



Objective

The aim of this study was To compare the tensile bond strength of two chairside resilient denture liners (C-liner) to various CAD-CAM denture base materials.

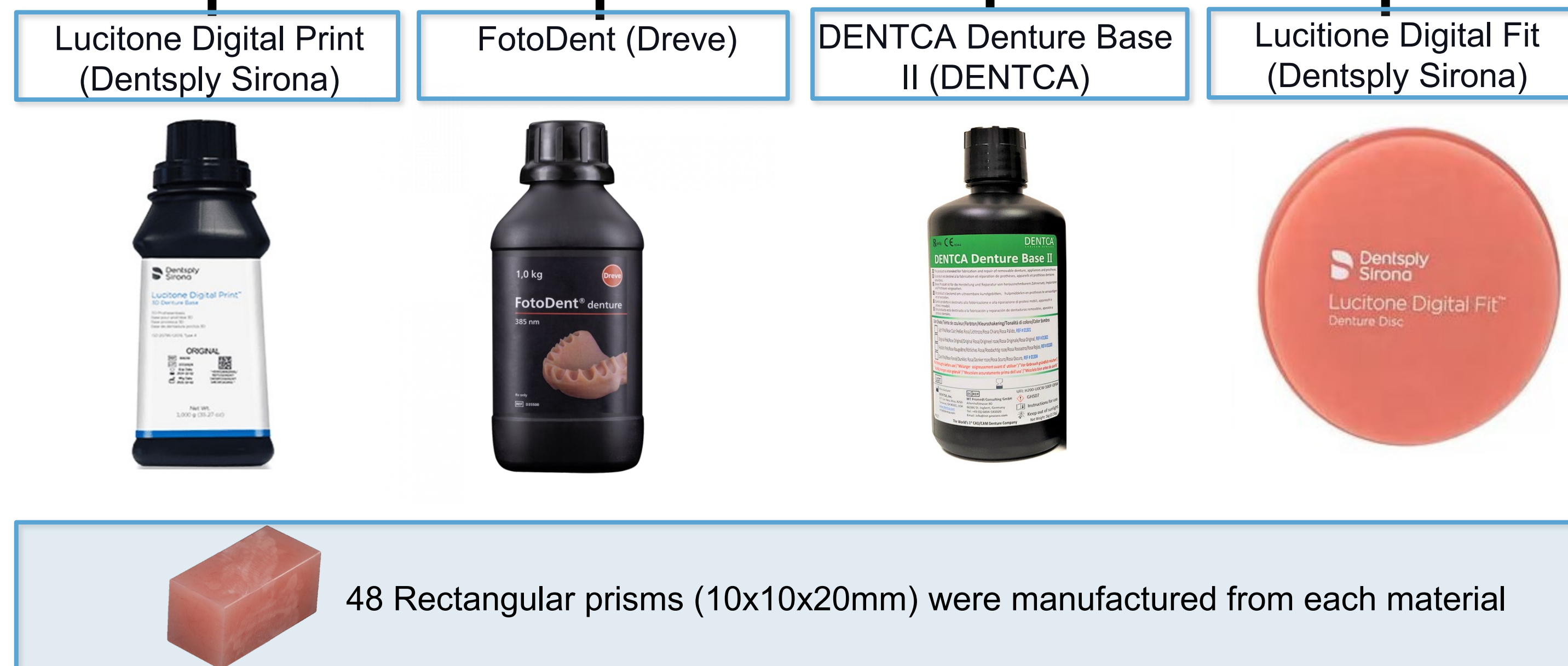
Introduction

Soft denture liners are a type of material used in dentistry to form a cushioned layer between the hard denture base and the oral mucosa.¹ This facilitates greater comfort and ease of use for the wearer.¹ The application of liners aids in the even distribution of masticatory forces to the underlying tissues, as they absorb a portion of the forces generated during the chewing process.² Furthermore, denture patients with ridge atrophy, thin and non-resilient mucosa, and bony structures can benefit from the use of soft liners, which have the potential to improve comfort.¹ Also, soft liners are recommended in cases of irregular bone resorption, immediate prosthesis, healing after implant placement, and for patients with bruxism and xerostomia.¹ Digital technologies are commonly used in modern dentistry for fabricating denture bases, utilizing both additive and subtractive methods.³ With digital dentures, when compared to heat-cured PMMA The fabrication process can be expedited, errors can be decreased, precision can be improved, and better material properties can be achieved.