

# Bond strength of various bracket base designs

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## Abstract

To determine the influence of various bracket base designs on bond strength and debond interface, 6 types of metal interlock brackets of different sizes and with different base designs were evaluated. The bracket base types and mesh sizes tested were as follows: retention groove base (Dynalock, Unitek, Monrovia, Calif), circular concave base (Accuarch appliance Formula-R, Tomy, Tokyo, Japan), double mesh with  $5.1 \times 10^{-2}$  mm<sup>2</sup> mesh size (Ultratrimm, Dentaurem, Ispringen, Germany), double mesh,  $3.1 \times 10^{-2}$  mm<sup>2</sup> (Minidiagonali Roth, Leone, Florence, Italy), double mesh,  $3.1 \times 10^{-2}$  mm<sup>2</sup> (Tip-edge Rx-I, TP Orthodontics, LaPorte Ind), and double mesh,  $2.9 \times 10^{-2}$  mm<sup>2</sup> (Mini Diamond, Ormco, Glendora, Calif). The Unitek bracket is cast in 1 piece; the other brackets are welded together. Brackets were bonded to human teeth and then debonded on a testing machine. The debond interface was recorded and analyzed with scanning electron microscopy and energy-dispersive x-ray spectrometry, and the distribution of interfaces was determined. The ranking of bond strength of individual bases (kg/base) from highest to lowest was Tomy, Dentaurem, Unitek, Leone, TP Orthodontics, and Ormco. The ranking of bonding strength per area squared MPa from highest to lowest was Tomy, Dentaurem, Leone, Unitek, TP Orthodontics, and Ormco. Debond in interfaces occurred between the bracket and resin, within the resin, or between the resin and enamel. The most debonded interfaces were between the bracket and resin and between the resin and enamel. The Tomy bracket, with its circular concave base, produced greater bond strength than did the mesh-based brackets; among the mesh-based brackets, Dentaurem, with the larger mesh size, produced greater bond strength than the brackets with smaller mesh sizes. The Unitek bracket, with its 1-piece cast base with retention grooves, ranked in the midrange of bond strength.