Guided Endodontic Treatment Using a New Software Approach - Case Report

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Aim
To present a novel approach for root canal localization and preparation using a 3D case planning software (SICAT ENDO) and a guided access approach (SICAT ACCESSGUIDE).

Case Report
A 32 year old female patient was referred with pain and localized swelling on lower right canine. Radiographically and clinically the patient exhibits dentin dysplasia type 1 with short or missing roots (shell teeth) combined with severe enamel hypoplasia and with some aplastic areas as well as periapical translucency (Fig. 2 A and Fig. 3). Access cavity preparation under the microscope was interrupted due to missing landmarks of dentin morphology. CBCT data (Orthophos SL, Dentsply Sirona, Bensheim, Germany) were correlated with an optical impression (CEREC Omnicam, Dentsply Sirona, Bensheim, Germany) using SICAT ENDO (SICAT GmbH, Bonn, Germany) software. A drill path was designed in the software (1,2 mm diameter, 24 mm length) to reach the apical third of the tooth root (Fig 1).

After rubber dam isolation the access cavity was slightly enlarged with a diamond bur to remove enamel overhangs. The guiding splint was correctly placed and the drill guide sleeve was, therefore, exactly located above the canine (Fig. 4). The dentine drill (Hager & Meisinger, Neuss, Germany) was used at 5000 rpm with water spray and intermittent force application of approximately 3.0 N (Fig. 5). This minimal invasive path was regularly irrigated with 5% NaOCl after 2-3 mm progression to remove dentin debris.

The dentin drilling ended at a length of 24 mm with a plateau at the entrance of the main root canal system in the apical third of the tooth. The root canal was revealed and negotiated under the microscope with high magnification. Further instrumentation was executed with hand and rotary instruments followed by irrigation protocols with 17% EDTA and 5% NaOCl. Finally the minimally enlarged root canal system was thermoplastically filled with gutta percha in a downpack and backfill procedure. Access cavity was sealed with a fiber post and a composite restoration.

Conclusions
The novel clinical approach using the SICAT ENDO software for planning and the SICAT ACCESSGUIDE for the endodontic access preparation seems to be an efficient and safe alternative to traditional methodologies. Future clinically controlled trials should evaluate (i) the reproducibility of this technique, (ii) the potential of accelerating the total treatment time, and finally and most importantly, (iii) the ability to conserve more crown and root dentin compared to the traditional approach. It is expected that guided endodontics could contribute to minimal invasive dentistry in the future, keeping more teeth for longer time in function(1-5).

Literature