

Prosthetic Rehabilitation of a Congenital Soft Palate Defect

Kurien Varghese

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Abstract Obturator is derived from the Latin verb obturate which means to close or to shut off. This definition provides an appropriate description of the objective of obturation in patients with palatal defects. The obturator is often helpful in improving the speech of individuals with partial or total velar defects i.e. cleft of soft palate. Soft palate cleft is one of the most common cause of velopharyngeal incompetence, which is the functional inability of the soft palate to effectively seal with the posterior and or lateral pharyngeal walls. In maxillofacial prosthesis the clinician may have the responsibility for reestablishing palatopharyngeal integrity to provide the potential for acceptable speech. Here a case report has been presented in which palatal plate with a solid one piece pharyngeal obturator prosthesis has been used for rehabilitation of a dentulous patient having congenital soft palate defect using functional impression technique.

Keywords Soft palate · Speech aid · Pharyngeal obturator · Velopharyngeal (VP) insufficiency · Hypernasality · Retention

Introduction

Defects of the soft palate may present as perplexing problems to the clinician. It is a condition in which there is

lack of effective closure between the soft palate and pharyngeal walls during swallowing or speech. Abnormalities of the soft palate can occur in different ways. The resultant palatopharyngeal deficiencies are usually grouped into congenital, acquired or developmental defects depending upon the etiology. In the congenital cleft palate the embryological development of the hard and/or soft palate is interrupted.

Veau in 1922 classified congenital soft palate defect into four types [1, 2]. Class I cleft involves only soft palate and may include sub mucous cleft. Class II, III and IV involves bony structures unilaterally and bilaterally.

A pharyngeal obturator prosthesis, which may also be called speech aid prosthesis, extends beyond the residual soft palate to create separation between the oropharynx and nasopharynx. It provides a fixed structure against which the pharyngeal muscles can function to affect palatopharyngeal closure [3].

The hinged pharyngeal obturator is not often referred to in recent times because of the mechanics involved in its fabrication and also the fear of fracturing of the hinged part and getting aspirated.

The objectives of prosthetic intervention are to prevent food and fluid regurgitation and to improve speech intelligibility. The prosthesis will include both pharyngeal and a palatal section.

Case Report

A 20 year old female presented with a large defect in the soft palate with nasal regurgitation of food and with excessive nasal resonance during speech. History revealed that it was a congenital defect and she had difficulty during speech (Fig. 1). She was malnourished and her economical

K. Varghese (✉)
Department of Prosthodontics, Azeezia College of Dental
Science and Research Center, Diamond Hills, Meeyanoor,
Kollam, Kerala, India
e-mail: kurienfinie@gmail.com

status was poor. So surgical treatment option was excluded. Prosthodontic treatment was decided with pharyngeal obturator prosthesis using functional impression with soft liner.

Clinical Procedure

Preliminary Impression

1. Preliminary impression of the defect was recorded in putty impression material using perforated stock tray after blocking the defect (Fig. 2). Defect is border molded by asking the patient to move her head in a circular manner from side to side, to extend her head as far forward as possible and to speak and swallow. These movements activate the remaining palatopharyngeal musculature and shape the impression. The activated pharyngeal musculature will displace the excess putty impression superiorly and inferiorly and the excess should be trimmed with a sharp scalpel. Putty displaced inferiorly will disrupt swallowing patterns, induce abnormal tongue movements and precipitate gagging. When the molding process is completed final impression is recorded with light body impression material.
2. The impression is poured with die stone and a master cast is obtained (Fig. 3).
3. This cast is used to make an oral section of the plate with Adams and embrasure clasp placed in molars and premolars respectively and using this plate the final prosthesis is made.
4. The posterior portion of the plate is cut off (Fig. 4) and a loop is bent in 19 gauge stainless steel wire, so that it should not touch the walls of the pharyngeal musculature. This loop is attached to the plate using cold cure acrylic (Fig. 5). Ligature wires are attached for retention (Fig. 6). The plate with the loop is placed in patient's mouth and the extension is checked and adjusted as necessary so that it will not touch the palatal wall.

