

Esthetic removable partial denture

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ABSTRACT

Prosthetic rehabilitation of a partially edentulous patient can be established by using wide range of treatment options. Magnetic attachment retained denture has always been considered beneficial for the patient, because it is giving a more esthetic and functional outlook to the denture. The following case report discusses removable partial denture with no clasps showing by using magnetic attachment retained, thus increase esthetics. A 60-year-old male patient came to Department of Prosthodontics, Airlangga University, for his esthetic problems and chewing inability. Intraoral examination revealed teeth 14, 13, 12, 11, 21, 22, 23, 24, 28, and 46 remained at lower jaw. He never had a denture and needed to make a new one. Clinical and radiographic examination along with the preliminary impression were taken. Teeth preparation and impression for magnet keeper, then cementation of magnet keeper on teeth 12 and 24. Functional impression for upper and lower jaw with individual tray. Denture delivery and one week after followed by insertion of magnet EX 600 in the denture. It was concluded that magnetic attachment retained partial denture could enhance the natural looking for the patient because it has no clasps showing.

Keyword: Magnetic retained, removable partial denture, overdenture

INTRODUCTION

The esthetic impact of tooth loss can be highly significant and may be more of a concern to a patient than loss of function. Restoring facial esthetics in a manner that maintains an appropriate appearance can be a challenge and is a major factor in restoration and maintenance decisions made for various prosthetic treatments.¹

Tooth loss consequences consist of anatomically reduced ridge volume and physical anatomic tools for mastication also the oral capacity for neuromuscular functions to manipulate food. Therefore a denture may help increase their natural feeling of chewing. Conventional removable partial denture (RPD), teeth or implant supported overdentures, fixed partial dentures, and implant supported fixed or partial dentures are the most preferred prosthetic treatment approach.² However, the traditional retention systems such as metallic clasps, frequently used in these conventional removable dentures, impose lateral forces on remaining abutments, increase abrasive wear, and cause unaesthetic appearance.³

Famous statement of Devan⁴ dictum, *It is essential to retain that is present originally in oral cavity than to replace what is lost due to any reason*. Overdentures cover one or more teeth or dental implants, restoring the entire dentition. They help preserve natural teeth or roots that are often indicated for extraction because of periodontal tissue loss. Maintaining these teeth or roots enables a delay in alveolar bone resorption and preserves periodontal proprioception and masticating efficiency.⁵ Overdenture is a better option as compared to a

removable complete denture prosthesis. Study by Renner *et al.* said that 50% of the roots used as overdenture abutments remained immobile even after 4 years.⁶

Magnetic attachments provide no vertical resiliency while decreasing horizontal stress transmission to abutment.⁷ Magnet used in this study is MAGFIT EX. Magfit utilizes a stainless steel casing hermetically sealed by microlaser welding to ensure excellent corrosion resistance. All Magfit magnetic attachments are closed field in order to ensure that the magnetic field leakage at the gingival margin is substantially below the accepted US Safety Standard of 0,02T. The surface of the keeper is coated with Cr-rich layer to protect it from oxidation during the casting process. Magfit DX attachments have ellipsoidal outer lip with an anti-rotation feature to ensure firm fixation in the denture base.⁸

The following case report discusses removable partial denture with no clasps showing by using magnetic attachment retained.

CASE

A 60-year-old male patient came to Department of Prosthodontics, Teaching Hospital of Dental Faculty, Airlangga University for his esthetic problems and chewing inability. Intraoral examination revealed teeth 15, 14, 12, 11, 21, 22, 23, 24, 28 remained at upper jaw. At lower jaw only tooth 46 remained with mobility grade 2 (Fig. 1).



Figure 1 Pre operative view: natural remaining teeth

The clinical and radiographic examination revealed that in the upper arch, the remaining teeth at upper jaw had fractures, caries, and periodontal tissue loss, and tooth 46 had mobility grade 2. With the remaining teeth that cannot be used as abutments for fixed prosthetic treatment, it was decided that overdenture could be the choice of treatment. It was decided to perform a magnet-retained partial overdenture for maxillary arch and bare-root complete overdenture for mandibular arch.

MANAGEMENT

Clinical and radiographic examination along with the preliminary impression using irreversible hydrocolloid (alginate) were taken on the first visit. The next visit was to extract teeth 13, 14, 28 and root canal treatment for teeth 12, 24, 36; composite filling for teeth 22, 23. Teeth color matched with *Vita-pan* shade guide.

