ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at: www.ijdsir.com

Volume – 6, Issue – 2, April - 2023, Page No. : 524 – 531

Prosthodontic rehabilitation of completely edentulous patient with cleft palate using hollow obturator prosthesis – A Case Report.

[1]Dr. Prachi, Postgraduate, Department of Prosthodontics and Crown and Bridge Vokkaligara Sangha Dental College and Hospital, Rajiv Gandhi University of Health Sciences (RGUHS), Bengaluru, Karnataka, India.

[2]Dr. Bharat Raj R, Reader, Department of Prosthodontics and Crown and Bridge Vokkaligara Sangha Dental College and Hospital, Rajiv Gandhi University of Health Sciences (RGUHS), Bengaluru, Karnataka, India.

[3]Dr. Surendra Kumar G.P., Professor, Department of Prosthodontics and Crown and Bridge Vokkaligara Sangha Dental College and Hospital, Rajiv Gandhi University of Health Sciences (RGUHS), Bengaluru, Karnataka, India.

[4]Dr. Anupama N.M., Head of the Department and Professor, Department of Prosthodontics and Crown and Bridge Vokkaligara Sangha Dental College and Hospital, Rajiv Gandhi University of Health Sciences (RGUHS), Bengaluru, Karnataka, India.

Corresponding Author: Dr. Prachi, Postgraduate, Department of Prosthodontics and Crown and Bridge Vokkaligara Sangha Dental College and Hospital, Rajiv Gandhi University of Health Sciences (RGUHS), Bengaluru, Karnataka, India.

Citation of this Article: Dr. Prachi, Dr. Bharat Raj R, Dr. Surendra Kumar G.P., Dr. Anupama N.M., "Prosthodontic rehabilitation of completely edentulous patient with cleft palate using hollow obturator prosthesis – A Case Report", IJDSIR- April - 2023, Volume – 6, Issue - 2, P. No. 524 – 531.

Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Cleft lip and palate are congenital anomalies of the or official region. The prosthodontic management of adult completely edentulous patients with cleft palate pose a significant challenge. The overall goal of rehabilitating these patients is focussed on improving speech, appearance, proper occlusion and masticatory functions. This article describes the prosthetic rehabilitation of a completely edentulous patient with cleft palate using removable mandibular and maxillary complete denture with a palatal hollow obturator. Additionally, neutral zone impression technique was followed for the atrophic man dibular ridge.

Keywords: Cleft Lip, Etiology, Retinoids, Diabetes, Smoking

Introduction

Cleft lip and/or palate are the most common congenital malformations occurring in the craniofacial region. These pathologies have a worldwide incidence about 1/ 700 live births.1 The incidence varies widely depending on geographic origin, racial and ethnic group, environ mental exposures and socio-economic status.2 The Etiology of cleft lip and/or palate remain largely

unknown but are thought to be a combination of genetic and environmental factors. Maternal risk factors include the use of steroids, anticonvulsants (phenobarbital and phenytoin), retinoids, diabetes, smoking, alcohol consumption and nutritional deficiencies (zinc, folic acid and vitamin A).[3]

A variety of classification schemes have been suggested and recommended for typical and atypical orofacial clefts. The classification scheme introduced by Victor Veau is the most popular system. Clefts of the palate were classified into 4 groups: group I defect includes a cleft of the soft palate only, group II clefts exist when the defect involves the soft palate and the hard palate extending not further than the incisive foramen (secondary palate), groups III and IV are unilateral and bilateral defects extending through the entire palate and alveolus, respectively.[4]

Treatment of cleft palates and cleft lips provides a tremendous challenge to the prosthodontist. For cleft palate patients, prosthetic rehabilitation aids in improving esthetics, developing normal speech, promotes deglutition, mastication and separates the oral cavity from the nasal cavity. From historical perspective, in 1511 Amatus Lusitonius constructed the first known prosthesis designed to improve the speech of the cleft palate patient. Other prosthodontists who have contributed to the process of cleft palate treatment include Ambroise Pare who in 1531 outlined the basic treatment principles for cleft patients. In 1881 Pierre Fauchard advocated nasal and pharyngeal extensions to a denture base to aid in speech. Most modern cleft palate prostheses are of the rigid type composed of an acrylic resin obturator or pharyngeal extension attached to a metal framework.[5]

