Case Report

JRAD Journal of Research and Advancement in Dentistry

J Res Adv Dent 2017;6:1s:197-201.

Management of Velopharyngeal Defect Using Interdisciplinary Approach: A Case Report

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ABSTRACT

Background: Rehabilitation of a patient with a soft palate defect is not only a surgical but a prosthodontic challenge as well. Surgery is the preferred treatment for speech correction in patients affected by velopharyngeal dysfunction which may not be feasible in many clinical conditions. Choice of treatment then would be by prosthetic management, combined with speech therapy. In velopharyngeal dysfunction, hypernasality and regurgitation of food and liquids is common if defect is not obturated. This case report describes rehabilitation of a patient with soft palate defect and subsequent velopharyngeal insufficiency by a palatal lift prosthesis.

Keywords: Velopharyngeal, Nasal Regurgitation, Cleft palate, Obturator, Hypernasal Speech.

INTRODUCTION

Velopharyngeal insufficiency is the improper closure of the velopharyngeal sphincter (soft palate muscle) during speech characterized by an acute nasal quality of the voice.Velopharyngeal deficiencies may be classified on the basisof physiology and/or structural integrity. *Velopharyngeal Palatal Insufficiency*and *Velopharyngeal Palatal Incompetency* are often used to define velopharyngeal deficits.[1]Although these terms are often used interchangeably, there are subtle differences. Palatal insufficiency refers to patients with inadequate length of the hard and/or soft palate to affect velopharyngeal closure, but with movement of the remaining tissues within normal physiological limits. The defect is secondary to a structural limitation. Patients with congenital and developmental aberrations and acquired soft palate defects would fall into this classification.Palatal incompetence refers to patients with essentially normal velopharyngeal structures, but the intact mechanism is unable to affect velopharyngeal closure. Patients with neurological diseases, such as bulbar poliomyelitis or myasthenia gravis, or neurologic deficits secondary to cerebrovascular accidents or closed head injuries are included in this category.

Mazaheri and Millard[2] suggested that for optimal restoration of function and speech the following guidelines should be observed:1) Superior extension should be located in the nasopharynx at the level of normal palatal closure.2) Inferior extension should be a continuation of the palatal plane and should be concave to provide adequate space for tongue movement.3) Inferior margin should be placed at the region of maximum pharyngeal activity. 4) Superior surface should be convex and polished to deflect nasal secretions into the oropharynx. The successful rehabilitation of such a patient requires concerted and team effort of various disciplines of dentistry as well as other health professionals.

Received: Jan. 11, 2017: **Accepted**: Mar. 7, 2017
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pISSN 2278-0076
eISSN 2321-9270

CASE REPORT

A 13-year-old female patient, requesting for closure of soft palate defect, was referred to The Department of Prosthodontics from The Department of Plastic Surgery. Patient history involved surgical closure of cleft palate at the 2nd month postnatal period. Soft palate closure was not achieved at that point. Patient yet again was not a good candidate for the surgical closure of the soft palate till the age of 13 years old. The patient had nasal regurgitation of liquids and sometimes food. The hypernasal speech was so severe that the patient's personal and academic life was disrupted. Patient being a teenager it was very important to restore the defect prosthetically in order to boost her confidence.

Examination: Extraoral examination was carried out to check any presence of deficiency. Examination of the nasal resonance was done by alternating closure of the nose during repeated pronouncing of /i-a/ and /u-i/ during connected speech, and both marked hypernasality and nasal escape were observed. This was performed by perceptual analysis and involved a speech therapist[3] and a prosthodontist. On further examination, nasal escape was perceived with speech samples that included sustained fricatives: /s/, /z/, /f/, and /v/. Substitution of /b/ with /m/ and /d/ with /n/ was observed during repetition of syllables /ba/, /bi/, /da/ and /di/, verbalized sentences and conversational speech. Intraoral examination showed rotated central incisor and crowding, extent of the soft palate defect was examined (Fig.1). During speech, palatal mobility and elevation were normal.

