

Effects of Orticochea Pharyngoplasty on Hypernasality and Speech Regurgitation after Cleft Palate Repair

Muhammad Mughese Amin, Nasir Uddin Khan, Fouzia Qayyum, Abdullah El Muttaqi, Sohail Attaur-Rasool

Abstract

Introduction: Abnormal speech pattern is a common presentation of velopharyngeal insufficiency (VPI) in a significant population after previous palatoplasty for cleft palate (CP).

Objective: We assessed the outcome of sphincter pharyngoplasty (SP) for hypernasality and speech regurgitation after CP repair.

Design: This was a prospective study conducted during 2004 to 2014.

Place & Duration of Study: Department of Plastic and Reconstructive Surgery, Bahawal-Victoria Hospital Bahawalpur.

Patients & Methods: Twenty patients diagnosed with residual VPI after palatoplasty were recruited. Speech evaluation was done before and after SP described by Orticochea.

Results: Our patients demonstrated significant improvement in hypernasality and speech regurgitation without complications. The effects were maintained during the study period without need for revision.

Conclusion: Sphincter pharyngoplasty (SP) successfully and safely alleviates symptoms of velopharyngeal insufficiency (VPI) in cleft palate (CP) patients who had previously undergone palatoplasty.

Keywords: Pharyngoplasty, Velopharyngeal insufficiency

Bahawal-Victoria
Hospital, Bahawalpur
MM Amin
F Qayyum

Sindh Hospital
Korengi-5, Karachi
NU Khan

Jinnah Medical & Dental
College, Karachi
A El Muttaqi

CMH Lahore Medical
College, Lahore
SA Rasool

Correspondence:
Dr. Muhammad Mughese
Amin
Associate Professor,
Head of Plastic and
Reconstructive Surgery
Unit, Bahawal-Victoria
Hospital Bahawalpur
mughese@yahoo.com

Introduction:

The Velopharyngeal sphincter is present between the oral and nasal cavities and directs appropriate airflow through each chamber to produce a normal quality voice. Velopharyngeal insufficiency (VPI) refers to an improperly functioning velopharynx (Figure 1) and is a known complication following primary palatoplasty for cleft palate (CP) ¹. Approximately 25% of CP patients require surgical correction after primary repair by palatoplasty ². Scarring as a result of initial palatoplasty and insufficient restoration of the palatal muscle sling at the time of primary repair are causes that warrant a secondary correction of VPI.

Clinical diagnosis of VPI is based on a group of symptoms including pathologically produced nasal resonance (hypernasality), compensatory misarticulations, escape of air through the nose

(nasal emissions), and aberrant facial movements (grimacing). Patients with symptoms of VPI undergo standard perceptual, nasoendoscopic, and fluoroscopic speech evaluations ³. A moderate-to-severe VPI that is not expected to be treated by speech therapy is corrected with various surgical techniques.

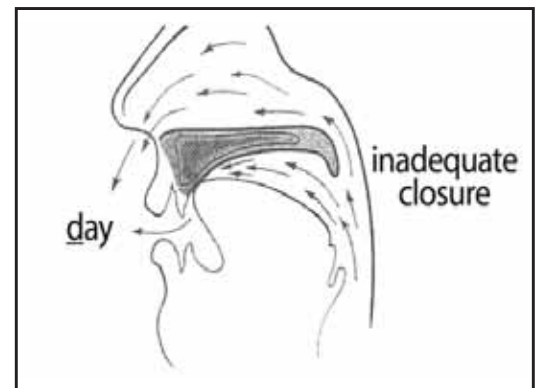


Figure 1: Inadequate closure of velopharynx during production of consonants is a feature of VPI.

The pharyngeal flap technique used to be the most common method for secondary management of VPI for the several decades. However, reports of morbidity and mortality associated with pharyngeal flap surgery have led to adoption of other techniques. The most feared complication with pharyngeal flap surgery is upper airway obstruction, which can occur acutely and result in death.^{4,5}

Sphincter Pharyngoplasty (SP) was described by Hynes more than 60 years ago and has been modified by others. Orticochea sutured palatopharyngeus muscles to an inferiorly based pharyngeal flap below the palatal plane^{6,7}. This procedure creates a soft tissue diaphragm which narrows the nasopharynx and enables velo-

pharyngeal closure. Several investigators have reported less airway morbidity among patients treated with SP than the pharyngeal flap^{8,9}. However, utility of this procedure in local population has not been investigated.

