

Evaluation of alternative polymer bracket materials.

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Abstract

INTRODUCTION: Polymer brackets still have some disadvantages because of decreased wear resistance and hardness. The aim of this study was to investigate the mechanical properties of alternative bracket polymers; urethane-dimethacrylate, high-density polyethylene, and an experimental bracket polymer (EBP) consisting of polyethylene and a copolymer were tested. Polycarbonate and polyoxymethylene brackets served as controls. **METHODS:** The mechanical properties of urethane-dimethacrylate, high-density polyethylene, EBP, polycarbonate, and polyoxymethylene bracket materials were evaluated after thermocycling (6000 x 5 degrees C-55 degrees C) in a mastication device before testing. Three medium-wear, fracture toughness, and Vickers hardness tests were performed. **RESULTS:** High-density polyethylene had the highest values of wear and the lowest values of fracture toughness and Vickers hardness. The urethane-dimethacrylate bracket material and the EBP had better mechanical properties than polycarbonate. The polyoxymethylene bracket material had the highest values of fracture toughness and Vickers hardness, and the lowest values of wear compared with the other investigated polymers. **CONCLUSIONS:** High-density polyethylene seems to be unsuitable as bracket material because it demonstrated excessive wear and insufficient fracture toughness. Polyoxymethylene had the best performance during mechanical testing. 2010 American Association of Orthodontists. Published by Mosby, Inc. All rights reserved.