



## Palatal eversion for the treatment of combined nasopharyngeal stenosis and tonsillar pillars adhesion<sup>☆</sup>



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### ABSTRACT

**Objective:** Rarely the tonsillar pillars and the soft palate became adherent to the posterior nasopharyngeal wall by strong fibrous tissue due to excessive dissection and cauterization during surgery leading to nasopharyngeal stenosis. Therefore, many treatment modalities are being tried to cure this problem. The aim of this study is to explore our results of modifying the basic technique to accommodate those patients with combined nasopharyngeal stenosis and tonsillar pillars adhesions in one stage. Study Design: Case series.

**Methods:** This study was conducted on 10 patients with combined nasopharyngeal stenosis and tonsillar pillars adhesions after adenotonsillectomy. They were subjected to treatment by palatal eversion through dividing the soft palate in the midline to separate each pillar from the pharyngeal wall in continuation with each half of soft palate and removal of the fibrous tissue causing stenosis. This was followed by eversion and fixation of the two palatal divisions on either side to allow complete epithelialization of the stenotic area. Postoperative follow-up was done for one year by the flexible nasopharyngoscopy, perceptual speech analysis, and polysomnography.

**Results:** The flexible nasopharyngoscopic examination of the 10 patients at the end of post-operative period revealed a freely mobile soft palate with no nasopharyngeal stenosis or palatal fistula. Velopharyngeal function and speech assessment by perceptual speech analysis was normal in all 10 cases. No obstructive episodes were recorded in polysomnograms.

**Conclusions:** Palatal eversion is a promising technique in the treatment of post-adenotonsillectomy of combined nasopharyngeal stenosis and tonsillar pillars adhesion. It is recommended to be used on a wider scale of patients and other indications as nasopharyngeal stenosis following uvulopalatoplasty and post nasopharyngeal radiotherapy. The level of evidence: 4 (case series).

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### 1. Introduction

Rarely after adenotonsillectomy, may the patient develop adhesion of the soft palate to the posterior nasopharyngeal wall by strong fibrous tissue. This may be due to excessive dissection and cauterization during surgery leading to nasopharyngeal stenosis. Sometimes the tonsillar pillars became adherent also to the lateral part of the posterior oropharyngeal wall due to severe fibrosis. The main predisposing factor is excessive scarring in keloid-forming patients [1,2]. The patient develops nasal obstruction,

accumulation of nasal secretion, hyponasal speech, anosmia, rhinorrhea, sleep apnea, dysphagia, which may complicate to acute otitis media and sinusitis secondary to nasopharyngeal stenosis [3,4].

The optimum treatment of nasopharyngeal stenosis is mainly prevention by careful operative technique, judicious use of electrocautery and adequate preoperative evaluation for adenoidectomy or uvulopalatoplasty during the primary surgery are essential to prevent nasopharyngeal stenosis. The definitive treatment of nasopharyngeal stenosis is very difficult due to the recurrence and restenosis and many patients require repeated operations to obtain a satisfactory result. Therefore, many treatment modalities are being tried to cure this problem. The trial of Triamcinolone acetate injections [5] and local injection of corticosteroids [6] has been shown to reduce the secretion of collagen as well as leading to its solubilization, significantly reducing the occurrence of keloids.

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Palatopharyngoplasty with bilateral buccal mucosal graft repair to alleviate oropharyngeal stenosis after tonsillectomy showed success in one case report [7]. Bilateral Z-pharyngoplasty for Amelioration of acquired nasopharyngeal stenosis has been described [8] with satisfied results. The author published in (2012) the new technique of palatal eversion for the treatment of nasopharyngeal stenosis [9]. The basic technique was prescribed in 2 stages mainly for those patients with nasopharyngeal stenosis due to plastered soft palate to the posterior pharyngeal wall in 12 patients after adenotonsillectomy without dealing with the tonsillar pillars. In some patients, the tonsillar pillars are also plastered to the lateral part of the posterior wall of oropharynx due to excessive fibrosis. The aim of this study is to explore our results of modifying the basic technique to accommodate those patients with combined nasopharyngeal stenosis and tonsillar pillars adhesions in one stage technique.

