Root Supported Overdenture for Special Needs Geriatric Patients: Case Reports

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Prosthetic treatment with overdenture therapy is widely employed for rehabilitation of elderly patients. The root supported overdenture provides the patient with greater retention, stability and improved masticatory function and esthetics. The aim of this article was to present two case reports where root supported overdentures were fabricated in elderly patients who had difficulty in seating their overdentures and had high retentive and esthetic demands. The self aligning root locator attachment was utilized for two patients with special needs and demands. The treatment revealed a feasible option for patients with economic circumstances that preclude implant therapy. Both patients were quite satisfied with the retention and functional stability of their delivered dentures. By respecting the high expectations and compromised oral health status of two older patients, a conservative low maintenance and easy to insert self-aligning locator attachment was attached to the denture prostheses, which permitted the patients to function with minimum postoperative care.

Keywords: overdenture, root locator, attachment, proprioception

Introduction

It is estimated that between 7% and 69% of adult populations internationally are affected with complete edentulism, which is defined as the loss of all permanent teeth [1]. Considering the number of partially or completely edentulous patients, various types of treatment may be indicated, including conventional complete dentures and both tooth-supported and implant-supported overdentures [2,3]. Most of the elderly edentulous patients wearing complete dentures are dissatisfied with the limited retention and stability of their prostheses [4]. Rapid resorption of the alveolar ridge foundation continues to be the paramount cause of their problem. Bone loss and continued deterioration of the alveolar ridge in the maxilla and the mandible can lead to severe atrophy and lack of the essential support for the complete denture prosthesis [5]. Therefore, both clinician and patient face multiple challenges to maintain existing removable prostheses in the oral cavity. Demographic studies have shown that the dental profession must be prepared to meet the prosthetic needs of an ever-increasing, longer-living patient population [6].

In data compiled by Carlsson and Persson, the rate of residual bone resorption was 0.5 mm per year starting after the second year [5]. Clinical research in 1975 over a five-year period indicated that bone loss in the edentulous mandible in denture wearers was reduced by an average of 0.1 to 0.3 mm a year [4,7].
Over a five year period the bone loss averages 5.0 mm. In the same period, vertical bone loss in patients wearing overdentures was 0.6 mm [4,7-11]. Alveolar bone resorbs at a faster rate without the support of natural dentition. Retained roots maintain alveolar bone, which will support an overdenture and prevent rapid bone loss [7].

A timely planned root-supported overdenture has been a proven mainstay of preventative prosthodontic therapy as it attempts to conserve the few remaining natural root and reduce alveolar bone resorption, thereby providing an effective solution to the problems of partially or completely edentulous patients. In addition to providing an alternative to tooth extraction and complete dentures, the root-supported overdenture offers a variety of advantages, including secured prosthesis support, proprioceptive feedback, and economic and psychological benefits [12,13]. Such over-dentures are capable of providing patients with a long duration of service and satisfaction. Various designs of overdenture attachments are available, including bar and clip, ball and O-ring, Extracoronal Resilient Attachment (ERA; Sterngold Dental, LLC, Attleboro, MA, USA), and magnet attachments. Attachments may connect either individual teeth or splinted teeth to the prosthesis. Attachment selection should be determined after the analysis of the occlusal vertical dimension (OVD) and vertical bone height around the abutment tooth [14,15]. This is because OVD determines the space for the attachment and there should be 10 mm of minimum root surface in bone as it is a prerequisite for various root attachment systems. As a result of complications related to attachment selection, fabrication, the attachment’s parallel inclination and inter-radicular retention of the post, a number of dental professionals avoid overdentures.

This article depicts two clinical case reports. In one case a Zest anchor root locator attachment was used to improve the retention and stability of the maxillary overdenture in a 65-year-old male patient with loss of one upper limb as a consequence of road accident injury. The second case utilized locator attachments to retain a mandibular overdenture in a 62-year-old female patient with high esthetic and retentive demands and expectations. Retained cuspsids and bicuspids were engaged to provide retention and stability to the denture. The locator root attachment is designed for use with overdentures or partial dentures, retained in whole or in part by endodontically treated roots in the mandible or maxilla, and can be attached to the endodontically treated roots using a direct or indirect technique. Both cases presented highlight the direct technique of attaching the locator attachments on the retained teeth. An implant-supported denture or telescopic denture could have been planned but were avoided due to relatively higher cost and increased level of technical expertise required for the procedure.