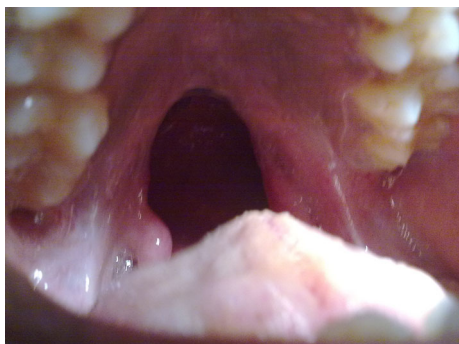


Fig. 1 Intra oral view showing the soft palate defect

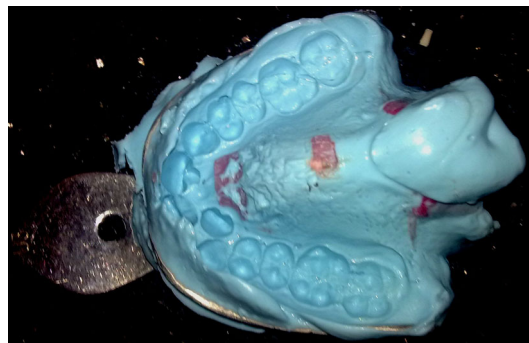


Fig. 2 Putty, light body impression of the defect



Fig. 3 Cast showing the defect



Fig. 4 Oral section of the obturator with posterior part trimmed off

5. Tray resin is added to the retentive mesh work (for chemical bonding with the soft liner) and adjusted so that it will not contact with the lateral and posterior walls as patient says 'ah'. The excess is removed using a metal disc, (Fig. 7) shows the palatal loop which exactly follows the soft palate defect.



Figs. 5, 6 Attachment of palatal loop with the ligature wire to the oral part



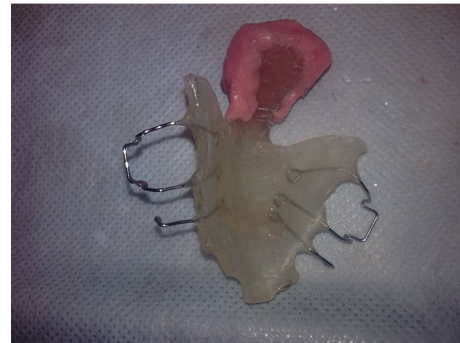
Fig. 7 Addition of cold cure acrylic resin to the loop

Functional Impression

1. The final impression of the soft palate defect is recorded by placing the plate with the palatal loop in the patient's mouth and using acrylic based soft liner (GC soft is used here). Required amount of powder and liquid is measured and dispensed in a container. After



Fig. 8 Recording of the defect with functional impression



Figs. 9, 10 Functional impression of the defect

proper manipulation the soft liner is applied onto the palatal loop and placed in the patients mouth. All the above mentioned movements are made. The process is repeated several times until the patient is able to tolerate the soft liner obturator and able to drink water and breathe without any problem (Figs. 8, 9, 10). Any difficulty in swallowing or drinking or breathing should be corrected by adjusting the soft liner using sharp scalpel.

2. Patient is allowed to wear it for few days and was asked to remove only during sleep. The soft liner will be molded during patient's speech and swallowing

activity and the patient was asked to report after 5 days.

3. The walls of the palatal defect was checked for any redness and the patient was asked whether she had any difficulty in speech or swallowing. If the patient was able to function properly then the same soft liner obturator is converted into speech bulb with autopolymerising acrylic resin.
4. The prosthesis is placed in the mouth and a pick up impression is made using putty impression material (Fig. 11) and cast is poured (Fig. 12), which shows exact recording of the defect.
5. Soft liner is removed from the palatal loop and the prosthesis is placed in the cast, separating media is painted into the defect and cold cure acrylic is poured until it is in contact with the palatal loop. After polymerization is completed the prosthesis is removed from the cast and is subjected to pressure pot curing to avoid excess monomer and finally it is finished and polished. The finished prosthesis is the exact replica of the soft liner obturator, which is ready to be used by the

patient. Since the superior extension of the bulb prosthesis is very small (as detected by the patient ability to swallow) hollow bulb was not made (Figs. 13, 14).

6. Prosthesis was again checked for proper extension in the patients mouth and the patient was instructed to



Fig. 13 Prostheses placed on the cast for cold cure acrylic resin addition



Fig. 11 Pick up impression of the prostheses



Fig. 14 Final obturator prostheses showing the pharyngeal section



Fig. 12 Master cast showing the exact recording of the defect

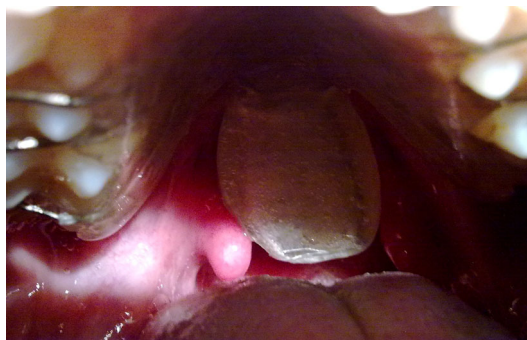


Fig. 15 Intra oral view of the speech aid prostheses

speak few words, such as k, ka gha, ng (velar sounds) swallow and to drink water. Patient was quite happy with the prosthesis (Fig. 15).

