Functional effect on implant overdentures according to modification of abutment height and attachment design

Richard Leesungbok * / Co-author; Su-Jin Ahn

*DMD, MSD, PhD. Head Prof. & Chair, Dept of Biomaterials & Prosthodontics, Kyung Hee University Dental School Hospital at Gangdong, Seoul, Korea Republic of

Abstract

Stability, support and retention are very significant factors on implant overenture to increase patient satisfaction.

Many reports showed that magnetic attachment provides lower retention and stability of implant overdenture than ball attachment and Locator attachment. But, Longitudinal clinical observations have revealed that the stability and comfort of the implant overdenture is more important to patient satisfaction.

Dental care and treatment, denture treatment are the most important issues for elderly people. Nevertheless within a limitation of the experiment, an abutment with increased height and a self-adjustable magnetic attachment provide significant higher stability and retention of implant overdentures. Patients' satisfaction is expected to be greater by increased retention and stability of implant overdenture.

Background and Aim

Background: Magnetic attachment provides lower retention and stability of implant overdenture than ball attachment and Locator attachment. (Walid Sadig, 2009) Patients satisfaction and preference is higher bar clip and ball-sockets attachment than magnets attachment. This is related high stability than high bite force of implant overdenture. (Cune et al. 2005, Ellis et al 2009)

Aim: The aim of this study is to evaluate the influence according to modification of abutment height and attachment design on stability and retention of implant overdentures after releasing of directional loading force.

Methods and Materials

Attachment		
NM3	3mm height keeper abutment without magnet (control group)	1
FM1	1mm height keeper abutment + flat type magnetic attachment*	
FM3	3mm height keeper abutment + flat type magnetic attachment	
FM5	5mm height keeper abutment + flat type magnetic attachment	
SM1	1mm height keeper abutment + self-adjusting magnetic attachment†	
SM3	3mm height keeper abutment + self-adjusting magnetic attachment	
SM5	5mm height keeper abutment + self-adjusting magnetic attachment	2
OR	O-ring attachment	
LO	Locator attachment	

Manufacturer ;

1. AICHI STEEL, Aichi-ken, Japan
2. OSSTEM, Busan, South Korea
3. ZEST ANCHOR, CA92029, USA

Six groups were constructed with three different heights (1mm, 3mm, and 5mm) and two designs (flat type, self-adjustable type) of magnetic attachment. 2 groups were also constructed with two different attachments (O-ring, Locator). The control group had abutment of 3mm in height without magnet. Total three tests were performed. 1) Stability test: 3D denture movement on a directional loading. 2) Retention test: Retention after releasing of directional 50N loading. 3) Strain gauge analysis. Data were statistically analyzed using a 1-way ANOVA and between-group difference were analyzed with Tukey's post hoc test ($\alpha=0.05$).

Results

Stability and retention were increased in relation to increasing the height of abutments. Self-adjustable type magnetic attachment had higher retention than flat type magnetic attachment after releasing of directional 50N loading. Strain around implants showed no significant difference between the self-adjustable magnetic attachment group with 5mm abutment height and the Locator group ($p<0.05$)

Conclusions

1. Stability and retention were increased according to the increasing height of magnetic attachment.
2. Self adjusting type magnetic attachment had higher retention than flat type magnetic attachment after releasing of directional 50N loading.
3. Strain around implants showed no significant difference between 5mm height self-adjusting magnetic attachment group and Locator attachment group ($p<0.05$)
4. The choice of the higher abutment and self adjusting type magnet provides significant higher stability and retention of implant overdenture. Patients' satisfaction is expected to be greater by increased retention and stability of implant overdenture.

Considering that we are now entering into an aged society, dentures for the disabled and elderly play a crucial part in life satisfaction as well as health related quality. Nutritional care is essential when they suffer from chronic and severe disorders. Patients' satisfaction is expected to be greater by increased retention and stability of implant overdentures.

References

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