Case Report

JRAD Journal of Research and Advancement in Dentistry

J Res Adv Dent 2016;5:3:301-305.

Availing the Benefits of Magnetic Force to Enhance Retention in Mandibular Overdentures: A Clinical Report

Pawashe Karuna G[1*] Tewary Shivsagar[2] Sanyal Pronob Kumar[3] Kumar Nilesh[4]

[1]Assistant Professor, Department of Prosthodontics, School of Dental Sciences; Krishna Institute of Medical Sciences Deemed University, Maharastra, India.
[2]Reader, Department of Prosthodontics, School of Dental Sciences; Krishna Institute of Medical Sciences Deemed University, Maharastra, India.
[3]Professor and Head, Department of Prosthodontics, School of Dental Sciences; Krishna Institute of Medical Sciences Deemed University, Maharastra, India.
[4]Reader, Department of Oral Surgery, School of Dental Sciences; Krishna Institute of Medical Sciences Deemed University, Maharastra, India.

ABSTRACT

Background: Preservation of tooth/roots for proprioception is widely known and accepted by the dental profession. Overdentures especially in mandibular ridge plays a crucial role in enhanced retention, thus satisfying the patient. Magnets have been widely used for this purpose, but the tedious laboratory techniques limit its use. Recently, developed magnetic systems eliminates the tedious laboratory procedures, at the same time provides enhanced retention. This case report avails the benefits of this system for enhancing retention in mandibular ridge.

Keywords: Magnet retained overdenture, Dental magnet, Tooth Supported Over Denture.

INTRODUCTION

Few remaining periodontally compromised teeth or edentulous cases, especially with severely resorbed alveolar ridges, require special approach in order to achieve good long-term clinical results. Traditionally the vast majority of problems arise with a mandibular prothesis, as due to the anatomy of the mandible often they fail to provide adequate support, retention and stability. The preservation of remaining roots and covering them with denture base has been used since more than a century ago.[1] These over-denture designs range from tooth supported with or without metal copings to bar supported, magnet retained, attachment systems to implant supported prosthesis. Recently developed hard magnetic substances such as samarium–cobalt [2,3] and iron–neodymium– boron magnets (Fe14Nd2B) [4,5] provide stronger magnetic force per unit size than the earlier open-field aluminum–nickel–cobalt magnets which are susceptible to corrosion by the saliva and provide weak retentive force. The clinical case report presented describes prosthodontic rehabilitation with magnetic retained mandibular over-denture and conventional maxillary tooth supported over-denture (metal copings)

CASE REPORT

A 65 year old male patient reported to the department of Prosthodontics for replacement of missing teeth. Intra-oral examination revealed presence of 13, 23, 33, 43 and 44 .43 showed grade III mobility and was decided to be extracted. Conventional maxillary over-denture with short metal copings and magnet retained mandibular over-denture was planned for the patient after root canal treatment of the teeth. (Fig: 1)

Received: June. 21, 2016: **Accepted**: Sept. 9, 2016
***Correspondence Dr. Pawashe Karuna G.**
Department of Prosthodontics, School of Dental Sciences; Krishna Institute of Medical Sciences Deemed University, Maharastra, India.
Email: karuna.pawashe@gmail.com

pISSN 2278-0076
eISSN 2321-9270

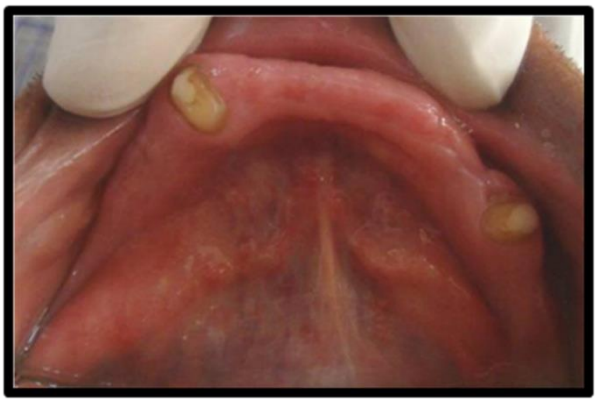

Fig 1: Root canal treated abutments-33 and 44.

