

Effect of horizontally shifting the center of magnetic assembly and that of keeper on the retentive force of cup-yoke type of dental magnetic attachments

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It is generally known that the retentive force of dental magnetic attachments decreases in the presence of a gap. In this study, retentive forces of cup-yoke type magnetic attachments in different horizontal positions were measured and the relationship investigated. The mechanism leading to the change was studied by making use of models.

The three dental magnetic attachments used were: GIGAUSS, HYPER SLIM and an experimental set made of HYPER SLIM magnetic assembly paired up with a keeper which had a hole at the center. Retentive forces were measured as per ISO 13017, in various positions whereby the center of magnetic assembly and that of keeper was shifted horizontally at intervals of 100 μm .

Retentive forces of all the sets decreased with increase in horizontal displacement. The decrease was not uniform and the curve had many inflection points. Based on analysis using mathematical formulas, conclusions could be as follows:

1. Retentive force changes due to movement of magnetic assembly away from keeper though the actual determinant is the disparity in contact surface area between cup-yoke to keeper and keeper to disk-yoke.
2. The change in contact surface area affects fields in the closed magnetic circuit leading to reduced retentive forces.