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Palatopharyngeal obturator prosthesis : Case report

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ABSTRACT

Velopalatal insufficiency is an anatomical anomaly of the palate affecting the soft palate, the hard palate or both together. It may be congenital, related to velopalatal clefts, or acquired following trauma, infectious lesions, or resection of benign or malignant tumour.

Treatment of these anomalies includes reconstructive surgery with bone grafts and/or endoprostheses and non-surgical treatments such as speech therapy and maxillofacial prostheses. Prosthetic rehabilitation needs to have 3 components : a functional component to restore swallowing and phonation, an aesthetic and psychosocial component.

However, the complexity of the anatomy of the soft palate and its mobility make rehabilitation more delicate. The aim of this paper is to highlight the steps involved in the fabrication of a pharyngeal obturator prosthesis, also known as a « speech aidprosthesis ».

Keywords : Palatopharyngeal obturator prosthesis, Maxillofacial prosthesis, deglutition disorder, speech disorder.

INTRODUCTION

The hard palate forms the roof of the oral cavity, which separates it from the nasal cavities, and is continued posteriorly by the soft palate. The loss of this structure will create a real functional problem by disrupting the physiology of swallowing, breathing and especially phonation [1].

Maxillofacial prosthodontics can be defined as the art and science of aesthetic and functional reconstruction of the facial skeleton. It is characterised by its medical and surgical roots through numerous multidisciplinary collaborations that go beyond the framework of dentistry [2],[3]. The aim of rehabilitation with a maxillofacial prosthesis is to restore speech, swallowing, mastication and to conceal aesthetic damage [4].

In the case of loss of velar substance, the maxillofacial prosthesis must meet the requirements of Housset's triad but also restore nasopharyngeal air and watertightness. This is known as the "maxillofacial prosthetic tetrad" (Housset's triad supplemented by the objective of air and watertightness). After rehabilitation with a pharyngeal obturator prosthesis, the patient must control the air during phonation and control the bolus of food during swallowing to prevent the leakage of material into the nasal passage.

In this paper, a case presenting a partial loss of velar substance, which was rehabilitated by an obturator prosthesis consisting of a hard resin extension fixed to a removable prosthesis will be studied following the methodological and technical design.

CLINICAL CASE

A 60-year-old patient, presented to the Department of Maxillofacial Surgery at university hospital Ibn Rochd- Casablanca with radiating pain in the soft palate. Examination of the oral cavity revealed a 1.5 cm oval violaceous mass on the soft palate. The margins were clear and palpation was soft and painless.

Exo-oral examination revealed no adenopathy. In the absence of any identified traumatic factor, a biopsy of the velar lesion was performed under local anaesthesia. Anatomopathological examination revealed that the lesion was a well-differentiated low-grade adenoid cystic carcinoma. Following multidisciplinary consultation, the lesion was excised with a safety margin, followed by 10 sessions of external beam transcutaneous radiotherapy with a total dose of 70 Gy.

2 months later, the patient was referred to the Casablanca Dental Consultation and Treatment Centre for prosthetic treatment. Endo-buccally, tumour removal had left a partial loss of maxillary velar substance, resulting in communication between the nasal and oral cavities and altering velo-pharyngeal hermeticity.
With the soft palate no longer acting as a barrier between the nasal and oral cavities, a number of functional sequelae were noted:
- Swallowing sequelae: The patient reported a leakage of fluid through the nose during swallowing, leading to difficulty eating.
- Phonatory sequelae: A marked deterioration in intelligibility with rhinolalia was noted.
Odontologically, the patient had class II mod 1 edentulism in the maxilla and class II mod 1 edentulism in the mandible according to the Kennedy classification (Fig.1).

