IADR Abstract Archives

Cyclic Fatigue of Tooth-Base Strength: Conventional, Milled, 3D Printed Dentures

Objectives: Separation of denture teeth from their bases is a common clinical occurrence. This research measured the cyclic fatigue of anterior denture teeth to their bases made using 3 different methods: conventional processing, milling, or 3D printing.
Methods: A wax-up of the desired gingival contour of an upper anterior segment (Cuspid-Central) was made including carded teeth (DENTSPLY Portrait Inspired IPN, 3D mold 163SP, A2) and was scanned. A cylindrical base form was digitally added to secure the specimen in a custom, 3-position fatigue machine. A commercial dental lab (Drake Prevision Dental Laboratory) provided 10 replications of each specimen type using the digital file: Conventional (single carded teeth processed to Lucitone 199); Milled (DENTSPLY multilayer PMMA disc for teeth and Lucitone 199 puck as base); Printed (Lucitone A2 for the teeth and Lucitone base for the denture, all on a Carbon printer). For milled and printed specimens, 3-tooth segments were made and bonded using DENTSPLY Sirona Lucitone Digital Fuse Steps 1/2. A dimple was made on the lingual of the lateral incisor where the vertical load was applied. Specimens were cyclically loaded under water between 15-200N at 1.5Hz until failure, or up to 1.6 million cycles. Number of accumulated cycles at failure were recorded. Static strength of surviving specimens were obtained (model 5544, Instron). ANOVA on ranks/Tukey post-hoc was used to analyze cycles to failures. Static strength of surviving specimens was compared to the 95% CI mean values for groups of previously run static strength specimens. Pre-set alpha=0.05.
Results: Figure: Numbers within groups surviving 1.6 million cycles: Conventional=0, Milled=1, Printed=6. Cycles-to-failure: Printed>Conventional, Printed=Milled, Milled=Conventional. Surviving strengths either > or < 95% CI for static group.
Conclusions: 60% of PRINTED dentures survived fatigue resting, 10% of MILLED, and none of Conventional. Printed denture teeth/bases provided greater resistance to long-term fatigue testing.

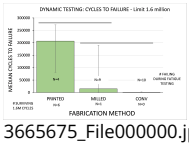
Division:
Meeting: 2022 AADOCR/CADR Annual Meeting
Location: Hybrid, Atlanta, Georgia
Year: 2022
Final Presentation ID: 0767
Abstract Category|Abstract Category(s): Prosthodontics Research

Authors
- Mettenburg, Donald (Dental College of Georgia, Augusta University , Augusta , Georgia , United States)
- Patel, Mohit (Augusta University , Augusta , Georgia , United States)
- Zaher, Ahmed (Dental College of Georgia, Augusta University , Augusta , Georgia , United States)
- Sananez, Andreina (Dental College of Georgia, Augusta University , Augusta , Georgia , United States)
- Knoernschild, Kent (Dental College of Georgia, Augusta University , Augusta , Georgia , United States)
- Frazier, Kevin (Dental College of Georgia, Augusta University , Augusta , Georgia , United States)
- **Rueggeberg, Frederick** (Dental College of Georgia, Augusta University , Augusta , Georgia , United States)

Financial Interest Disclosure: NONE
Support Funding Agency/Grant Number: Omicron Kappa Upsilon Research Grant

SESSION INFORMATION
IN PERSON Interactive Talk Session
Keynote Address; Prosthodontics I
Friday, 03/25/2022 , 11:00AM - 12:30PM

IMAGES



3665675_File000000.jpg

Abstract Archives (https://www.abstractarchives.com) © 2025 PLANet Systems Group (http://www.planetsg.com)