

Rehabilitation of Severly Resorbed Mandibular Ridge with Implant Supported Overdenture with Magnet Attachment : A Case Report.

Abstract :

Magnets have been used widely in the field of dentistry for many years with some success, as they can be manufactured in small dimensions as a retentive devices in overdenture technique, maxillofacial prosthesis and obturators. These magnet attachment attached to osseointegrated implants which transfer the occlusal load to the bone, thereby prevent resorption of remaining alveolar bone and improves the retention and stability of the denture. Magnetic assembly consist of magnet and ferromagnetic metal keeper. More recently, magnets have been made from alloys of the rare earth elements samarium and neodymium, which provides stronger magnetic force per unit size. Magnets are sealed by means of the latest laser lasing techniques thus protect magnet from corrosion in oral cavity. The present article demonstrates the rehabilitation of completely edentulous patient with the help of implant supported mandibular overdenture with magnet attachment and conventional maxillary denture.

Key words : Magnet attachment, implant overdenture, overdenture, implant attachment.

Introduction:

In the history of human mankind, numerous kinds of methods have been developed and attempted to replace missing teeth in the oral cavity. Conventional denture remains one of the most popular treatment of choice in daily dental practice, being as a more economical, quick and non-invasive treatment approach. A conventional complete denture can be a great discomfort for edentulous individuals due to lack of stability, retention, social concern i.e slippage, unnatural appearance and continued bone loss leading to further instability of denture, especially in a mandibular denture. Implant supported overdenture is a technique of enhancing denture retention, support and stabilization.[1,2]

Various types of attachments systems with distinct retentive characteristics have been proposed for implant supported overdenture.[3] The use of magnets in dentistry dates back to the 1940s, when Freedman attempted to improve the retention of dentures in patients with severely resorbed edentulous mandibles. Curved magnets were embedded in the upper and

lower denture bases, with the like pole opposing each other, creating a repulsive force intended to keep the dentures in place.[4] Alnico alloy was then used owing to its favorable height-diameter ratio. They were bulky, but showed a way for future clinical use of magnets. Alloys of rare earth elements Samarium and Neodymium have been used in recent years to manufacture magnets that are much stronger than conventional ferrite or alnico alloy magnets (aluminium, nickel, cobalt). Due to the use of neodymium/boron/iron alloy

¹RAJEEV SRIVASTAVA, ²SOURABH KHANDELWAL, ³VIVEK CHOUKSE, ⁴PALLAVI MUNDRA

¹Department of Prosthodontics, Crown & Bridge and Implantology

Index institute of dental sciences, Indore, Madhya Pradesh, India

²Private Practitioner
Indore

³Dr. HSRSM Dental College & Hospital,
Hingoli, Maharashtra

⁴Index Institute of Dental Sciences, Indore

Address for Correspondence: Dr. Rajeev Srivastava
Index institute of dental sciences, Indore, Madhya Pradesh, India
E-mail Address : docrajeev@yahoo.com

Received : 4 July, 2021, **Published :** 31 December, 2021

Access this article online	
Website: www.ujds.in	Quick Response Code 
DOI: https://doi.org/10.21276/ujds.2021.7.3.16	

How to cite this article: Srivastava, D. R., Khandelwal, D. S., Choukse, D. V., & Mundra, D. P. (2021). Rehabilitation of severely resorbed mandibular ridge with implant supported overdenture with magnet attachment : A case report. UNIVERSITY JOURNAL OF DENTAL SCIENCES, 7(3).

in the fabrication of magnets, its retentive property has increased several folds.[5,6] They are encapsulated in stainless steel housing that prevents tarnish and corrosion of magnets from saliva intraorally.[7]

A more popular method was to attach a ferromagnetic metal keeper (generally made of stainless steel) to the implant for attraction by magnet embedded in the intaglio surface of the denture, this arrangement is known as magnet-keeper unit.[Figure 1]

Case Report :

A 47 year old man came to department of prosthodontics, crown & bridge and implantology, modern dental college and research centre, Indore wanted to fix loose denture, which has been used for 5 years. Chief complaint of a mobile mandibular denture. The patient was completely edentulous and exhibited resorbed alveolar ridge [Figure 2]. He requested treatment for the restoration of oral function, including more retentive and stable mandibular denture.

