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Case Report

Prosthetic Rehabilitation of an Unusually Self-Obturated Cleft Palate Defect in an Adult Edentulous Patient Living in a Remote Rural Area. A Clinical Report

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Abstract: Patients with unrepaired cleft palate defects still exist within remote rural areas. The prosthodontic rehabilitation of an adult edentulous cleft patient could be very demanding for treating maxillofacial prosthodontist, since most of them are edentulous, challenging the retention and the stability of the maxillary prosthesis. It is therefore highly important that cleft palate patients seek dental and prosthodontic care as early in their life as possible. In this report, an unusual case of a patient self-obturated cleft palate defect is presented. The patient's self-made prosthesis was replaced by an appropriately fabricated pharyngeal obturator prosthesis in order to improve speech and swallowing.

Keywords: cleft palate defect; pharyngeal obturator

Citation: Artopoulou, I.I.; Salia, A.; Polyzois, G. Prosthetic Rehabilitation of an Unusually Self-Obturated Cleft Palate Defect in an Adult Edentulous Patient Living in a Remote Rural Area. A Clinical Report. *Prosthesis* **2021**, *3*, 388–393. https://doi.org/10.3390/prosthesis3040034

Academic Editor: Bruno Chrcanovic

Received: 16 October 2021
Accepted: 11 November 2021
Published: 16 November 2021

1. Introduction

Cleft palate is among the most common birth defects today, and refers to an elongated opening in the hard and/or soft palate [1]. The palatal defect results in defective suckling and deglutition, feeding difficulties, delayed and impaired speech development, psychosocial maladjustments, and an impaired quality of life, associated with chronic disability for the growing individual. Multidisciplinary management and team approach are essential throughout the restorative treatment course, and the treatment objectives include repairing the barrier between the oral and nasal cavities, and the rehabilitation of the velopharyngeal sphincter closure, in instances where the soft palate is insufficient and/or incompetent.

Although the advent of plastic surgery offered more predictable outcomes in the cleft palate reconstruction, surgical repair alone often cannot rehabilitate the palatal defect, and appropriate palatal appliances such as palatal obturators and/or a speech aid prostheses, are necessary in order to restore the congenital defect [1]. These appliances have been historically used since Demosthenes (384-323 B.C), the great Greek orator accomplished the first obturation in order to improve his speech by using moderately sized pebbles to fill his palatal defect [2]. Hollerius, Petronius, and Pare lived in the 16th century and described the process of prostheses using every day materials such as sponges, wax, and silver as well as more sophisticated materials and techniques [2]. In the 19th century Snell, Stearn, Kingsley, and Suerson [2] described their designs of prostheses, which are more similar to those used today. Currently, palatal obturators with or without speech aid prostheses can be used as a definitive treatment option in order to recontour the oral cavity, restore oronasal communication, and to address problems associated with impaired velopharyngeal sphincter closure that create velopharyngeal inadequacy (VPI) [1,3].

Generally and due to the significantly related disability, it is highly important to restore the palatal cleft during the first two decades of life. Cleft palate rehabilitation protocols recommend concomitant reconstructive surgery and multidisciplinary management by team approach that ideally begins during infancy [4]. However, although their numbers

are limited, in developing countries and remote rural areas of developed regions where residents have limited access to primary and specialist dental services [5], adult patients with surgically unrepaired and prosthetically unrestored palatal clefts are still present.

The aim of this clinical case is to report the presence of adult patients with an unoperated cleft palate in remote rural areas, who do not have access to specialized dental care, to address the associated functional and esthetic deficits, and to illustrate the unusual effort made by an individual patient to obturate his palatal defect with a self-fabricated prosthesis, in order to alleviate speech and swallowing. In addition, the prosthodontic steps for an appropriate prosthetic rehabilitation will be described.

2. Case Report

A 56-year old Caucasian male was referred to the Graduate Prosthodontics Clinic at the National and Kapodistrian University of Athens for prosthodontic rehabilitation. The patient presented with problems in speech and swallowing caused by a large palatal defect associated with cleft palate. His medical history was unremarkable and negative for medications or known allergies. The history of his present illness revealed no attempts for surgical reconstruction. The patient had lived in a rural, distant area throughout his whole life, with challenging access to dental care. He reported that he first visited a dental clinic at the age of 15, when a general dentist fabricated an acrylic plate attempting to cover the hard palate and restore his palatal defect. At the age of 30, the same general dentist extracted all his remaining decayed teeth and fabricated a conventional complete denture. Both the acrylic plate and the complete denture were unable to successfully obturate his palatal defect and restore his speech and swallowing, therefore, the patient modified his complete denture, and all his consequent conventional complete dentures, by adding a significant amount of modeling clay in their intaglio surface. In these unusual self-made prosthesis, the clay was modeled intraorally and followed the shape of the defect to improve swallowing and food regurgitation to some extent (Figure 1). However, since the self-fabricated prosthesis did not have adequate posterior extension to the pharyngeal walls, air emission remained, and speech hypernasality was not sufficiently addressed.

Figure 1. The self-fabricated clay obturator.

