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Cheek Bumper Prosthesis for a Patient with a Neurofibromatous Lesion in the Left Cheek

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Abstract

Neurofibromatous lesions of the oral cavity affect the chewing cycle by interposition of cheek mucosa during contact of opposing teeth. In this report, an intraoral prosthesis was fabricated to restore and improve oral function and reduce the incidence of cheek biting on the neurofibromatous lesion. The prosthesis successfully reduced the incidence of cheek biting and improved the patient's oral competency. This report describes the procedure for making an intraoral cheek bumper prosthesis to improve patient oral function.

Prosthetic rehabilitation has proved to be the preferred treatment option not only for maxillofacial defects resulting from resection, but also in many other clinical situations like impaired speech articulation, difficulty in swallowing, problems with mastication, and deviation of the mandible during functional movements.[1] Cheek biting, "*Morsicatio buccarum*" is a condition where a person has a chronic habit of biting the buccal mucosa of the cheek.[2] The most common causes for cheek biting include malocclusion, sharp teeth, stress, eruption of wisdom teeth, conditions that cause puffy cheeks such as glycogen storage disease, agranulocytosis, and lesions of tumors such as neurofibroma.[3] When a person constantly bites his or her cheeks, the buccal mucosa is irritated, causing localized pain and discomfort, in turn leading to longstanding detrimental effect. It causes oral lesions to develop most frequently along or inferior to a line opposite the plane of occlusion, localized in distribution and hyperkeratotic in nature.[2]

Cheek biting is rarely caused by neurofibroma (also called *Fibroma molluscum*), a benign tumor of nerve tissue origin, derived from the cells constituting the nerve sheath. The neurofibroma cell of origin is generally believed to arise from the connective tissue sheath of Schwann cells and perineural fibroblasts that are neuroectodermal in origin. The tumor is seen either as a solitary lesion or as multiple forms of the systemic disease. The cause of solitary neurofibroma is unknown, and the most commonly involved site is the face. The tumor produces a swelling that is either hard or firm in palpation, and it may cause pain or parasthesia if associated with the mandibular nerve. Patients suffering from neurofibroma in the oral region pose problems with mastication, speech, and deglutition due to the presence of diffuse masses of tissue involving the buccal mucosa, palate, and alveolar ridges.[2,3] Smoothening sharp teeth, using oral appliances, extracting problematic teeth such as buccally erupted wisdom teeth, or inhibiting behaviors such as self-mutilation of the lips, cheeks, and tongue are prosthodontic solutions for such soft-tissue trauma.[4-6]

Recent advances in treatment modalities have resulted in improved collaborative rehabilitation efforts between surgical reconstruction and prosthodontic rehabilitation.[7] An alternative to surgical intervention, prosthetic rehabilitation includes a prosthesis made of clear autopolymerized acrylic resin placed in the buccal vestibule and attached to the remaining teeth to provide support on the affected side. This prosthesis can reduce the incidence of cheek biting and improve the patient's oral competence. The following clinical report explains the importance of prosthodontic rehabilitation in one such patient with impaired masticatory function due to chronic cheek biting.

Figure 1 Extraoral view of the swelling of left cheek.

Figure 3 Intraoral view of cheek biting.

Figure 2 Scars seen on left upper eyelid and eyebrow.

Figure 4 Prosthesis showing wire extensions on the left side of the palatal plate.

Clinical report

An 11-year-old boy was referred from Department of Plastic Surgery to the Department of Maxillofacial Prosthodontics and Implantology, Sri Ramachandra University (Chennai, India), in June 2009 for presurgical prosthetic management. The patient presented a complaint of continuous cheek biting during speech, eating, and swallowing. He also presented a diffuse swelling in the left cheek over the upper eyelid (Fig 1). He had surgical correction at 6 months of age and then was operated on twice for the same condition at $1\frac{1}{2}$ years and $4\frac{1}{2}$ years.

Figure 5 Prosthesis showing extension of the buccal plate.

Figure 6 Intraoral view of prosthesis showing extension of the buccal plate.

Extraorally the lesion extended medially from the corner of the lip to laterally around 3 cm to 4 cm short of the lower earlobe. Superiorly the lesion extended above the left upper eyelid, involving the eyebrow and inferiorly to the angle of the mandible. Scars were also present on the left upper eyelid and eyebrow (Fig 2). On palpation, swelling was soft in consistency and mildly tender with no pus discharge. Skin over the swelling was smooth and showed no evidence of secondary changes or visible pulsation. Intraoral findings revealed a whitish pinpoint patch in the retromolar region, a lump caused by the swelling, and deranged occlusion. On palpation, the whitish patch was soft and tender, with no discharge. The lump measured about 6 cm × 3 cm and was poorly defined. The lump extended anteriorly to the first premolar region, posteriorly to the retromolar region, superiorly to the buccal mucosa in relation to 26, and inferiorly to the buccal mucosa in relation to 36 and 37. The patient reported that the swelling was bitten every time the teeth occluded (Fig 3). The above complaint was verified clinically. An intraoral prosthesis was designed to either contain or keep the swelling away from the teeth during the chewing cycle.

