Prosthetic Rehabilitation of Soft and Hard Palate Defect in a Pediatric Patient

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ABSTRACT

Palatopharyngeal insufficiency refers to soft palate defects where some or all of soft palate is deficient affecting palatopharyngeal closure. When surgical correction is not possible or failed, prosthetic rehabilitation by means of a speech-aid prosthesis or a speech bulb is the most desirable option to restore the function. In this case report, prosthetic rehabilitation of a pediatric patient with a hard and soft palate defect is described. Emphasis is given to the role of multidisciplinary approach in the management of cleft palate patients, clinical and laboratory procedures involving construction of a speech bulb prosthesis and the role of speech therapy for the improvement of overall outcome of the treatment.

Keywords: Palatopharyngeal insufficiency, Soft palate defects, Speech bulb prosthesis.

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INTRODUCTION

Palatal defects of the oral cavity can be either congenital or acquired. Further, they can be classified according to the anatomical area as hard palate and soft palate defects. Palatal defects can lead to nasal regurgitation of fluid and food, hypernasality of speech, and difficulty in swallowing and whistling which can affect a patient's physical and mental well-being and quality of life.¹ Palatopharyngeal deficiency may be classified based on physiology or structural integrity. Palatal insufficiency refers to patients with an inadequate length of the hard and/or soft palate to produce palatopharyngeal closure, but with the movement of the remaining tissues within normal physiological limits. Palatal incompetence refers to patients with essentially normal velopharyngeal structures, but the intact mechanism is unable to produce a velopharyngeal closure.² If a patient cannot undergo surgical treatment at the appropriate time either due to availability or economic constraints, it is still possible to improve their social and psychological well-being with prosthodontic rehabilitation. A speech bulb obturator, also known as a speech-aid appliance, is a removable device that is used for the treatment of palatal insufficiency.^{3,4} Speech bulb is the part of an obturator that lies in the nasopharynx, the form, and the position which controls nasal airflow and balances the nasal quality of the voice.^{5,6} While designing an obturator prosthesis, it is important not to overlook fundamental principles that apply to all removable prostheses namely retention, stability, and support.⁷

This case report describes the design and construction of a temporary speech bulb prosthesis for a 14-year-old patient with hard and soft palate defects.

CASE DESCRIPTION

A 14-year-old boy was referred for prosthetic rehabilitation of palatal defects.

His presenting complaints were difficulty in speech and swallowing, increased secretions accumulating in the mouth seeping from the nose, and an unesthetic smile due to missing 21. He had a history of a repaired unilateral cleft lip on the left side in 2006, and an alveolar bone grafting in 2016. He was on orthodontic

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fixed appliance therapy for 3 years. He had undergone speech therapy but not continued as recommended. The patient's medical history was otherwise not significant.

The child was schooling, and he was the only child in the family. His socioeconomic status was poor, and he was under the care of his single-parent mother.

The patient was on a strict oral hygiene regime prescribed by the orthodontist and a regular attendee for dental follow-ups. Dietary history revealed consumption of minimal quality and quantity of sugary food.

On examination, the patient was healthy-looking, significant extraoral findings were flattening of the nasal bridge, asymmetry of the upper lip, and scarring of the left side of the upper lip.

Evaluation of speech revealed hypernasality.

Intraoral Hard Tissues

All teeth were present up to permanent second molars in all quadrants with congenitally missing 21. Orthodontic brackets were present in the upper arch. The upper midline was shifted to the right side by 4 mm (Fig. 1).

A midpalatal defect measuring 30 and 15 mm in anteroposterior and transverse dimensions was observed. Further, a repaired anterior cleft palate in the left side extending labially across the ridge was noted. Edentulous space showed depressed ridge form

covered by thick keratinized mucosa. Adequate space was available to replace the missing 21 (Fig. 2).

Intraoral Soft Tissues

A band of soft palate tissue was present separating the hard palate. Musculus uvulae was absent, therefore, a greater portion of the soft palate was missing (Fig. 3). The reduced stretchability of the upper lip was noted due to scarring of repaired cleft lip, all other mucosae were normal in color and texture.

A diagnosis of an unrepaired midpalatal cleft of the hard and soft palate with congenitally missing 21 was made.