We aimed to assess the treatment outcome for CP patients with residual VPI after palatal repair undergoing a SP described by Orticochea.

Methodology:

This was a prospective study carried out at Plastic & Reconstructive Surgery Unit at Bahawal-Victoria Hospital Bahawalpur during 2004 to 2014. Patients diagnosed with residual VPI after cleft palate repair presenting to us were considered eligible for the study. Based on the inclusion criteria, patients having 1) undergone a primary repair of the palate; 2) age between 4 and 30 years; and 3) diagnosis of VPI by speech specialist were recruited 10. Whereas, patients having 1) size of the velopharyngeal gap exceeding 2 cm in anteroposterior diameter; 2) hearing impairment; 3) craniofacial syndrome, (4) pre-existing palatal fistulae; and 5) obstructive sleep apnea syndrome were excluded from the study. Twenty patients meeting these criteria were included in this study. Subjects ranged in age from 5 to 28 years with mean age of 8.4 years. These included 13 male and 7 female subjects.

For evaluation of patients, a subjective Auditory Perceptual Assessment (APA) was used for evaluation of patients' speech during a free conversation and the speech sample was recorded. Speech evaluation included the type and degree of open nasality, audible nasal air escape and overall unintelligibility of speech. All elements are graded along a 5-point scale in which 0 = normal and 4 = severe affection.

The posterior pillars of the fauces were incised. The palato-pharyngeus muscle freed from superior constrictor, salpingopharyngeus and stylopharyngeus by dissecting with scissors laterally and then posteriorly. The dissection was extended as far as the top of the tonsillar fossa, to preserve the muscle's neurovascular pedicle. The distal end of this muscle strap was divided.

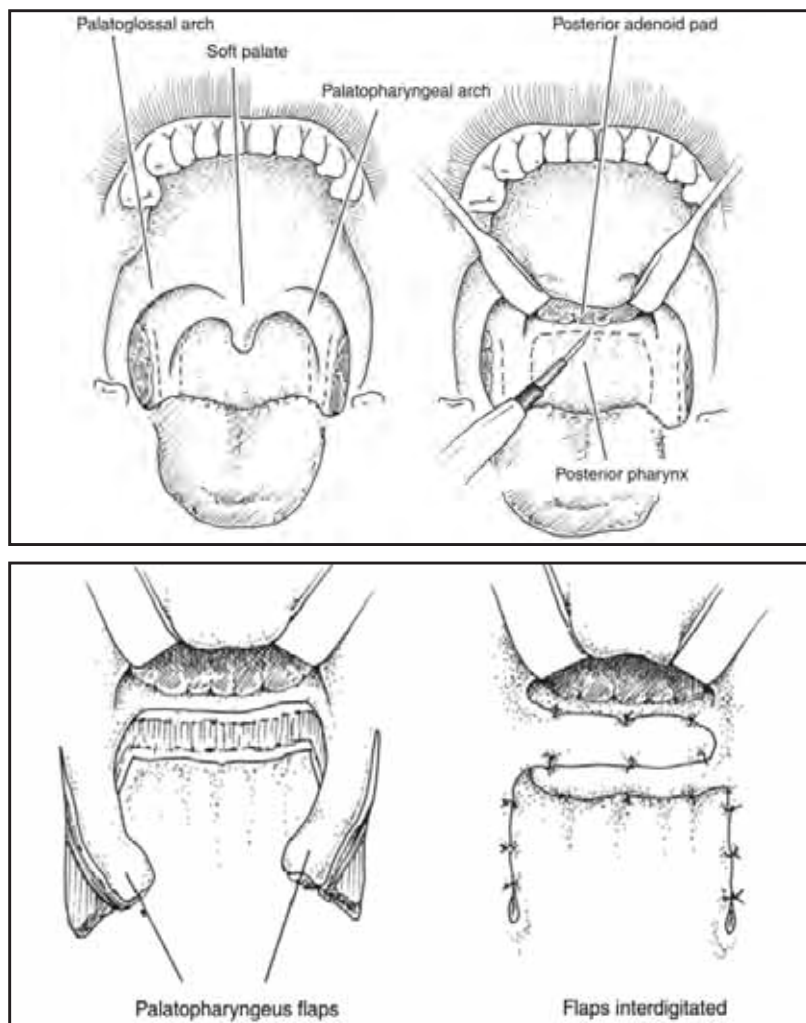


Figure 2: Technique of Sphincter Pharyngoplasty.

