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Magnetic Attachment For Tooth Supported Mandibular Overdenture: A Case Report

Author

Abstract
The goal of preventive prosthodontics is to highlight the significance of any surgery that can postpone or completely prevent future prosthodontic issues. In terms of preventive prosthodontics, the overdenture is a therapeutic option that is supported by science. Overdentures have been fitted with a variety of attachments to improve retention. Because rare earth magnets like Sm-Co and Nd-Fe-B may be produced in small sizes as retentive devices for complete dentures, detachable partial dentures, obturators, and maxillofacial prosthesis, their application for increasing retention has been widely used in the field of prosthodontics.
This article presents a simple method of fabricating mandibular over denture retained by magnets in a patient whose mandibular residual ridge was severely resorbed with few remaining teeth and opposed by maxillary complete denture.
Keywords: *Overdenture, tooth supported, magnet-retained, retention, stability*

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I. Introduction

Overdenture refers to removable dental prostheses that cover and rest on one or more remaining natural teeth, the roots of natural teeth, and/or dental implants. Other nomenclature for this includes overlay dentures or overlay prostheses. Overdentures supported by teeth are more costly but require no invasive surgical procedures, and are quite straightforward. An overdenture with a magnetic attachment employs a magnet to increase the denture's stability and retention. During traditional overdenture implantation, the magnetic assembly is lodged in the denture base, and its corresponding keeper is placed into the abutment root. The keeper is held in place by the retentive force exerted by the magnetic assembly-effective, and data indicates that wearers of overdentures supported by teeth retain superior oral tactile sensitivity because of retained proprioception. Many people prefer this treatment choice because of these features.

The remnant roots are favorably indicated for denture retention by using magnetic attachments. The main objective of keeping residual roots was to lessen the alveolar ridge's resorption, which supports the denture base. The denture's ability to retain and support itself is aided by residual roots.

Since the 1950s, magnetic attachments have been used to keep dentures stable. They have a number of benefits, such as a long-lasting, continuous retentive force, a reduction in lateral forces, and ease of installation for patients with dexterity issues.They have demonstrated excellent levels of clinical performance and have been frequently used in dental prosthesis and implants. Mandibular magnetic overdentures kept with two implants are stable, economical, less invasive, and have produced satisfactory patient outcomes.[1]

Three types of the magnetic attachments, such as flat-type, dome-type, and cushion-type, are commercially available . Flat type magnet is more retentive than other types, and cushion type has shock-absorbing effects and permits vertical movement of dentures.

Magnets made from aluminum–nickle– cobalt (AlNiCo) alloys have been used in dentistry for many years. However, these clinical approaches lost popularity, particularly when clinicians discovered that AlNiCo alloys corrode rapidly in saliva. Newer magnetic systems have been made available for prosthodontics in the past couple of decades with the introduction of alloys of the rare earth elements samarium (SmCo) and, more recently, neodymium (NdFeB) in closed-field systems.[2]

II. Selection Of Abutments For Overdenture

1 - Periodontal and mobility status: Abutments that exhibit severe vertical bone loss combined with movement on a grade 2 or 3 are not appropriate for these teeth. Even in cases where there is horizontal bone loss, periodontal challenged teeth that have a good prognosis for therapy are likely to be considered appropriate abutments.

2- Abutment location: Cupids and/or bicuspids are thought to be the best overdenture abutments since the anterior alveolar ridge seems to be particularly vulnerable to time-dependent occlusal pressures. The suggestion that each quadrant have at least one tooth is supported by clinical experience. Furthermore, it is preferable for

retained roots or abutment teeth not to be next to one another as this will reduce the possibility of plaque buildup and soft tissue damage.

3- The teeth should have enough coronal substance to maintain the integrity of abutment

III. Case Report

A 55 year old male patient was referred to the department of Prosthodontics at J.N Kapoor DAV Dental College and Hospital , Yamunanangar with the chief complaint of difficulty in chewing due to missing teeth. Extraoral examination showed tapered facial form, concave profile, mouth opening was adequate. Mandibular movements were smooth with normal TMJ. Intraoral evaluation revealed complete edentulous maxillary arch and partially edentulous mandibular arch. Remaining teeth in the mandibular arch (33, 43) were RC treated and severe resorption was recorded in relation to bilateral mandibular posterior ridge.

Patient was made aware of the clinical condition and he was willing to preserve the remaining teeth as long as possible.

Clinical Procedures

Mandibular teeth abutment tooth preparation and endodontic therapy Abutment teeth (33, 43) underwent endodontic treatment and preparation using diamond rotary instruments. The teeth were reduced to a point slightly above the gingival margin (2 mm). Subsequently, a peeso-reamer was used to remove two-thirds of the root canal filling material, thereby creating a post space suitable for the post and copings. Canals were ready for magnetic coping for (33, 43). A prosthetic retention element and a magnetic keeper make up the magnetic attachment system. The root cap components, known as keepers, fall into two general categories: cast coping and resin coping. The keeper for the cast coping type is cemented to the endodontically treated abutment after being integrated into the cast metal post. Glass ionomer cement was used for the final coping cementation.

