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## Fracture strengths of ceramic brackets subjected to mesial-distal archwire tipping forces

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### ABSTRACT

This study tested the strength of ceramic orthodontic brackets subjected to mesial-distal tipping forces on five types of pre-adjusted, maxillary right central incisor ceramic twin brackets for both 0.018" and 0.022" slot sizes. Description of each bracket was by manufacturer's abbreviation-crystallinity-slot bracket, eg., AL-P-18, meaning Allure-polycrystalline-0.018" slot bracket. Thirty brackets of each type were used for a total of 300 brackets, each bonded to a porcelain denture tooth. A special apparatus was designed to hold the denture tooth, the wire, and the bracket in a standard position while an Instron machine applied a tipping force to the full size rectangular archwire at a distance of 7.0 mm lateral to the center of the bracket. The tipping force was applied until the bracket fractured. The fracture force, fracture angle, and fracture location were recorded.

High fracture force values tended to accompany large fracture angles while low fracture force values tended to be associated with small fracture angles. The clinical significance was that the stronger ceramic brackets can be expected to withstand larger amounts of archwire tipping adjustments prior to bracket fracture. With the literature indicating the optimum force for tipping of maxillary incisors to be from 50 to 125 g, all the brackets are sufficiently strong to consistently withstand the suggested magnitude of archwire tipping forces. However, if excessive tipping forces were required by the clinician, ceramic brackets would be prone to fracture.

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