoperative Morbidity

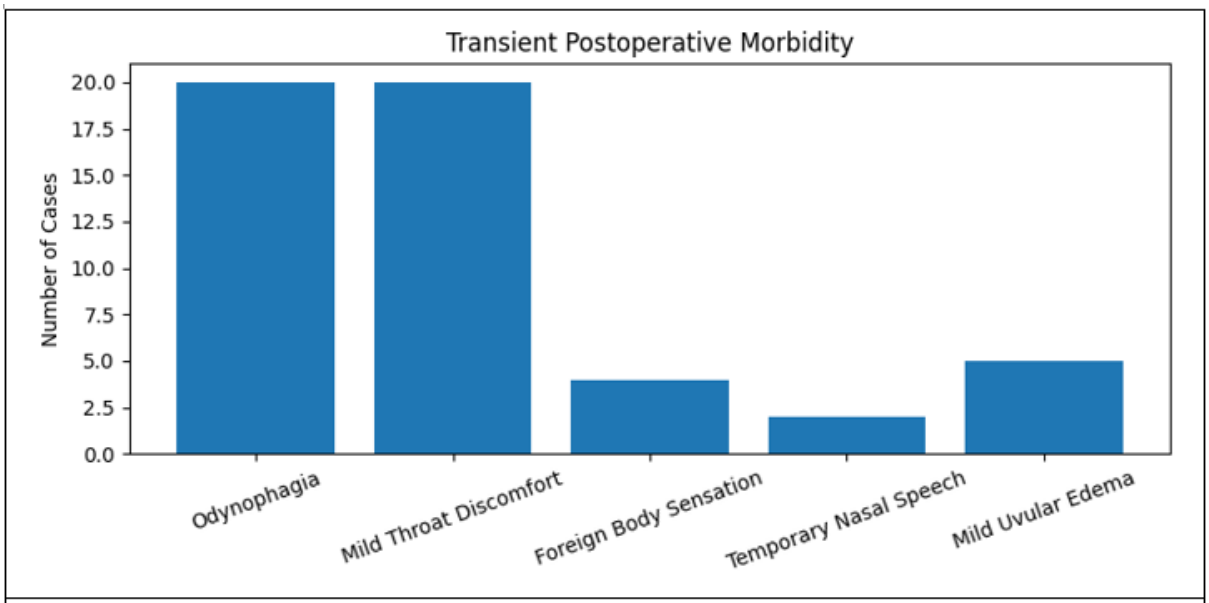


Figure 6. Radar chart demonstrating transient postoperative morbidity following lateral suspension uvulopalatopharyngoplasty. Odynophagia and throat discomfort were universally observed, whereas uvular edema, foreign body sensation, transient dysphagia, and temporary nasal speech occurred less frequently and resolved spontaneously

DISCUSSION

The present study specifically evaluated intraoperative complications associated with lateral suspension uvulopalatopharyngoplasty. The overall incidence of intraoperative adverse events was low, with only one patient experiencing transient laryngospasm during extubation.

The principal concern during upper airway surgery for OSA is maintenance of airway safety throughout induction, surgical manipulation, and emergence from anesthesia. Conventional UPPP has historically been associated with complications including hemorrhage, airway obstruction, difficult airway management, and postoperative respiratory compromise.[2]

Modern pharyngoplasty procedures such as relocation pharyngoplasty, expansion sphincter pharyngoplasty, and barbed reposition pharyngoplasty were developed primarily to improve airway stabilization while minimizing tissue disruption.[4,5,7] However, these procedures frequently involve muscular repositioning and more extensive tissue handling.

The lateral suspension technique differs in that lateral pharyngeal wall stabilization is achieved using mobilized tonsillar pillar tissue without extensive muscular reconstruction. This may contribute to the low rate of intraoperative adverse events observed in the present series.

The only intraoperative complication encountered was transient laryngospasm during extubation. Laryngospasm is a recognized complication following upper airway surgery and may occur secondary to airway irritation, blood contamination, or heightened airway reflexes. The episode resolved promptly following laryngeal mask ventilation and did not require further intervention.

No significant hemorrhage was observed. This finding may be related to the extracapsular tonsillectomy plane and meticulous hemostasis employed throughout the procedure.

Transient postoperative symptoms were consistent with expected postoperative healing after pharyngeal surgery and resolved without additional treatment.

Complication	Conventional UPPP	Modified Pharyngoplasty Procedures	Present Study
Significant hemorrhage	Reported[2]	Rare[5]	0%
Airway complications	Reported[2]	Rare[4-5]	5% transient laryngospasm

Difficult airway management	Reported[6]	Rare	0%
Airway injury	Rare[2]	Rare	0%
Need for emergency airway intervention	Rare[2]	Rare	0%

Table 4. Comparison of Intraoperative Complications with Previously Reported Literature

Relationship with Previous Functional Outcome Study

In our previous prospective study evaluating functional outcomes following lateral suspension uvulopalatopharyngoplasty, the same patient cohort demonstrated significant improvement in both daytime sleepiness and sleep-related quality of life following surgery. Functional Outcomes of Sleep Questionnaire (FOSQ) scores improved from a mean preoperative value of 13.34 ± 1.99 to 18.36 ± 1.55 postoperatively, while Epworth Sleepiness Scale (ESS) scores improved from 11.55 ± 0.99 to 6.95 ± 1.76 during follow-up.

These clinical improvements corroborate findings from existing literature, which suggest that lateral suspension techniques provide enhanced functional benefits for patients with obstructive sleep apnea.[12]

Limitations

Limitation	Description
Small sample size	Only 20 patients included
Single-center study	Limited external validity
No control group	Direct comparison not possible
Descriptive analysis	No inferential statistical testing
Short follow-up	Long-term safety not assessed

CONCLUSION

Lateral suspension uvulopalatopharyngoplasty demonstrated a favorable intraoperative safety profile in this prospective series. Only one episode of transient laryngospasm occurred during extubation and was successfully managed without sequelae. No difficult airway events, significant hemorrhage, or airway injuries were encountered. The procedure was associated with low transient postoperative morbidity, all of which resolved with conservative management. These findings suggest that lateral suspension uvulopalatopharyngoplasty is a safe technique for lateral pharyngeal wall stabilization in patients with severe obstructive sleep apnoea.

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