An obturator is defined as a maxillofacial prosthesis used to close a congenital or acquired tissue opening, primarily of the hard palate and/or contiguous alveolar/ soft tissue structures. The obturator prosthesis is used to restore masticatory function and improve speech, deglutition and cosmetics for maxillary defect patients.[6] Oral rehabilitation and restoration of adult patients with cleft lip and palate depends on the severity of the functional and anatomical alterations that causes difficulty in proper closure of the nasopharynx. When surgery is not possible or when the patient is not willing, a palatal prosthesis may be the best solution.[7] Complete edentulism present a unique challenge during the fabrication of complete dentures so proper obturator and palatal extension of the complete dentures need to be carried out to fulfil functions of speech, deglutition and mastication.[8]

This clinical report describes the prosthetic rehabilitation of an edentulous cleft palate patient using a heat polymerizing acrylic resin complete denture with hollow obturator with the objective of providing satisfactory esthetics and function.

Case Report

A 70-years old male patient reported to the Department of Prosthodontics, Vokkaligara Sangha Dental College and Hospital, Bengaluru with the chief complaint of difficulty in intake of food and mastication due to missing teeth in maxillary and mandibular arches. The patient gave a history of undergoing extraction of maxillary teeth 3-months back and mandibular teeth 12-years back due to periodontal reasons.

Upon clinical examination, a midline cleft involving both hard and soft palate measuring 4*2cm which was present since birth was found and the mandibular ridge was atrophic. (Figure 1)

Figure 1

The patient was diagnosed with completely edentulous, U shaped, well-formed maxillary arch with anterior undercuts and Veau's class II soft and hard palatal defect and completely edentulous, U shaped, severely resorbed mandibular arch. The patient presented with Class II tongue size, Class III tongue position, moderate lateral throat form, Class II intermaxillary relationship and impacted canine in the first quadrant which was visible on radiographic examination. (Figure 2)

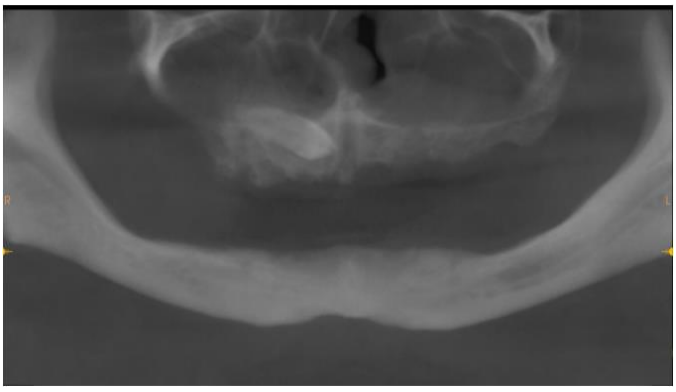

Figure 2

The patient refused to undergo surgical reconstruction. Therefore, a conventional removable maxillary and mandibular complete dentures with definitive obturator prosthesis was contemplated.

Procedure

• A gauze piece lubricated with petroleum jelly was packed into the palatal cleft prior to impression making to avoid any impression material from being forced into nasal cavity.

• Preliminary impressions were made in irreversible hydrocolloid impression material (Tropical Gin, Zhermack) with perforated edentulous stock tray for maxillary arch and impression compound (Functional impression com pound, Pinnacle) with non-perforated edentulous stock tray for mandibular arch (Figure 3).

• Primary casts were obtained (Figure 4). The undercuts and defect area were blocked with wax (Modelling wax, Hindustan). Auto polymerizing acrylic resin (DPI RR Cold cure) was used to fabricate custom tray of uniform thick ness on both maxillary and mandibular casts. (Figure 5)

• The tray was adjusted in patient's mouth and low-fusing compound (DPT Pinnacle Tracing Stick) was used to perform border molding. Cleft area was bordermolded by asking the patient to swallow and carry out head movements such as flexion extension of neck, rotation and side by side movement while the material was still soft. For the atrophic mandibular ridge all green technique was used and low viscosity poly-vinyl siloxane rubber base impression material (Flexed Light Figure 2 Body) was used to make the final impressions of both maxillary and mandibular arch. (Figure 6)

• The final impressions were poured in type IV dental stone for maxillary arch and type III dental stone for mandibular arch. Modelling wax (Modelling wax, Hindustan) was used to block undercuts and the cleft area.

