



Tooth Bonding of Four Denture Processing Techniques

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Poster #1964

INTRODUCTION

Technological advances in removable prosthesis include enhanced materials as well as more efficient processes. The use of carded denture teeth with conventional processing involves skill and time from the laboratory technician. The fabrication of dentures via a milled monolithic material can save a technician's time and inventory. The emergence of print technologies also saves time but currently has esthetic limitations.

As new processes become standard of care, it is critical to understand the properties of strength, modulus and bond of these materials.

OBJECTIVE

The purpose of this study was to examine the load bearing capability of denture teeth from four different denture production methods.

MATERIALS AND METHODS

Materials:

Table 1: Materials

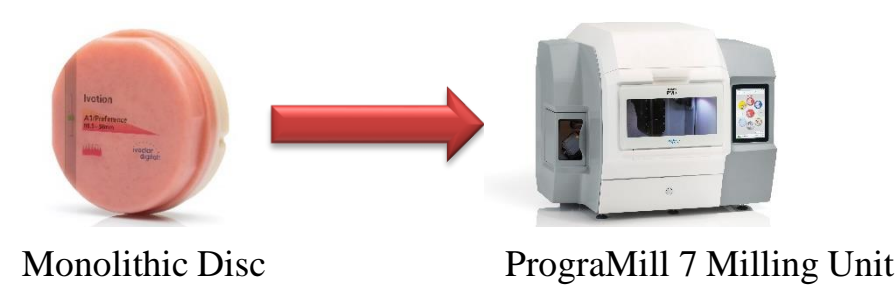
Group	Denture Tooth	Denture Base	Process	Manufacturer	Photo
1	Ivotion™ Monolithic		Single Disc Milling	Ivoclar Vivadent	
2	Ivotion™ Dent	Ivotion™ Base	2 Disc Milling	Ivoclar Vivadent	
3	Blueline® Denture Teeth	Ivobase® High Impact	Conventional - Ivobase®	Ivoclar Vivadent	
4	IPN® CAD Denture Teeth	Lucitone® Digital Print™	Carded Teeth/Print	Dentsply Sirona	

Methods:

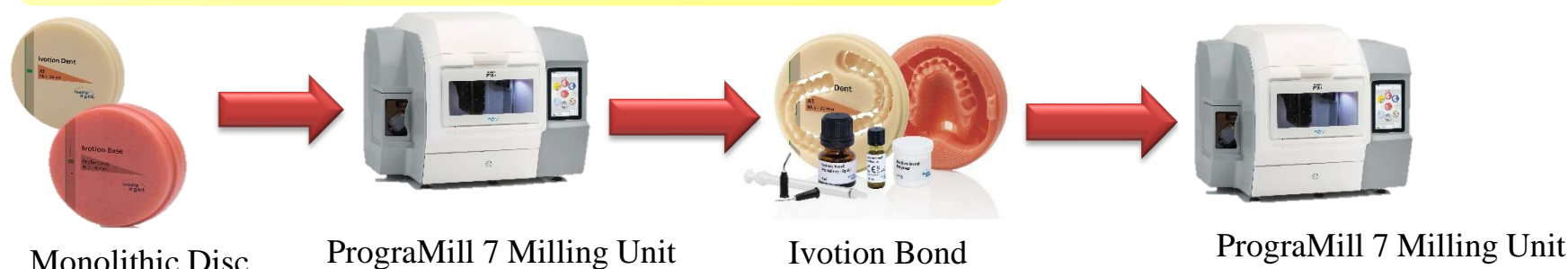
Denture Process

Eight full arch lower dentures were processed from each method.

