Prosthodontic management of an extreme atrophy of the mandible correlated with a prominent genial tubercle – a clinical report

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Abstract

Extreme atrophy of the mandibular alveolar crest can pose a great prosthodontic challenge, especially when the genial tubercles remain as a bony projection in the floor of the mouth. This article is a clinical report on the prosthodontic management of a severe mandible atrophy correlated with a prominent genial tubercle. A complete denture was carefully designed and fabricated in order to restore both the function and esthetics of the patient.

Keywords: mandibular atrophy, genial tubercle, complete denture.

Introduction

The outcome of conventional complete denture therapy can be evaluated based on some prognostic indicators. Construction of technically correct dentures, a well-formed mandibular ridge and accuracy of jaw relations are positive indicators for success, whereas patient neuroticism and a poorly formed mandibular ridge are negative indicators [1]. Severe atrophy of the mandible is therefore a great prosthodontic challenge, especially when the genial tubercles become prominent in the floor of the mouth.

After tooth extraction, the mandibular alveolar crest undergoes a resorptive process following a centrifugal pattern [2]. This proved to be significantly more pronounced in women than in men, when vertical height [3, 4] cortical thickness [5] and the increase of the gonial angle [6] were measured. Genial tubercles are stimulated functionally, as they are the origins of the genioglossus muscle and the geniohyoid muscle. In the case of excessive atrophy of the alveolar ridge, they can remain as a hard projection in the alveolar-lingual sulcus, in or around the midline, sometimes extremely prominent [7]. There are reports of fracture of the genial tubercles that occurred either spontaneously [8] or in relation to an ill-fitting denture [9].

The prosthodontic treatment of such cases should be carefully conducted, with special attention to the conformation of the lingual border of the restoration. The presence of genial tubercles interferes with the peripheral seal in the anterior-lingual area [10]. Denture border should be relieved on the tubercles to avoid pain and sourness and should rest on the soft tissue around them. Some authors suggest the surgical removal of these structures [11].

This clinical report aims to present the prosthodontic management of an extreme atrophy of the mandibular alveolar crest in correlation with a large genial tubercle.

Case report

A 73-years-old female patient, completely edentulous, requested the replacement of the two complete dentures, which had been in service for 25 years.

Clinical examination revealed a severe atrophy of the mandibular bone and a genial tubercle of an impressive relative size. The complete denture was particularly small and ill-fitting. Vertical dimension of occlusion (VDO) was decreased, as deduced from functional tests, from patient’s appearance and from the size of the dentures in relation to the amount of bone resorption. As a result, the patient presented angular keilitis (Figure 1).

Figure 1 – Clinical view of genial tubercle. Angular keilitis is visible.

CBCT examination revealed the full extent of the atrophy, as well as the size and morphology of the residual bone (Figure 2). The resorption affected the entire alveolar crest and a part of the basal bone. The mental foramina were absent bilaterally, as their original position was coronal to the present bone level. The mandibular canal opened on the superior aspect of the mandible in the molar region and continued as a mandibular groove, hosting the inferior alveolar nerve (IAN) right underneath the soft tissue. On the left side, the incisive canal and a
corresponding incisive foramen could be depicted in relation to the genial tubercle (Figure 3). The genial tubercle was asymmetrical, more prominent on the left, measuring 16 mm in width, 10 mm in height and 5 mm in thickness (Figure 4). The superficial location of the IAN caused a slight sensitivity upon palpation of the superior aspect of the mandible, which was not perceived by the patient during functioning of the old dentures. The incisive foramen on the left side of the genial tubercle could be sensed upon palpation, as well as the emergence of the mandibular canals.

Given the severity of the mandibular atrophy, treatment with conventional complete denture was considered. The clinical situation requested a maximum extension of the denture, especially on the lingual aspect, but at the same time, the genial tubercles had to be relieved.

A preliminary irreversible hydrocolloid impression (Tropicalgin; Zhermack SpA, Badia Polesine, Italy) was attempted with a standard impression tray (Schreinemakers Kit; Clan Dental Products, Maarheeze, The Netherlands). The impression was considered unsatisfactory as the tray did not match the form of the mandibular arch and did not reproduce properly the details found clinically. A second preliminary impression was made with a standard tray that better adapted to the anatomy (Si-Plast Träger; Detax GmbH & Co. KG, Ettlingen, Germany). A preliminary cast was poured and a custom impression tray was fabricated, with the genial tubercle being relieved. The custom tray was minimally adjusted in the mouth. The posterior-lingual borders were molded using a thermoplastic compound (Impression Compound; Kerr Corp., Orange, California, USA) and then a wash impression was made with a low consistency polysiloxane (Oranwash L; Zhermack SpA, Badia Polesine, Italy) (Figure 5).