Orthopantomogram (OPG) is advised to the patient to evaluate bone height in the interforaminal region available for the overdenture [Figure 3]. Complete blood investigations including complete blood count, random blood sugar, HIV screening and Hbs Ag test was done.

The diagnostic cast was made and diagnostic mounting was done on hanau wide view semi-adjustable articulator for selection of the attachment system according to the available inter-ridge distance. The available inter-ridge distance in the anterior region was 8 mm and in posterior region was 9-10 mm. hence, magnet attachment is selected over ball or flat attachment due less interarch distance. Cone beam tomography (CBCT) was performed with radiographic marker to evaluate the height and width of the bone in the interforaminal region. Treatment decided for the patient was two implant supported overdenture with magnet attachment. Two implants (3.3 mm in diameter and 10 mm in length)(Noris medical, Israel) were placed in the anterior region of mandible at B and D position according to standardised surgical protocol. (Figure 4)

After 3 months, when the implants were osseointegrated second stage surgery was done and two gingival formers were placed to form gingival collar around implants.

After healing of second stage surgery the prosthetic procedure was started. Primary impression of the mandibular arch was made with impression compound and primary cast was made. Sectional border molding with green stick compound was done and final impression was made with polyvinyl siloxane impression material [Figure 5]. Master cast was made. Face bow record was taken [Figure 6] and face bow transfer was done [Figure 7]. Vertical and centric jaw relation relation was done and mounted on hanau wide view articulator. Teeth arrangement [Figure 8] and then trial of the denture was done. The denture was cured and finished & polished. Adequate space would be provided in the intaglio surface for magnet attachment.[Figure 9]

Then, each gingival former was removed from the implant and magnetic keeper (Dyna, Netherlands) was placed into the implant [Figure 10] and the magnet (Dyna, Netherlands) was placed on the magnetic keeper.[Figure 11]

Then, denture was seated over the mandibular ridge containing magnetic keeper with magnets as a result, on the removal of the denture, the magnets were picked up in the space created in the intaglio surface of the denture and were secured using self cure acrylic resin. [Figure 12] Denture insertion was done and patient was satisfied with the denture. [Figure 13 & 14]

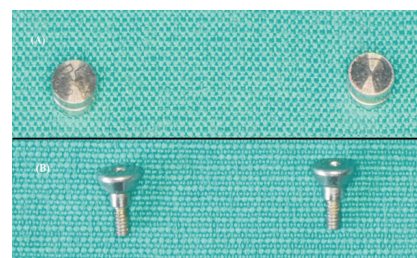


Figure 1. Magnet attachment (A) Magnet (B) Magnetic keeper.

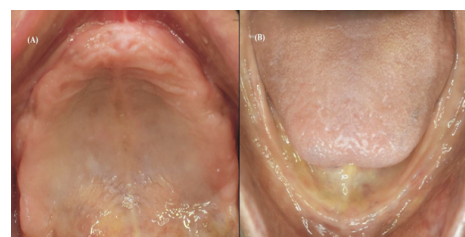


Figure 2. (A) Maxillary arch (B) Mandibular arch.

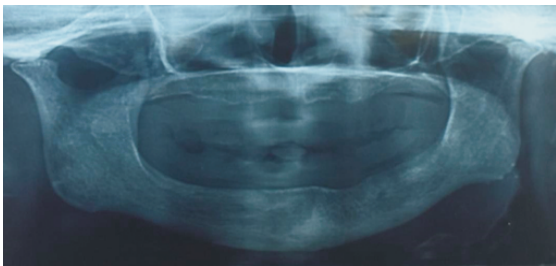


Figure 3. Pre-operative orthopantomogram (OPG).