## 2. Patients

Ten patients with combined nasopharyngeal stenosis and tonsillar pillars adhesions after adenotonsillectomy were included in this study (Fig. 1). The patients were collected from the outpatients clinic of pediatric otolaryngology unit in Cairo University Hospitals from March 2013 to March 2015. They were seven males and 3 females, their age ranged between 3 and 10 years with a mean age of 6 years and 8 months. They complained of complete bilateral nasal obstruction 6–18 months after adenotonsillectomy with hyponasal speech, snoring and sleep apnea. There was no history of surgical correction of nasopharyngeal stenosis in all the patients. Informed consent was obtained from parents of the patients and the principles outlined in the Declaration of Helsinki were followed.

## 3. Methods

All patients were subjected to the following:

### 3.1. Pre-operative assessment

- \* Full ENT examination and history taking.
- \* Flexible nasopharyngoscopy: to see the degree of stenosis, and mobility of the different velopharyngeal walls. Five points scale regarding stenosis of the nasopharynx was used for assessment (Table 1). Patients with complete nasopharyngeal stenosis were selected to be participants in this study.
- \* CT scan of the paranasal sinuses to exclude chronic sinusitis.

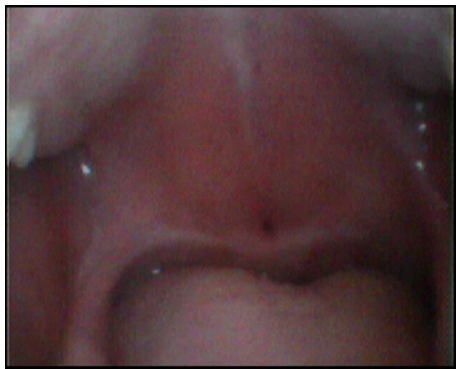


Fig. 1. Preoperative nasopharyngeal stenosis showing complete soft palate and tonsillar pillars adhesions to the posterior pharyngeal wall, and the dimple represents the site of the base of the uvula.

**Table 1**

The degree of preoperative and postoperative nasopharyngeal stenosis by flexible nasopharyngeal examination.

Point scale	Preoperative	Postoperative
Normal	0	6
Mild (25% stenosed)	0	3
Moderate (50% stenosed)	0	1
Severe (75% stenosed)	0	0
Complete obstruction	10	0

- \* Tympanometry to exclude middle ear effusion.
- \* Preoperative perceptual speech analysis for velopharyngeal function and speech assessment with 4 points scale of hyponasality (normal, mild, moderate and severe) was done by a speech pathologist (Table 2).
- \* Overnight polysomnography to detect any obstructive episode.

### 3.2. Operative technique

Under general anesthesia with oral endotracheal intubation, a Dingman mouth gag is introduced. The posterior tonsillar pillar and lateral part of the posterior pharyngeal wall and the soft palate are injected with saline in adrenaline (1: 200,000). A midline incision was done by dividing the full thickness of the soft palate into two halves right and left. Separation of each half of the soft palate from the posterior pharyngeal wall was done using sharp dissection which was extended downwards to separate each pillar from the pharyngeal wall (Fig. 2). The stenotic scar tissue plastering the soft palate to the posterior pharyngeal wall was excised. Eversion and fixation of each half of the soft palate by two absorbable stitches (Vicryl 0) laterally at the oral side was done (Fig. 3). The uvula was fixed in the midline followed by hemostasis using bipolar electrocautery.

### 3.3. Post-operative follow-up

The nasal regurgitation more to fluids and rhinolalia aperta were developed postoperatively, which were improved by increased mobility of soft palate and decreased pain within few days. Releases of the two palatal divisions were done by lysis of the lateral stitches, with complete healing of the pharyngeal wound and complete epithelialization of the site of stenosis (Fig. 4). Follow-up of the patients was done for one year by the flexible nasopharyngoscopy. Velopharyngeal function and speech assessment by perceptual speech analysis were done after one month. Sleep studies were done for all patients at the end of the follow-up period using overnight polysomnography to detect any obstructive episode.

