

# Prosthetic Rehabilitation Using Broadricks Plane Analyser and Magnet Retained Mandibular Overdenture

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## ABSTRACT

Complete denture designs have been modified to gain additional support and stability from few retained natural teeth and later using attachment and thus by modifying it into an overdenture design. The different attachments are bar, stud/ball and magnet. Patients with retained natural teeth under denture can masticate more effectively and transfer the occlusal load to the bone with better neuromuscular feedback through the periodontal ligament, thereby prevent resorption of remaining alveolar and inter-radicular bone present around the roots. This case report describes an easy way of fabrication of magnet retained overdenture and rehabilitation of maxillary arch with fixed partial dentures.

**KEYWORDS:** Magnet, DYNA Magnet, Attachment, Magnet Retained Overdenture, Broadricks Plane Analyzer

## INTRODUCTION

Tooth loss or extraction is a major occurrence and due to this loss the periodontal proprioception which has discrete discriminating sensory inputs is lost and the alveolar bone resorption occurs at a faster rate.<sup>1</sup> Any removable dental prosthesis that covers and rests on one or more remaining natural teeth, the roots of natural teeth, and/or dental implants; a dental prosthesis that covers and is partially supported by natural teeth, natural tooth roots, and/or dental implants was also known as overdenture also known as overlay denture, overlay or superimposed prosthesis.<sup>2</sup> In the clinical practice, the major problem faced by the dentists is retention and stability. To overcome this problem, various methods have been used since history such as springs, suction cups, adhesives, attachments, implants and magnets.<sup>3</sup> In 1950, Alnico bar magnets accompanied by Platinum-Cobalt, Cobalt-Samarium, and the recently introduced Neodymium-Iron-Boron magnets. This case report of fabrication of mandibular overdenture using DYNA magnets which are a new, innovative method and time saving.<sup>4-9</sup> They are made up of Pd-Pt-Co but are small with sufficient retentive force to hold the denture and have ability to resist forces to demagnetization. They are anticorrosive and meets the international standards for physical effect to tissue due to magnetism.<sup>10</sup>

## CASE REPORT

A male patient of 62 years reported to the Dept. of

Prosthodontics, Crown and Bridge at K.M.Shah Dental College and Hospital, Waghodia with chief complaint of difficulty in chewing due to the missing teeth. According to extraoral examination showed tapered facial form, profile convex, mouth opening was adequate. Mandibular movements were smooth with normal TMJ. On intraoral examination and from OPG in the maxillary arch 26, 27 teeth were missing and in mandibular arch 33, 38, 43, 44, 45 teeth were present, supraeruption with 11, 12, 21. 17 was grossly carious and supraerupted. 44 and 45 had periapical infection and the prognosis was poor with both.[Fig.1]



Fig.1 Pre-operative Orthopantomograph

On the basis of the clinical findings, the different treatment options possible for this patient were

**Pre-Prosthetic Phase:** Extraction with 17, 44 and 45 was done. During healing period, RCT was done in 22, 23,

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33, 43 crown lengthening and post and core (everStick POST, Japan) with 22 and 23 of 0.9 and 1.2mm respectively and cemented with dual cure self-adhesive resin cement(G-Cem Link Ace, Japan). Midline diastema closure was not done as the patient was not willing for it.

**Prosthetic phase:** Tooth supported overdenture using DYNA magnets with mandibular arch and preserving 38 as it was planned. The location of the teeth was favorable for an overdenture. Diagnostic impressions were made using irreversible hydrocolloid. (IMPRINT [DPI], India) and a diagnostic jaw relation was taken and mounted on mean value articulator to analyze interarch space to be sufficient for using magnetic attachments.

Diagnostic casts were prepared [Fig.2] and diagnostic wax up was done with maxillary arch and special tray was fabricated for the mandibular arch. Attachment selected was Dyna WR magnet (02MS2) open field type of size 4.5mm × 2.7mm for 33 and 43.



Fig.2: Diagnostic Cast

After this facebow transfer was done and mounted on the Hanau wide view semi-adjustable articulator. Then anterior teeth arrangement of mandibular arch and tentative arrangement of mandibular posterior teeth was done. Using the mandibular trial denture anterior and posterior survey lines were marked for Broadrick's plane analysis [Fig.3] and mandibular arch plane was again verified and corrected according to maxillary posterior teeth plane. Now the diagnostic wax up was completed for the maxillary arch with the established plane. Then, a thermoplastic sheet was prepared as a template for biomechanical preparation of the maxillary arch. Then the final impression was made and the master cast was done with type III stone [Fig.4].



Fig.3: Broadricks Plane Analysis

Then provisionalization was done with self-curing tooth colored acrylic (Semident Tooth colored acrylic, India) and cemented with Zinc-oxide-eugenol cement (Neelkanth Healthcare Ltd., India) and interim denture was delivered [Fig.5]. Simultaneously, the final prosthesis of maxillary arch was fabricated. Then the



Fig. 4 Preparation of maxillary teeth, final impression and master cast



Fig.5 Provisionalization and Interim denture

definitive prosthesis was verified on Broadrick's plane analyzer and then cemented with Resin-modified GIC (GC Fuji-Cem, Japan)[Fig.6].



Fig. 6 Verification of final prosthesis on Broadrick's plane analyser

Mandibular canines were now prepared for overdenture. A slight lingual inclination is given on the occlusal surface parallel to the alveolar crest. This prevents the problem of magnet fixing as well as leverage forces coming to the root. If sufficient intermaxillary space is available and periodontal condition are good, a slightly higher preparation (2-3mm above the gingiva) is acceptable for more lateral stability of denture.