⁴ The scientific literature on the bonding characteristics of denture liners to CAD/CAM fabricated denture resins is currently. It is crucial for clinicians to understand the adhesion mechanism between CAD/CAM acrylic materials and soft liners to apply these materials in clinical settings appropriately.

Materials and Methods

One-hundred ninety-two rectangular prisms (10×10×20mm) were fabricated from three 3D-printed and one milled denture base materials, each 48. All 3D-printed rectangular prisms were cleaned using isopropyl alcohol in ultrasonic post-processing. Additionally, prior to bonding, all bonding surfaces were cleaned with isopropyl alcohol on gauze, including the milled denture base group. Two soft liners (Coe-Soft; GC America, and Lynal; Dentsply Sirona) were used to bond two rectangular prisms of the same denture base materials using a jig, allowing a 3mm thick soft liner between two rectangular prisms. The outcome was having 12 specimens per denture base material and soft liner. Specimens were then stored in distilled water for 24 hours before being exposed to a tensile force using a universal testing machine (Instron 1123 Tensile Tester 4400R) at a cross-head speed of 3 mm/min until complete failure (N). Specimens were then examined under light and magnification to determine the mode of failure. Two-way ANOVA and post hoc tests were used to assess the impact of denture base materials and soft liners on the tensile bond strength ($\alpha=0.05$).