Method of fabrication of intraoral prosthesis

Maxillary and mandibular impressions were made with irreversible hydrocolloid impression material (Zelgan 2002, Dentsply, York, PA). Definitive casts in dental stone were prepared from the impressions. A palatal plate with clear heat-polymerizing resin (DPI, Mumbai, India) was designed. Clasps-0.8 mm wrought wire (HP Industries, Calcutta, India) were fabricated to engage the first premolar and second molar on the left side to retain the palatal plate in the oral cavity (Fig 4). Wrought wire (0.8 mm wrought wire Konark, HP Industries) extensions were also designed on the left side of the palatal plate (Fig 4). A buccal plate measuring about 1 cm high, 2 cm long, and 2 mm wide was designed to be extended from the first premolar to the second molar and was fabricated using clear autopolymerizing resin (DPI). With the aid of wrought wire extensions, the buccal plate was attached on the left side of the palatal plate (Fig 4). The appliance was checked in the patient's mouth for upper and lower vestibular extensions of the buccal plate and trimmed so that the plate would be 2 mm away from the sulcular depth to avoid any irritation of the mucosa (Figs 5, 6). The patient's occlusion in centric, lateral, and protrusive excursion was checked with the appliance in position. The buccal extensions of the prosthesis were adjusted to provide space for the coronoid process and anterior border of the ramus to aid in opening and closing of mouth. The efficiency of the buccal plate to keep the swelling out of the occlusion was verified.

The patient was advised on periodic scaling and the home-care regimen for an efficient periodontal maintenance including tooth brushing twice daily, use of interdental toothbrushes,[8] use of fluoride-containing dentifrice (1.1% sodium fluoride) for effective caries prevention,[9] and to use chemotherapeutics such as 0.12% chlorhexidine gluconate rinse once daily.[10] The patient was also instructed to wash the prosthesis and rinse his mouth after every meal to minimize the risks of plaque accumulation.

Discussion

Cheek bumpers are modifications of the lip bumpers first described by Korn and Melson.[11] Lip bumpers are simple functional appliances used to eliminate the lower lip biting habit in children and to increase mandibular arch length. A lip bumper produces arch expansion by altering the functional pattern of the tongue, lips, and cheeks with buccal shields.[12] In 1989, they were modified with the buccal shield to further improve both the efficiency of the appliance and increase patient comfort. This new design eliminated tissue irritation by keeping the cheek muscles away from the appliance.[13] Cheek bumpers are also known to improve esthetics by accentuating the cheek area in patients with inadequate cheek volume and shape and in patients with asymmetrical cheeks due to prominent facial bones that shift the cheeks downward toward the corner of the mouth and nose, causing an aged appearance. Mukohyama et al[7] used a lip plumper prosthesis for a patient with marginal mandibulectomy, who lost lower lip support due to damage of the marginal mandibular branch of the facial nerve. This prosthesis was retained with ball clasps, made using clear, heat-polymerized acrylic resin, and was placed in the buccal vestibule, attached to the remaining teeth, and successfully improved oral function by preventing cheek biting and by providing the lost lip support. Later, Sahin et al[14] used a cast metal guidance prosthesis with supporting flanges to keep the cheek out of the path of closure for a patient with facial paralysis on treating segmental mandibulectomy.

Neurofibromas are broadly classified into two types, dermal and plexiform. Dermal neurofibromas are associated with a single peripheral nerve and typically arise in association with the onset of puberty. They look like lumps on or under the skin and continue to increase in number and size throughout adulthood.[15] Plexiform neurofibromas are associated with multiple nerve bundles. They are large and cause pain and disfigurement.[16] The treatment includes surgical removal and chemotherapy. Radiotherapy is not advised unless there is no malignant transformation.[17] The cheek bumper prosthesis used in this case successfully helped to relieve the pressure from the intraoral lump, kept it away from occlusal trauma, and improved masticatory and speaking abilities of the patient. The appliance is easy to fabricate and does not require multiple visits for the patient.

The mandibular guidance flange prosthesis, a treatment for a deviated mandible, usually consists of a removable partial denture framework with a guidance ramp on the buccal aspect of the bicuspids and molars on the nondefect side, engaging the maxillary teeth during mandibular closure, thereby directing the mandible into a desired interocclusal relationship. Both the guidance flange prosthesis and the cheek bumper prosthesis are similar in that they allow the mandible to reach an appropriate intercuspal position, but the guidance ramp used in the guidance prosthesis is smaller by about 7 mm to 10 mm than the buccal plate of the cheek bumper prosthesis (1 cm to 2 cm extension). Moreover, the buccal plate extends perpendicular to the occlusal plane with the aid of wrought wire extensions to push the cheek muscles away, whereas the guidance ramp is extended in a diagonal manner to assimilate the angular pathway of mandibular closure.[1] Even though the clasps in the appliance interfered in occlusion, it improved masticatory function of the patient by keeping the intraoral lump away from the occlusal scheme.

According to Beumer et al,[1] when prosthetic therapy involving compromised mandibular function is combined with a well-organized exercise regimen, improved results may be achieved. There are cases reporting that physiotherapy is essential, especially for cases requiring mandibular guidance therapy, in treating segmental and/or partial mandibulectomy, to assist the patient in improving the symmetrical arc of closure and finding centric occlusion position without guiding the mandible manually. In this case, as the patient was able to bite in centric occlusion, and the chief complaint was only due to the presence of an intraoral lump, physiotherapy was not needed. The patient was encouraged and motivated to maintain oral hygiene and regular follow-ups to improve the efficacy of the appliance.

The clinical results indicate that a cheek bumper prosthesis is a potential treatment modality to alleviate problems caused by the lesion. Following proper periodontal maintenance and regular follow-up and treatment of the tumor progression, the definitive treatment, considering the age of the patient, would be a cast partial denture framework including rests and clasp assemblies.

Summary

The goals of prosthodontic rehabilitation are management of speech and swallowing function, to restore the function of hard/soft tissues, and to improve esthetics. The cheek bumper prosthesis successfully improved function for a patient who had difficulty chewing because of the intraoral lump. The clinical results indicate that a cheek bumper prosthesis is a potential treatment method to alleviate problems caused by the neurofibromatous lesion and the resultant cheek biting and associated reduced masticatory efficiency.

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