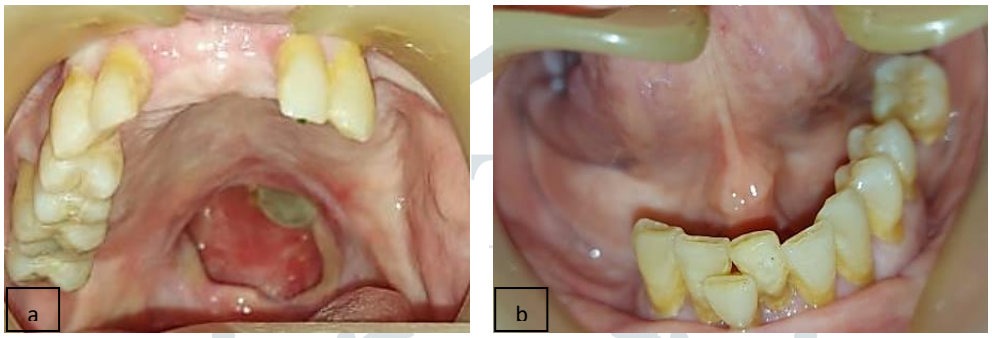

Figure 1 : Endobuccal views: (a) Maxillaryarch, (b) Mandibular arch

Prosthetic management began with an alginate impression using a commerciallya vailable impression tray, with the precaution of placing a compress at the bottom of the loss to prevent material leakage (Fig.2). A resin plate is initially fabricated with a conditioning resin extension, also known as a transitional obturator (Fig.3), to guide healing and improve the quality of the supporting tissues. Adjustments and relining with conditioning resin are performed weekly to monitor tissue remodelling.

Figure 2 : Maxillary alginate impression

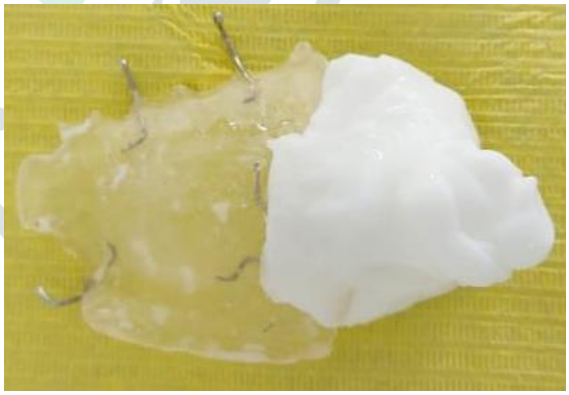

Figure 3 : Palatal plate with a conditionnig resin extension

3 weeks later the definitive prosthesis was started, consisting of an acrylic velar obturator attached to a removable cast metal framework prosthesis to replace the missing maxillary teeth and a conventional removable partial prosthesis in the mandible.

The prosthetic treatment begins with a primary impression taken with alginate and a standard tray extended to cover the loss of substance with a red thermoplastic paste.

This impression allows the registration of the maxillary arch and the fabrication of a individual impression tray with an extension facing the loss of velar substance.
The design of the stellite followed the classic rules of cast partial metal framework prosthesis. In maxillofacial prosthetics, it is recommended to use the maximum amount of dental support to increase prosthetic stability. The design included a full palate central connector, Aker's Clasp on 13, 22, back action clasp on 23, embrasure clasp on 15,16 and Circumferential clasp on 17. It should also be noted that the plate facing the loss of substance must be grilled to ensure retention of the obturator resin.

The necessary preparation of abutment teeth has beencarried out and the secondary impression was taken according to conventional rules, with some special features specific to the clinical situation. The patient had undergone radiotherapy, which increased the sensitivity and fragility of the fibromucosa. The Kerr paste margin, which can be a source of irritation, was replaced by a flexible polyether peripheral seal. The central impression was taken with the same material. The patient was asked to move her head in a circular motion, tilting her head forward and backward as much as possible and uttering a deep "ah" until the impression was taken (Fig.4).

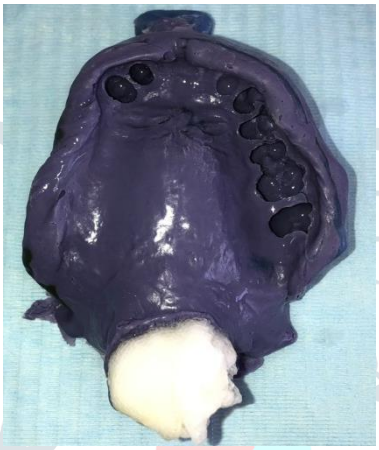

Figure 4 : Maxillary secondary impression

The intermaxillary position is recorded with a green wax (Aluwax). The centric relation was used as a reference. The placement of the teeth must follow the specific rules for partial dentures and the prosthetic teeth must match the existing teeth in colour and shape (Fig.5).

