Case Report

Utilising a Palatal Lift Prosthesis in restoration of Oronasal Function in a Patient with Oral Submucous Cleft - A Clinical report

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Abstract

This article describes the restoration of oronasal function in a patient with oral submucous cleft, a rare congenital disorder, which is characterized by separation of muscles in the soft palate, with mucous membrane covering the defect by utilization of palatal lift prosthesis. A systematic diagnosis and treatment plan has been described which involves mainly a prosthodontist and a speech therapist. A step by step procedure of building palatal lift prosthesis and the role of a speech therapist at the time of building the prosthesis has been emphasized. The patient’s inability to be understood by others was solved by lifting the soft palate, to effect palatopharyngeal closure, using interim palatal lift prosthesis. The rehabilitation of the patient was carried out in two phases. Patient’s ability to speak was considerably improved after wearing the palatal lift prosthesis and undergoing speech therapy sessions.

Introduction:

Submucous cleft palate is a clinical condition which is characterized by separation of muscles in the soft palate, with mucous membrane covering the defect. Clinically, this is visible as a notch in the posterior portion of the hard palate, displaced musculature, attenuated raphe and/or bifurcation of uvula. Due to displaced musculature, the functions of the oral cavity are affected because in the median region, there is incomplete closure of the nasopharynx. Though the cleft is not clinically evident, but functionally the patient’s speech and swallowing including regurgitation are affected.
The speech disorder in such cases takes the form of dysarthria which manifest more in resonance than articulation disturbance. It is vital to understand patients struggle to communicate with family, friends and health care workers.

The production of speech sounds is a phenomenon of several highly integrated factors which Kantner and West divided into: (1) respiration, (2) phonation, (3) resonation, (4) articulation, and (5) neurologic integration. Speech begins with respiration, which provides the power or pressure during exhalation to vibrate the vocal cords, called phonation, and producing a complex tone. This tone is modified by the resonators: the pharyngeal, oral, and nasal cavities. It is then shaped by the movement of the tongue, soft palate, teeth, and lips during articulation to arrive at the end result, which is fully formed speech.

The speech characteristics of a person with occult cleft palate is typically characterized by imprecise consonant production, distorted vowels, monoloudness, monopitch voice, hypernasality, harsh voice quality and slow speaking rate. Resonance is the amplification or modification of vocalized sound within the vocal tract, namely, the pharynx, oral, and nasal cavities. This increases the loudness of the voice and effects its quality. The valving action of the palatopharyngeal mechanism regulates the flow of air into the mouth or nasal chamber, according to the characteristics of the desired speech. The muscles of the soft palate and pharynx constitute the palatopharyngeal valve. During continuous speech, the nasal cavity must be closed for production of oral sounds, yet open for the nasal sounds /m/, /n/, and /ng/. This valving is accomplished by the sphincteric muscle action, resulting from medial movement of the lateral pharynx and superior-posterior elevation of the soft palate against the posterior pharyngeal wall to seal the palatopharyngeal port. Within contextual speech, this sphincteric muscle action changes rapidly and dynamically.

This resonated sound is then sent to the oral cavity for the various static structures like the teeth, the alveolar ridge and the hard palate to establish the route, the air should take during connected or continuous speech. The dynamic structures, the tongue, soft palate, and lips, control and direct the exhaled air to form the appropriate speech sound. Neurologic dysfunction that affects these dynamic structures interferes with normal articulation.

Prosthetic rehabilitation of the maxillofacial region has played an important role in improving the quality of life of patients with congenital maxillary defects. A palatal lift prosthesis which extend into Submucous cleft to various degree, contributes largely to the effectiveness of oronasal separation and the retention and the stability of the prosthesis, thereby improving the patients’ speech. In 1967, Lang recommended the use of a palatal lift prosthesis for the neurologically compromised patient, provided concomitant speech therapy was offered.
Clinical Report

History
A female patient, aged 40, came to the Govt. Medical College, Srinagar with the chief complaint of speech defect. She was referred to Govt. Dental College, Srinagar (Deptt. Of Oral Medicine and Radiology). Patients medical history was non significant. Patient was referred to Department of Prosthodontics for opinion where a speech examination revealed imprecise consonant production, distorted vowels, hypernasality, harsh voice quality and slow speaking rate. The patient’s speech was not understandable even at a closer distance and her speech intelligibility tended to deteriorate the longer she spoke. Oral examination of the dentition revealed a class one malocclusion with mild spacing in the maxillary anteriors. On inspection of the palate, a V - shaped groove was observed in the posterior median palatal region. On palpation, the mucous membrane in the region was sensitive to touch and depressible. The mucous membrane was depressible more than a centimeter in the region and when force was applied vertically in the region the surrounding musculature was displaced from both sides medially towards the midline. On further palpation it was felt that there were no muscle attachments in the posterior part of the palate.