Prosthetic rehabilitation by providing a temporary speech bulb prosthesis with a palatal acrylic plate incorporating the upper left lateral incisor was recommended at the multidisciplinary clinic. The prosthesis was designed without an obturator part extending to the hard palate defect and it was retained by Adams clasps placed on both first premolars and first molars.

Clinical Procedure

Primary impressions were taken with modified metal stock trays and alginate (Aroma Fine DF II, Fuji, Japan) after removal of orthodontic wire and blocking of brackets with soft wax. A definitive impression was taken with spaced acrylic special tray

and alginate (Aroma Fine DF II, Fuji, Japan) (Fig. 4). Heat cure acrylic plate with Adams clasps on first premolars and first molars was fabricated. Acrylic plate try in was done. Pre-contoured wire loop was attached to the posterior border of the plate with self-cure acrylic resin to hold the pharyngeal functional impression. The functional impression of the soft palate defect was done in two stages. Impression compound (Pyrax Polymers, India) was added to record the general contour of soft palate structures with functional movements. Gross excess was removed, and necessary adjustments were done. The final functional wash impression was taken with a tissue conditioner (D-Soft Tissue conditioner, Medicept, UK) (Fig. 5). Matching acrylic tooth for 21 was selected and attached to the prosthesis chairside. The final prosthesis was processed with heat cure acrylic.

At the time of insertion stage, assessment of the peripheral seal, comfort during rest and function, and speech was carried out, and necessary adjustments were done. Post-delivery instructions were given and the patient was referred for speech therapy as planned (Figs 6 and 7).

A review was done after 2 weeks to see how the patient is coping up with the prosthesis. The patient was happy with the improvements in his speech, swallowing, and is now on regular follow-up with speech therapy.

Fig. 1: Anterior view showing missing 21

Fig. 2: Hard palate defect

Fig. 3: Soft palate defect

Fig. 4: Definitive impression

Fig. 5: Functional impression

Fig. 6: Finished speech bulb prosthesis

Fig. 7: Post-insertion of speech bulb prosthesis

DISCUSSION

Palatopharyngeal insufficiency is an acquired or congenital anatomic defect of the soft palate that makes the palatopharyngeal sphincter incomplete.^{2,8} It can be rehabilitated either by a surgical approach or by a prosthodontic approach. The speech-aid prosthesis or the speech bulb is the best choice in the case when the surgically repaired soft palate is deficient to contact pharyngeal walls during the function.⁹ In this patient, a speech bulb was selected to rehabilitate the soft palate defect.

The palatal obturator is a prosthetic device that can be used to cover an open hard palate defect. This prosthetic appliance functions by closing off the nasal cavity from the oral cavity.³ For speech, this can normalize resonance and improve the ability to impound intraoral pressure. Additional acrylic extension superiorly will fit perfectly into the area of deficiency.³ This can be either an open or a closed bulb. In this case, palatal obturator part was designed to cover the hard palate fistula with minimal border extension into the defect. The retention and support were obtained mainly by Adams clasps.

Functional molding of the velopharyngeal defect is an important step and different materials are used. The obturator is strategically placed and molded so that the residual musculature

can contract down to it providing a nasopharyngeal seal.⁵ Supporting wire is added to retain the functional impression. Black gutta-percha can be used for functional molding and the final impression can be taken by coating tissue conditioners.⁵ In addition, a combination of thermoplastic wax and tissue conditioner,² a combination of cold-cure acrylic resin and soft silicone liners,¹⁰ and a combination of impression compound and cold cure acrylic resin⁴ are suggested by other authors. In this case, the impression compound was used with tissue conditioner material for the final functional impression. It is essential to ensure that the speech bulb itself is of the correct shape, size, and position during insertion. Hence, time taken to carry out functional molding is worthwhile to ensure success. Improvement of speech is the main objective of fabrication of such prosthesis. Several investigations like naso video endoscopy, fluoroscopy, and naso metric analysis are available but, according to speech pathologists, perceptual analysis is best.^{4,6} Unlike palatopharyngeal incompetence, speech intelligibility improves immediately after insertion of the pharyngeal obturator.⁴

CONCLUSION

A removable dental prosthesis is designed for rehabilitation of soft palate defect to restore function and to re-establish velopharyngeal valve closure with the replacement of 21. With proper planning, patient compliance and with the aid of speech therapy, a successful outcome can be achieved to improve the quality of life of the affected individual in a cost-effective manner using readily available materials in dental practices in a low socioeconomic setup.

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