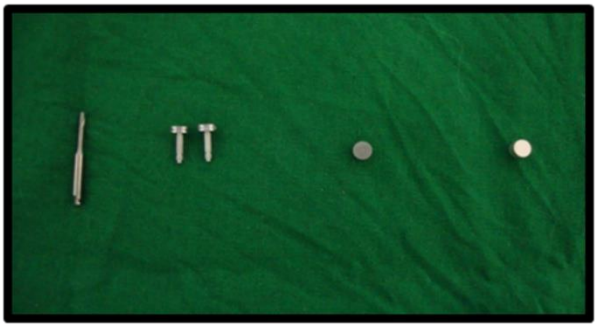

Fig 2: Magnetic keeper attachment assembly-Male and female components.

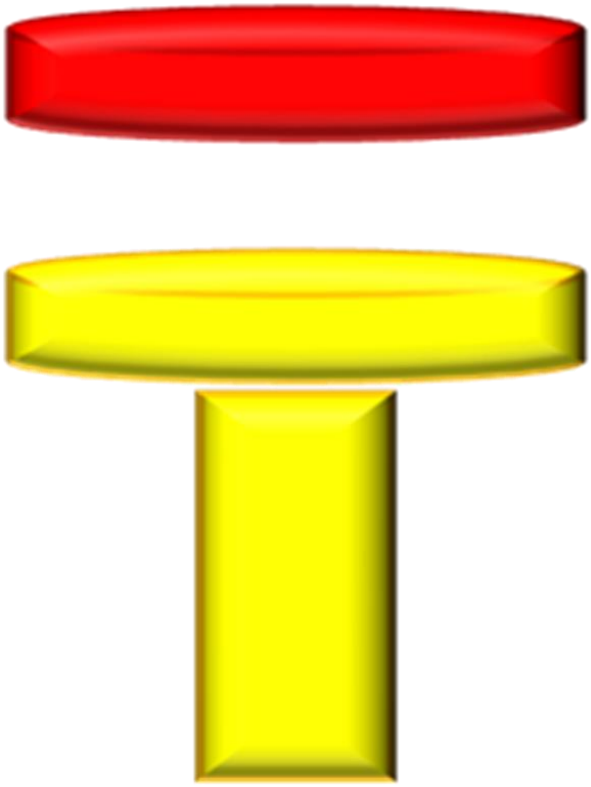

Fig 2a: Magnetic keeper attachments(Male & female components).

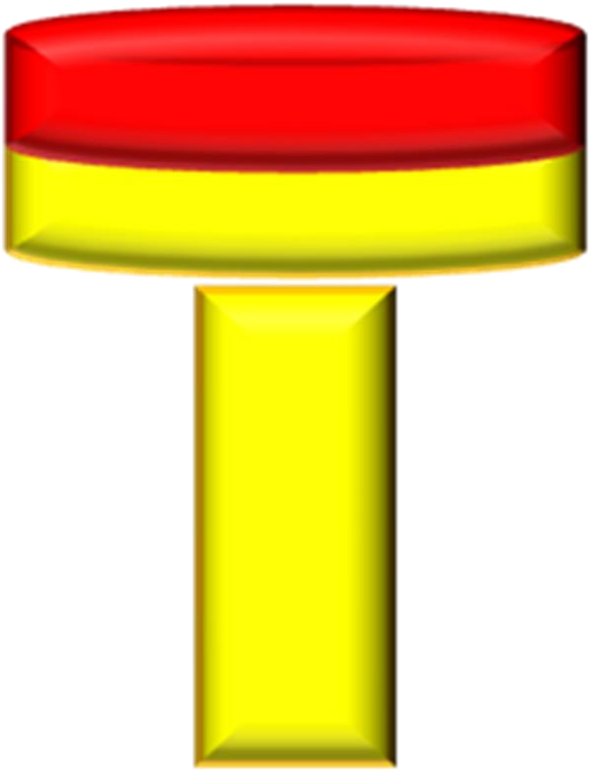

Fig 2b: Magnetic keeper attachments(Male & female components).

