MECHANICAL PROPERTIES OF PRISMO AND TRADITIONAL STAINLESS-STEEL CROWNS

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Resources

Background

- Pre-fabricated stainless-steel crowns have a record of high clinical success in primary teeth with extensive caries[1]
- There is **low parent and patient satisfaction** with the esthetics of stainless steel[2]
- **Prismo crowns are an alternative restorative option** with lustered blue, gold, purple, and multicolored options for pediatric patients[3] (Fig 2)

Objective

To evaluate the mechanical properties of Prismo crowns with comparisons to other crown brands (3M, NuSmile)

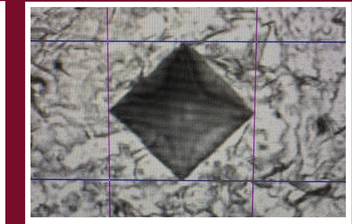

Figure 1: Microhardness tester indentation measurements

Materials & Methods

Wear Testing

- Crowns were tested in an Alabama wear simulator (Fig 3) with opposing force of 75N and 30° rotation for 230k cycles
- Compared crowns via pre- and post-cycling intraoral scans

Microhardness

- Vickers microhardness indenter dwelled on the samples for 15s with a 200g vertical load
- Effect of the indenter was measured at 50x magnification (Fig 1)

Toothbrush Abrasion

- Prismo crowns were tested in a toothbrush simulator for 80k (8 years equivalent[4]) cycles of toothbrushing
- Colors were evaluated qualitatively with photographs and quantitatively with a spectrophotometer

Figure 2: Multicolored Prismo crown restoring a primary molar[3]

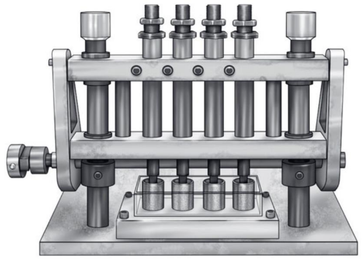

Figure 3: Alabama wear simulator[5]

Figure 4: Blue Prismo crowns after respective number (and years equivalent) of toothbrush abrasion cycling

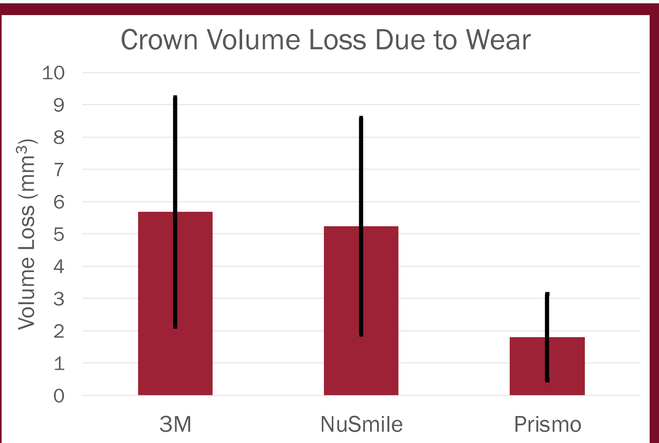

Figure 5: Crown volume loss and standard deviation

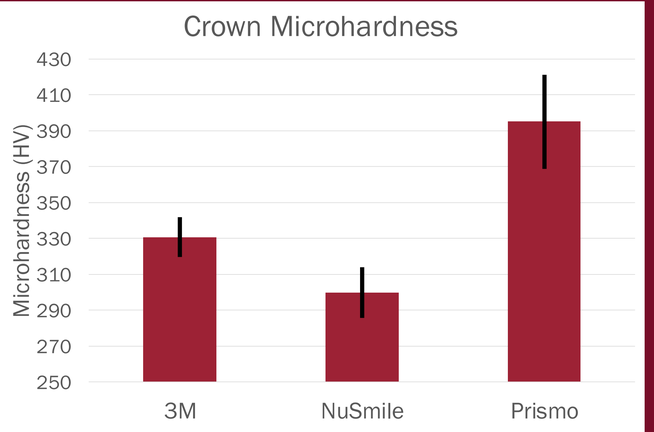

Figure 6: Crown microhardness and standard deviation

Results

Wear Testing (Fig 5)

- **Prismo crowns had significantly less volume loss** due to wear compared to 3M and NuSmile crowns
- No significant difference between 3M and NuSmile crowns

Microhardness (Fig 6)

- The **difference in microhardness was significant between all 3 crown brands**
- Prismo > 3M > NuSmile

Toothbrush Abrasion (Fig 4)

- There was a **significant difference in the color of the Prismo crowns** before and after toothbrush abrasion cycling

Discussion

- Prismo crowns may be more suitable for heavy bruxers in preventing crown deformation and perforation
- Tooth preparation may require a slightly more passive fit to accommodate the less ductile Prismo crowns; more studies needed
- The color of Prismo crowns is not stable and begins to fade within 2 years or less of regular brushing