• Auto polymerizing resin (DPI RR Cold cure) was used to make record bases and wax (Modelling wax, Hindu stan) occlusal rims were made on the record bases. The

maxillomandibular relationship was recorded (Figure 7) and then mounted on the articulator.

• The neutral zone was recorded using mandibular occlusion rim. The mandibular wax occlusion rim was removed and retentive wire loops were attached to the record base in the anterior region and acrylic stents were made in the premolar molar region for determination of the vertical height of the rim (Figure 8). Kneaded low-fusing compound (DPT Pinnacle Tracing Stick) was adapted to the denture base and placed in the patient's mouth. The patient was asked to carry out different functional movements like swallowing, sucking, smiling, licking the lips and pronouncing vowels. Mandibular compound rim was taken out and excess compound was trimmed away till the level of the acrylic stents and the material was re-softened and replaced in the mouth asking the patient to repeat the functional movements. This procedure was repeated for about ten times so that a narrow accurate zone could be recorded. The resultant molded occlusion rim was the neutral zone of the patient. (Figure 9)

• The addition silicone putty index (Aqusil soft putty, Dentsply sirona) of this recorded zone was made and the compound rim, the retentive loops and acrylic stents were removed. The putty index was replaced on the cast and melted wax was flown to obtain a wax rim in the neutral zone area. (Figure 10)

• First the mandibular teeth were arranged in the neutral zone area and checked by replacing the putty index (Figure 11). The maxillary teeth were arranged according to the mandibular teeth.

• At the try-in stage the posterior extension of the cleft area was recorded using low fusing compound. The patient was asked to swallow and then bend the head forward slowly, touch the chest and move it backward. The extension was adjusted till the patient was satisfied with the speech and comfort (Figure 12). The occlusion, speech, esthetics and swallowing were evaluated (Figure 13). The patient was asked to drink water and the denture prevented the regurgitation of water during swallowing.

• Waxed and finished trial dentures were sealed to the cast (Figure 14). After flasking and dewaxing, lost salt acrylization technique was used to fabricate hollow maxillary obturator (Figure 15) and mandibular denture was acrylized conventionally. After processing, holes were made and salt was removed by injecting water (Figure 16), later the holes were sealed up using auto polymerizing acrylic resin. The dentures were trimmed, finished and polished.

• The finished obturator prosthesis was inserted into the patient's mouth and necessary adjustment was carried out (Figure 17). Phonetics of the patient was evaluated, the speech showed definite improvement. The patient was given training for placement of the prosthesis and post insertion instructions for maintenance were given.