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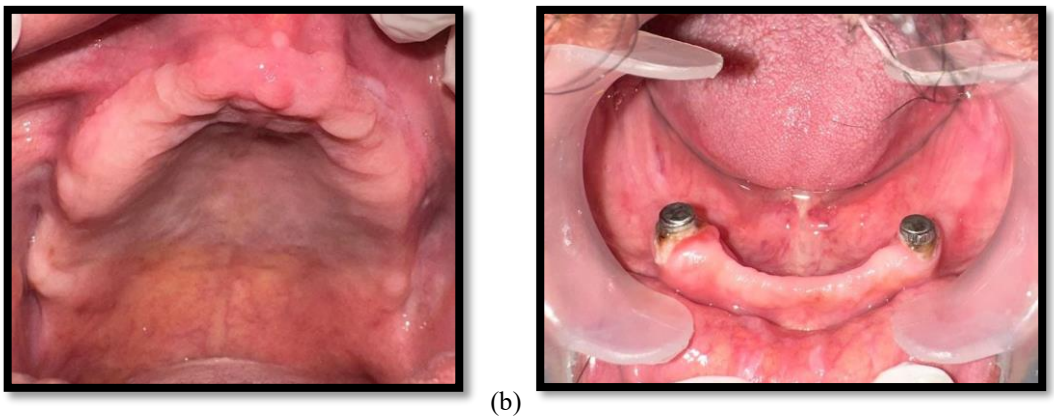

(a) (b)

Fig.1 (a,b) - Intra oral view of maxillary and mandibular arch.

Primary impression of the maxilla was made using impression compound and mandibular arch was made using irreversible hydrocolloid.

A close-fitting individual tray used with light body elastomers after border moulding with tracing stick compound and definite cast was poured. Occlusal rims were fabricated on definitive upper and lower cast. Jaw relation, teeth arrangement and try- in was done. After the approval of try - in by the patient, the dentures were processed using Heat cure acrylic resin.

Fig 2- Secondary impression

Fig 3 - Try -in Placement of magnets in the denture

To incorporate magnet into the denture, the intaglio area of teeth 33, 43 were reduced to create space for magnets . The magnet was positioned align with the keepers. Resin was added to the reduced area. After the resin was set, denture was removed with the magnets picked up in the denture. Excess resin was trimmed and the denture was polished.

Fig 4 - Magnet incorporated in mandibular denture

Insertion

The denture must be passively inserted and removed because applying force on insertion and removal will affect the abutment teeth. Border extensions and occlusion were checked and adjusted, after polishing, the dentures were again placed intra-orally and checked for comfort, occlusion and retention.

Fig 5- Anterior view of denture intraorally

Care of Abutments

1-Tooth brushing of the abutment with a fluoride-containing tooth paste and the use of chlorhexidine mouth wash
2-Denture hygiene including removal of prosthesis at night & denture cleaning.

3-Self-application of topical fluoride to the abutment by the patient
4-Dietary advice regarding reduction of sugar in diet.
5-Frequent recall visits to check status of abutment teeth.
On recall it was observed that patient was satisfied with his new dentures and was able to masticate properly.

IV. Discussion

Magnetic attachments used in prosthetic dentistry have developed considerably in terms of the magnetic material, housing, design of the soft-magnetic material, and sealing technique.

The magnetic system used to retain dentures may be an open-field or closed-field system. Whether the open-field system causes any deleterious effect by the magnetic flux that scatters to the tissues has not been determined. In closed-field systems the external magnetic flux fields were eliminated by placing the magnetic components in a series, called an assembly. When the two poles of a magnet are connected by any ferromagnetic material such as iron or stainless steel, the external magnetic flux field is shunted through the steel plate (keeper), because this is a path of least resistance. [4]

Magnatic attachments are typically shorter than mechanical attachments, are particularly useful for patients with restricted interocclusal space and challenging esthetic demands, can also accommodate a moderate divergence of alignment between two or more abutments, and dissipate lateral functional forces. Magnet retain over denture gives better retention, stability, comfort and fit of the denture. The technical simplicity, the usefulness for geriatric and handicapped patients, the increased control of jaw function trough the maintained periodontal ligament and the physiological action of magnetic forces in the tooth axis are arguments for the use of magnets.[5]

Intraoral magnets provide the following benefits: they are simple to integrate into dentures using straightforward clinical and technological processes; they are also easy to clean and put for the patient and the dentist. Because they are usually shorter than mechanical attachments, magnetic denture attachments are especially helpful for patients with limited interocclusal space and demanding aesthetic requirements. Since they are not dependent on a specific insertion path, magnetic attachments can also accommodate a moderate divergence of alignment between or among abutments. This sets them apart from most mechanical attachments, which typically necessitate minimal divergence for optimal performance. Furthermore, magnet-retained dentures have been observed to be quite easy to install and remove by patients with physical impairments, such as those encountered by weak elderly persons. Magnets are small, attractive, and can be positioned on the underside of dentures to preserve their beauty, particularly when they cover anterior teeth.

In this case, Dyna WR magnets are used which are produced with the help of CAM lathing machine . This process enable shaping the magnet encapsulation in hardened surgical steel so that the ready product is wear resistant . The use of the latest laser lasing techniques prevents any undesired leakage. Dyna magnets are made of Nd-Fe-B alloy and coated with a biocompatible sealing then encapsulated in surgical steel 316L .

Compared to other attachments, magnetic attachments have the advantage of being small and easy to integrate into dentures. The denture also covers metal parts, giving the patient an aesthetically pleasing option. The patient's ability to maintain good oral hygiene will determine the overdenture's duration and prognosis. It is important to wipe the overdenture after each meal. It was recommended that the patient have follow-up appointments every six months in order to achieve long-term success.

V. Conclusion

A rising number of people are interested in magnetic retention as a potential solution to improve the stability of dental prosthesis because of easy clinical and laboratory procedures. While there have been issues in the past with magnets' long-term endurance, new research has demonstrated that different subjective factors have no effect on their attracting force. Dentistry now has access to newer magnets thanks to current research that, even at smaller sizes, have great biological compatibility, corrosion resistance, sealing ability, closed-field magnetism, and enhanced magnetic force. Magnets can thus be utilized both intra- and extra-orally as an effective retentive aid.

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