Evaluation of shear bond strength of different treatments of ceramic bracket surfaces

Patrícia Helou Ramos Andrade[1], Rogério Vieira Reges[2], Marcos Augusto Lenza[3]

Objective: To evaluate the bonding strength of the interface ceramic bracket and composite resin restoration, using four types of treatment on the base of the bracket.

Methods: 48 photoactivated resin disc were used (Filtek™ Z250) contained in specimens and divided into 4 groups of 12 specimens for each group according to the type of treatment performed on the bases of the brackets. Once bonded the brackets, the specimens were subjected to shear stress carried out in a universal testing machine (MTS: 810 Material Test System) calibrated with a fixed speed of 0.5 mm / minute. The values obtained were recorded and compared by means of appropriate statistical tests (analysis of variance and then Tukey's test).

Results and conclusions: The surfaces of ceramic brackets conditioned with 10% hydrofluoric acid for 1 minute, followed by aluminum oxide blasting, 50μ, after silane application and adhesive application, was considered the best method to prepare of surfaces prior to ceramic brackets orthodontic esthetic bonding..

Keywords: Ceramic bracket. Composite. Shear.

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[1] Specialist in Orthodontics, Funorte.

[2] Full Professor, discipline of Dental Materials and Dentistry, UNIP-GO. MSc and PhD in Dental Materials, FOP-UNICAMP.

[3] Full Professor, discipline of Orthodontics, and Coordinator of the Specialization Course in Orthodontics, Federal University of Goiás.

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Contact address: Patrícia Helou Ramos Andrade
Rua QRSW 4, bloco B8, Apto. 303 – Sudoeste – CEP: 70.675-428 – Brasília / DF – Brazil
E-mail: patricia_helou@yahoo.com.br

Editor's summary

Corrective Orthodontics in the current aspect, presents itself with a variety of materials and techniques that aims to streamline the treatment seeking functionality and esthetics. One of the challenges the professional faces, in terms of technique and material, is the union of esthetic orthodontic attachments to teeth with composite resin or ceramic restorations. Thus, the authors' proposal in the present work was to evaluate the shear bond strength of ceramic brackets bonded to composite resin surface after different treatments carried out at the base of the brackets before bonding. For this, it was made 48 photoactivated composite discs, 10 x 5 mm, which were included in metal tubes in a centralized manner. Prior to the bonding of ceramic brackets, the specimens were divided into 4 groups (n = 12): Group I – surfaces of the brackets conditioned with hydrofluoric acid (HFL) to 10% for 1 minute, rinsed and dried for 30 seconds with air jets; Group II – surfaces of the brackets blasted with aluminum oxide for 10 seconds; Group III – surfaces conditionated with hydrofluoric acid (HFL) to 10% for 1 minute, rinsed for 30 seconds and dried with oil-free air jets. Then, they undergone blastings with aluminum oxide for 10 seconds and Group IV – in the surfaces were made prophylaxis with a brush and pumice, rinsed for 30 seconds and dried with jets of oil-free air (control group). Continuing with the surface treatment on Groups I, II and III, it was applied dry silane with air jets for 15 seconds followed by application of two layers of primer, thus removing excess with absorbent paper. The surfaces of the composite resin discs were performed conditioning with 37% phosphoric acid for 30 seconds followed by rinsing, drying and primer application. After performing all the different types of surface treatments, the brackets were bonded with Transbond™ XT. Following, the entire sample was subjected to a shear test in a universal testing machine MTS: Material Test System 810 (Fig 1). The results showed that the highest strength values were achieved by the group III which presented no statistical differences with the group II ($p > 0.05$). Group IV presented the lowest values being statistically different from the others ($p<0.05$). The authors conclude with the completion of this work that the surfaces of ceramic brackets conditioned with 10% of hydrofluoric acid for 1 minute, followed by blasting with aluminum oxide size 50µm, after application of silane and primer application, was considered the best method for preparing ceramic brackets surfaces prior to orthodontic bonding.

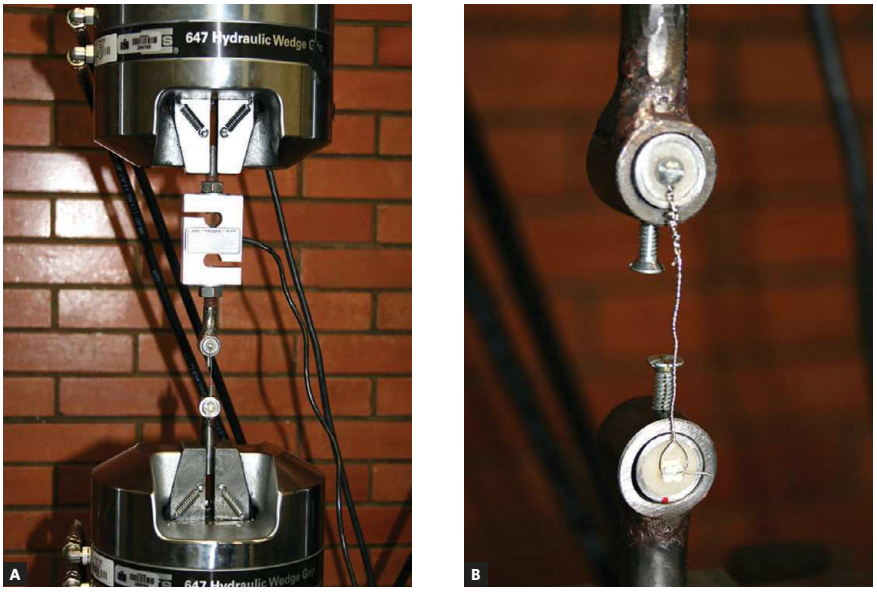

Figure 1 - **A**) universal testing machine MTS: 810 Material Test System. **B**) Moments before the rupture of the adhesive bond of the ceramic/composite/composite interface.