Technique: Maxillary and mandibular perforated stock trays were selected.Maxillary tray was modified with impression compound extention into the defect to record the extent.After examination, maxillary and mandibular impressions were made with alginate (Zelgan; Dentsply India Pvt. Ltd., Gurgaon, India)(Fig.2) and casts were poured in a stone[4](Fig. 3). Maxillary record base were fabricated from autopolymerizing acrylic resin (Pyrax; Pyrax Polymer, Roorkee, India) with adams clasps on both the molars. A retentive loop with zig-zag pattern (Fig.4) was extended posteriorly from palatal portion of maxillary record base along with the bulb which was short of the extents of the defect (Fig 5)inorder to facilitate placement and retention of impression material into pharynx. This extension was as parallel and as close to the defect as possible. Low fusing compound(DPI, Mumbai, India) was added into the defect area to the retentive loop posteriorly in order to record the functional impression.(Fig 6)

Fig 1: Extension of the defect

During border molding, the custom tray was inserted in the patient's mouth with warmed low fusing compound on retentive loop. The patient was instructed to flex the neck fully to achieve contact of the chin to the chest. With this movement, contact of posterior aspect of obturator with the soft tissue covering the anterior tubercle was established. Lateral aspects of the obturator were formed by rotation and flexion of the neck to achieve chin contact with the right and left shoulder, respectively (Fig.7). When border molding was completed around the entire periphery, there was no escape of liquid from the oral to nasal cavities and the articulation of plosive sounds such as |b| and |p| and nasal consonants m, n, and ng was improved to an appriciable extent.

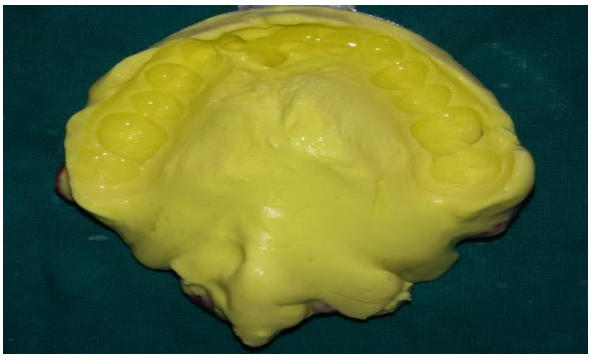

Fig 2: Primary impression using irreversible hydrocolloid.

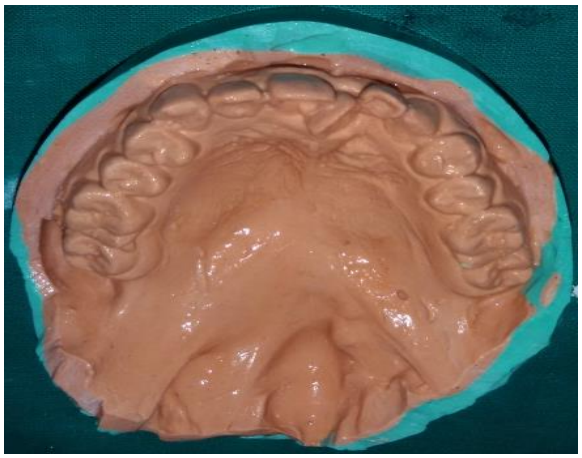

Fig 3: Diagnoistic cast.

Fig 4: Fabrication of the obturator

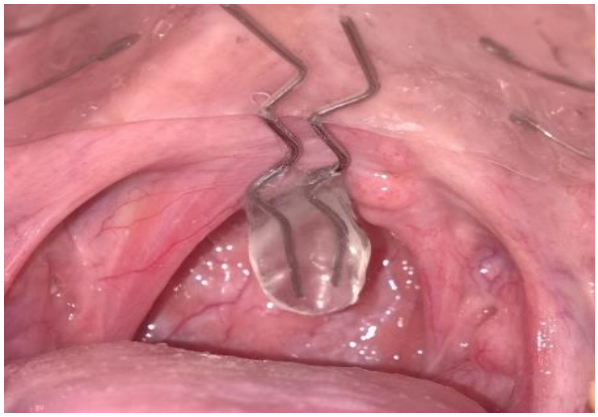

Fig 5: Checking for the extensions.