Now after preparation with the pilot and master drill supplied in the DYNA direct system kit by manufacturer, keepers were cemented with resin-modified GIC (GC Fuji-Cem, Japan) [Fig.7] and border molding was done with low fusing green stick compound and definitive impression was made using elastomeric impression material (Honigum, DMG, Germany) [Fig.8]. Then again jaw relation was verified and the teeth arrangement and final cementation of maxillary FPD was completed with resin modified GIC. Then holes were drilled in canine region of mandibular denture and cold cure resin was used for pick-up of magnets. Excess resin was trimmed and denture was polished. [Fig.9] Full mouth



Fig.7 Prepared mandibular canines for overdenture, drilled abutments for magnet, cemented magnets



Fig.8 Mandibular final impression and master cast



Fig.9 Trial denture, cemented maxillary prosthesis and pick up of magnets into final denture



Fig.10 Mandibular denture insertion

rehabilitation was completed. [Fig.10] Then the denture was placed intraorally and checked for comfort, occlusion and retention. Patient was instructed how to wear and remove the denture, on denture maintenance and oral hygiene as well. Patient was recalled after 24hrs, 7 and 15days.

## DISCUSSION

Overdenture is a kind of treatment option which anchors the denture to the abutment to provide better retention, support and stability and also improves the oral health related quality of life of the patients.<sup>11</sup> There are two types of magnetic systems namely open and closed field systems. Open field has two magnets one which is cemented in the root canal treated teeth and other which is secured in the denture.<sup>6,12</sup> Earlier in the posterior teeth repelling magnets were embedded in the maxillary and mandibular denture such that they do not approximate and lead to dislodgement. Rare earth magnets like Sm-Co, Nd-Fe-B and Pt-Pd-Co have been nowadays used in dental applications which provides enough forces even though they are smaller in dimensions.<sup>11</sup>

The major advantages of DYNA system over the conventional was that they are simpler to use and less time consuming because no extra lab procedures are required. In a single appointment various steps can be completed like decoronation of tooth, preparation of root space for magnet accommodation, post space impression, working cast fabrication, cementation of root component of magnet and making final impression can be completed in one appointment, thus eliminating chance of alignment error between the approximating surfaces of both magnets.

The distance of separation and inclination between the magnets is inversely proportional to the force required to depart the magnets is the breakaway load (in grams). Optimal occlusal or masticatory pressure should be used during securing the magnets in the denture such that the magnets do not get displaced inside the dentures. If excess pressure is applied the magnets will displace more in the dentures which may reduce the breakaway force of magnets when the dentures are again inserted in the mouth after the pick up of magnets in the denture.<sup>14</sup>

The various advantages of DYNA system are<sup>10</sup> a. activation of magnet is not required, b. stability is more and retention is persistent, c. no accessory lab impression or elements are required and thus less lab expenses, d. parallelism of magnets is not a prime requirement, e. effortless maintenance of oral hygiene, f. distributes vertical load easily to post element.

The extra advantages of DYNA system are<sup>10</sup>:

- As it is a chair side procedure, less time is required for the treatment procedure.
- Very limited expense

General Contraindications<sup>10</sup>: The general consideration for DYNA system are severe bruxism, patient is not

ready for the treatment, inadequate interocclusal distance and improper hygiene maintenance.

Overdenture treatment thus achieves much greater satisfaction, retention, stability and effortless removal and reseating of the denture than conventional dentures. In magnetic attachment lesser chances of biofilm accumulation are present thus less oral hygiene maintenance is required.<sup>11</sup>

## REFERENCES

1. Patil R, Mistry G, Shetty O. Harnessing retention through attraction. *Guident*. 2013 Apr 1;6(5). 26-32.
2. The Glossary of Prosthodontic terms. Edition 8, *J Prosthet Dent*, 2005; 94(1): 58.
3. Carreiro AFP, Guerra CMF, Moraes SLD, Neto AF, Torres EM. The use of a magnetic attachment in a removable partial denture of a patient with periodontal tissue loss. *Int J Dent*, 2009; 8(4): 215-219.
4. Balu K. An innovative method for magnet retained over denture. *J Indian Acad Dent Spec*. 2010;1:52-55.
5. Boice GW, Kraut RA. Maxillary denture retention using rare earth magnets and endosteal implants. *Int J Oral Implantol*. 1991; 7(2):23-7.
6. Bormes T. Magnets myth and magic *Trends Tech.Contemp Dent Lab* 1998; 5(3): 42-7.
7. Davis DM, Packer ME, Mandibular Overdentures stabilized by Astra Tech implants with either ball attachments or magnets; 5 year results. *Int J Prosthodont*. 1999; 1993: 222-9
8. Drago CJ. Tarnish and corrosion with the use of intra oral magnets. *J Prosthet Dent*. 1991; 66(4): 536-40.
9. Evans RD, Mc Donald F. Effect of corrosion products (Neodymium Iron Boron) on oral fibroblast proliferation. *J Appl Biomater*. 1995; 6(3):199-202.
10. DYNA Dental System Brochure. [www.dynadental.com](http://www.dynadental.com).
11. Patel R, Patel S, Sethuraman R, Chhabra T, Bhatt N, Patel J. *Sch. J. Dent. Sci.*, 2015; 2(1):1-5.
12. Akaltan F, Can G. Retentive characteristics of different dental magnetic systems. *J Prosthet Dent*. 1995;74(4) : 422-7.
13. Moghadam BK, Scandett FR. Magnet retention for overdentures. *J Prosthet Dent*,1979.;41(1):26-9.
14. Gillings BR, Samant A. Overdentures with magnetic attachments. *Dent Clin North AM* 1990; 34(4) : 683-709.

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