Denture Base Materials

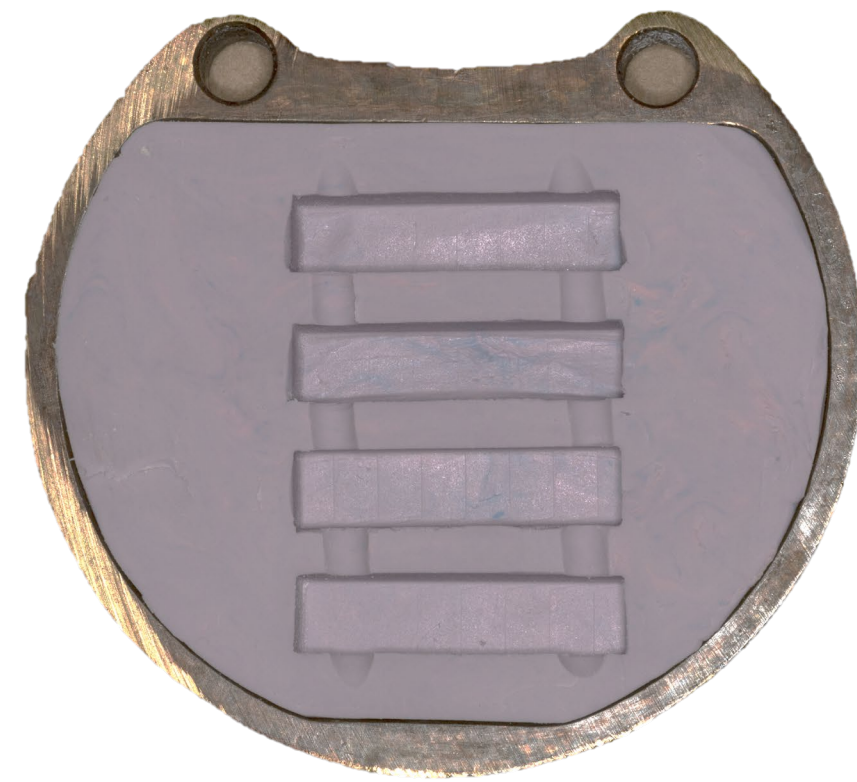


Chairside Denture liners

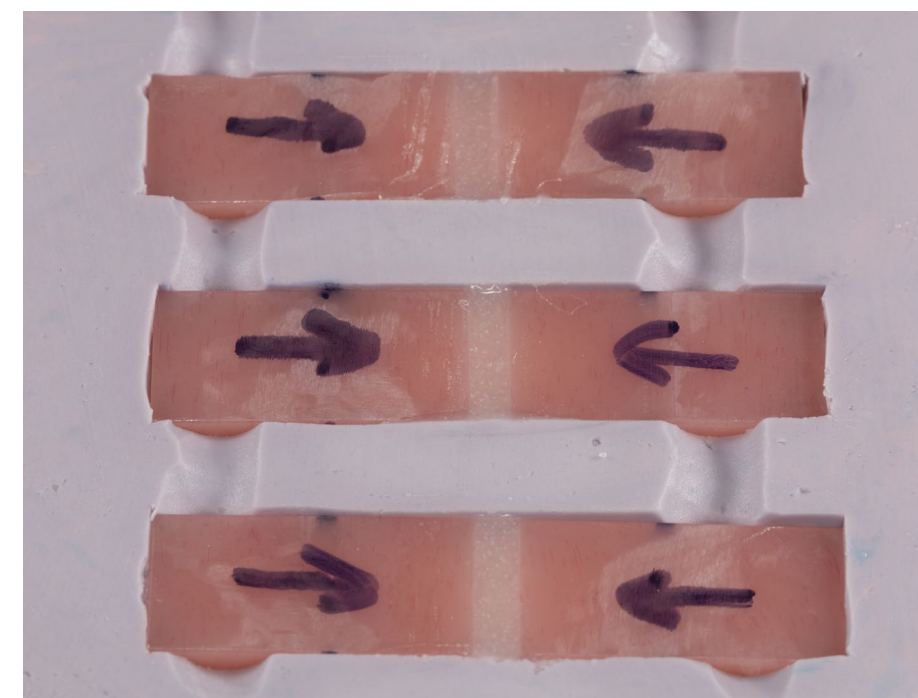
Lynal® (Dentsply Sirona)

COE-SOFT™ (GC America)

Specimen Fabrication



A jig was fabricated from putty, featuring a measured space of (10x10x43mm) to facilitate precise orientation of the rectangular prisms and application of the 3mm soft liner. Specimens were cleaned using alcohol Then, soft liners were mixed and applied following their manufacturers' instructions.