Group 1: Ivotion



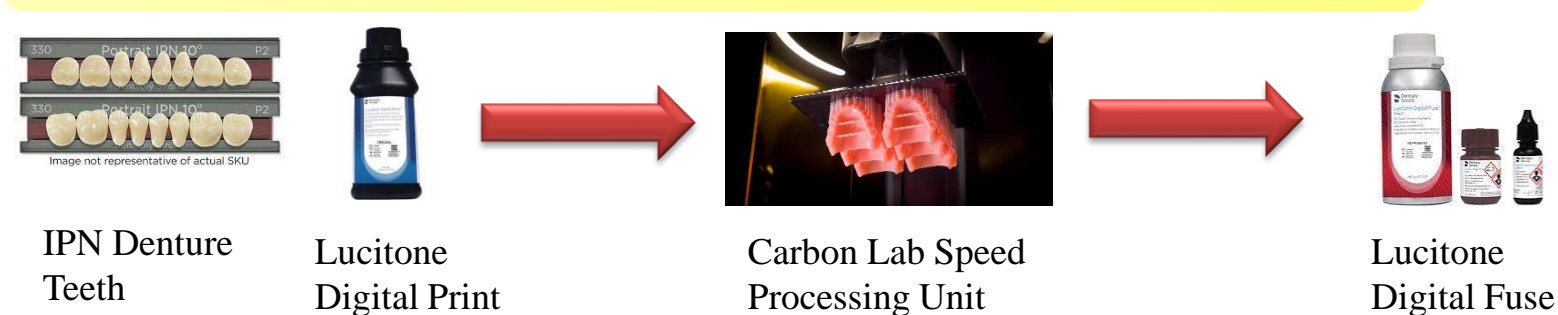
Group 2: Ivotion Dent | Ivotion Base



Group 3: Blueline Denture Teeth | Ivobase High Impact



Group 4: IPS Denture Teeth | Lucitone Digital Print



Specimen Preparation

Teeth 21-23 (ADA Universal Tooth Numbering System) were cut from each arch to be loaded.



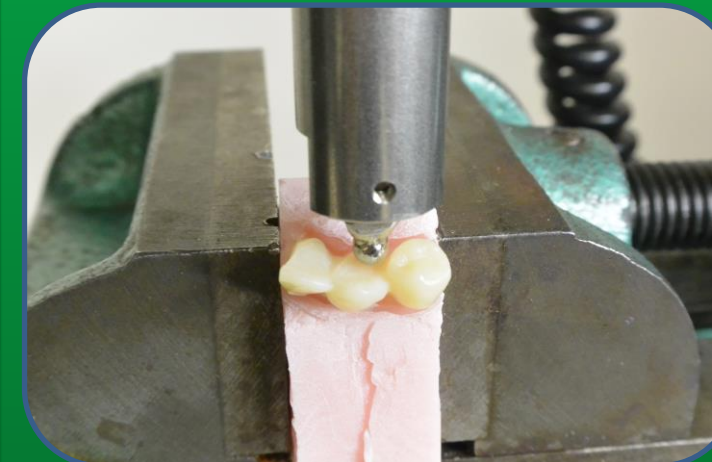
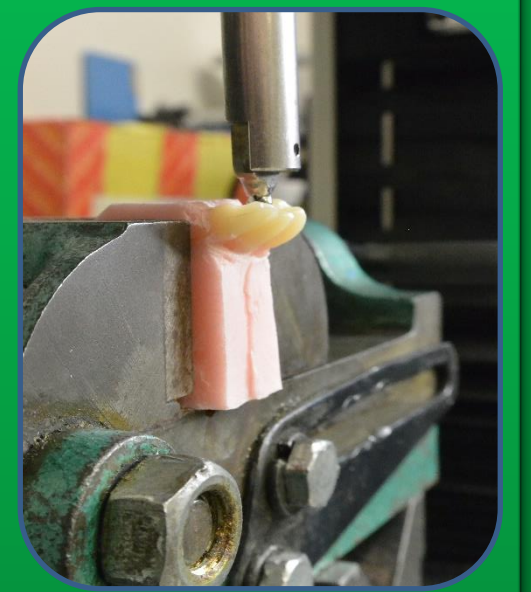
MATERIALS AND METHODS, Cont.