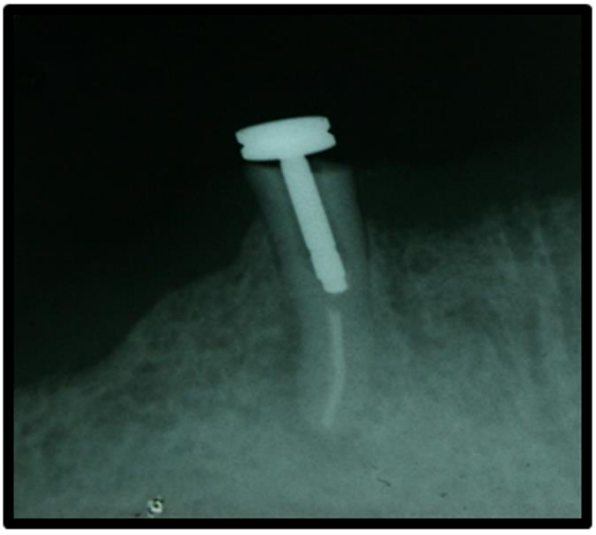

Fig 3: Precementation radiograph.

Fig 4: Cementation of female component in the prepared post space.

Fig 5: Tissue surface of the denture incorporating the male component.

Fig 6: Pre & post treatment extra-oral photographs.

Fig 6a: Pre & post treatment extra-oral photographs.

PROCEDURE

1. Mandibular abutment (33 and 44) teeth preparation was performed with diamond points (Shofu, Kyoto, Japan). Chamfer finish line was prepared.

2. Two-third of the root canal filling material was removed with a stainless rotary instrument (Peasow reamer; Dentsply, York, Pa) and Dyna Spiral Drill (Dyna Dental Magnet System, Netherlands) (stainless steel) to prepare the post space to accommodate post along with keeper.

3. 2a &2b show the diagrammatic representation of male and female component of the magnetic assembly.

4. The magnetic keeper attachments (Fig: 2) were then cemented on to the prepared roots with Glass Ionomer Cement (GC Co.,Tokyo, Japan). (Fig:4)

5. Fig: 3 shows radiograph of the abutment with the male component pre-cementation.

6. Maxillary abutment 13, 23 teeth were prepared with a chamfer finish line to receive short metal copings.

7. Following cementation of metal copings in the maxillary arch, impressions with irreversible hydrocolloid material was made for both arches, followed by border moulding, jaw relation and try-in appointments.

8. Maxillary denture insertion was done in the conventional fashion.

9. Interfering occlusal contacts were eliminated before attachment the magnetic assembly is fixed in the intaglio surface of the mandibular denture.2x2 inch latex glove was pierced to form 2 holes that co-incide with the position of abutments prepared. The glove was stretched over the abutments. This acts as a barrier between mucosa and autopolymerising acrylic resin .The position of the abutments was located on the intaglio surface of the denture and was trimmed accordingly to provide space for the magnets. (WR Magnet S5, Dyna Dental Magnet system, Netherlands) . Magnets were circular in shape and measure 3mm in diameter and 2 mm thick.

10. Autopolymerising acrylic resin was mixed according to manufacturer's instruction s and was placed in the intaglio surface and denture was placed intra-orally (Fig: 5). The patient was asked to be in occlusion until the setting of resin. Excess of resin removed and occlusion was checked to remove interceptive occlusal contacts.

11. Fig: 6 & 6a show the patient's pre and post-treatment photographs.

DISCUSSION

These attachment systems, consisting of a magnet and a keeper, are used to retain removable partial dentures and maxillofacial prostheses.[6] An over-denture with a magnetic attachment is a useful choice for an abutment tooth with chronic periodontal disease, because the magnetic attachment dissipates the lateral stress component on the abutment teeth and improves poor clinical crown-to-root ratios.[7-15]

In this described article the DYNA WR Magnets were used. The main advantage of this system over the conventional magnetic systems was that there is no need for activation, Permanent stable retention, no impression or laboratory auxiliary elements, Parallelism is less necessary, Biocompatibility, rebasing procedure is the same as for a standard denture, very easy dental hygiene for the patient, vertical load of the post elements, time saving, simple and very economical method.

