

Retention and wear of attachments for implant overdentures

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Background and Aim

Recently, attachment systems have been improved regarding retention and stability of implant-supported overdentures. Ball and ball-like attachments are known to be cost effective, simple, hygienic and easy to handle¹. However, considerable loss of retention due to the attachment abrasion and micromovements during function has been reported², but little evidence is given on the influence of implant angulation on the retention of attachments. The present laboratory study aimed to investigate the retention and wear of three different attachments for implant overdentures and the influence of implant and patrices angulation.

Methods and Materials

Sixteen patrices from each attachment system (Locator RTx, Zest; Novaloc, Straumann; CM Loc, Cendres + Métaux) were connected to an implant analogue and fixed rigidly in an auto-curing resin cast, either orthogonally or 15 degrees tilted. Eight patrices from the Novaloc system with a 15° tilted male part were additionally tested. The corresponding matrices were connected to the patrices and in that position fixed in a stylized unilaterally removable dental prosthesis using a BisGMA based temporary crown and bridge material (LuxaTemp, DMG). Overall, 30,000 joining and separating cycles of the matrix were performed in the chewing simulator. The tests were performed in water at room temperature. After each joining movement, the unilaterally removable dental prosthesis was loaded eccentrically with 100 N at a distance of 12 mm from the attachment to simulate posterior masticatory forces.

Results

All attachments showed an initial increase in retention irrespective of the angulation and later on a consistent decrease over time. This decrease was statistically significant over time for all attachments ($p \leq 0.05$; one-way ANOVA). The highest loss of retention was seen for the orthogonal Locator RTx attachment, which lost 71% of its initial retention after 30,000 cycles.

The smallest loss of retention after 30,000 cycles was observed for the orthogonal Novaloc attachment. The differences in loss of retention were statistically significant between the two attachments ($p \leq 0.05$)

