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Abstract

Aim To investigate the prevalence, location, and pattern of preexisting microcracks in non-endodontically treated teeth from fresh cadavers. Micro-computed tomography (micro-CT) technology was used as the analytical tool enabling full screening of the root dentine with the teeth retained in their original alveolar socket.

Methodology As a pilot study and to validate the present method, a series of 4 high-resolution scans were performed on one bone-block specimen with teeth collected postmortem: (i) entire bone-block including the teeth, (ii) second molar tooth extracted atraumatically from the bone-block (iii) extracted tooth dehydrated to induce dentinal defects and (iv) entire bone-block following reinsertion of the extracted tooth into its matching alveolar socket. In the main study, forty-two dentoalveolar maxillary bone-blocks each containing 3-5 adjacent teeth (178 teeth in a total) were collected postmortem and scanned in a micro-CT device. All cross-section images of the 178 teeth (n = 65,530) were screened from the cemento-enamel junction to the apex to identify the presence of dentinal defects.

Results In the pilot study, the microcracks observable when the dehydrated tooth was outside the bone-block remained detectable when the entire bone-block plus reinserted tooth was scanned. This means that the screening process revealed the presence of the same microcracks in both experimental situations (the tooth outside and inside the maxillary bone-block). From a total of 178 teeth in the bone-blocks removed from cadavers, 65,530 cross-sectional images were analyzed and no dentinal microcracks were detected.

Conclusions This *in situ* cadaveric model revealed the lack of preexisting dentinal microcracks in non-endodontically treated teeth. Thus, the finding of dentinal microcracks observed in previous cross-sectional images of stored extracted teeth is unsound and not valid. It should be assumed that microcracks observed in stored extracted teeth subjected to root canal procedures are a result of the extraction process and/or the post-extraction storage conditions. Therefore, As a consequence, the presence of such dentinal microcracks in stored extracted teeth – observable in cross-sectional images of the roots - should be referred to as *experimental dentinal microcracks*.