

Magnet Retained Cheek Plumper to Enhance Denture Esthetics: Case Reports

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Abstract Handicap due to the loss of teeth in patients can be severe due to the impairment of masticatory function and facial disfigurement leading to negative psychological impact on the individual. To combat this, apart from the regular measures of positioning the teeth to obtain lip support, excellent denture esthetics can be achieved by providing additional support to the slumped tissues. This clinical report highlights a technique to provide support for sunken cheeks using detachable acrylic cheek plumpers, retained using iron–neodymium close-field magnets. The use of these magnets is a modification from the conventional technique of supporting the slumped tissues.

Keywords Psychological stress · Elderly · Cheek plumper · Closed field magnets · Denture esthetics · Sunken cheeks

Introduction

Loss of teeth brings along with it the crippling disabilities related to impairment of masticatory function and facial disfigurement having a psychological impact on the individual [1]. Appearance is an important aspect of social interaction and self-image which is smitten by teeth loss. The exemplary image of an elderly individual usually includes empty mouth and exaggerated nose along with sunken cheeks [2]. The external form of lips and cheeks are reliant on the internal structure of their underlying support. When cheeks and lips are unsupported muscles do not

function properly and become weak. As a result skin wrinkles and the lips and cheeks sag [3].

Rehabilitating a patient with loss of teeth with dentures may result in increased confidence and social interactions due to positive esthetic changes [2]. However sometimes the denture flanges do not give adequate support to the facial muscles. In order to deal with the slumped tissue extra support might be required [3]. This is achieved with the help of cheek plumper, also known as cheek lifting appliance which is basically a prosthesis to support and plump the cheek providing a youthful appearance [1]. The conventional method of adding excessive amount of denture base resin to plump the cheek or fabrication of single unit prosthesis with extensions on either side of buccal surfaces may add weight to the denture simultaneously causing discomfort to the patient [1]. This problem can be solved with the fabrication of denture with detachable cheek plumpers creating dentures that are in harmony and dignity with the aging gentleman, which would not eradicate but compliment the stigma of ageing in him.

Case Report 1

A 65 year old male patient with no history of medical illness, conscious of his appearance with a history of worn out old complete dentures reported to the department for complete denture prosthesis (Fig. 1a). Patient desired dentures not only for functional purpose but also to enhance his appearance. He has been edentulous since 12 years. The patient and his daughter in particular complained about his sunken cheeks regardless of wearing dentures, making him appear much older than he actually was. This was evident on extra oral examination but was thought could be corrected with accurate impressions and

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Fig. 1 Before treatment. **a** Case 1, **b** Case 2

appropriate extensions to the sulcus and/or at the jaw relation stage by adequate support to the cheeks. The psychological stress due to embarrassing appearance prevented the patient from attending social gatherings, resulting in loneliness.

Treatment Plan

The upper and lower ridges were U shaped and low well rounded. Border moulding was done with low fusing compound (DPI Pinnacle, The Bombay Burmah Trading Corporation Limited, Mumbai, India) and impressions made by selective pressure technique using zinc oxide eugenol impression paste (Denzomix, Mixodent, India). At the jaw relation stage a trivial change in the sunken cheek appearance was noticed and placement of rims more buccally would have resulted in instability of dentures. Thus, patient was given an option of detachable cheek plumper. It was demonstrated by placing wax in the premolar region. The change in the appearance with and without wax-up cheek plumper was evident and was readily accepted. The dimensions were 2.5 cm in length, 2 cm in width and 0.9–1 cm in thickness on right side and 1.2 cm on the left side. Hence complete dentures with cheek plumpers which could be detached and replaced by patients with the mode of attachment being intraoral closed faced magnets were designed. They were designed according to the available space intraorally necessary to enhance the appearance and thickness which will not interfere with functional movement.

Case Report 2

A 70 year old male patient presented to the department for replacement of missing maxillary teeth. Intraoral examination revealed maxillary completely edentulous foundation and mandibular partially edentulous foundation with

missing 41, 42, 31, 32, 34 and 36. He was edentulous since 6 months. He complained that loss of teeth resulted in the appearance of sunken cheeks (Fig. 1b). His mental attitude indicated that he was not capable of coping with the unavoidable features of senescence. Hence, the esthetic aspect assumed paramount importance while formulating the treatment plan.

