3M Oral Care

Abrasive wear of monolithic Lava™ Plus zirconia crowns: Two Year Report

Investigators

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Aim of the Study

The aim of this study was to evaluate the amount of abrasive wear on the antagonist occlusal surfaces of clinically placed monolithic Lava Plus premolar and molar crowns.

Study Design at a Glance

Design: longitudinal, prospective, two-center, clinical study

Materials: Lava Plus Monolithic Zirconia Crowns, RelyX Unicem Self-adhesive cement (3M)

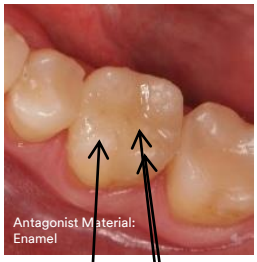
Number of Lava Plus crowns included: 14 crowns (9 molars, 5 premolars)

Number of antagonist teeth available for wear analysis: 15 teeth (7 molars, 8 premolars) with 22 analyzed contact areas.

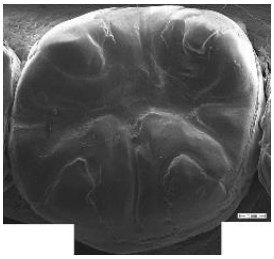
Evaluation Criteria: Polished monolithic zirconia crowns were placed at Aachen University and VPS impressions were taken. Maximum vertical loss and volume loss at the occlusal surfaces of Lava Plus crowns and antagonists were quantified by optical profilometry (CT100, Cybertechnologies) based on replica. Relevant contact points on enamel or ceramic of the antagonists were visually identified and qualitatively analyzed on replicas using scanning electron microscopy

Occlusal situation with respective contact points on antagonist. First lower molar with ceramic inlay.

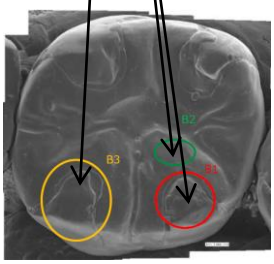
Baseline



T1



Baseline

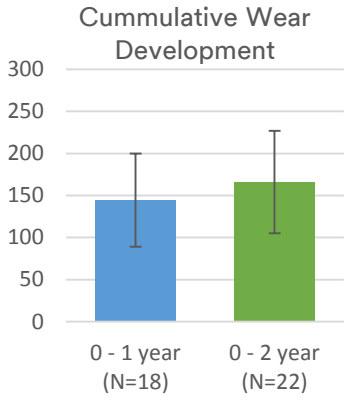


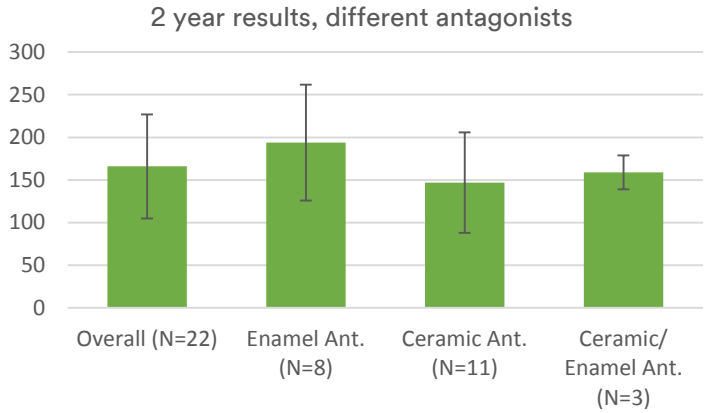
24 Month

SEM images of epoxy replicas of antagonist tooth, circles showing the worn areas on enamel and ceramic after 24 month.

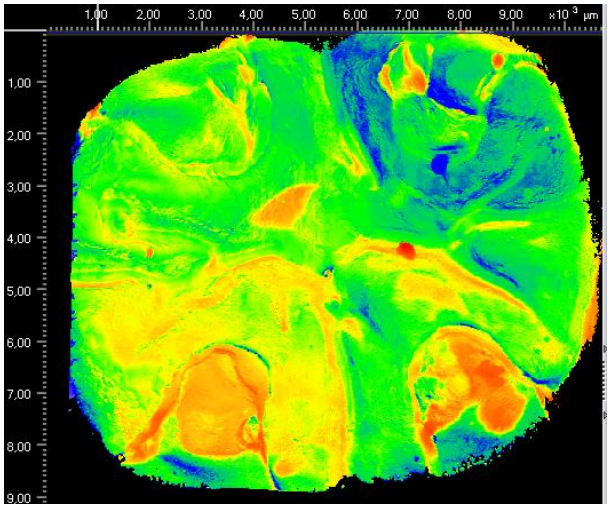
Results

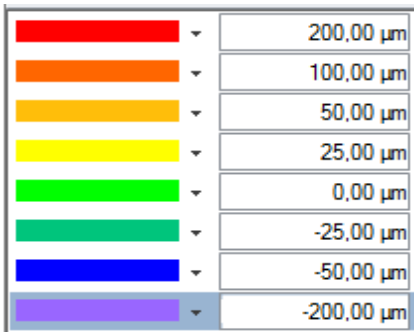
Mean maximum vertical loss of the investigated antagonist teeth after two years in situ: 166 µm (± 61 µm) (one year: 144 µm (± 55 µm)).





Maximum Vertical Loss on antagonist teeth in µm at 1 and 2 years and on different antagonists at 2 years. Reasons for excluding teeth / contact areas from analysis were nonocclusion, intra-oral adjustment after 6 month or chippings. Not all study teeth could be analyzed at the 1 Year recall due to insufficient impressions and replicas.





Differential image (lower first molar as an example) of antagonist from Baseline and 12 month recall replicas using the Software Surfer 9 (Golden Software, Co, USA). Worn areas in orange/red.

Conclusions from Report

- The measured wear rates are comparable with other studies and are in the normal physiological range.
- No significant difference was found between natural enamel antagonists and ceramic restorations.
- The monolithic zirconia restorations did not seem to be affected by wear in the first two years.

Related Clinical Evaluations

Esquivel-Upshaw JF, Rose WF Jr, Barrett AA, Oliveira ER, Yang MC, Clark AE, Anusavice KJ. Three years in vivo wear: core-ceramic, veneers, and enamel antagonists. Dent Mater 2012;28:615-621.

Preis V, Schmalzbauer M, Bougeard D, Schneider-Feyrer S, Rosentritt M. Surface properties of monolithic zirconia after dental adjustment treatments and in vitro wear simulation. J Dent 2014

Stober T, Bermejo JL, Rammelsberg P, Schmitter M. Enamel wear caused by monolithic zirconia crowns after 6 month of clinical use. J Oral Rehabil 2014;41:314-322.

2-year report to 3M Oral Care (internal)

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