Impression of study cast of upper arch is taken with *polyvinylsiloxane* (PVS) for preparation of making temporary crown. Teeth 11, 21 being prepped for single crown. After the preparation of the abutments, the impression was made by using a PVS elastomeric impression material (regular body) with *putty/wash one step impression technique*. Direct temporization made with *Bis-acrylic composite*, then *temporary single crown* inserted (Fig.2).

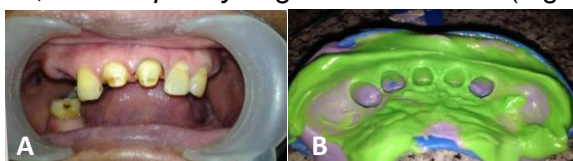


Figure 2A Preparation for single crown 11, 21, B impression of crown preparation.

Abutment teeth 12, 24, 36 were endodontically treated. The teeth were cut down to gum level (equigingival) and post space preparation for teeth 12, 24 was done up to 2/3rds of the length of the canal with *gates glidden drill* and. In order to prevent the movement of the post in the post space, an antirotational notch was placed. Chamfer margin of 1 mm was made. To support the impression material in the post space, a toothpick was placed in the post space. Lentospiral was used to coat the inner surface of the teeth by PVS light body. A pick up impression was made with putty. Post space preparation was done for teeth 12, 24 and tooth preparation to receive metal coping was done for 36. Impression sent to dental laboratory for fabricating magnet cast keeper and metal coping (Fig.2).

After fabricating the posts, they were tried in the patients mouth and verified for fit. The prepared post space was thoroughly washed with distilled

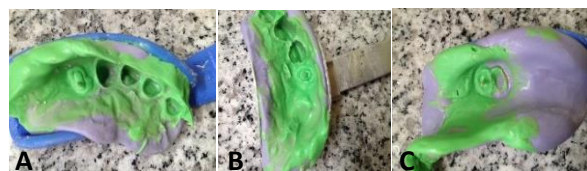


Figure 3A,B Magnet cast keeper abutment impression, C impression of lower ridge abutment for metal coping

water and dried thoroughly with endodontic aspirator and absorbent paper points. The casting was cemented using *luting glass ionomer cement*.

Denture was then fabricated by conventional material and methods. Preliminary impression of maxillary and mandibular arches were made using impression compound *irreversible hydrocolloid* and cast poured in dental plaster (Fig.3). Acrylic custom tray with wax spacer was fabricated. An additional wax spacer to the dimension of denture magnet, about 3x2 mm was placed over the root face on preliminary cast. Final impression was made while putting magnet on the cast keeper using PVS *medium bodied* consistency. Master cast was poured in type IV dental stone and occlusal rims were made on the denture bases. Jaw relations were recorded and transferred to a semiadjustable articulator for arrangement of artificial teeth. Artificial teeth were mounted and tested in the oral cavity to check occlusion and esthetic results. The dentures were manufactured and installed along with single crown of teeth 11, 21 (Fig.4).



Figure 4A Denture insertion intra oral, B patient profile while wearing the new denture

Patient was recalled after 1 day, 3 days, and 7 days for evaluation. On recall it was observed that patient was satisfied with his new dentures and was able to masticate properly.

After 7 days of denture insertion, denture in 12, 24 region was scraped to make space for magnets and a hole made in the buccal flange adjacent to keeper's location. The magnets were positioned on the keepers in the mouth. Resin was added to the scraped area and the mandibular denture was placed over the magnets in mouth under proper occlusion. After the resin was set, denture was removed with the magnets picked up in the mandibular denture. Excess resin was trimmed and denture polished. After polishing, the denture was again placed intra-orally and checked for comfort, occlusion

and retention. Patient was instructed how to wear and remove the denture, denture maintenance and oral hygiene as well.