Treatment Plan

At the jaw relation stage, imperceptible change in the sunken cheek appearance was noticed. Thus, patient was given the option of cheek plumper and explained, to which he readily agreed. Hence maxillary complete dentures with cheek plumpers retained by intraoral closed faced magnets were planned.

Procedure

At the try in stage, cheek plumpers were made as separate portions in wax and contoured. The dimensions on right side were 1.5 cm in length, 0.9 cm in width, 1 cm in thickness and 3 cm in length, 1.7 cm in width, and 1 cm in thickness on left side. They were superficially attached to the buccal surface on the right and left side and later intraoral neodymium–iron–boron magnets (Nd–Fe–B) of 5 mm in diameter and 2 mm in thickness were embedded in wax and tried in the patients' mouth to determine the amount of support appropriate for comfort, function and esthetics (Case 2, Fig. 2). Provision for placements of magnets in the flange of the trial denture and in the wax form of cheek plumper was made and the trial denture acrylised (Case 1, Fig. 3). After finishing and polishing, magnets were placed in the hollow cavity. A layer of petroleum jelly applied on the magnet helped prevent monomer reacting on the surface of magnets and was sealed with autopolymerising clear acrylic resin (Case, Fig. 4). Complete polymerisation was ensured by placing in pressure pot. Patients were instructed on the placement



Fig. 2 Case 2, try in with cheek plumpers in place



Fig. 3 Case 1, complete dentures with cheek plumpers

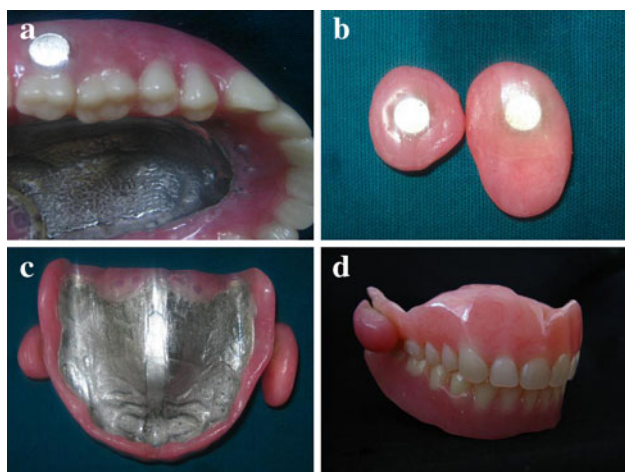


Fig. 4 a, b Magnet within clear acrylic resin, c, d cheek plumper attached to buccal surface of maxillary complete denture



Fig. 5 After treatment. a Case 1, b Case 2

and removal of the plumpers. The strong magnetic pull helped in orienting the cheek plumpers. Care was taken to make sure that cheek plumpers do not hinder the opening, closing and lateral movements of the mandible. Thus, magnet retained detachable cheek plumpers were delivered to the patients and they were satisfied with the esthetics achieved (Fig. 5).

Discussion

The cheeks are less mobile than the lips and are embraced on three sides by foundations that are subject to little change: the zygoma, the mandible and the parotid gland overlying the masseter muscle in the posterior region. In addition, support is also provided by subcutaneous fat and buccal fat pads which are responsible for the soft, rounded contours of the cheeks in the lower third of the face. Cheek contours are further altered by the loss of anterior teeth and subsequent loss of vertical dimension of occlusion. With the loss of posterior teeth, the cheeks tend to collapse and move medially to meet the laterally expanding tongue [4].

Complete denture prosthesis should help in supporting the slumped tissue. Conventional methods either by increasing thickness of flange of maxillary and mandibular denture such that vestibular fornix is filled with appropriate facial contours or by arranging second row of teeth for esthetic reasons has been reported in the literature [1]. Other methods such as adding bulk in the premolar region to support the cheek has been followed till this time. Stereo magnets have been used as a mode of attachment in detachable cheek plumpers [1].

