

## THE CLINICAL TRIAL OF PATIENT SATISFACTION WITH TOOTH AND MAGNET SUPPORTED OVERDENTURE BY VISUAL ANALOGUE SCALE (VAS)

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### ABSTRACT

*The purpose of this study was to determine the effect of magnet retained overdenture treatment over tooth supported overdenture and degree to which subjective treatment outcome could be predicted by VAS (Visual Analogue Scale). 10 patients were identified and conventional over denture was delivered, they form group A1. In the same patients magnets were attached to the abutments and the same over denture was converted to magnet retained over denture after 6 months. They form group A2. They finished a questionnaire with 10 statements on overdenture complaint. Visual analogue scale were used to investigate their satisfaction. Difference between the group were analyzed. Magnet retained overdenture was shown to be very effective on compare to tooth supported overdenture.*

**Key Words:** Magnet overdenture, patient satisfaction, visual analogue scale.

### INTRODUCTION

For many years complete denture design was only option in edentulous cases, but the major problem encountered by using conventional design is lack of retention, stability, support because it is totally supported by mucosa and also later it become maladaptive with time due to ongoing residual ridge resorption.<sup>1,2</sup> This is more so in mandible as compared to maxilla.<sup>3,4</sup> Diminishing oral tissue volume resulting from residual ridge resorption, leads to poor patient satisfaction, confidence and comfort.<sup>3,5</sup>

Complete denture design have been modified to gain additional support and stability from few retained natural teeth and later by the use of attachment and thus by modifying complete denture into overdenture. Patient with retained natural teeth or tooth with attachments, can masticate more effectively, this is possible with better neuromuscular feedback mechanism from periodontal ligament.<sup>6</sup>

The most common form of anchorage system used for over denture includes clip on bar connecting the tooth, ball attachment and magnets.

Magnets were used frequently in dentistry because of long lasting retentive properties compared with other mechanical attachment and the potential for favorably distributing forces to supporting oral structures and use of magnets along with tooth root as an economic and functional alternative, which improves patient satisfaction, convenience, thus increasing the rate of treatment success.<sup>7,8</sup>

Views may differ from dentists and the patients to judge the success of denture treatment.<sup>9,10</sup> Many research states that evaluation of treatment should be based on patient's own rating of treatment success rather than on traditional clinical estimates.<sup>26</sup> Several studies have reported on the relationship between patient general satisfaction with denture and their opinion on functional aspects of their prosthesis.<sup>11,12</sup>

The study was undertaken to compare simple tooth supported over denture and over denture with magnetic attachment to assess patient satisfaction before and after magnet over denture treatment in relation to satisfaction of edentulous patient who also applied for tooth supported over denture and to correlate the same with the sex of the patients by VAS.

### METHODOLOGY

The medical ethical committee of the SRM Dental College and Hospital approved the conduction of the study. For the study 10 patients were selected and received maxillary complete denture and mandibular tooth supported overdenture and after 3 months magnet was attached to the overdenture. Inclusion criteria for selection of patient.

- Both male and female
- Age group between 40-60

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- Bilateral distribution canine or premolar
- Endodontic treatment possible
- 2 to 3-mm abutment height
- No bony undercuts

Detailed written information was provided to all patients regarding the study, and written consent was obtained from all patients.

### Endodontic therapy

The retained teeth were subjected to intentional endodontic treatment, following which the clinical crown were reduced to height of 1.5 – 2mm above gingival margin (Fig 1). Surface of the preparation was smoothed and rounded to eliminate undercuts.

### Prosthetic phase

The dentures were fabricated out of methacrylate copolymer resin base material (DPI Universal Heat Cure Denture Material) by the conventional compression moulding technique and placed in patient's mouth. (Fig 2)

### Root keeper installation procedure

After 3 months, root keeper, magnet was cemented [Type I glass ionomer cement (GC corporation)] and attached to tooth root and conventional tooth supported overdenture respectively as per the manufacturer instruction (Fig 3 & 4). We used cement in keeper type provided by AICHI Steel Corporation. It is a flat type model RK-DF/L, the specification was,

Diameter of the keeper	—	4mm
Height of the keeper	—	0.8mm
Max diameter of the post	—	1.2mm
Length of the post	—	5mm

Data collection was performed for the patients, as per the following interval

- A1 six months after overdenture placement  
 A2 six months after placement of magnet retained overdenture

Data collection was done for all the subjects by a single observer to avoid inter observer differences.

