

# Effect of Cleansing Solutions on the Retention of Locator Attachments

**Language:** English

**Authors:**

Dipl.-Ing. (FH) Christin Arnold, Dörte Fraedrich, Univ. Prof. Dr. Jürgen M. Setz, Dr. Arne F. Boeckler, Center for Dentistry and Oral Medicine, Department for Prosthodontics, Martin-Luther-University Halle-Wittenberg, Germany

**Date/Event/Venue:**

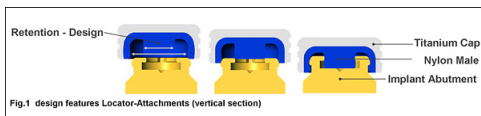
July 14-17 2010  
88th General Session & Exhibition of the IADR  
Barcelona, Spain

**Introduction**

Locator-Attachment (Zest Ancors, Escandido, USA) are prefabricated semi-precision abutments. Those attachments are available for 50 different implant systems. Locator attachments provide dual retention through both external and internal mating surfaces (Fig. 1). The retentive nylon males are available in varying amounts of retention and are hold in a titanium denture cap. The colour coded males (polyamide) have to be replaced in case of decrease of the retention. Poor denture hygiene results in the accumulation of debris and bacterial plaque on the surface of prostheses, causing malodor and inflammatory changes to the adjacent mucosa. Chemical has been considered to be an efficacious method to prevent micro-organism and denture plaque formation. However, some denture cleansers may have harmful effects on the nylon components of the denture and it may adversely affect the retention force and accelerate the process of wearout (Fig. 6-9).

**Objectives**

The aim of this in vitro-study was to evaluate changes in retention forces of different Locater-Attachments after exposure to denture cleaners and mouthwash.



properties	effect
Corega® Tabs® Dental	disinfection <sup>1</sup>
Corega® Tabs® Partial	cleaning <sup>2</sup>
producer Stafford Miller, dungarvan (Ireland)	other <sup>3</sup>
distribution: GlaxoSmithKline, Parsipanny, NY (USA)	
sodium carbonate	alkaline reacting substances <sup>2</sup>
sodium sulfate H <sub>2</sub> O <sub>5</sub> SK	oxidant <sup>1</sup>
citric acid	calciumcarbonate-solvent complexing substances <sup>2</sup>
sodium perborate	Oxidant and bleach <sup>1</sup>
sodium bicarbonate	alkaline solution (effervescent-foam) <sup>2</sup>
sodium benzoate	bacteriostatic & fungistatic <sup>2,1</sup>
PEG- 180	binding agent <sup>2</sup>
sodium lauryl sulfoacetate	Detergents (tenside) <sup>2</sup>
subtilisin	enzyme (protein fission) <sup>2</sup>
PVP/VA Copolymer	binding agent (antistatic & filmforming) <sup>2</sup>
aroma substance	taste and aroma <sup>3</sup>
CI42090	cosmetic colorant (blue) <sup>3</sup>
CI73015	cosmetic colorant (blue) <sup>3</sup>
EDTA	complexing substances (softening) <sup>2</sup>

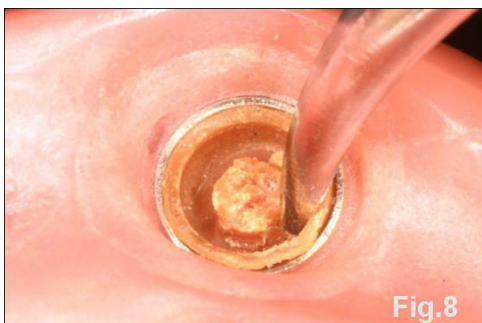
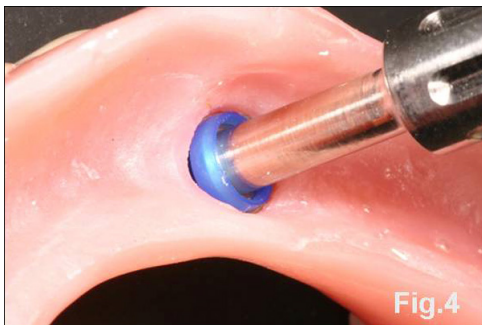
Tab. 1

## Material and Methods

In this study long time influences of denture cleansers and mouthwash with different chemical effect were evaluated. Ten new Locator replacement males of each color coded type (blue/pink/clear, Fig.3) were soaked for the equivalent of 12 months of clinical use in 2 cleansing solutions (Tab.1) and mouthwash (Cool Mint Listerine). Control specimens (n=10) were stored in water for the same time period at room temperature. According to manufacturer's instruction the Locator-Attachments were exposed to cleansing treatments. The exposures lasting 15 minutes each were conducted 365 times (one year) at 22°C. After thermal-cycling (n=5000/5°/55°C) a universal testing machine (Zwick Roell GmbH, Germany) was applied to test retentive force (n=20) for each male at a cross-head speed of 50mm/min (s=3mm). Results were electronically measured and descriptively and statistically analysed (t-Test,  $p < 0.05$ ).

