MICROLEAKAGE ASSOCIATED WITH THE USE OF CERAMIC INSERTS

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INTRODUCTION: One of the major clinical disadvantages associated with the use of composite resins in the direct technique for class II cavities is the gap formation in the tooth-filling interface [1,2]. In class II cavities, this lack of adaptation of the material to tooth structure particularly occurs at the gingival margin [3,4]. In order to overcome the undesirable effects of consecutive microleakage, recent restorative techniques followed three main directions: incremental insertion, placing a polymerization tip inside the composite interproximally and the placement of glass or ceramic inserts inside the proximal of proximo-occlusal restorations. Since their introduction, glass and ceramic inserts have improved significantly. The most precise systems are those which use calibrated burs: Cerafil (Komet), Cerana (Nordiska Dental) and β-Quartz (Lee Pharmaceuticals). The Sonicsys approx system (Vivadent and Kavo) uses sonic driven diamond tips for the final cavity preparation. These diamond tips are mounted in the Sonicflex 2000L/N handpiece (Kavo). The inserts are fabricated from leucit-reinforced glass ceramic and their size (2, 3 or 4) fits to the corresponding preparation tips. According to manufacturer's indications, the inserts are luted in the cavities using a flowable composite resin, namely Tetric Flow (Vivadent). With this system, class II cavities can be restored in a consistent and cost-efficient manner. Marginal adaptation in class II cavities restored using the Sonicsys approx ceramic inserts was investigated by several authors [3,4]. Their results prove that a perfect adaptation at the gingival margin located in enamel can not be achieved

METHODS: Forty noncarious and crack-free mandibular third molars were used. The teeth were randomly divided into to four groups each containing ten teeth. One mesial box cavity was prepared on each tooth, using the diamond tip Sonicsys approx no.3. The cervical margin of each cavity was located about 1 mm coronally to the cementoenamel junction. The prepared cavities were filled using Sonicsys approx ceramic inserts no.3 and four resin-based materials: group 1 – Tetric Flow; group 2 – Admira Flow; group 3 – Nexus 2; group 4 – X-flow. After finishing and polishing, all specimens were stored in distilled water for 7 days at 37ºC, thermocycled 1000 cycles between 5-55ºC, and stored 24 hours in basic fuchsine 2%. All specimens were then sectioned along a mesial-distal plane through the middle of the cervical margin. To assess the dye penetration, the cervical areas of the sections were examined using an optical microscope. The registered scores were analysed with Kruskal-Wallis and Mann-Whitney U tests.

RESULTS: Kruskal-Wallis test showed statistically significant differences among groups ($p = 0.009$, $\alpha = 0.01$). The Mann-Whitney U test displayed significant differences between Admira Flow group and Tetric Flow ($p = 0.011$, $\alpha = 0.05$), Nexus 2 ($p = 0.001$, $\alpha = 0.01$), and X – flow ($p = 0.004$, $\alpha = 0.01$), respectively.

DISCUSSION & CONCLUSIONS: The extent of microleakage in the cervical area (enamel) of class II cavities filled with Sonicsys approx ceramic inserts, depends on the material used for luting. The highest leakage occurred when Admira flow ormocer was used.

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