Maxillary record base was reseated over maxillary stone cast. Dental stone was mixed and placed around the obturator impression to include the intaglio side of the denture base. When the stone was initially set, denture base and its extension was removed to obtain the master cast. Maxillary denture base was re-fabricated from clear autopolymerizing resin onto the master cast which was treated with a separating medium (Fig.8). After finishing and polishing, the final position and contour of obturator was determined with prosthesis positioned into the mouth . Pressure indicator paste was used to determine the area of overextension (Fig.9).

Fig 6 Relining the bulb using low fusing compound.

Fig.7 Records after functional movements.

Fig 8: Refabricated prosthesis.

Fig 9: Final prosthesis insertion.

Post-prosthetic evaluation: Speech evaluation of the patient was performed with and without the palatopharyngeal prosthesis in the mouth. Patient was then referred to a speech therapist for speech-language therapy and re-examined after treatment. There was a mean duration of 3 weeks between fitting of the prosthesis and the final post-prosthesis evaluation of the patient. The initial and subsequent improvement in speech, including both hypernasality and intelligibility, were noted.Remarkable changes were noted in nasal regurgitation of food and liquids.

DISCUSSION

As with all phases of prosthodontics, there can be considerable difference in soft palate defects from one patient to another. There are many techniques that would lend themselves development of acceptable obturator prostheses. It must always be remembered, and the patient must be so counseled in advance of treatment that the prosthodontist cannot restore the intricate neuromuscular structure that is the soft palate,but can mimic the velopharyngeal function which is required for normal oronasal respiration control[5].

The palatopharyngealvalvingmechanism regulates resonation and speech utterance and partakes in non-speech oral activities such as swallowing, blowing,sucking, and whistling[6]. Palatopharyngeal insufficiency implies the presence of hyper-nasality, inappropriate nasal escape and decreased air pressure during the production of oral speech sounds (weak pressure consonants).

Traditionally, various types of speech-aid prostheses have been used: hinge type,[7] meatus-type obturator, palatal lift prosthesis devices,[8,9] palatal stimulators, and fixed-type obturator known as a speech bulb. Prosthetic management using speech bulb is an effective, physiologic, and versatile treatment modality. The objectives of obturation are to provide the capability for the control of nasal emission and inappropriate nasal resonance during speech and to prevent the leakage of material into the nasal passage during deglutition.[10]

Orthodontic treatment needed expansion of the maxillary arch and then extraction of few teeth. Expansion of the arch will lead to increase in the size of fistula which must be followed by surgery. Fixed orthodontic treatment is then needed for proper alignment of teeth. This treatment plan does not improve defect size, needs additional surgery, and is expensive and time consuming. Hence opting for a transitional/definitive prosthesis in such situation would be the appropriate choice.

Surgical intervention in cases of velopharyngeal insufficiency may be contraindicated for local or systemic reasons. Patients for whom surgical intervention is contraindicated are candidates for prosthetic treatment. In our patient, prosthetic treatment was designed to effectively treat the palatopharyngeal insufficiency both in speech and in deglutition when awake.Thesuccess of the soft palate defect prosthesis depends onthe functional adaptation of the impression material.[11-13]

CONCLUSION

Palatopharyngeal prostheses seem to be an effective treatment approach for patients suffering from palatopharyngeal insufficiency and cannot be treated surgically.

Remarkable changes were noted in hypernasality in phonetics and nasal regurgitation of food and liquid. Multidisciplinary approach of prosthodontics from an otolaryngologist and a speech therapist helped the patient to regain his personality physically, psychologically and socially.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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