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Effect of Crosslinking in Acrylic Teeth on Failure Strength

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ABSTRACT


Purpose : The purpose of this study is to evaluate the failure strength of two different types of denture teeth fabricated on injection moulded or compression moulded high impact denture base resins and to analyse the type of bond failure that occurs after failure testing (adhesive/cohesive/mixed).

Materials and Methods: Two central incisor denture tooth materials were tested: crosslinked (Cosmo HXL; Dentsply) and conventional non-crosslinked (New Ace; Yamahachi). Denture teeth of each type were processed on an injection moulded resin (SR-Ivoclar; Ivoclar Vivadent) or a compression moulded resin (Lucitone 199; Dentsply) (n= 10). The denture teeth were loaded at 45° on the incisal edge. The failure load was recorded and analyzed with ANOVA test, and the fracture mode was categorized from observed fracture surfaces as cohesive, adhesive, or mixed failure.

Results: The following failure loads (mean) were recorded: injection moulded non-cross linked group- 505.09 N; injection moulded crosslinked group- 487.34 N; compression moulded non-crosslinked group- 413.00 N; compression moulded crosslinked group- 184.92 N. Injection moulded resin yielded significantly higher failure strength for both denture teeth ($P<0.001$), among which non-crosslinked teeth had the highest strength. Failure was predominantly cohesive in the teeth, with the exception of mixed mode for the compression moulded crosslinked group.

Conclusion: When good bonding was achieved, the strength of the structure (denture tooth/base resin combination) was determined by the strength of the denture teeth, which may be affected by the processing technique.

Key words: injection moulding; compression moulding; failure strength; high impact denture base resin; crosslinked teeth.

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