

SURVIVAL OF LITHIUM-DISILICATE TABLE-TOPS AS A FUNCTION OF CEMENT THICKNESS

Candida Parisi, Laura Facchini, Costanza Micarelli, Roberto Scotti, Paolo Baldissara

Keywords: Lithium-disilicate, fatigue resistance, table-top restorations

Abstract

Lithium-disilicate (Li) adhesive restorations (table-tops) have been suggested for the rehabilitation of worn-out posterior teeth, establishing a new, increased, vertical dimension of occlusion. However, concerns still remain about the proper thickness of adhesive cement to be used to ensure proper fit and function under chewing loads for this type of occlusal coverage. The purpose of this study was to determine the survival rate of simplified Li restorations as a function of the cement thickness.

Materials and Methods: Sixty sound human molars were extracted and stored in 0.02% thymol solution. The teeth were then severed in a plane parallel to the occlusal surface to create a flat dentin surface surrounded by enamel edges. Teeth with pulp horns exposed during cutting were not included in the study.

Sixty 15x13x1mm flat plates were obtained from Li blocks (IPS e.max CAD LT, Ivoclar-Vivadent) using a microtome under water irrigation. Each plate was randomly assigned to a specimen tooth. The Li table-tops were then obtained finishing the plates with a diamond bar (Komet 390 314 016) in order to have the same perimeter as the teeth. The table-tops were finally sintered and glazed (Programat P500) according to the manufacturer instructions.

The ceramic restorations were divided in 4 groups according to the cement thickness used

and applied to each teeth using Multilink Primer A+B (Ivoclar-Vivadent) on the teeth surface and Monobond Etch&Prime (Ivoclar-Vivadent) combined with Multi-Link Automix cement, (Ivoclar-Vivadent) on the restorations. The teeth were previously spaced to obtain 50, 100, 150 and 200 μ m film. The restored teeth were placed in a ball-mill fatigue machine containing 10 zirconia and 10 stainless steel spheres 20 and 25mm in diameter, respectively, along with 500ml distilled water at 37°C. The ball-mill created randomly distributed impacts of a known maximum energy on a target area of about 6mm in diameter on the occlusal ceramic surface of the restored teeth. Crack growth and damages occurring in the lithium-disilicate table-tops were evaluated under a stereomicroscope by opening the ball-mill every 60 minutes. Twelve cycles of 60 minutes each were performed. Survival curves (Kaplan-Meier) were obtained and compared using the Gehan-Breslow-Wilcoxon test ($\alpha = 0.05$).

Results:

The survival curves referred to the success and survival rate recorded among the tested groups were not statistically different, ($p=0,408$, and $p=0,250$, respectively). Only 150 μ m- and 200 μ m-groups showed a statistically significant difference in their survival rate ($p=0,046$). Notably, the 50 μ m-group showed no failures. The most common failures observed were conchoidal and full-thickness parting-type fractures.

Conclusions:

Fatigue survival of simplified lithium-disilicate table-tops restorations was not influenced by the thickness of the cement when used in the range of 50-200 μ m. As far as survival to fatigue testing is concerned, this study suggests that the cement thickness is not a relevant factor in determining the long-term survival of table-top restorations.