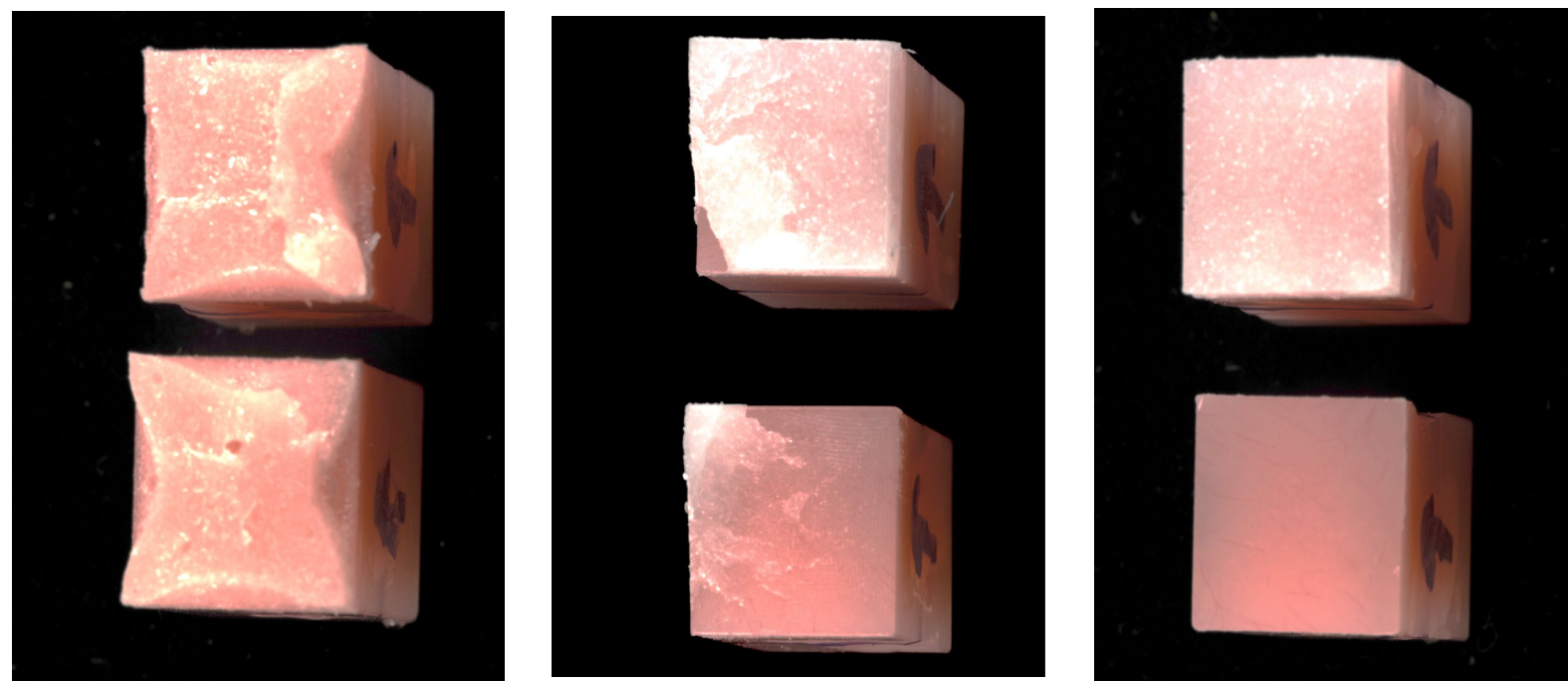


Tensile Bond Strength Test



Tensile force was measured until complete failure using a universal testing machine at a cross-head speed of 3 mm/min.

Mode of Failure



Mode of failure was defined cohesive (left) when a layer of soft liner remains on both surfaces. Mixed (middle) when 50% or less layer of soft liner remains on one surface. Adhesive (right) when all layers of soft liner are removed on one surface.