Case Report

1. Case 1

A 65-year-old male patient reported to the Out Patient Department of Prosthodontics, ITS Dental College, Hospital and Research Centre, Greater Noida with a chief complaint of missing a few upper and lower teeth (Figure 1). The patient had a habit of smoking 2-3 cigarettes per day for the past eight years.

Extraoral examination revealed no loss of vertical dimension, unsupported lip and cheek musculature, and mild distortion of speech articulation. General physical examination of the patient revealed loss of one of the upper limbs as a consequence of road accident injury one year previously. Intraoral examination revealed the presence of five maxillary teeth with teeth nos. 2, 6, 8, 9, and 13 with no clinical mobility and missing teeth no. 31 (Figure 2). The residual maxillary ridge mucosa was firm and healthy. Oral hygiene was moderately neglected because of smoking and compromised manual dexterity.

Figure 1. A 65-year-old male patient (preoperative).

Figure 2. Preoperative intraoral view.
Radiographic examination revealed adequate bone support (> 10 mm) with respect to the maxillary retained teeth.

The patient expressed the desire to keep his maxillary teeth intact and avoid extraction. A treatment plan was made to use the Zest anchor root locator attachment on the maxillary right cuspid and left bicuspid based on the probability that this patient would not be able to maintain satisfactory oral hygiene or make the genuine effort to properly orient his overdenture prosthesis before seating it. Both of the maxillary central incisors were also left untreated in the mouth. A metal overdenture coping was planned for the retained teeth no. 2. Thus, a symmetric bilateral distribution of Zest anchor locator attachments and an additional anchor in form of metal coping covered retained tooth was planned to gain extra support for the maxillary denture. The metal coping covered overdenture abutment could easily be converted to root locator attached abutment in case of the need of enhanced retention, support or failure of the existing abutments.

1) Procedure

After endodontic therapy of teeth nos. 2, 6, and 13, surgical crown lengthening was carried out in relation to teeth no. 6 to increase the vertical crown height (Figure 3). The clinical crown height of teeth nos. 6 and 13 were decoronated to within one mm supragingivally, leaving the top of the root as flat as possible. Dome-shaped metal coping preparation was done for endodontically treated teeth no. 2, and it was luted with glass ionomer luting cement (Riva Luting; SDI Limited, Victoria, Australia) (Figure 4). The partial denture was then completed and delivered to the patient (Figure 5).

A pilot drill was then used to follow the root canal of teeth nos. 13 and 25 to receive the locator post (Figure 6), leaving 5 mm of gutta percha in the canal as an apical seal. Final contouring of the post preparation was accomplished using a spot-faced bur (Figure 7). The spot faced bur created an internal dentinal seat for the locator female post.

Using the locator parallel post as a handle, a zero degree female post was placed into each of the completed preparations to visually approve the proper fit and parallel alignment of the two attachments (Figure 8). Both retention and parallelism increase the attachment’s longevity and prevent premature failure.
of the overdenture [16].

The locator females were then cemented into the prepared recess in the root (Figure 9). A white block-out spacer was placed over the head of each cemented locator female. The spacer was used to block out the remaining exposed root surface, so that when the denture acrylic is added and polymerized, it will not come in contact with the root.

A locator black processing cap male was then inserted into each cemented female, leaving the white block-out spacer beneath it (Figure 10).

The next step involved preparation of a recess in the denture to accommodate the standard Zest anchor male. A slight amount of self-cure acrylic resin was mixed and placed in the recess of the denture and around the top of the male cap. The denture was inserted into position in the oral cavity. The patient was guided into occlusion, maintaining maximum contact with the opposing natural teeth.