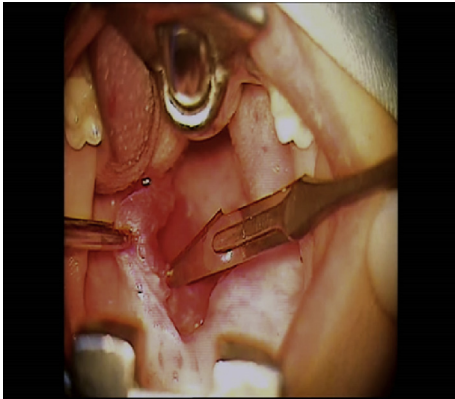
## 4. Results

The study was conducted on 10 patients who complained of post-adenotonsillectomy combined nasopharyngeal stenosis and

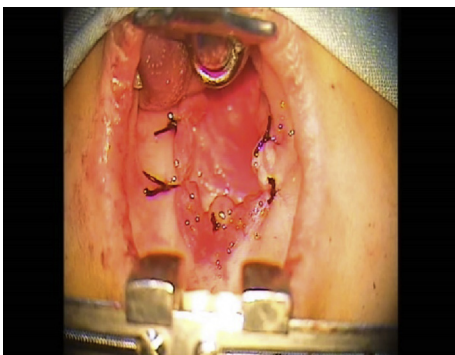
**Table 2**

The degree of preoperative and postoperative hyponasality by speech analysis test.

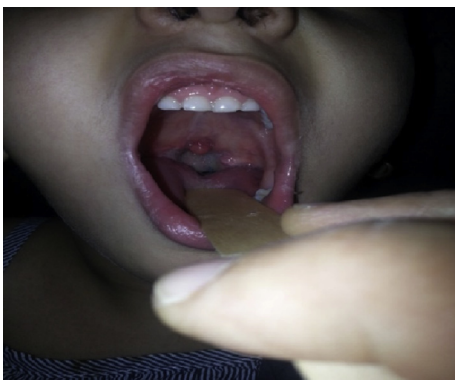
Point scale	Preoperative	Postoperative
Normal	0	7
Mild	0	2
Moderate	2	1
Severe	8	0



**Fig. 2.** The midline incision dividing the full thickness of the soft palate into two halves right and left and sharp dissection of each half from the posterior pharyngeal wall.



**Fig. 3.** Eversion of each half of the soft palate at the oral side by two absorbable stitches laterally and fixation of the uvula in the midline.



**Fig. 4.** Follow-up of the patient after one year postoperatively shows patent nasopharynx and midline uvula.

tonsillar pillars adhesions. As regards the flexible nasopharyngoscopic examination of the 10 patients at the end of the postoperative period which is one year revealed normal nasopharynx and freely mobile soft palate in 6 cases (60%). Mild stenosis was detected in 3 cases (30%) and one case with moderate stenosis (10%) (Table 1). No failure (complete stenosis) or palatal fistula were detected also the tonsillar pillars were fashioned in good shape. Comparison of preoperative and postoperative velopharyngeal function and speech assessment by perceptual speech analysis showed 7 cases (70%) with a normal improvement of their speech, 2 cases (20%) showed mild hyponasality and one case (10%) with

moderate hyponasality (Table 2). No obstructive episodes were recorded in polysomnograms.