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In the next clinical appointment, the jaw relationship was registered. The VDO was established using the photographs of the patient from the dentate period and the need to accommodate both denture bases in the distal region of the mouth. The centric relation was then recorded on the wax rims. The trial dentures required several corrections of the tooth arrangement. The lower incisors were eventually retruded and only three incisors could be positioned in the available space, without affecting the esthetic outcome.

The denture was later processed and placed in the patient’s mouth (Figures 6–8). Selective grinding was performed to correct the occlusion and also on the denture’s borders, relieving areas of pressure on the genial tubercle. During the next recall appointments, the genial tubercle was further relieved, as well as the mucosal surface facing the left retromylohyoid fossa.

The patient quickly became accustomed to the new VDO. This was considerably increased in relation to the one existing with the previous dentures, but was similar to the VDO she had during the dentate state. The angular keilitis disappeared shortly after placing the new dentures.
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Discussion

This clinical report presents the management of a severe mandibular atrophy that affected even the superior wall of the mandibular canal. This extreme resorption placed the IAN in a subgingival position. The incisive canal is still present, as the resorption did not interfere with the region of the mandible that usually houses this anatomical structure. The genial tubercle hosts the origins of genioglossus and geniohyoid muscles, which makes it a biostatic region and prevents resorption [7].

Genial tubercle is normally quite small (mean height of 5.82 mm and mean width of 6.98 mm) [12]. In our case, the genial tubercle was almost twice the mean size (16 mm in width, 10 mm in height and 5 mm in thickness). Such morphology can lead to a chronic irritation by the ill-fitting denture, compromising the success of the prosthodontic treatment [13].

Cone-beam computed tomography (CBCT) is a relatively new technology used for the spatial imaging of the hard tissues of the maxillofacial region [14, 15]. The three-dimensional reconstruction using CBCT examination proved to be useful for the volumetric evaluation and visualization of the mandible, in accordance with Rubira-Bullen et al. [16]. As found in our study, highly accurate location of genial tubercles using this investigation technique is sustained also by Hueman et al. [17].

In the prosthodontic treatment with complete dentures, a good preliminary impression that reproduces as many anatomic details as possible is paramount, since any imperfection would generate errors throughout the clinical and technical steps in the fabrication of the denture. This treatment posed a challenge in finding an appropriately configured standard impression tray. The final impression focused on reproducing the lingual border of the denture, where the retromylohyoid fossae proved particularly useful, and on relieving the genial tubercles.

The mandibular wax rim had an impressive height, because of the extreme amount of missing bone and soft tissue that had to be prosthodontically restored with the new denture. A new VDO was established, as the one associated with the old dentures was decreased. Using old photographs, the VDO from the dentate period was established, which was later validated by functional tests. This is in accordance with the work published by McCord & Grant [18]. The patient did not report any problem related to the new VDO.

After the placement of the new complete denture, little adjustments were required to further relieve the genial tubercle and the left retromylohyoid fossa. The denture displayed an optimum retention, despite the excessive atrophy of the mandibular bone and despite the presence of the genial tubercle that interfered with the lingual seal.

This case report proves that even in extremely atrophic cases associated with prominent genial tubercles, a properly constructed denture, with good occlusal relations and a positive patient may lead to a successful treatment.

Conclusions

Although nowadays implant supported complete dentures can be considered a first option in mandibular edentulism, in extreme mandible atrophy it can be an unpredictable solution. Modern 3D complementary investigations can help clinicians choose the best treatment option for abnormal morphological situations. In this clinical case with a prominent genial tubercle, the only reasonable treatment was a conventional complete denture respecting all aspects of the oral anatomy. If the patient has realistic expectations and a good coordination, a careful approach of the clinical and laboratory stages is mandatory for the correct and complete restoration of function and esthetics.

Conflict of interests

The authors declare that they have no conflict of interests.

Author contribution

All authors have equal contributions to the study and the publication.

References


Figure 8 – Occlusal view of the new and old dentures.

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