

Manufacturing and evaluation of refractory die used for direct sintering of ceramic inlay

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Abstract

This study was conducted in order to manufacture and assess a refractory die used for direct sintering of porcelain.

Two types of refractory die were locally manufactured depending on two type of binder, one is gypsum bonded and the other is phosphate bonded.

Final optimal mix for each manufactured refractory dies was obtained after a series of experimental preparation and formulation of the raw material according to tests of ADA specification No. 92/2001.

Standardized MOD class II inlays cavities with one proximal box (mesial) extending above and the other proximal box (distal) below the cemento-enamel junction (CEJ) were prepared in 60 extracted human upper premolars which randomly assigned to six groups:

Group 1: Inlay ceramic sintered on the Espri vest refractory die material (standard refractory die) and cemented to the tooth with out using selective double –bond technique.

Group 2: Inlay ceramic sintered on the Espri vest refractory die material (standard refractory die) and cemented to the tooth using selective double –bond technique.

Group 3: Inlay ceramic sintered on the manufactured refractory die type I (phosphate bonded) and cemented to the tooth with out using selective double –bond technique.

Group 4: Inlay ceramic sintered on the manufactured refractory die type I (phosphate bonded) and cemented to the tooth using selective double –bond technique.

Group 5: Inlay ceramic sintered on the manufactured refractory die type II (gypsum bonded) and cemented to the tooth with out using selective double –bond technique.

Group 6: Inlay ceramic sintered on the manufactured refractory die type II (gypsum bonded) and cemented to the tooth using selective double –bond technique.

For groups (1, 3 and 5) a single layer of bonding agent was applied on the entire cavity walls with out being pre-cured.

For groups (2, 4, and 6), a selective double –bond technique was used in which a small amount of bonding agent (Adaper Single Bond) was selectively applied to the cervical cavity floor using a disposable brush, thoroughly air thinned and light cured for 30 seconds.

The result shows the resin cement thickness obtained by the use of Espri vest refractory die (group 1 and 2) both at mesial and distal proximal boxes were significantly lower than obtained by the use of manufactured phosphate bonded (group 3 and 4) and that of gypsum bonded refractory die (group 5 and 6).

The use of selective double –bond technique did not increase resin cement thickness of the different groups significantly.

Regarding dye penetration the inlay ceramic cemented to enamel wall shows less microleakage than ceramic cemented to dentin with no significant difference between inlays manufactured on Espri vest refractory die as compared with the other manufactured refractory dies both in enamel and dentin. The use of selective double –bond technique decrease microleakage but not significantly both at enamel and dentin.