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Evaluation of a system for grading the complexity of root canal treatment

Aim To evaluate a system of grading the complexity of root canal treatment and apply it to endodontic referrals.
Methodology A system of grading the complexity of root canal treatment that had been previously developed was applied to all endodontic referrals to a Department of Restorative Dentistry in a District General Hospital within a period of one year. Grading was repeated in 60 randomly selected teeth to test for intra-observer and inter-observer agreement. The appropriateness of referrals and treatment undertaken was assessed in terms of the complexity.
Results In all 152 patients were referred for root canal treatment of 186 teeth within this period. Of these, 60 teeth were treated in the Department. There was moderate intra-observer agreement and moderate to poor inter-observer agreement with regards to the complexity grades allocated. Among the referrals, 47% (87) of teeth were of complexity grade 3 (high), 48% (89) of grade 2 (medium) and 5% (10) of grade 1 (low). Overall, 48% (29) of treatment was undertaken in teeth of complexity grade 3 and 52% (31) in teeth of complexity grade 2.
Conclusions This system of grading the complexity of root canal treatment was found to be simple to use, but was ambiguous and incomplete. There was moderate intra-observer agreement and moderate to poor inter-observer agreement. The referrals to the Department were of appropriate complexity.
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Endodontic surgery using endoscope visualization: 1-year follow-up

Aim To monitor the outcome of ultrasonic apical root-end preparation using endoscope visualization during endodontic surgery in relation to tooth type and location, and the presence of post retained restorations.
Methodology Teeth treated surgically had a periradicular lesion of strict endodontic origin. In all 28 anterior and premolar teeth were included in the study using specific selection criteria. A full mucoperiosteal tissue flap was reflected and carefully retracted. Surgical access to the root was then made through the cortical bone using a round bur. The periradicular lesion was removed with sharp bone curettes and angled periodontal curettes. After exposure of the apical root-end, a straight fissure bur in a hand-piece was positioned perpendicular to the long axis of the root and then beginning from the apex, 2.5–3 mm of the root-end was removed. Prior to root-end preparation, local haemostasis was achieved through the use of bone wax. Root-end cavities were prepared using a zirconium nitrate retro-tip (Dentsply Maillefer Instruments, Switzerland) driven by an ultrasonic device unit (EMS, Switzerland). Root-end cavities were then dried using paper cones and a zinc oxide EBA-reinforced cement was used as the root-end filling material. All root-end procedures were performed using endoscope visualization. Cases were followed for a period of one year and then classified into three groups (healing, uncertain healing and disease) according to radiographic and clinical criteria.
Results Of the 28 teeth evaluated at 1-year follow-up, 26 teeth (93%) had healed, 1 tooth had uncertain healing and 1 had disease. There was no statistically significant differences in treatment outcome related to the type of tooth, tooth location, or presence of post restoration.
Conclusions In this study the adherence to a strict endodontic surgical protocol, the use of contemporary techniques and materials together with endoscope visualization lead to a predictable outcome with definite healing in 93% cases.

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Operating times for mechanical Ni-Ti instrumentation with two filling techniques: a preliminary report

Aim To evaluate the amount of time allocated to each stage of root canal treatment (total working time TWT) and to compare the time taken to complete canal filling using 2 techniques.
Methodology In a private clinic, general dental practitioners with varying levels of experience were instructed to recruit, on a predetermined date, patients for all types of endodontic treatment. Three independent calibrated observers carried out a double-blinded evaluation by timing each step of the consecutive endodontic treatments. After hand exploration with size 08–10 K-Flexofiles, engine-driven rotary instrumentation (ProTaper®, Dentsply-Maillefer, Switzerland) was employed for all the canal preparations. Subsequently, a similar evaluation was completed for 2 filling techniques employing thermoplasticized gutta-percha: Thermafil® system (Dentsply-Maillefer); and System B (SybronEndo, USA) with Obtura II (Obtura Corporation, USA) for vertical condensation and backfilling.
Results Thirteen teeth representing 35 canals were treated. Excluding radiographical examination, the mean TWT/canal was 20.7 ± 7.7 mins. Seven different steps were measured: 1. Diagnosis, information and anaesthesia: t = 4.5 min (range 1–11 min) 2. Access cavity preparation: t = 4 min (range 1–7), exploration: t = 1 min, 3. Electronic working length determination/canal: t = 1 min 4. Cleaning, preparation and

drying: 5 to 7 min/canal when using a five instrument sequence (Sx–S1–S2–F1–F2) including 10–15 s for instrument changing (total = 1 min). Drying time: 1.5 min/canal 5. Thermafil® obturation/canal t = 2.5 min ± 1.7 6. Temporary filling: t = 1 min 7. Discussion t = 3 min. TWT averaged 23 min, 34 min and 44 min for single rooted, 2-rooted and 3-rooted teeth, respectively. The operating time for canal obturation with Sytem B-Obtura II was 5.9 min ± 2.4; the Thermafil® technique was faster and involved less preparation and instrumentation, without significantly influencing TWT.

Conclusions The major time consuming steps were canal cleaning and preparation, followed by diagnosis, anaesthesia and cavity preparation. New developments, mainly in the cleaning and preparation phase and a faster induction of anaesthesia could further shorten chair-side time.

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A new cone-beam computerized tomography system for use in endodontic surgery

Aim To present a newly developed ortho cubic super-high resolution computed tomography system (Ortho-CT) and its application in endodontic surgery.

Methodology A prototype was assembled on a Scanora (Soredex Findent Co, Finland) with the use of a 4-inch image intensifier instead of film. Data were collected from a single 360 degree scan and a cylinder 32 mm in height and 38 mm in diameter. Images were reconstructed with a software programme on a personal computer. Imaging data consisted of 240 (height) × 280 (diameter) cubic voxels, each with a dimension of 0.136 mm. With this small voxel size, the image resolution was high and was the same in any direction. Sections parallel to the dental arch (*P*arallel sections), perpendicular to the dental arch (cross sections) and horizontal sections were produced with a slice width of 1 mm at an interval of 1 mm. Patients with fractured instruments were evaluated with Ortho-CT, and the images were compared to routine radiographic films.

Results Ortho-CT produced images of high resolution, enabling identification of the lesions and the fractured instruments, and the relationship with the maxillary sinus and adjacent teeth.

Conclusions Because Ortho-CT can take high-resolution 3-dimensional images at any tomographic layer with only 1 exposure, it is a useful aid for the diagnosis and treatment of diseases in endodontic surgery.

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