(Photo Courtesy of Murphy K, Scambler P. *Velocardiofacial syndrome: understanding microdeletion disorders*. Cambridge University Press; Cambridge UK: 2005.)

A 1cm wide inferiorly based flap of midline posterior pharyngeal wall mucosa and superior constrictor was then raised from the under lying prevertebral fascia. These 3 flaps were then sutured to each other, putting the two distal ends of the palatopharyngeal muscles together in the midline, and securing each to the posterior pharyngeal wall.

The blood loss was minimal during surgery. All patients made uneventful recovery. The study subjects attended four follow up visits after the surgery. The first two visits were scheduled one and half months and three months after surgery respectively. The third follow up visit was after six months of surgery and the fourth was scheduled at 12 months. During follow up visit operated site was checked for the size of sphincter and size of lateral ports. At each visit, patients underwent speech evaluations for symptoms of VPI. The Quality of voice was checked by serial recordings of voice and intelligibility of speech was ascertained by perception of quality and meaningfulness of spoken recordings.

Results:

Twenty cases followed up for at least one year were included in the study. In 18 cases (90%), significant improvement in perceptual speech evaluation was demonstrated. The velopharyngeal sphincter closed completely during speech and the nasal resonance was normal. There were no complications of obstructive dyspnea. Postoperative snoring was reported by all patients during first few weeks but it disappeared usually 2-3 months later. Postoperative hyponasality resolved 7-10 days later in all patients. Two male patients (10%) showed some degree of persistent hypernasality even after 1 year of surgery (Table 1)

Table 1: Results of Orticochea Pharyngoplasty by outcome pattern of speech

	No. of Patients	Percentage
Improvement	18	90%
No Change	2	10%
Worsening	0	0
Obstruction	0	0
Dehiscence	0	0
Total	20	100%

Discussion:

The term velopharynx is derived from the words velum (soft palate) and pharynx. Velopharyngeal insufficiency (VPI) is a frequently encountered problem in patients who previously underwent surgery for repair of cleft palate (CP). Surgical procedures attempt to restore or modify anatomy of the velopharynx to improve velopharyngeal function in patients with VPI. These procedures include pharyngeal flap, sphincter pharyngoplasty (SP), and pharyngoplasty and Furlow palatoplasty³. The earliest manipulations of velopharyngeal mechanism report back to the 19th century, and have shown remarkable transformation¹¹. We attempted to assess outcome of SP described by Orticochea in our patients presenting with residual VPI after correction of cleft palate (CP).

The results of our study have shown that SP successfully correct VPI in the majority of selected patients. Our results are in agreement with retrospective studies in which velopharyngeal competence was achieved in 72-85% of patients^{12,13}. Furthermore, Riski et al. has reported that 78% of his 139 patients demonstrated resolution of hypernasality and normalization of pressure-flow measurements following SP⁸. Our cases never developed any complication requiring review of SP. Reports by Witt et al. and Losken et al. had pharyngoplasty revision rates for persistent VPD of 16 and 12.8 %, respectively. In these reports, dehiscence, syndromic diagnoses, and greater preoperative nasalance scores were associated with poor outcomes^{14,15}.

Patients of this series achieved normal nasal resonance and retained it for study period. We hope that speech results would last for several years. It has been a standard practice to leave the pharyngoplasty untouched unless in the case of acute airway obstruction. Recent research has led to the need for continued refinement of the SP several years later, especially when initial velopharyngeal surgery was undertaken during childhood¹⁶.

Pharyngoplasty creates a sphincter orifice that is believed to be a dynamic structure with active

movement to control nasal escape as proposed by Orticochea. Whether closure of the sphincter orifice is active or passive, is a matter of continuous debate. Electromyographic analysis of patients before and after SP reported by Ysunza et al. has failed to demonstrate activity in the palatopharyngeus muscle. Contrary to that, normal electromyographic activity was recorded in superior constrictor and levator veli palatine muscles. Their videonasopharyngoscopic data revealed that lateral pharyngeal wall movements were related to electromyographic activity in the superior constrictor muscle. This seems to suggest that flaps of the SP do not create an active diaphragmatic closure of velopharynx. However, the observed sphincter appeared to work passively by contraction of the superior constrictor muscle¹⁷.

It is being increasingly advocated that surgeons, speech pathologists, and researchers should consider multiple factors beyond resonance, such as speech acceptability, intelligibility, naturalness, patient and family satisfaction, as well as the presence of upper airway obstruction and other complications, when judging and reporting surgical outcome of SP.

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