Following the curing of the acrylic resin, the denture was removed (Figure 11) and the white spacer was discarded. A round carbide bur was used to remove excess acrylic resin, and the denture was finished.

The locator male removal tool was used to remove the black processing male from the metal denture cap (Figure 12). The
medium retention pink locator retentive male at three lb pressure each was given at the delivery (Figure 13, 14).

The patient was instructed regarding the path of insertion. The patient practiced insertion and removal of the denture several times. The snap retention was accomplished by mere finger pressure without the aid of the opposing teeth. A postoperative orthopantograph was made to confirm the extent of the cemented locator posts in the respective canal of the abutment (Figure 15).

At the 24-hour follow-up appointment the patient expressed no difficulties. The patient was satisfied to have avoided extraction of his maxillary teeth and was pleased to gain extra retention and stability from this treatment modality (Figure 16). The patient was instructed to comply with an oral hygiene program that included the use of fluoridated toothpaste and a 6-month recall schedule.

The patient returned for the follow-up appointment after one year and reported no problems with the prosthesis. He was extremely pleased with the results of treatment.

2. Case 2

A 62-year-old female patient was referred to the prosthodontic clinic for overdenture evaluation. The maxillary arch was completely edentulous and the mandibular arch contained only canines with no periodontal problems. The residual maxillary and mandibular ridge mucosa was healthy. The patient ex-
pressed a strong desire to retain the roots and to avoid implant surgery. She expected high retention from the prostheses as she was quite socially active. The proposed treatment included a maxillary conventional complete denture and mandibular overdenture retained with Zest root locator attachments on the bilateral mandibular cuspsids. Retained cuspsids were engaged to provide retention and stability to the denture. Endodontic treatment was performed on both the mandibular cuspsids, and the teeth were decoronated to within one mm of the gingival crest. A conventional maxillary and mandibular denture were constructed, and the root locators were attached to the endodontically treated roots using a direct technique (Figure 17-20).

The patient was quite pleased with the retention and stability of the overdenture and was satisfied in terms of meeting her needs and desires. At her recall follow-up appointment after 6 months the patient expressed no difficulty and was quite satisfied with the treatment. The long-term prognosis was considered to be favorable. At 1-year follow-up, both clinical and radiographic exams were performed, and the patient’s satisfaction was again assessed.

Discussion

This article examines two clinical case reports where the root locator, a low-maintenance self-aligning overdenture attachment, was retrofitted to an existing denture following an efficient preservation of supporting tooth roots. The preservation of the roots to be used as retentive attachments to support an overdenture is a short-term, effective procedure when implant therapy is not performed [17-19]. An overdenture requires careful assessment of the interocclusal distance. There must be sufficient space for roots, metal copings and possible attachments, together with an adequate thickness of the denture base material and artificial teeth, all without jeopardizing the strength of the denture [20]. The locator root attachment is classified as a universal hinge, resilient attachment for endodontically treated
roots and is a low vertical profile attachment with a complete attachment vertical height requirement of only 2.5 mm, which permits its use in tight inter-arch spaces. Locator attachments require low maintenance and offer high durability and long lasting performance for over 60,000 insertion cycles (equivalent to 10 years of clinical function) [21]. The unique dual retention (internal and external aspect) innovation provides the locator attachment with a greater retention surface area than certain other attachments. Cakarer et al. [22] concluded that the locator attachment with a greater retention surface area than certain other attachments. The root locator attachment is designed with a locating skirt that seats the attachment in the accurate position every time, regardless of the patient’s ability. It is therefore selected as a treatment option for the presented patients — one having limited manual dexterity and the other having high retentive demands from the prosthesis. The treatment described represents a feasible option for patients with economic circumstances that preclude implant therapy. Both patients were quite satisfied with the retention and functional stability of their delivered dentures. By respecting the high expectations and compromised oral health status of two older patients, a conservative low maintenance and easy to insert self-aligning locator attachment was attached to the denture prostheses, which permitted the patients to function with minimum postoperative care.

References