## Results

Locator males soaked in water (control) showed different retentive values (5.00±1.9N [blue] 11.17±2.4N [pink], 18.9±3.4N [clear]). Denture cleansing solutions significantly affected the retentive values of all Locator attachments. The results are presented in Fig. 10. There was a significant difference in the retentive values of attachments soaked in Corega Tabs Dental White (8.90±1.9N [blue], 14.71±1.1N [pink], 24.34±3.6N [clear]), Corega Tabs Partial (8.45±2.1N [blue], 13.43±2.5N [pink], 23.45±3.8N [clear]) and Cool Mint Listerine mouthwash (6.50±2.9N [blue], 14.65±2.3N [pink], 22.48±1.9 [clear]) when compared to the control group ( $p \leq 0,001$ , t-test, Mann-Whitney-Test). The blue Locator-Attachments showed the highest increment of retention after storage in Corega Tabs Dental White ( $p \leq 0,001$  Mann-Whitney-Test). Mouthwash also caused discolorations in all Locator attachments (Fig. 9).



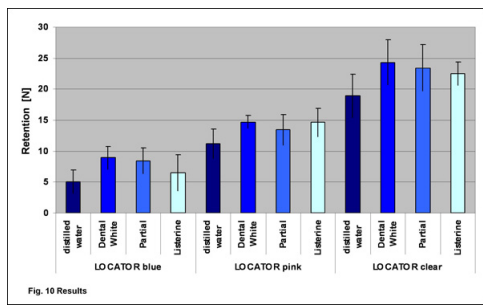


Fig. 10 Results

## Conclusions

Denture cleansing solutions affected the retentive values of the tested Locator attachment males. In this in-vitro study denture cleansing solution statistically increased the single-pull retentive values of the Locator-Attachments, an effect that may not be beneficial. The increased retentive forces [N] (Fig. 10) are similar to the data reported by Varghese et al. [5] - which tested semi-precision yellow harder clips. However it is impossible to reproduce precise intraoral displacement patterns. Increased retentive values and the high standard deviation may be associated with reduced durability of the Locator-Attachments which is caused by the attachments' semi-precision characteristics. Further research with more samples is needed to address this issue.

In this in-vitro study denture cleansing solutions caused an increment of the retention force of tested Locator attachment males. Under clinical conditions retention may also be influenced by wear and fatigue stress.

## Literature

1. Boeckler A, Arnold C, Rump D, Bierögel C, Setz J: Retention characteristics of Locator attachments on angulated dental implants. J Dent Res 88, 2923 (2009)
2. Chung KH, Chung CY, Cagna DR, Cronin RJ, Jr.: Retention characteristics of attachment systems for implant overdentures. J Prosthodont 13, 221-226 (2004)
3. Ludwig K, Hartfil H, Kern M: Untersuchung zum Verschleißverhalten von Kugelkopfattachements. Quintessenz Zahntech 1074-1083 (2005)
4. Nguyen C, Masri R, Driscoll CF, Romberg E: In-Vitro effects of cleansing solutions on pink locator attachments' retention. J Dent Res 88, 1791 (2009)
5. Varghese RM, Masri R, Driscoll CF, Romberg E: The effect of denture cleansing solutions on the retention of yellow Hader clips: an in vitro study. J Prosthodont 16, 165-171 (2007)

*This Poster was submitted by [Dipl.-Ing. \(FH\) Christin Arnold](#).*

### Correspondence address:

[Dipl.-Ing. \(FH\) Christin Arnold](#)  
 Martin-Luther-University Halle-Wittenberg  
 Department of Prosthodontics, Centre for Dentistry and Oral Medicine  
 Poliklinik für Prothetik  
 Grosse Steinstrasse 19  
 06108 Halle /Saale  
 Germany

Arnold Ch, Fraedrich D, Setz J, Boeckler AF

## Effect of Cleansing Solutions on the Retention of Locator Attachments

### Introduction

Locator-Attachment (Zet Ancors, Escandido, USA) are prefabricated semi-precision abutments. Those attachments are available for 50 different implant systems. Locator attachments provide dual retention through both external and internal mating surfaces (Fig. 1). The retentive nylon males are available in varying amounts of retention and are held in a titanium denture cap. The colour coded males (polysulfide) have to be replaced in case of decrease of the retention.

Poor denture hygiene results in the accumulation of debris and bacterial plaque on the surface of prostheses, causing malodor and inflammatory changes to the adjacent mucosa. Chemical has been considered to be an efficacious method to prevent micro-organisms and denture plaque formation. However, some denture cleansers may have harmful effects on the nylon components of the denture and it may adversely affect the retention force and accelerate the process of wearout (Fig. 6-9).

The aim of this in-vitro study was to evaluate changes in retention forces of different Locator-Attachments after exposure to denture cleaners and mouthwash.