Treatment Plan
The treatment plan was divided into two phases:-

PHASE 1 - Fabrication of an interim palatal lift prosthesis followed by speech therapy programme.

PHASE 2 - After the clinical correction of the speech, a definitive prosthesis in the form of cast prosthesis was given that would be retained by cast circumferential clasps.

Clinical Procedure
First appointment: - A complete case history was recorded and an examination of the speech was done with the help of a speech therapist. Patient had nasal tone added to her speech which made the pronunciation completely uninterpretable. Primary alginate impressions of both the arches were made. The impressions were poured with the dental stone and a diagnostic cast was prepared. On the diagnostic cast, a special tray of self cure acrylic was fabricated.

Second appointment – On the special tray, small amount of rubber base material (putty) was added in the posterior region and was inserted in the patients mouth with vertical pressure applied on the palatal region. Because the material would be displaced as soon as it would come into contact with the soft palate, a finger was placed posterior to the tray so that the material does not flow horizontally, but rather remain vertically so that it could displace the palatal tissue in the region. Another cast was poured and another special tray was made of self cure acrylic. To this self cure custom tray, wrought wire clasps were placed so that they would retain the tray in place by utilizing the undercuts present on the teeth. The tray now had a vertical extension in the posterior region, which would hold the moldable material in place.
Third appointment (lift – generation appointment) – the second custom tray with acrylic vertical extension was placed on the maxilla and first softened impression compound was placed on the vertical extension, shaped, flamed to create a smooth surface, and then chilled before placing it into the mouth. Generating the lift portion is different from generating pharyngeal obturator prosthesis, in that border molding to register the functional movements of the surrounding musculature is not done. After placing the hardened compound in the oral cavity the patient was allowed to wear the palatal lift for several minutes to become familiar with the sensation of the lift. Small additions were made to the compound posteriorly until the soft palate was brought into light contact with the posterior pharyngeal wall. The material was then added laterally. Following each addition, the patient was asked to breathe through the nose and attempt speech. The patient at this stage was asked to speak ‘b’ and ‘p’.

Once the results were satisfactory the compound was reduced by 1-2 mm. On this, zinc oxide eugenol impression material was added (ideally mouth temperature wax) and then reinserted in the patient’s mouth. The patient was asked to speak, swallow water, and move the head in all directions to mould excess. The lift was removed after setting of zinc oxide eugenol and evaluated carefully for thin areas that might indicate excessive pressure. The lift was now ready to be processed and replicated in acrylic resin.

Fourth appointment – Insertion and patient’s instructions. The effectiveness of the lift was again confirmed. Pressure indicating paste was used to evaluate excessive pressure areas and those areas were then relieved. The patient was instructed to wear the prosthesis continuously as long as she is comfortable. The patient was also instructed to determine the value of wearing the prosthesis herself during eating. The patient was instructed not to wear the lift prosthesis during night as it was not required and moreover this will allow the mucosa of the palate to recover.

**Discussion**

The ‘v’ shaped groove that is formed in the posterior region of the palate is more because of the displaced musculature which do not find their origin or attachment in the region.

A palatal lift functions best when there is residual function of the superior constrictor muscles and is especially effective if the levator muscles still have some ability to contract. A palatal lift should not completely occlude the nasopharyngeal port for hypernasality to be eliminated as this will in turn, cause inability to breathe through the nose and hyponasal speech. Wearing a palatal lift prosthesis that completely eliminates nasal breathing may also reduce the patient’s willingness to wear the device.

It is extremely important that the speech pathologist or therapist be present during the lift generation session. During this session, nasal endoscopy is the method of choice to evaluate the effect of the palatal lift therapy. The endoscope reduces the guess work in evaluating effective obturator seal and in locating the source of leakage when it occurs.
Reduction of hypernasality is not likely to occur until the lateral extent of the lift is increased sufficiently to reduce the size of the lateral ports.

Sounds like 'b' and 'p' are plosive sounds which require high intra oral pressure. For a prosthodontist to evaluate the efficacy of his lift, asking the patient to articulate baby or paper will quickly reveal whether the palatopharyngeal sphincter is closing tightly enough to build oral pressure.

Follow-up and speech therapy: the patient was recalled after two days and one week. During the follow-up appointments, the mucosa over the palate was closely observed. The patient was able to wear the prosthesis continuously over a period of one week. The patient was then referred to a speech therapist for the needful.

**Summary and Conclusion**
The purpose of palatal lift prosthesis is to obtain velopharyngeal closure by displacing the soft palate to the level of normal palatal closure at the palatal plane. The patient adapted to the prosthesis very well. After two months of counseling and practice with the speech therapist, there was a definite improvement in patient’s speech. She was highly satisfied with the results.

**References**