At his presentation to the Graduate Prosthodontic Clinic, the patient had a congenital cleft palate defect, which interfered with his nasal and maxillary sinus cavities. The right alveolar palatal process was not developed, and upon palpation, the area appeared to be soft, consisting of freely movable mucosa without any underlying bony support. The left alveolar process had developed until the midline, with attached mucosa covering the alveolar bone, but was severely resorbed at the maxillary tuberosity area. The hard palate was low vaulted, and had an irregular anatomy. Upon examination, the soft palate appeared anatomically intact but lacked adequate neuromuscular ability, presented with reduced mobility and was unable to perform adequate elevation in order to achieve the necessary palatopharyngeal closure, creating VPI symptoms (Figure 2). An oral and radiographic examination indicated that he was completely edentulous in both maxilla and

mandible, whereas no other lesions were observed. His temporomandibular joint and his oral opening appeared to be within normal limits. There was no lip clefting. The treatment plan included the fabrication of a complete denture pharyngeal obturator prosthesis and a mandibular complete denture. Compared to a palatal lift prosthesis, the pharyngeal obturator was found to be more appropriate, since, although there was a remaining soft palate, it was firm and rigid with a turgid uvula that could not be easily elevated therefore causing discomfort, as well as retention and stability issues in case of the palatal lift appliance. The palatal portion of the prosthesis covers the hard palatal defect and prevents food and liquid impaction, therefore improving the patient's speech and swallowing. The pharyngeal portion of the prosthesis extends back at the level of the palatal plane and above the remaining soft palate, in contact with the posterior and lateral pharyngeal walls during normal function, thereby reestablishing the velopharyngeal sphincter closure.

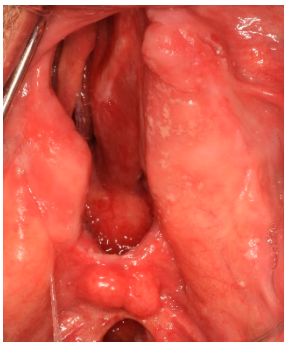

Figure 2. The hard and soft cleft palate intraoral defect.

Preliminary maxillary and mandibular impressions were made using irreversible hydrocolloid material (BluePrint® X-creme; Dentsply Int, York, PA, USA) and the obtained casts were used for the fabrication of maxillary and mandibular custom trays. A modeling impression compound (Green stick impression compound; Kerr Corp., Brea, CA, USA) was used to border-mold the basal area of the tray (Figure 3) and the hard palate cleft defect, whereas the final wash was performed using a polysulfide impression material (Permlastic; Kerr Corp) (Figure 4). The undercuts in the maxillary master (Figure 5) cast were blocked-out with baseplate wax, and the maxillary record base was fabricated. For the mandibular final impression, the vertical and centric relation records, the set up of the teeth, the try-in procedures, and the laboratory steps, techniques and guidelines used in the fabrication of conventional complete dentures were followed. The maxillary obturator prosthesis was processed, placed intraorally, and the necessary adjustments were made. In order to record the contours of the velopharyngeal musculature and to add the pharyngeal extension of the prosthesis, functional tracing, with a resilient acrylic relining material (Trusoft; Hary J. Bosworth Co., Skokie, IL, USA), was performed. The contours of the defect were functionally recorded while the patient swallowed, spoke, made a circular head movement, and breathed over a 20-minute period (Figure 6). Articulation and resonance were evaluated in collaboration with a speech pathologist. The necessary follow up adjustments were made, the nasopharyngeal extension impression was converted to heat polymerized acrylic resin (Lucitone 199; Dentsply Sirona, Charlotte, NC, USA), and the prosthesis was delivered to the patient (Figure 7).

Figure 3. Maxillary master cast.

Figure 4. Custom tray with border molding.

Figure 5. Final impression.

Figure 6. Tracing of the pharyngeal extension of the maxillary prosthesis.

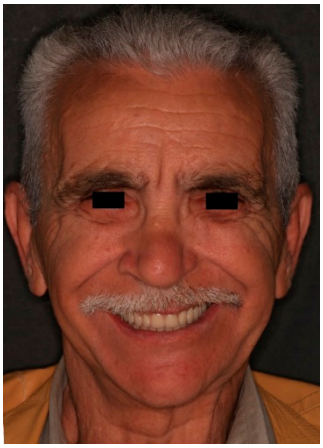

Figure 7. Definitive maxillary and mandibular prostheses delivered to the patient.

3. Discussion

Considering the associated significant functional and esthetic impairment, a restoration of the cleft palate defect should ideally begin early, ideally before the patients enter adulthood. That is tremendously important, since adult patients that require prosthetic rehabilitation for their unrepaired cleft palate present a unique challenge for the maxillofacial prosthodontist who treats the patient. Furthermore, VPI treatment with or without speech therapy is more effective and has more predictable outcomes in younger patients, since older patients usually demonstrate a combination of well established habitual speech and sound errors, in order to compensate for their structural deficits, abnormal neuromuscular function, incomplete closure of the velopharyngeal valve, nasal air emission, irregular jaw relationships, atypical dentition, defective intraoral tongue pressure, weak lip support, and their conductive hearing loss [6–8].

When adult patients become edentulous, prosthetic rehabilitation becomes even more demanding, mainly due to the weight of the prosthesis, the inadequate peripheral border seal, and the absence of an opposing mandibular dentition [9]. Tooth loss and edentulism are generally common in remote rural areas, since both are related to poorer oral health, a lower education level, lower socioeconomic status, and limited access to dental treatment. According to reports [5,10] in rural areas, there are still older adults who admit that they have never visited a dentist. These patients usually remain completely edentulous for extended periods of time, although the lack of adequate prosthetic rehabilitation has a significant effect on their overall quality of life.

In the present report, the patient's palatal defect was not appropriately prosthetically restored and interfered with his speech and swallowing, therefore he sought alternative materials to obturate the defect on his own, and he trained his tongue, lips and soft tissues to perform certain maneuvers in order to speak. It was interesting that the patient attempted to obturate his palatel defect and that the material of choice (modeling clay) resembled the previously mentioned, historically employed attempts for the prosthetic management of the cleft palate.

Author Contributions: I.I.A. clinical steps, writing—original draft preparation, review and editing; A.S. clinical steps, and G.P. supervision. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: The patient provided their informed consent (in order to use medical record information and photographs).

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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