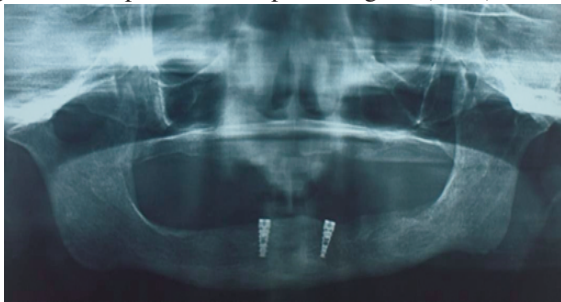


Figure 4. Post-operative orthopantomogram (OPG).

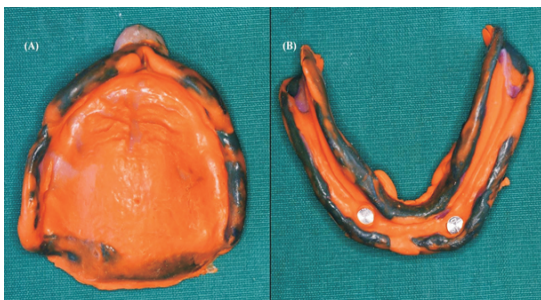


Figure 5. Final Impression (A) Maxillary arch impression (B) Mandibular arch impression showing picked up magnets

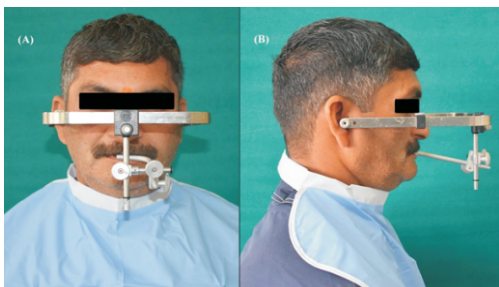


Figure 6. Facebow record (A) Frontal view (B) Lateral view.

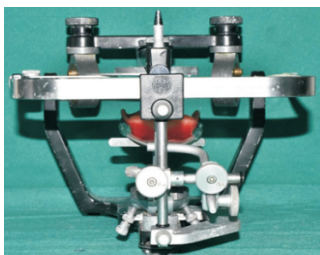


Figure 7. Facebow record transferred to the hanau articulator.

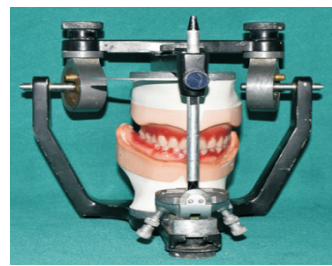


Figure 8. Teeth arrangement on hanau articulator.



Figure 9. Intaglio surface of the denture showing space created to accommodate magnets.



Figure 10. Screwing of the magnetic keeper into the implant intraorally with hex driver.



Figure 11. Magnets seated on the magnetic keeper.



Figure 12. Intaglio surface of the denture showing picked up magnets secured with self cure resin.



Figure 13. Denture insertion (A)facial view (B)Right occlusion view (C)Left occlusion view.



Figure 14. Extra oral frontal view (A) Pre-operative (B)Post-operative.

Discussion :

The paradigm has shifted over the last century from removable dentures to implant-supported prostheses. Although dental implants have been shown to be superior to other options. Mandibular two implant-supported over denture opposed by conventional maxillary denture is a more suitable treatment. Using the mandibular over denture helps prevent mandibular alveolar bone loss. According to two consensus published in 2002 McGill consensus and 2009 York Consensus, prosthetic rehabilitation with a conventional denture of the patient with a completely edentulous mandible should no longer be the treatment. Instead, the placement of two implants and fabrication of an implant-retained over denture should be the first treatment to be deemed.[2,8]

Various types of attachment systems with distinct retentive characteristics have been proposed for implant-supported over denture. They are ball attachment, flat attachment, magnet attachment, locators, bar & clip, and stud attachment.[3]

Several disadvantages of bar and clip attachment system are requirement of minimum inter-arch space of 12-15mm, vertical dislodging of the bar type attachment show maximum stress generation around implants, fabrication is technique sensitive, higher treatment costs, and frequent loosening of retentive clips.[9] Ball attachment are regarded to be simplest type of attachment but o-ring gradually loose retention, and need to be replaced periodically.[10] If implants are non parallel and they have angulation more than 15°, stud attachment cannot be used.[3] While magnet attachments can be used in non-parallel implants since they do not follow a specific path and they are shorter compared to mechanical attachments so they can be used in cases of reduced interocclusal space and challenging esthetic demands.[11] Potentially pathologic lateral or rotating forces are eliminated providing maximum abutment protection.