The magnetic system used to retain dentures may be an open-field or a closed-field system. In closed-field systems, the external magnetic flux fields are eliminated by placing the magnetic components in a series, called an assembly.[15] Therefore, it is not surprising to find the greatest retention force occurring with the closed-field magnets at both speeds of separation. Their closed field nature also makes this system more biocompatible than the open-field system, as open-field uncoated magnets exhibit significant cytotoxic effects.[16,17] The magnetic system used in this case was closed-field system and magnetic field leakage at the gingival margin was substantially below the accepted United State safety standard of 0.02 T.

Advantages of intra-oral magnets include: Easy incorporation into a denture involving simple clinical and technical procedures, ease of cleaning, ease of placement for both dentist and patient (physically disabled or neuromuscular compromised), automatic reseating, and constant retention with number of cycles.[18]

CONCLUSION

Elimination of tedious laboratory procedures with the use of this type of magnets provided satisfactory retention and acceptance by the patient.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Brewer AB, Morrow RM, editors. Over-dentures. 2nd ed. Missouri: Mosby; 1980.

2. Becker J. Permanent magnets. J Appl Phys 1970;233:92-100.

3. Strnat KJ. The hard magnetic properties of rare earth-transition metal alloys. IEEE Trans Magn 1972;8:511-6.

4. Sagawa M, Fujimura S, Yamamoto H, Matsuura Y, Hiraga K. Permanent magnet materials based on the rare earth-iron-boron tetragonal

compounds. IEEE Trans Magn 1984;20:1584-9.

5. Sagawa M, Fujimura S, Togawa N, Yamamoto H, Matsuura Y. New material for permanent magnets on a base of Nd and Fe. J Appl Phys 1984;55:2083-7.

6. Saha S, Ray-Chaudhuri A. Mandibular implant-retained complete over-denture using retentive abutments: A case report. Dent Update 2009; 36:154–8.

7. Maeda Y, Nakao K, Yagi K, Matsuda S. Composite resin root coping with a keeper for magnetic attachment for replacing the missing coronal portion of a removable partial denture abutment. J Prosthet Dent 2006;96:139–42.

8. Van Waas MA, Kalk W, Van Zetten BL, Van Os JH. Treatment results with immediate over-dentures: an evaluation of 4.5 years. J Prosthet Dent 1996;76:153–7.

9. Obatake RM, Collard SM, Martin J, Ladd GD. The effects of sodium fluoride and stannous fluoride on the surface roughness of intraoral magnet systems. J Prosthet Dent 1991;66:553–8.

10. 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

11. Sasaki H, Kinouchi Y, Tsutsui H, Yoshida Y, Karv M, Ushita T. Sectional prostheses connected by samarium–cobalt magnets. J Prosthet Dent 1984;52:556–8.

12. Akaltan F, Can G. Retentive characteristics of different dental magnetic systems. J Prosthet Dent 1995;74:422–7.

13. Matsumura H, Kawasaki K . Magnetically connected removable sectional denture for a maxillary defect with severe undercut: a clinical report. J Prosthet Dent 2000;84:22–6.

14. Riley MA, Walmsley AD, Harris IR. Magnets in prosthetic dentistry. J Prosthet Dent 2001;86:137–42.

15. Gillings BR. Magnetic retention for complete and partial over-dentures. Part I. J Prosthet Dent 1981;45:484-91.

16. Drago CJ. Tarnish and corrosion with the use of intra oral magnets. J Prosthet Dent 1991;66:536-40.

17. Evans RD, Mc Donald F. Effect of corrosion products (Neodymium Iron Boron) on oral fibroblast proliferation. J Appl Biomater 1995;6:199-202.

18. Riley MA, Walmsley AD, Harris IR. Magnets in prosthetic dentistry. J Prosthet Dent 2001;86:137-42.