### Visual analogue scale

Evaluation of patient satisfaction of using overdenture by giving questionnaire was done. The questionnaire consisted of 10 statements. Patients were asked to grade their prosthesis depending on the level of satisfaction with regards to esthetics, comfort, speech,

ability to chew, retention, stability, general satisfaction using visual analogue scale.

The VAS scale consisted of a 100mm line with the end defining the grade of feelings between the phases. The left end of the line represented a satisfactory response and right end of the line represent an unsatisfactory response. The patient was asked to register their assessment with pencil mark across the line at a point corresponded to their subjective feeling. Satisfaction was then expressed at the distance in millimeter from right end limit to the distance of pencil mark and represented as VAS score. When comparing the scores between the groups for same variable, a low score represent as unsatisfactory feeling and high score represented satisfactory feelings. The scores for each patient were separately recorded by one investigator.

### RESULTS

One way ANOVA was used to analyse the mean values of all variables between tooth supported and magnet supported overdenture. All the parameter were statistically significant but, the mean esthetics for group A1 was  $6.92 \pm 0.57$  which was decreased to  $6.89 \pm 0.60$  for group A2 and P-value was 0.0434 which was not statistically significant. The mean cleaning efficiency for group A1 was  $6.61 \pm 0.753$  which was decreased to  $6.52 \pm 0.78$  for group A2 and P-value was 0.678 which was not statistically significant [Table 1].

Student t-test was used to analyse the mean values of all variables between male and female within tooth supported and magnet supported overdenture. All the parameter were statistically significant but, Mean standard deviation value for fit of the denture in both A1 and A2 groups among male and female was  $5.15 \pm 0.65$ ,  $7.00 \pm 1.12$  and  $3.65 \pm 0.92$ ,  $6.42 \pm 0.53$  respectively and P-value was 0.017 in A1 which was statistically significant and 0.374 in A2 which was not statistically significant [Table 2].

### DISCUSSION

Increased retention and stability of the overdenture can be achieved by lengthening the vertical wall contact between abutment teeth and the denture base, but in periodontally compromised teeth, it is not possible because only by preparing the abutment into dome shaped can improve the crown root ratio which will reduce mobility. To compensate for retention loss because of the reduced vertical wall, the mechanical device can be used to provide a mechanical inter connection between the tooth roots and a denture base to enhance prosthesis retention and stability.<sup>6,13,14</sup>

Magnets have been used for such retention as they are easy to incorporate within the denture and both clinical handling, technical procedure are simplified when compare to other types retainer, which are also subjected to wear and create more stress on abutment.<sup>15,16,17</sup> Studies had shown that there was no biological effect of dental magnet assembly on human tissue.<sup>18,19,20,21</sup>

TABLE 1: MEAN STANDARD DEVIATION AND TEST OF SIGNIFICANCE FOR TOOTH SUPPORTED AND MAGNET RETAINED OVERDENTURE

Variables	A1		A2		Significance
	Mean	SD	Mean	SD	
Chewing Efficiency	5.140	1.38	7.63	0.457	0.000
Pronunciation	6.42	0.991	7.64	0.72	0.001
Fit of the denture	4.55	1.06	6.77	0.93	0.000
Accumulation of Food Particles	5.59	1.33	6.68	0.70	0.003
Esthetics	6.92	0.57	6.89	0.60	0.434
Cleaning Efficiency	6.61	0.753	6.52	0.78	0.678
Stability	4.19	0.66	6.54	0.81	0.000
Retention	3.77	0.92	7.35	0.83	0.000
Comfort	4.93	0.89	6.72	0.50	0.000
Overall satisfaction	5.47	0.66	6.55	0.61	0.002

TABLE 2: MEAN STANDARD DEVIATION AND TEST OF SIGNIFICANCE FOR MALE AND FEMALE PATIENTS

Variable		Male		Female		Significance
		Mean	SD	Mean	SD	
Chewing Efficiency	A1	5.10	1.23	5.20	1.79	0.919
	A2	7.78	0.42	7.40	0.45	0.211
Pronunciation	A1	6.30	0.78	6.60	1.35	0.666
	A2	7.63	0.63	7.65	0.94	0.974
Fit of the Denture	A1	5.15	0.65	3.65	0.92	0.017
	A2	7.00	1.12	6.42	0.53	0.374
Food Particles	A1	5.26	1.11	6.07	1.65	0.378
	A2	6.57	0.72	6.85	0.74	0.564
Esthetics	A1	7.05	0.66	6.73	0.41	0.412
	A2	7.02	0.71	6.70	0.83	0.447
Cleaning Efficiency	A1	6.45	0.65	6.85	0.92	0.443
	A2	6.50	0.68	6.55	1.04	0.929
Stability	A1	4.15	0.79	4.25	0.52	0.832
	A2	6.43	0.83	60.70	0.89	0.643
Retention	A1	3.72	0.47	3.85	1.48	0.838
	A2	6.85	0.40	8.10	0.73	0.008
Comfort	A1	4.51	0.83	5.55	0.61	0.067
	A2	6.48	0.45	7.07	0.35	0.061
Overall Satisfaction	A1	5.40	0.80	5.57	0.47	0.708
	A2	6.65	0.68	6.40	0.54	0.562

