MÜSBED 2012;2(Suppl. 2):S53

The Effect of Various Mixing Techniques on Some Physical Properties of Mineral Trioxide Aggregate

Fatima Betul Basturk[1,2], Mohammad Hossein Nekoofar[2,3], Mahir Gunday[1], Paul Dummer[2]

[1]Department of Endodontics, Faculty of Dentistry, Marmara University
[2]Endodontology Research Group, School of Dentistry, Cardiff University, Cardiff, UK
[3]Department of Endodontics, Faculty of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

Objective: To evaluate the effect of trituration of encapsulated MTA and conventional condensation as mixing techniques and indirect ultrasonic activation as a placement technique on compressive strength, flexural strength, porosity and hydration of mineral trioxide aggregate.

Method(s): ProRoot MTA and MTA Angelus were used. One gram of each powder was mixed with a 0.34 g aliquot of distilled water. Samples were mixed by using either trituration of capsules for 30 sec at 4500 rpm or application of condensation pressure of 3.22 MPa for 1 min. Half of the samples were placed using indirect ultrasonic vibration. Compressive strength and flexural strength tests were applied using Universal testing machine. Porosity evaluation was made using micro-computed tomography (μCT). Hydration characteristics were identified using X-ray diffraction analysis (XRD).

Results: The mean compressive strength and flexural strength values of ProRoot MTA were higher than those of MTA Angelus regardless of the mixing and placement techniques applied ($p<0.05$). Compressive strength values of trituration technique were higher than those of conventional condensation technique ($p<0.05$). Although the results of porosity analysis were not statistically significant, a medium negative correlation was found between porosity and flexural strength. XRD results revealed that calcium hydroxide phase formation was not effected in ProRoot MTA groups whereas it was observed only in trituration groups of MTA Angelus.

Conclusion(s): ProRoot MTA showed better compressive and flexural strength than MTA Angelus. Preparing MTA slurry using trituration enhanced the compressive strength and calcium hydroxide phase formation of the material.

Key words: Flexural strength, micro-computed tomography, MTA, compressive strength, X-ray diffraction