Enables automatic reseating of the denture if dislodged during chewing. Furthermore, patients with physical disabilities such as those experienced by frail older adults, have reported that magnet-retained dentures are relatively easy to place and remove.

Though the conventional (AlNiCo) magnets have been used as retentive devices for removable partial dentures, obturators and maxillofacial prosthesis the rare earth magnets samarium (SmCo) and more recently, neodymium (NdFeB) overtook conventional magnets with its unique properties of retentive force, stress-breaking, characteristics, corrosion resistance, biocompatibility and compactness which have resulted in widespread use for the overdentures.[5,6] Dyna magnets are open field magnets meaning that the magnetic flux field radiate into the surroundings. The reason for choosing such a design is the fact that open field magnets, in contrary to the closed field magnets, do not have to be in close contact with an object to attract it. This has naturally clinical consequences. An overdenture placed in the mouth of the patient during its functional life has a certain degree of mobility meaning that the magnets are not always in contact with the keeper or abutments. It is by using open field magnets that the magnetic attraction may be retained even in such situations. In addition, a new system has been introduced to seal the metal capsule around a magnet and thus to protect it from corrosion in the mouth.[7,12] Furthermore, there were no unusual

technical difficulties in rendering the treatment or maintaining the implants.

Conclusion :

Magnetic attachment can be used to retain mandibular implant overdentures. Patient satisfaction was excellent. Patient found it easy to insert and remove the denture.

This new generation of magnetic attachment can be applied in a straightforward manner and offers the potential for long-term durability.

References :

1. Doundoulakis JH, Eckert SE, Lindquist CC, Jeffcoat MK. The implant-supported overdenture as an alternative to the complete mandibular denture. *J Am Dent Assoc.* 2003;134:1455-58.
2. Melescanu IM, Marin M, Preoteasa E, Tancu AM, Preoteasa CT. Two implant overdenture - the first alternative treatment for patients with complete edentulous mandible. *J Med Life* 2011;4:207-09.
3. Prasad DK, Prasad DA, Buch M. Selection of attachment systems in fabricating an implant supported overdenture. *J Dent Implant* 2014;4:176-81.
4. Chopra V, Smith BJ, Preiskel HW, Palmer RM, Curtis R. Breakaway forces of flat and domed surfaced magfi implant magnet attachments. *Eur J Prosthodont Rest Dent* 2007;15:7-12.
5. Boeckler AF, Morton D, Ehring C, Setz JM. Mechanical properties of magnetic attachments for removable prostheses on teeth and implants. *J Prosthodont* 2008;17:608-15.
6. Kamath R, Sarandha DL, Anand M. Clinical use of magnets in prosthodontics- A review. *Int J Clin Dent Sci* 2011;2:10-13.
7. Jackson TR, Healey KW. Rare earth magnetic attachments: the state of the art in removable prosthodontics. *Quintessence Int* 1987;18:41-51.
8. Thomason JM, Kelly SAM, Bendkowski A, J.S. Ellis. Two implant retained overdentures—A review of the literature supporting the McGill and York consensus statements. *J Dent.* 2012;40:22-34.
9. Misch CE. *Dental Implant Prosthetics.* Elsevier Health Sciences. 2nd ed. Mosby: Elsevier; 2015.
10. Warreth A, Alkadhimi AF, Sultan A, Byrne C, Woods E. Mandibular implant-supported overdentures: attachment systems, and number and locations of implants—Part II. *J Irish Dent Ass* 2015;61:144-48.
11. Ceruti P, Bryant SR, Lee JH, Macentee MI. Magnet retained implant supported overdentures: review and 1-year clinical report. *J Can Dent Assoc* 2010;76:1-6.
12. Veleski D, Shahpaska BP, Stevkovska DV. Applications of different types of magnet retention systems in prosthetic practice. *Br J Med Res* 2016;12:1-7.