Fig 1 design of Locator Attachment (partial section)

Tab. 1 Cleansing Solutions

properties	effect
Corega® Tabs® Dental White	disinfection/bleaching
Corega® Tabs® Partial	disinfection/bleaching
profender Softand Mild, Drogenes (Biod)	
Amberline GlanzSchleife, Peropony, NY (USA)	
sodium carbonate	alkaline neutral substances
sodium sulfate H <sub>2</sub> O <sub>2</sub> SE	odor
citric acid	alkaline substances-solvent
sodium perborate	removing substances
sodium bicarbonate	acid and bleach
sodium borate	alkaline solution
PEG-180	lubricant
sodium lauryl sulfonate	surfactant
hydroxyethylcellulose	viscosity
PVP/VA Copolymer	binding agent
ammonium acetate	inertness & alkalinity
CI 43000	color
CI 73018	cosmetic colorant
EDTA	chelating substances

### Materials and Methods

In this study long time influences of denture cleansers and mouthwash with different chemical effect were evaluated. Ten new Locator replacement males of each color coded type (blue/pink/clear, Fig. 3) were soaked for the equivalent of 12 months of clinical use in 2 cleansing solutions (Tab. 1) and mouthwash (Cool Mint Listerine). Control specimens (n=10) were stored in water for the same time period at room temperature. According to manufacturer's instruction the Locator-Attachments were exposed to cleansing treatments. The exposures lasting 15 minutes each were conducted 365 times (one year) at 22°C. After thermal-cycling (n=5000/5/55°C) on universal testing machine (Zwick Roell GmbH, Germany) was applied to test retentive force (n=20) for each male at a cross-head speed of 50mm/min (n=3/mm). Results were electronically measured and descriptively and statistically analysed (t-Test, p<0.05).

### Results

Locator males soaked in water (control) showed different retentive values (5.00±1.9N [blue], 11.17±2.4N [pink], 18.9±3.4N [clear]). Denture cleansing solutions significantly affected the retentive values of all Locator attachments. The results are presented in Fig. 10. There was a significant difference in the retentive values of attachments soaked in Corega Tabs Dental White (8.90±1.9N [blue], 14.71±1.1N [pink], 24.34±3.6N [clear]), Corega Tabs Partial (8.45±2.1N [blue], 13.43±2.5N [pink], 23.45±3.8N [clear]) and Cool Mint Listerine mouthwash (6.50±2.9N [blue], 14.65±2.3N [pink], 22.48±1.9 [clear]) when compared to the control group (p<0,001, t-test, Mann-Whitney-Test). The blue Locator-Attachments showed the highest increment of retention after storage in Corega Tabs Dental White (p<0,001 Mann-Whitney-Test). Mouthwash also caused discolorations in all Locator attachments (Fig. 9).

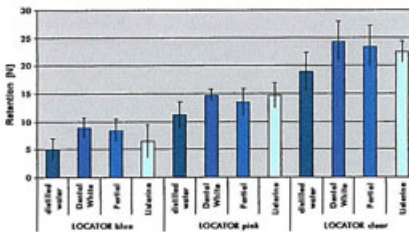


Fig 10 Results

### Discussion

Denture cleansing solutions affected the retentive values of the tested Locator attachment males. In this in-vitro study denture cleansing solution statistically increased the single-pull retentive values of the Locator-Attachments, an effect that may not be beneficial. The increased retentive forces [N] (Fig. 10) are similar to the data reported by Varghese et al. [5] - which tested semi-precision yellow harder clips. However it is impossible to reproduce precise intraoral displacement patterns. Increased retentive values and the high standard deviation may be associated with reduced durability of the Locator-Attachments which is caused by the attachments' semi-precision characteristics. Further research with more samples is needed to address this issue.

### Conclusions

In this in-vitro study denture cleansing solutions caused an increment of the retention force of tested Locator attachment males. Under clinical conditions retention may also be influenced by wear and fatigue stress.

- Boeckler A, Arnold C, Rang D, Böttger C, Setz J. Retention characteristics of Locator attachments on organized dental implants. J Dent Res 88, 2922 (2009)
- Chang EP, Cheng CY, Cheng SK, Chen SJ, Lu S. Retention characteristics of attachment systems for implant overdentures. J Prosthodont 13, 221-226 (2006)
- Isidor F, Jørdal H, Kim AH. Untersuchung von Verschlussmechanismen von Kugelgelenkverbindungen. Quintessenz Zahnarch 1074-1082 (2009)
- Hagen C, Mauer R, Ditschel C, Böttger C. Einfluss 1- bis 3-jähriger Exposition von Locator-Attachments auf die Retention. J Dent Res 88, 1791 (2009)
- Varghese SB, Mose C, Dostal CT, Böttger C. The effect of denture cleansing solutions on the retention of yellow Harder clips: an in-vitro study. J Prosthodont 16, 165-171 (2003)



Christin Arnold, Dipl.-Ing. (FH), graduate engineer  
Center for Dentistry and Oral Medicine  
Department of Prosthodontics  
Christine-Franke-Str. 19  
06108 Halle Saale, Germany  
email: christin.arnold@med.uni-halle.de