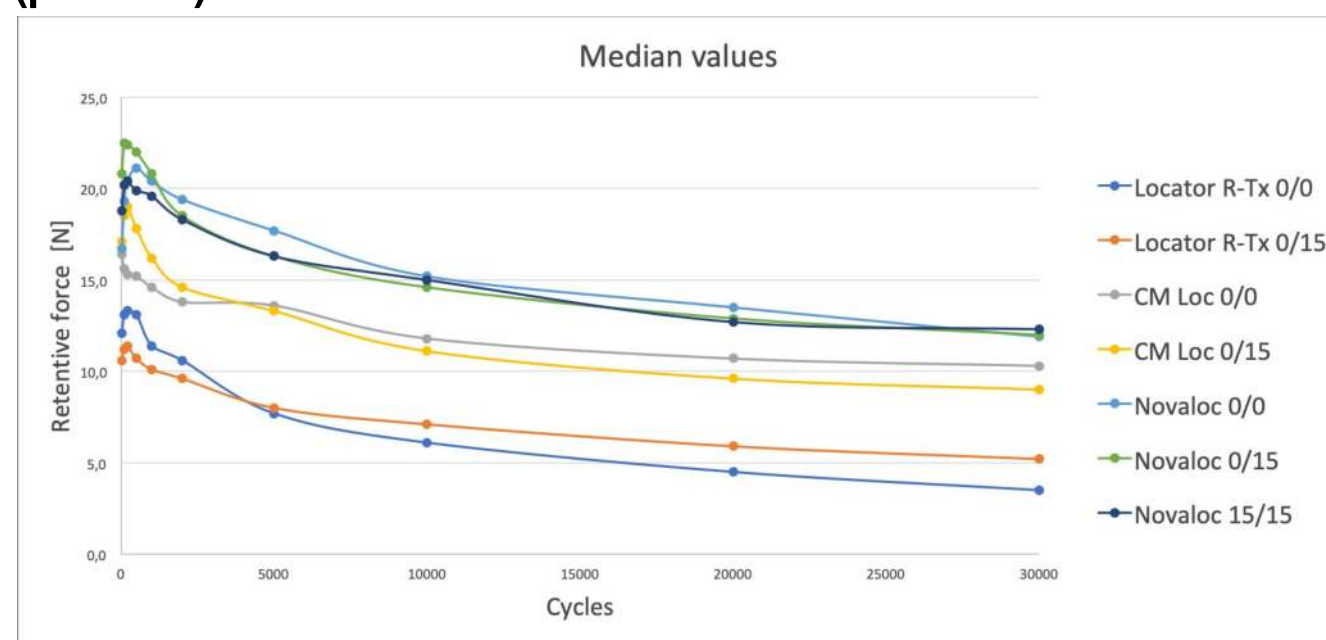


Fig 1: Median values of the retention forces of the three different attachment systems

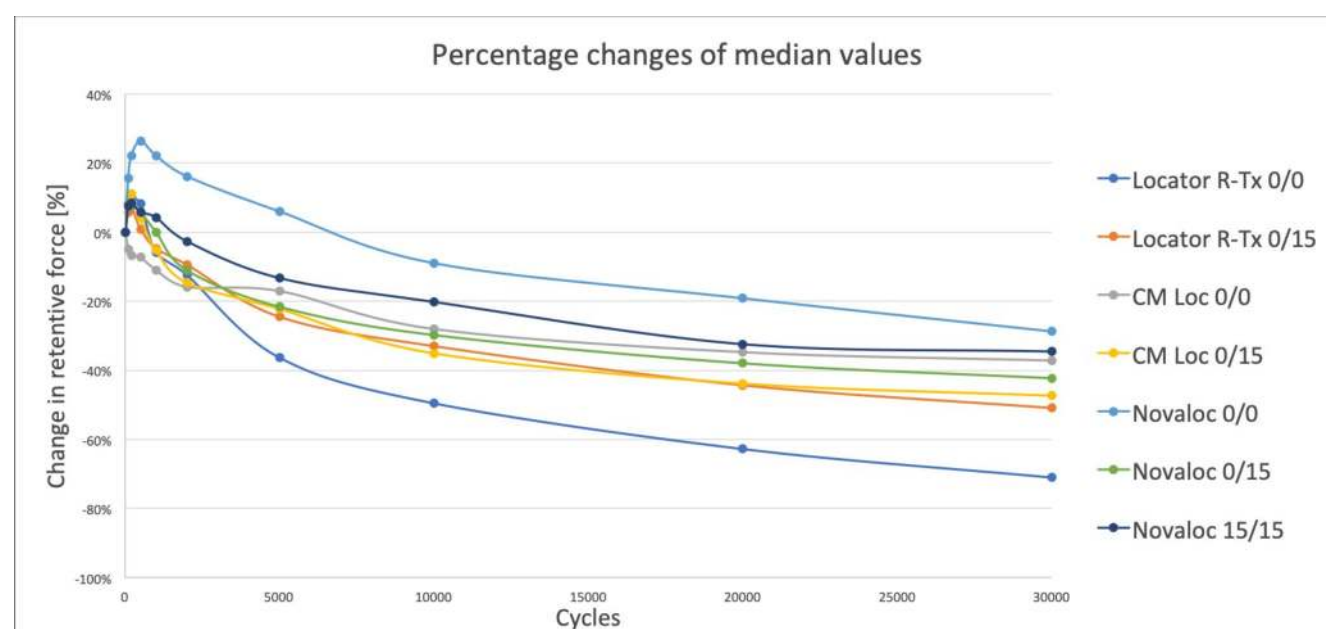


Fig 2: Percentage changes of the median values of the retention forces of the three different attachment systems

Conclusion

All attachment systems revealed a decrease in retention forces over time, irrespective of the implant or male part angulation. The orthogonal Novaloc attachment showed the lowest loss of retention of all tested attachments.

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References

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