Load to Failure



The three teeth specimens were aligned at 60° from vertical in an Instron® Universal Testing Machine.

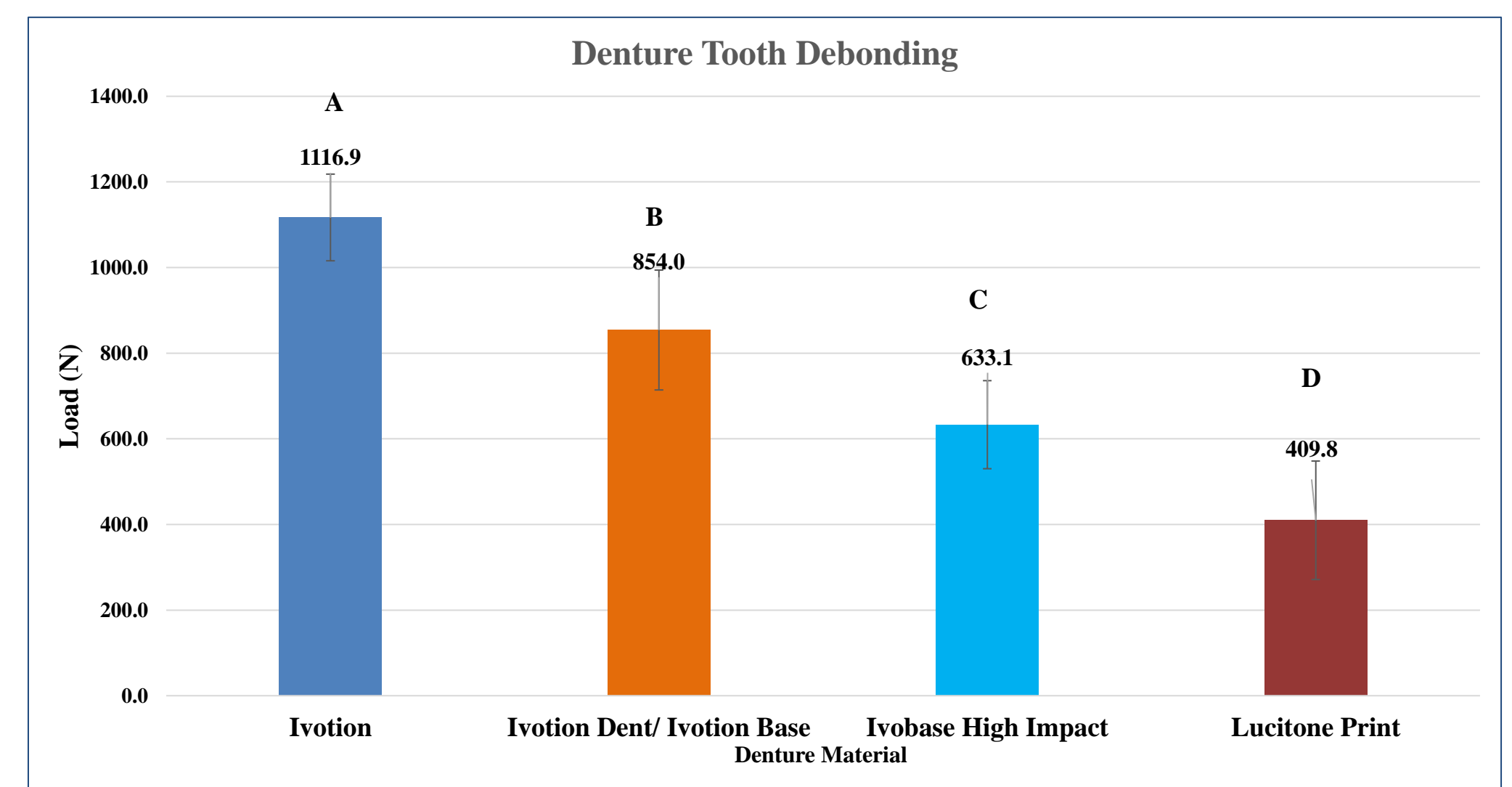
A 3.8mm stainless steel ball was loaded 1 mm from the cusp tip on tooth 22 at a loading rate of 1mm/min until failure occurred.



