Retention and mechanical behavior of attachment systems for implant-retained auricular prostheses

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Objective: Auricular prostheses are artificial substitutes for facial defects. The retention of these has often been a problem. This study aimed to evaluate the mechanical behavior of 3 retained auricular prosthetic connections when submitted to a mechanical cycling test. Materials and Methods: Twelve samples with installed implants were obtained and divided into 3 groups according to their retention system with 4 samples in each group. I: bar-clip system; II: magnet system; and III: ball/o-ring system. Each of samples was submitted to the pull-out test during 3240 cycles (f=0.5 Hz) to determine its tensile strength. The mechanical cycling test was performed using the servo-hydraulic machine MTS 810-Flex Test 40 (Eden Prairie, MN) that had a 2.5mm shift at a 10 mm/s velocity. The retaining strength for each of the samples was obtained at 7 intervals. Results: The tensile strength for the group retained by the bar-clip system (29.60 N) was higher with statistically significant difference ($P<0.05$) when compared with the group retained by the ball/oring system (9.41 N) and magnets system (8.61 N) for all periods assessed. The ball/o-ring system showed loss of retention during the fatigue test (Kruskal-Wallis, chi-squared=17.28; $P<0.01$). Conclusions: The evaluated systems showed a tensile strength compatible with the clinical use and no fractures of the components were observed.

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Prosthesis retention

Tensile strength

biomechanics

bone implant interface

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