CASE REPORT

High Palatoglossal Arch: A New Indication for Pre-prosthetic Surgery

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Abstract Pre-prosthetic surgery helps to overcome the challenge of prosthetic rehabilitation of the patient including restoration of the best masticatory function possible, combined with restoration or improvement of dental and facial esthetics. Maxillary denture prosthesis fabrication should include thorough examination of the soft palate and palatoglossal arch anatomy. This case report emphasizes on high palatoglossal arch as a rare and new cause of loss of posterior palatal seal and thereby retention of maxillary denture with rational, treated by pre-prosthetic surgery, ever reported in literature.

Keywords High palatoglossal arch · Pre-prosthetic surgery · Lasers · Maxillary denture

Successful denture therapy is a complex process demanding technical and interpersonal expertise with focus on optimum aesthetic and functional rehabilitation of the patient. During prosthetic rehabilitation, the soft palate and palatoglossal arch anatomy of the patient is overlooked which can lead to loss of retention of maxillary denture.

We present a unique case of preprosthetic surgery done in a 60 year old edentulous patient with a dislodging maxillary denture. Clinical examination revealed no under or overextended borders but the patient had a deep V-shaped palate (Fig. 1) and class III nature of the soft palate with an unusual anatomy of the soft palate and palatoglossal arch. The arch was high with fibres of the palatoglossus muscle inserted much anteriorly on the lateral surface of the tongue (Fig. 2) keeping the soft palate in tension, which was severe during tongue movements.

The soft palate is a fibro-muscular shelf that projects backward and downwards from the posterior edge of the palate. During quiet respiration it is almost vertical but during speech its anterior two-thirds is raised to or above the level of the hard palate and only its posterior part then curves downwards [1]. Closure of the velopharynx during speech is a voluntary action that is mediated by the motor cortex and that requires the coordinated action of the velopharyngeal musculature. The most superficial muscle fibres on the oral surface of the soft palate form the small palatoglossus muscle. This curves downward to the lateral margin of the tongue anterolateral to the tonsil, raising the mucous membrane to form the palatoglossal arch. The soft palate brings about the velopharyngeal closure by contraction of the levator veli palatini muscles which elevates it against the posterior nasopharyngeal wall during swallowing [1]. Interestingly, velar elevation for swallowing has been shown to be more complex than the simple vertical elevation during speech [2]. The palatopharyngeus and the palatoglossus muscles draw the soft palate downward and forward [3, 4], hence are antagonist to the levators to provide fine motor control of velar position during speech.

A well-fitting and retentive complete maxillary denture requires a well fitting surface, a peripheral border compatible with the muscles and tissues and finally, a posterior

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Fig. 1 V-shaped palate of the patient

Fig. 2 High palatoglossal arch with part of muscle fibres inserted much anteriorly on the lateral surface of the tongue keeping the soft palate in tension

palatal seal (PPS). Avants [5] has shown that “a PPS is necessary for optimum retention of maxillary complete dentures”. The posterior palatal seal area has been defined as an area of soft tissue along the junction of the hard and soft palate on which pressure, within the physiologic limits of the tissues, can be applied by a denture to aid in its retention [6]. Regardless of the technique used or the stage of denture fabrication during which the PPS is placed, the objectives of its utilization are the same.

Factors to be considered for determining posterior extension include:

- The drape of the soft palate in relation to the hard palate. A more abrupt relation between the hard and soft palates generally indicates increased muscular functional activity of the soft palate, thus reducing the potential posterior extension of the palatal seal [7].
- The shape of palatal vault is related to the activity of the soft palate. The flat vault has the least movable soft palate and the widest area of displaceable tissue. In contrast, the high vault or “V” shaped palate often has

a soft palate virtually at right angles to the hard palate and is extremely mobile. Thus the area of tissue displaceability is very narrow. The intermediate palatal vault lies between these two extremes [8, 9].

Thus, the width of the posterior palatal seal area is found to be greatest in patients with the flat palatal shape and least in patients with the deep palatal shape [4, 10]. Difficulties in soft palate movement are typically present in high vaulted patients because of the small area for the posterior palatal seal.

Achieving maxillary retention is possible satisfactorily in patients with V-shape and the class III nature of the soft palate having narrow posterior palatal seal. However, satisfactory maxillary retention was not achieved in our patient with all the best possible techniques. Possible rationale for the same was thought to be the high palatoglossal arch. As discussed earlier, the high vault or “V” shaped palate often has a soft palate virtually at right angles to the hard palate and is extremely mobile. Thus the area of tissue displaceability is very narrow. But, in our patient as a part of muscle fibres extending much anteriorly on the lateral surface of the tongue bringing the soft palate more downward and forward making a more acute angle as compared to class III nature of the soft palate patients having the least posterior palatal seal area. This altered anatomy worsened and completely compromised the posterior palatal seal area. Also, the velar elevation required for velopharyngeal closure during function was more and there was no area for tissue displaceability, on which pressure, within the physiologic limits of the tissues, could be applied by the denture to aid in its retention. As a result, during functions like speech and deglutition, the peripheral seal was breached with ultimate loss of retention of maxillary denture.

Taking into consideration the above findings, a pre-prosthetic surgery—palatoplasty was planned to reduce the tension on the soft palate to improve the downward and forward position. Palatoplasty was performed by incising the palatoglossal arch fibres which inserted high, anteriorly on the lateral surface of the tongue using soft tissue laser till the tension on the soft palate was relieved (Smile-Pro 980 nm diode laser by Biolitec, Germany) bilaterally. Following complete healing, the maxillary denture was fabricated with satisfactory retention during function. There was no significant contracture (Fig. 3) after a follow-up period of 2 years.

The authors want to highlight that high palatoglossal arch can compromise retention of maxillary complete denture and should be treated with pre-prosthetic surgery, though rare. This case report is unique mentioning high palatoglossal arch as a rare cause of loss of posterior palatal seal and thereby retention of maxillary denture with

Fig. 3 Complete healing with normal soft palate anatomy

rational, treated by pre-prosthetic surgery, ever reported in literature.

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