## 5. Discussion

Nasopharyngeal stenosis (NPS) is an infrequently encountered entity characterized by obliteration of the natural pathway between the nasopharynx and the oropharynx. Obstruction ranges from a thin membranous diaphragm to a mass of dense fibrotic tissue obliterating the nasopharynx. Over resection of mucosa during surgery of the naso/oropharynx, as adenotonsillectomy, uvulopalatopharyngoplasty, and irradiation of nasopharyngeal tumors comprise the majority of current day cases [10]. Sometimes the tonsillar pillars became adherent also to the lateral part of the posterior oropharyngeal wall due to severe fibrosis. The main predisposing factor is excessive scarring in keloid-forming patients [1,2]. The main principle of the new technique with two stages procedure for nasopharyngeal stenosis treatment is the wide separation between the two row surfaces of the soft palate and posterior pharyngeal wall till the natural epithelialization occurs during palatal eversion without the use of any local or distal flaps which is considered as an advantage of this technique. Modification of this technique to include dissection of the tonsillar pillars and separation of each half of the soft palate from the posterior pharyngeal wall using sharp dissection which was extended downwards to the tonsillar pillar on each side to separate each pillar from the pharyngeal wall in continuation with each half of soft palate. Doing the technique as two stages procedure considers as a disadvantage, so we tried to replace the non-absorbable stitches (silk) by the absorbable stitches (vicryl) with lysis of the stitches and healing of the wound spontaneously and saving the second stage of the technique. The other disadvantage of this technique is the midline separation of the soft palate leading to temporary nasal regurgitation more to fluids and rhinolalia aperta which partially improved by pain relief and gradual mobility of two palatal segments. No postoperative palatal fistula was detected and all the patients have normal velopharyngeal functions regarding speech as proved by perceptual speech analysis and no obstructive episodes were detected by polysomnography. Comparative studies are non-existent and clinical series are usually limited to just a few patients. Most of the techniques described for correction of nasopharyngeal stenosis depended on local flaps of the pharynx to cover the row surfaces of the soft palate and posterior pharyngeal wall to prevent stenosis. These flaps usually are liable for secondary infection and necrosis leading to restenosis. Fritz [11] stated that the reconstructive surgery of the velopharyngeal stenosis and atresia may often be difficult and it is sometimes impossible to cut viable flaps from the mucosa of the velum and/or pharynx or to bring free grafts to be taken. For the permanent success of the surgery, the covering of the lateral pharyngeal wall is also essential. So he described a surgical technique using flaps from the nasal mucosa in five patients with fair results.

Bilateral Z-pharyngoplasty was effective in alleviating severe postsurgical nasopharyngeal stenosis. Symptomatic grading of the nasopharyngeal stenosis improved from a mean score of 3.3 (severe stenosis) preoperatively to a score of 0.2 (minimal to no stenosis) in follow-up. Endoscopic measurement of the stenosis was improved from  $6.1 \times 6.3$  mm preoperatively to  $28.1 \times 39.3$  mm in follow-up [8].

Cotton [12] described a new method of repair, using a laterally based pharyngeal flap, with good results in six cases of nasopharyngeal stenosis in children. Other technique depended on the use of CO<sub>2</sub> laser to correct the stenosis followed by prolonged use of nasopharyngeal stents and molds to prevent restenosis, which could not tolerate by the patients leading to failure of surgery.

Fixation of the stent is difficult, it must be extremely reliable in order to avoid an obstructive catastrophe, and both its insertion and removal require a general anesthesia [4,13].

Regarding follow up and restenosis, even with optimal planning and surgical technique, many patients require repeat operations to obtain a satisfactory result. Giannoni et al. showed that acquired nasopharyngeal stenosis symptoms had an average onset time of 3.1 weeks postoperative [14]. Stepnick reported recurrent scarring and stenosis within 6 weeks of treating nasopharyngeal stenosis with the placement of a free flap [15].

## 6. Conclusion

Combined nasopharyngeal stenosis and tonsillar pillars adhesions post-adenotonsillectomy remains a rare but serious complication of a surgical procedure that is frequent in ENT. Prevention of this rare complication can be achieved by surgical expertise when performing adenotonsillectomy and preserving the anatomical structures, avoiding excessive electrocoagulation. Still, surgery is the definitive treatment and the palatal eversion as a single stage is a promising technique in the treatment of post-adenotonsillectomy stenosis and it is recommended to be used on a wider scale of patients and other indications as nasopharyngeal stenosis following uvulopalatoplasty and post nasopharyngeal radiotherapy.

## Conflict of interest

None.

## Disclosure

No financial disclosures.

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