Lazzari [5] described the fabrication of a maxillary removable partial denture for a patient with unilateral facial paralysis. Design included an open loop of eight gauge half round wire attached in the area of first bicuspid, the purpose of which was to elevate and support the upper lip and corner of the mouth. Loop was covered with baseplate wax and after completion of adjustments replaced with clear acrylic resin [5]. Larsen et al. [6] advocated fabrication of maxillary removable partial denture framework with a retentive mesh in the bicuspid region which was reinforced with modelling plastic to obtain desirable contours on evaluation of speech and esthetics. Wax was later substituted with autopolymerising resin [6]. These techniques may however result in the dentures being bulky and cause discomfort to the patient. Earlier case reports also suggest fabrication of hollow bulb cheek pad for cheek support and detachable cheek plumpers with the use of stereo/radio magnets [1, 7]. However, radio magnets show higher chances of corrosion and loss of magnetic properties over time. The conventional cheek plumper with buccal extension could interfere with masseter muscle and the coronoid process of the mandible and hence destabilize the maxillary denture especially during mastication [1].

In this present case report, intraoral NdFeB magnets as the mode of attachment was used. With the availability of rare earth magnets it has become possible to produce magnets with small enough dimensions to be used in dental applications and still provide the necessary force. NdFeB is of closed field type hence reduces the magnetic field effects

in the oral cavity [8]. They are less expensive to produce than RE alloy samarium–cobalt (Sm–Co) alloys and hence are the main rare earth permanent magnets in use today.

In these two case reports, the dimensions were according to the available intraoral space necessary to enhance the appearance without interfering with functional movements. In both the cases the position of the cheek plumper was in the second molar region and hence interference to the normal food flow pattern was very minimal. Both the patients reported usage of the cheek plumpers even during eating and did not complain of any problem. The detachable cheek plumper had the advantage of being removed and inserted easily, hence, removing and cleaning it after eating was not a problem. Also cheek plumpers being rounded and finished to a smooth texture prevented food retention, hence better maintenance.

A range of materials has been documented in the literature to act as a barrier to corrosion. They can be encapsulating materials like stainless steel, titanium or palladium metal or coating materials like thin layer of parylene, polytetrafluoroethylene and polymeric materials [8–11]. In this case report a thin layer of petroleum jelly over the magnets encased within auto polymerising clear acrylic resin has been used. Petroleum jelly helped prevent any possible corrosive action of monomer on the surface of magnet. Clear acrylic resin helped to safeguard the magnets from coming in contact with saliva directly. It would also help in visualising surface discoloration, therefore aiding in the assessment of the corrosion rate over a period of time. An 8 month follow up however has shown no evident changes in the magnets due to corrosion.

Ryf et al. [9] conducted an in vitro study to assess the interference of neodymium magnets with cardiac pacemakers and implantable cardioverter-defibrillators. It was concluded that NdFeB magnets for home and office use may cause interference with cardiac pacemakers and ICDs at distances up to 24 cm [9]. Hiller et al. [12] evaluated the safety of dental mini-magnets in patients with permanent cardiac pacemakers. The effect of cylindrical magnets (4 mm diameter, 2.5 mm height, retention power 300 g) made of Sm–Co was evaluated in the study and results showed the use of dental mini-magnets in dental care of patients with implanted pacemakers is safe and acceptable. However, the effects of NdFeB intraoral magnets with closed field principle on pacemakers are still to be documented [12].

The advantages of magnet retained cheek plumper over other known techniques are, it allows ease of placement and cleaning; automatic reseating due to powerful magnetic force; magnets of smaller dimension can be easily placed in the denture flange. The present design of magnetic cheek plumper can also be used in case of restricted

mouth opening. The 8 months follow up of the magnets did not reveal any signs of corrosion. Long term follow up needs to be done so as ensure longevity of these magnet retained cheek plumpers. The effects of closed magnetic field on the health of oral tissues need to be assessed.

Conclusion

Loss of teeth, a part of normal aging can be restored along with few modifications to enhance the lifestyle and dental care of the elderly. With increasing age, treatment modalities become increasingly challenging. In addition to positioning of teeth for lip support, excellent denture esthetics can be achieved by providing additional support to the slumped tissues. The use of magnets in the present case report demonstrates a paradigm shift from the conventional methods. Magnet retained detachable cheek plumper simplifies the procedure and helps the elderly to preserve independence, self-esteem and to maintain dignity. This innovative aid in short helps in achieving overall well being of the patient. A lost smile and enthusiasm for life was thus restored.

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