RESULTS

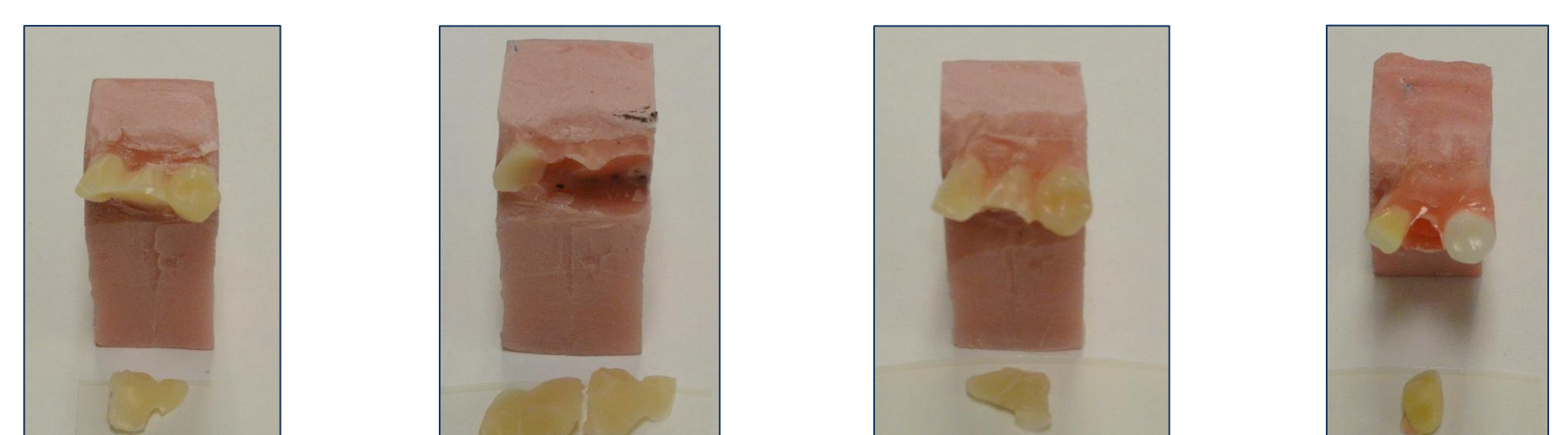
The mean failure loads (N) were analyzed using a one-way analysis of variance (ANOVA) and Tukey's post hoc analysis to determine statistical difference between or within groups ($p \leq 0.05$).

Chart 1: Denture Tooth Debond Values (N)



*Means with different letters are statistically different ($p \leq 0.05$)

Failure Mode: Representative Sample



- The monolithic one-disc milled denture sample showed the highest load to failure to a printed denture base showing the lowest value.
- The printed dentures with carded teeth showed pure adhesive debonding in the adhesive while the other three groups showed mixed mode or cohesive failure.

CONCLUSION

Within the bounds of this study, the load to cause failure of teeth was statistically different for all four tested denture processing methods. The failure method also differed between the groups for each tested method.

REFERENCES

Maragliano-Muniz, Pamela, and Eric D. Kukucka. "Incorporating Digital Dentures into Clinical Practice: Flexible Workflows and Improved Clinical Outcomes." *Journal of Prosthodontics* 30.S2 (2021): 125-132.

Steinmassl, Patricia-Anca, et al. "Evaluation of currently available CAD/CAM denture systems." *Int J Prosthodont* 30.2 (2017): 116-22.