Figure 3

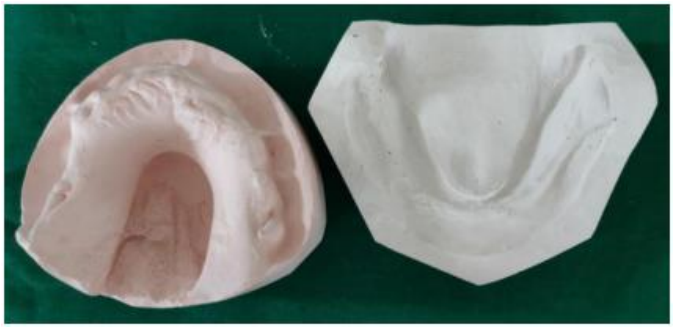

Figure 4

Figure 5

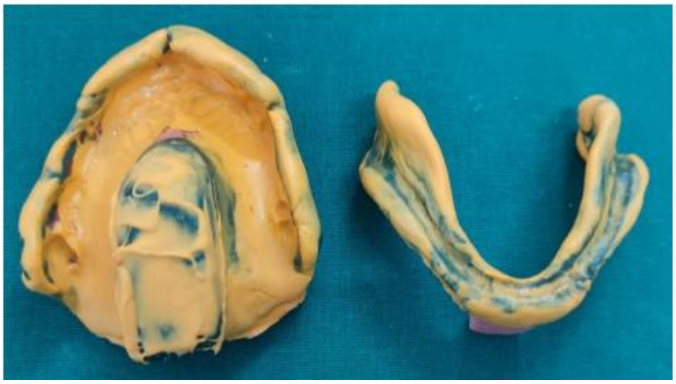

Figure 6

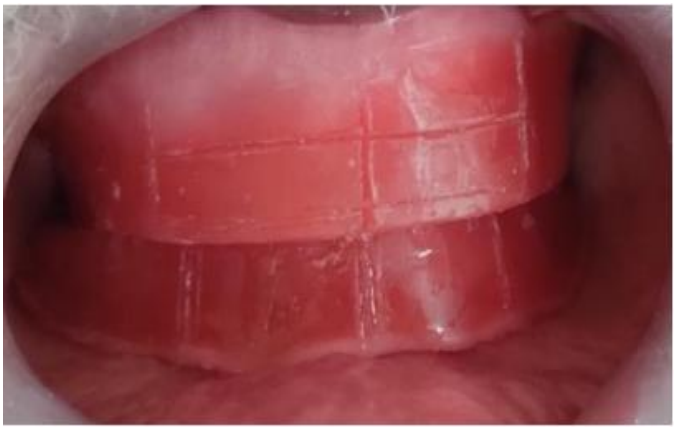

Figure 7

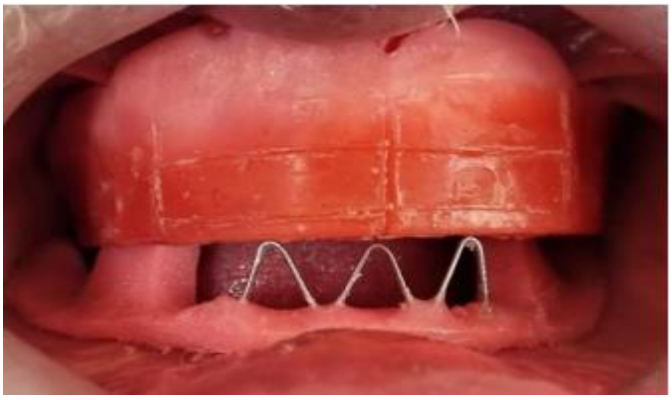

Figure 8

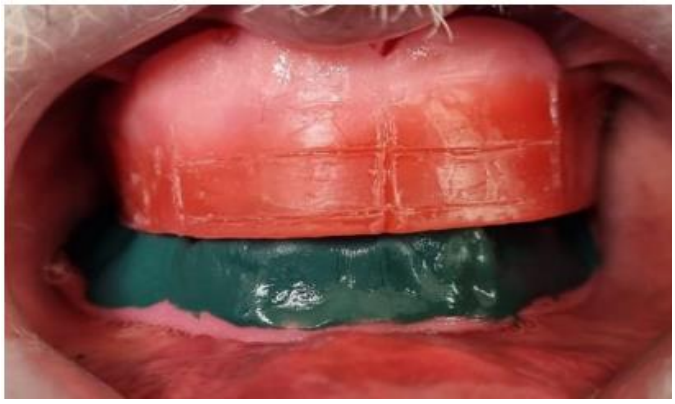

Figure 9

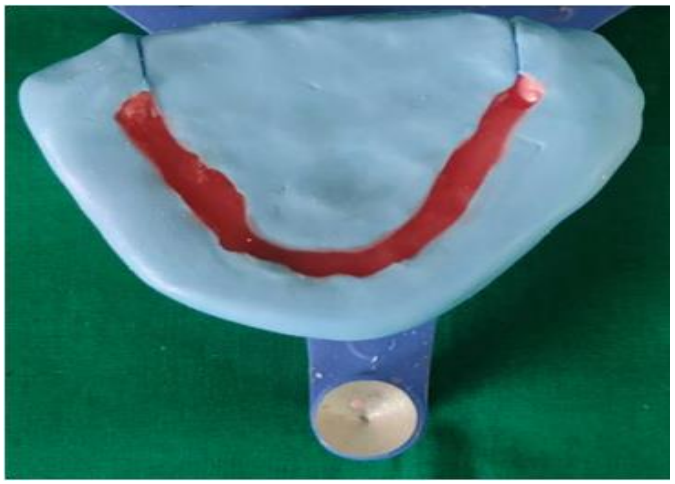

Figure 10

Figure 11

Figure 12

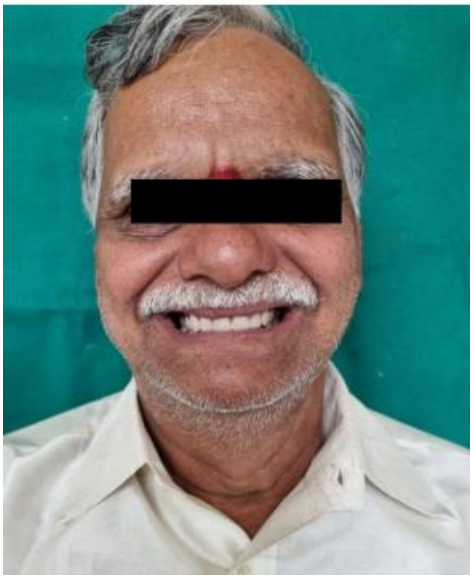

Figure 13

Figure 14

Figure 15

Figure 16

Figure 17

Figure 18

Discussion

Obturator prostheses are commonly used in the rehabilitation of patients with cleft palate. It helps in separating the oral and the nasal cavities and restores normal deglutition, speech and improves the midfacial esthetics by supporting the soft tissues. A comfortable, cosmetically acceptable prosthesis that restores the impaired physiologic activities of speech, deglutition and mastication is a basic objective of prosthodontic care. As stated by De Van's the most important objective of prosthodontic care is "The perpetual preservation of what remains rather than the meticulous restoration of what is missing." This principle is most important in the treatment of the cleft-palate patient. The success of obturator depends upon the volume of the defect, positioning of the remaining hard and soft tissues to be used to retain the prosthesis and also the weight of the prosthesis.[6]

The present article describes the prosthetic rehabilitation of a completely edentulous cleft palate patient with a removable complete denture with closed hollow obturator. The patient's apprehension towards surgical treatment led to the treatment option of prosthodontic rehabilitation using an obturator. The open-end bulb obturator is often associated with food, fluid and mucus accumulations that results in bad odour and altered taste sensation hence a closed bulb obturator was fabricated.