7. Patient was instructed to wear the prosthesis throughout the day and to remove only during night to give some rest to the tissues. Patient was recalled after 24 h, 1 and 3 months and the patient was happy as there was drastic improvement in her activities and nasal regurgitation was reduced. Patient was referred to speech therapist for further improvement. Under the speech therapist speech training was done and the patient was asked to speak few words without the prostheses and it was recorded and after that, speech was tested with the prostheses and it was also recorded and difference in speech was noted and it was found that there was definite improvement in speech. Recall was made every 2–3 months and patient was able to tolerate with the appliance and there was definite improvement in her speech as told by her parents and the speech therapist. There are several methods of speech evaluation such as (1) acoustic spectrogram [4], (2) pressure flow technique [5], (3) acoustic and aerodynamic techniques [6] and (4) perceptual analysis [7]. Out of these, the first three are instrument based and need special instruments to conduct the test. Perceptual analysis was done by the therapist after listening to the speech pattern of the patient and it is the easiest method and was used here by the speech therapist. The perceptual analysis used by the speech therapist was speech intelligibility.

This is evaluated after hearing the patients’ speech and a seven point scale assessing the speech intelligibility was used:

1. Intelligible.
2. Listeners attention needed.
3. Occasional repetition of words required.
4. Repetition.
5. Isolated words understood.
6. Occasionally understood by others.
7. Unintelligible.

Speech analysis	Pre treatment	After 24 h	After 1 month	After 3 months
Speech intelligibility	Score 6	Score 5	Score 3	Score 2

The scores indicated definite improvement of speech intelligibility.

As the appliance had to be fabricated in a single day owing to the limited time available for her marriage and

speech training sessions with the speech therapist, auto polymerized resin was used.

Discussion

Prosthetic rehabilitation of the patients suffering from velopharyngeal defects with obturator prostheses varies according to the location and nature of the defect or deficiency [8, 9]. There are differences between obturator prostheses constructed for patients with developmental or congenital malformations of the soft palate, as compared with those constructed for patients with acquired defects [10]. However, the objectives of obturation are to provide the control of nasal emission and inappropriate nasal resonance during speech and to prevent the escape of food into the nasal passage during deglutition.

Pharyngeal obturator prostheses may prevent the hyper nasality and/or nasal emission associated with VP inadequacies [11]. In order to obtain adequate VP closure during speech and swallowing a posterior extension is added to prosthesis. The extension must be positioned at the level of the hard palate during the most active movement of the pharyngeal sphincter [12]. This movement can be achieved by asking the patient to say ‘ah’ or by touching the posterior wall of the pharynx with an instrument to initiate gag reflex. An acrylic resin extension must be formed functionally. This extension must be in static contact with the soft tissues and must not affect the stability of the prosthesis. The impression should be examined for contact with the pharynx bilaterally and posteriorly. The success of the soft palate defect prosthesis depends on the functional adaptation of the impression material and functional contouring of the palatal defect and VP portion. The resilient soft liner [13, 14] is used for that purpose. It has visco elastic properties and may be used as functional impression. Chemically activated plasticized acrylic resin is the most commonly used soft liners [15]. The treatment of VP insufficiency requires multidisciplinary approach. A speech pathologist should participate in treatment of these cases to test articulation errors and inappropriate oro-nasal resonance balance [16, 17, 18].

Summary

As with all phases of prosthodontics, there can be considerable difference in soft palate defects from one patient to another. The aim of this presentation was to offer essential suggestions in their management with obturator. There are many techniques that would provide themselves to development of suitable obturator prostheses. It is important that

the clinician become familiar with a technique with which he/she is comfortable and can master. Application of that technique to the variations in soft palate defects should not be that difficult. It must always be remembered that the patient must be so counseled in advance of treatment, that the prosthodontist cannot restore the intricate neuromuscular structure that is the soft palate. The clinician can only try to provide an alternative means for oropharyngeal function. How successful that alternative is, will be dependent on the patient's ability to accept the defect and to adapt to an alternative environment.

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