In the present study of 10 patients with only either mandibular canine or premolar or both present bilaterally of mandibular arch were selected because, Clinical experience and the historical literature support the recommendation of at least one root per quadrant in the mandible.<sup>17,22</sup>

Selected abutment teeth for all subject was decoronated into dome shaped to the height of 1.5 to 2 mm above gingival margin to improve the crown root ratio and to eliminate the tooth undercut.<sup>7,17</sup>

Conventional overdenture was fabricated by standard technique and delivered. After 6 month interval magnet was attached.



Fig 1: Preparation done on endodontically treated teeth



Fig 2: Denture placement



Fig 3: Placement of magnet over the keeper with spacer in between



Fig 4: Intaglio surface of Overdenture

Data collection was performed 2 times during the study to evaluate patient satisfaction. In the literature, opinion vary among researchers as to which scales are more sensitive to expose a change in satisfaction.<sup>23</sup> In this study visual analogue scale was used because it has been reported to be superior to other behaviour rating scale.<sup>24</sup>

In this study patient were asked to express their opinion about their overdenture in general and specifically about certain subjective items. In order to have standard questions, questionnaires were taken from published studies.<sup>25,26,27</sup>

The study was carried out in patients with mandibular overdenture because greater dissatisfaction was with retention and comfort of mandibular denture.<sup>3,27</sup> Patient had no prior knowledge of denture design and were unaware of the treatment outcome of treatment.

The findings of this study shows improvement in overdenture patient satisfaction with their prosthesis when two magnets were used to retain the mandibular prosthesis except, Esthetics was not statistically significant in this study. It may be due to use of the same denture. Cleaning efficiency of the denture was also not statistically significant because of absence of prominence on the tissue surface of conventional tooth supported and magnet retained overdenture. This may be because magnets are smoother and less prominent when compared to other mechanical attachments.<sup>26</sup>

In this study females rated higher scores for fit of the tooth supported overdenture than male. It may be due to fact that female produce less biting force than male therefore they may dislodge their denture less frequently and consequently be more comfortable.<sup>28,29</sup>

Most important psychological variables to dissatisfaction appeared to be functional aspects of denture in general, and expectation towards the new denture. The patient might have greater expectation about the functional aspects, before receiving denture.<sup>30,31</sup>

Above result are in concordance with those of Ettinger and Jacobsen findings, who demonstrated that patient satisfaction with mandibular overdenture was significantly associated with combined effect of retention, appearance and comfort.<sup>11</sup> In this study, most of the patient responded positively when asked about general satisfaction of their prosthesis. However when questioned about ability to chew, stability, speech, esthetics, they responded negatively sometimes. This discrepancy between the results may be due to the complicated wordings of the questionnaire.<sup>27</sup>

But general satisfaction for both conventional tooth supported and magnet retained overdenture was greater than conventional denture measured in previous studies.<sup>12,31</sup>

When results of magnet retained tooth supported overdenture are compared with findings of implant supported magnet attached denture, significant values are ( $p < 0.01$ ) greater when compared to this study.<sup>3,25</sup>

On comparing the results of magnetic retained overdenture to a previous study conducted by Ronald

L. Ettinger on conventional overdenture the result was significantly lower in this study ( $p < 0.001$ ).<sup>32</sup>

Though useful information could be obtained, the study was limited to the following: Sample size was small ( $n=10$ ), duration of study was limited, age was not considered a distinct distinguishing factor in the study, biological response to magnet retained overdenture was not elicited in this study, further longitudinal study should be carried out to obtain more precise results.

## CONCLUSION

With the limitations of the study the following conclusion can be made:

Overdentures supported by magnet attachment achieve greater satisfaction than those simply supported by tooth. There was highly significant difference between overdenture supported by tooth and overdenture supported by magnet with regards to retention, stability/comfort and fit of the denture. There was no significant difference between the groups with regards to esthetics and cleaning efficiency.

There was no statistical significant difference between male and female for tooth supported overdenture and magnet supported overdenture except for fit of the denture for tooth supported overdenture, where female rated higher score than male.

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