Advantages of a hollow bulb obturator include [9:]

• The weight of the obturator is reduced, making it more comfortable and efficient.

• The lightness of the obturator improves one of the fundamental problems of retention and increases physio logical function so that teeth and supporting tissues are not stressed unnecessarily.

• The decrease in pressure to the surrounding tissues aids in deglutition and encourages the regeneration of tissue.

• The light weight of the hollow bulb obturator reduces the self-consciousness of wearing a denture.

• The lightness of the obturator does not cause excessive atrophy and physiological changes in muscle balance.

Neutral zone technique was used for the atrophic mandible to enhance the stability and retention of the denture. In the highly atrophic mandible muscular control over the denture is the main retentive and stabilising factor during function. A denture shaped by the neutral zone (NZ) technique will ensure that the muscular forces are working more effectively and in harmony. The dentures will have the following advantages 10:

• Improved stability and retention

• Posterior teeth will be correctly positioned allowing sufficient tongue space.

• Reduced food trapping adjacent to the molar teeth.

• Good aesthetics due to facial support.

The patient showed remarkable improvement in speech and function after the insertion of dentures.

Conclusion

The prosthodontic rehabilitation of an edentulous cleft palate patient poses difficulties due to compromised retention. The case report presents the successful management of an edentulous cleft palate patient with a maxillary complete denture having a palatal hollow obturator. The patient was satisfied with dentures in terms of aesthetics, chewing, swallowing, and speech.

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