

MORFOLOGICAL ANALYSIS OF BIOMATERIALS AND DENTAL HARD TISSUES USING SEM

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Objective. To analyze morphology and bonding interface of tooth hard tissues and two esthetic restorative materials: ceramic and composite using SEM.

Material and methods. Ten extracted human premolars were randomly divided into two groups of five samples in each. The similar MOD cavities were restored with indirect leucite reinforced glass ceramic inlays (Finesse; Dentsply, Ceramco) and direct high viscosity hybrid composite material (Filtek P60; 3M, ESPE), using hydrophilic adhesive (Adper Single Bond 2; 3M, ESPE) and composite cement (Rely X ARC; 3M, ESPE). Samples were embedded in epoxy resin (Epoxide; Buhler) cylinders and leaved for 12 h setting. Then vertically along axis of teeth mesial-occlusal-distal sections with low speed saw (IsoMet; Buhler) were made. Surfaces of sectioned teeth were polished with 20, 5, 3, 1 and 0.25 μm fine particles diamond pastes (MiniMet 1000 Grinder/Polisher; Buhler), cleaned in distilled water for 10 min. The specimens were submitted to demineralisation with 50% phosphoric acid for 4 min, followed by 10 min ultrasonication in distilled water. Then dried in a desiccator containing silica gel for 12 h. The surfaces were sputter-coated with gold layer of 7 nm thick during 2 min with 25 mA pressure.

Results. Morphology of tooth tissues: dentin and enamel and morphology of ceramic material, composite cement and composite filling material were examined. Bonding between adhesive restoration material and tooth tissues was evaluated. In cases of composite fillings, hybrid layer was seen with demineralized dentin and resin tags. The average width of the adhesive layer of dentin was 5 μm . Examining proximal adaptation of filling, the filling material was observed to cover beyond cavity borders. In ceramic group the average width of the adhesive layer by dentin was 5 μm , similar to composite group, the average width of cement layer was 100 μm . The cement layer width in proximal adaptation area was 100- 200 μm .

Conclusion. The described samples showed good adaptation of ceramic inlays and composite fillings with tooth tissues.