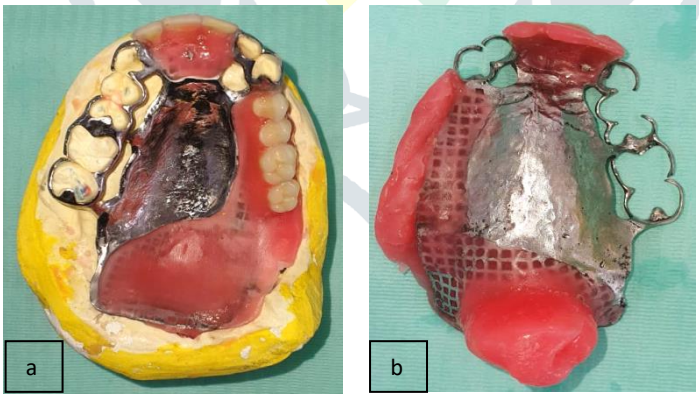

Figure 5 : (a) Prosthesis intrados (b) Prosthesis extrados

Once the prosthesis has been validated and adjusted, low viscosity silicone is applied to the obturator. The patient is asked to perform the same movements as described above (moving the head in a circular motion, tilting the head forward and back as far as possible, uttering a deep "ah" and swallowing). The prosthesis is corrected by eliminating the areas of over-extension indicated by the revealing material. The patient did not experience any tongue interference or breathing difficulties during the evaluation.

A control calendar was established to ensure the adaptation of the velar obturator and its physiological integration by asking the patient to perform the movements previously described.

DISCUSSION

A velar obturator prosthesis, or pharyngeal prosthesis, consists of a conventional removable dental prosthesis with a rigid resin extension in the posterior part, beyond the residual soft palate.
It should be noted that to maintain normal oral and nasal resonance, the passage of air from the oropharynx to the nasopharynx must be prevented by adequate velopharyngeal closure [5]. This implies an exact and precise position of the pharyngeal obturator in case of anomaly or loss of velar substance.

According to Beumer et al, the extension of the prosthesis should be positioned in the nasopharynx at the level of the normal velopharyngeal closure and its lower extension should be in the extension of the palatal plane to the posterior pharyngeal wall [6], [7].

It must provide a fixed structure against which the pharyngeal muscles can rest during palatopharyngeal closure. The existence of a space between the prosthesis and the walls of the pharynx allows nasal breathing and the emission of nasal sounds. The existence of this space is verified when the patient pronounces « ah » for a long time. When this is done, the pharyngeal sphincter is at its maximum closure [7]. At this point the extension should be at the same level as the hard palate. The position and height of the obturator is determined by the position of the residual velopharyngeal sphincter [8].

Pharyngeal obturator prostheses for patients with acquired or congenital defects provide not only physical and functional improvements but also psychological support [9].

In practice, patients find it difficult to accept this type of prosthesis. The rigid, immobile acrylic extension does not adapt perfectly to the residual soft palate tissue, which is flexible and mobile. This inertia of the extension can cause imbalances within the prosthesis. In addition, the mobility of the residual tissues means that their mucosal limits are constantly changing, making it impossible for the rigid resin extension to adapt perfectly to them [10]. To overcome this problem, the design of the prosthesis must take into account the physiology of a normal soft palate.
In this context, it is necessary to use a material that is both mobile and flexible, allowing physiological movements during function and adapting to the anatomy of the residual musculo-mucosal tissues.

Several techniques have been reported for the management of patients with velopalatal substance loss. Ch. Bou et al used a membrane obturator prosthesis that incorporates a dental dam to compensate for the soft palate defect [11]. Due to its flexibility, it adapts to the residual tissues bordering the loss of substance, both at rest and during the various movements of the pharyngeal muscles. However, the dam replacement was needed every week due to loss of elasticity [11].

The management of this type of substance loss requires a great deal of creativity to design an obturator that approximates the physiology of a normal soft palate to guarantee the restoration of function, the social and professional reintegration of patients.

CONCLUSION

The management of patients with velar substance loss is a real challenge. Its main objective is to restore essential functions such as swallowing, phonation and breathing to improve the patient's quality of life.

However, it is not always possible to adapt a rigid obturator prosthesis to the soft palate, which is a mobile and retractable structure. The design of this type of prosthesis requires in-depth expertise from the medical team. Changes in the size, shape and position of the soft palate must be taken into account.

Rehabilitation of velar substance loss opens up new perspectives in maxillofacial rehabilitation and encourages further research and progress.

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