Results

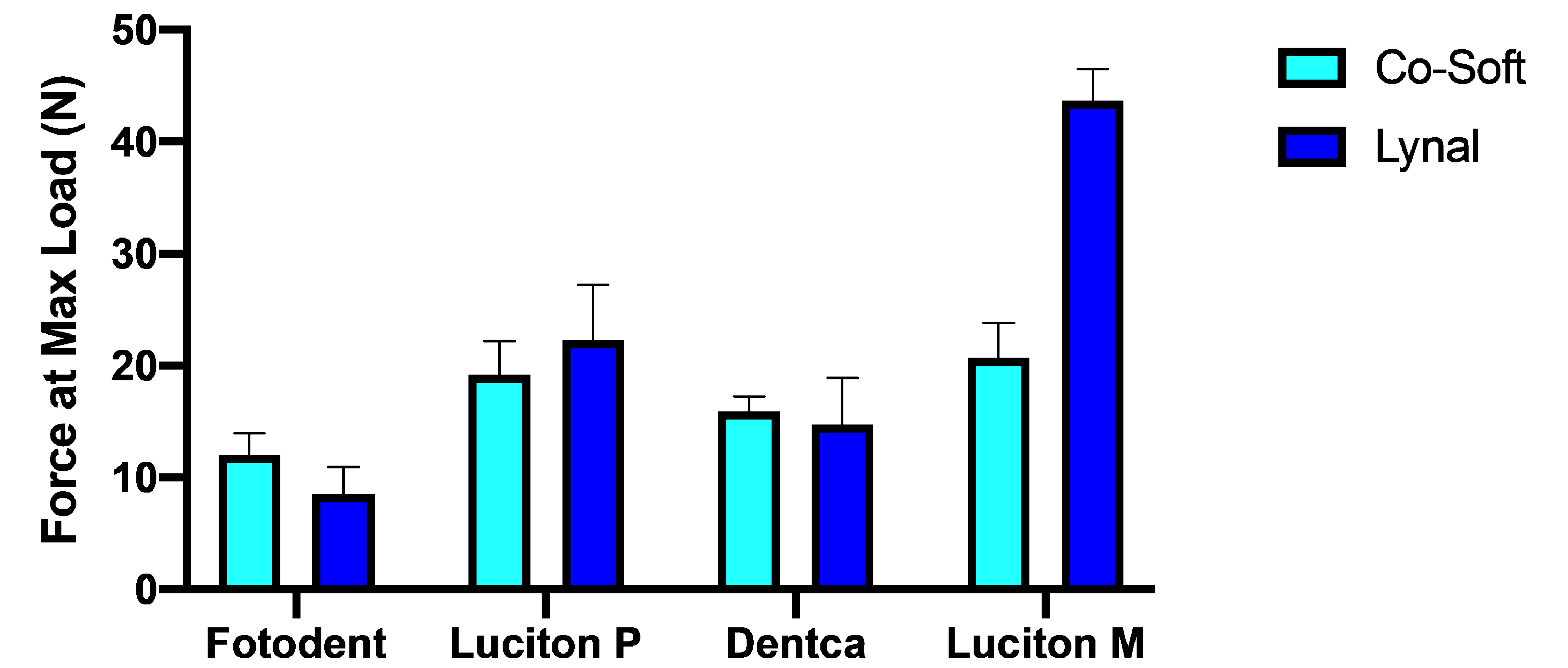


Fig. 1: Force at Maximum Load (N) for various denture base materials and various soft liner.

Denture Base	Soft Liner	Cohesive	Mixed	Adhesive
Fotodent	Co-Soft	12	0	0
	Lynal	0	0	12
Luciton P	Co-Soft	12		
	Lynal	0	0	12
Dentca	Co-Soft	11	1	0
	Lynal	12	0	0
Luciton M	Co-Soft	12	0	0
	Lynal	0	1	11

Table 1: Mode of failure for various denture base materials and various soft liner.

Conclusions

Within limitations of this study it can be concluded:

- Bond strength between soft-liner and 3D-printed denture base materials is lower than Bond strength between soft-liner and milled denture base materials.
- Type of soft liner does not impact ($p>0.05$) the bond strength to 3D-printed denture base materials
- Lynal has significantly ($p<0.05$) higher bond strength to the milled denture base materials than Co-Soft.

References

- Hashem MI. Advances in soft denture liners: An update. J Contemp Dent Pract. 2015 Apr 1;16(4):314-8.
- McCabe JF, Carrick TE, Kamohara H. Adhesive bond strength and compliance for denture soft lining materials. Biomaterials. 2002 Mar 1;23(5):1347-52.
- Anadioti E, Musharbash L, Blatz MB, Papavasiliou G, Kamposiora P. 3D printed complete removable dental prostheses: A narrative review. BMC Oral Health. 2020 Dec;20(1):1-9.
- AlHelal A, AlRumaih HS, Kattadiyil MT, Baba NZ, Goodacre CJ. Comparison of retention between maxillary milled and conventional denture bases: A clinical study. The Journal of prosthetic dentistry. 2017 Feb 1;117(2):233-8.