DISCUSSION

Tooth loss leads to difficulty in masticatory function and oral capacity for neuromuscular functions to manipulate food also influences facial appearance and psychological condition.¹ Treatment of choice in this particular case was magnet-retained partial overdenture for maxillary arch and bare-root complete overdenture for mandibular arch. Remaining teeth had fine periodontal and gingival attachment so it worth to be maintained.⁹ Endodontically treated retained root can support a denture and transmit masticatory pressures to the periodontal ligament receptors. This improves the patient's oral perception, also to prevent bone resorption.^{1,10}

Magnets had many advantages, such as ease of placement, automatic reseating, constant retention with many cycles, easy replacement, small size with strong attractive forces, can be placed within prosthesis, dissipate lateral functional forces, less need for parallel abutments, can be used for implant-supported prosthesis, ease of cleaning.¹¹

In order to be an abutment for cast keeper, abutments must be prepped almost at the same height as surrounding ridge. Magnetic attachments prevent any lateral forces also it had easy application.¹² It has to be noticed that magnets increase retention of partial or complete dentures and overdentures.¹³ It offers adequate retention and decreases the transmission of excessive forces to the remaining teeth.^{14,15}

Conventional removable partial denture have led to harm the periodontal tissue, and may contribute to carious lesion formation, also the appearance of clasps may interfere patient smile and resulting in presence of wearing denture.¹⁶ Additionally, the magnetic overdentures are more stable and retentive than conventional partial dentures, and they are easily removed and seated without the patient having to grapple with clasps and complex paths of insertion, thereby improving esthetics, function, and comfort.¹⁷

Based on denture design of RPD, Shala et al¹⁸ confirmed statistically significant difference ($P=0,008$) patient's success of RPDs with attachment compared with RPDs with clasps which agree with Owall,¹⁹ that considering patient's satisfaction were better when used combination with fixed partial dentures retained with attachment (93,8%) compared with RPDs retained with clasps (58,7%). Simi-

lar results reported that the presence of anterior teeth in an RPD could influence patient's satisfaction.²⁰

Magnet used in this study is MAGFIT magnetic attachments developed by Aichi Steel Corporation for the Toyota Group, which claimed to have the strongest retention with an ultra-compact size, no corrosion due to Aichi Steel's precision micro-laser welding technology enables a perfect hermetic seal of the stainless steel outer casing which protects the magnet from corrosion in the oral environment, and new magnetic materials technology.²¹

There are few types of magfit; Magfit DX and MAGFIT EX, these are cast coping type magnet. MAGFIT DX series is suitable especially for molars where vertical space is limited. It has a thin disk-type design with improved wear resistance. The ellipsoidal outer lip of the magnetic assembly prevents rotation to ensure firm fixation to the denture base. It is 30% shorter than the EX series but wider in diameter. Durability has been enhanced by increasing the hardness of the magnet casing. MAGFIT EX has a "sandwich type" structure with attractive forces ranging 400-600 gf, which is comparable to the spring method. MAGFIT EX600W is recommended for cases with regular space requirements. MAGFIT EX400W is suitable for cases with minimal space conditions as well as cases requiring lower retention. MAGFIT EX is in rectangular shape, so it is prone to use in long or oval shaped retained root surface.¹² MAGFIT EX600W is chosen for this case because the dimensions (3,8 x 2,8 mm) suitable for root surface of teeth 12, 24.

After magnet insertion, patient was recalled to observe and evaluate denture. Patient was satisfied with appearance of his new dentures and was able to masticate properly. There were no mucosal inflammation. Denture is better in retention and stability. The patient was instructed to control intra oral hygiene by regularly brush abutment teeth with fluoride toothpaste because clean and healthy periodontal is what makes any treatment especially overdenture successful.¹² Denture also had to clean regularly with baby toothbrush that has really soft bristles and liquid soap twice a day. Denture-wearing habit patient must follow is to remove denture at bedtime and put into liquid denture cleanser.^{22,23} Almost 40% of patients no longer use their RPD within 5 years because of factors such as socio-demographics, pain, and esthetics. Timely recall and maintenance are required for success.²⁴ Patients are advised to control every 6 months so prosthodontic treatment can be optimal.²⁵

It is concluded that regarding quality of dentu-

res, patients are generally satisfied more with RPD with attachment based on level of aesthetics, retention, and chewing ability, because they prefer not to show the anterior labial clasps of RPD. Magnet-retained partial overdenture may be preferred in the rehabilitation of partial edentulous patients to the conventional removable dentures, because of their advantages such as better aesthetic, retention, stability, stable occlusion, and chewing function due to the conservation of proprioception feedback. Also, the rate of the residual ridge resorption was decreased because of the transfer of compressive forces into the tensile forces by the periodontal ligament and better stress distribution.

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