KNOWLEDGE INTO SKILL

BUDAPEST

7-10 SEPTEMBER 2022

Oral presentations on freely chosen subjects

20TH ESE BIENNIAL CONGRESS

OP01 - ACCESS CAVITY DESIGNS: PRACTICALITY VS SHOWMANSHIP

Nawar N[1]

[1]The British University In Egypt, Alshorouk, Egypt

Aim

To review the biominimalistic access cavity trends in the light of the recent accumulated peer reviewed evidence based research.

Biominimalistic trends in Endodontics gained a lot of popularity among clinicians throughout the last decade. Conservation during Endodontic access to save as much as possible of hard tooth structure is a practice that has its roots in the axiomatic assumption that such preservation can extend the service years of Endodontically treated teeth. This resulted in the emergence of new designs including and not limited to: Contracted access cavity, Ninja access and Truss access. Even before the accumulation of a sufficient body of evidence that can support such assumptions, these new designs gained momentum among practitioners for reasons related to the glamour of showmanship highlighted by a tiny access cavity preparation that can be posted on social media and different marketing streams, thus becoming a trademark on their own. However, the biological objectives of root canal treatment should never be put in jeopardy since the main objective of Endodontics remains disinfection and minimizing the microbiological load.

Conservative and Ultra conservative access cavity designs have been heated topics in the scientific community recently and this presentation attempts to provide a concise review of the topic aided by recent peer reviewed evidence.

Conclusions:

- Conservative access cavity designs elongate the years of service expected for an endodontically treated tooth, yet the choice to adopt such technique is the clinician's decision on a case by case basis and depending on the available knowledge and armamentarium.
- Ultraconservative access designs have no added value.
- Contracted access cavity is the design of choice when sufficient armamentarium & knowledge are available. It provides both the practicality of traditional designs and the conservation that elongates tooth's life expectancy without taking the extra complex unnecessary step of ultra-conservation.

OP02 - DIGITAL SCANNING AS AN EFFECTIVE TOOL TO CLINICALLY ASSESS THE ACCURACY OF GUIDED ENDODONTICS

Torres A[1,2], Dierickx M[1], Coucke W, Pedano M[1], Lambrechts P[1], Jacobs R[2]

[1]Department of Endodontics, KU Leuven, Leuven, Belgium, [2]OMFS-IMPATH Research Group, KU Leuven, Leuven, Belgium

Introduction
Accuracy assessment of guided endodontics is done by comparing pre- and post-operative CBCT scans. Such methodology cannot be applied on patients since it involves unnecessary radiation. The aim of this study is to compare the accuracy of a novel method using a post-operative intraoral scan (IOS) with a sandblasted bur inside of the cavity, with the current gold standard (CBCT) on its ability to measure the accuracy of guided endodontics.

Methods
A total of 4 models (2 maxillary and 2 mandibular) were created including 10 extracted teeth each. Forty guided access cavities were planned on dentin to simulate pulp canal obliteration. Four guides were designed, and 3D printed. Two operators with different levels of experience in endodontics performed guided access cavities. After treatment, a post-operative CBCT and IOS were acquired. The distance deviation at the coronal entry point, apical point, and angular deviation was measured for each operator with both analysis methods (CBCT and IOS).
Data analysis was performed using multiway Anova and a correction for simultaneous hypothesis testing according to Tukey. $P \leq 0.05$ was considered statistically significant.

Results
A total of 38 cavities were finally assessed with a mean length of 13.8 mm. No statistical difference between operators and methods was found for all measured parameters.

Conclusions
No difference was found between the proposed method and the gold standard. The currently proposed method allows radiation-free accuracy assessment of guided endodontics in patients.

Key words
Cone Beam Computed Tomography
Guided Endodontics
Intraoral scanner
Assessment
Dental Pulp Calcification
3-Dimensional printing

OP03 - ROOT CANAL MORPHOLOGY AND ITS IMPLICATIONS IN ENDODONTIC THERAPY

Alani A[1]

[1]Nova Medical Center, Al-Ain, United Arab Emirates

The hard tissue repository of the human dental pulp takes on numerous configurations and shapes; the variations of anatomical and morphological characteristics of the teeth are very important for any practitioner. These differences in root morphology determine the success of the endodontic therapy and the long-term prognosis of the tooth, especially when it is an abutment for a prosthetic restoration. Before beginning an endodontic treatment, the clinician must take into account the morphological variations of the root anatomy. A thorough knowledge of tooth morphology, careful interpretation of angled radiographs, proper access preparation and a detailed exploration of the interior of the tooth are essential prerequisites for a successful treatment outcome; magnification and illumination are aids that must be utilized to achieve this goal.

This presentation describes:

1. How the lack of knowledge in root and pulp anatomy permits errors in diagnosing and treatment planning.
2. A thorough understanding of the complexity of the root canal system is essential for understanding the principles and problems of shaping and cleaning, for determining the apical limits and dimensions of canal preparations.
3. Unfilled canals, left like this by omission, can compromise both the endodontic and prosthetic treatment.
4. Describes and illustrates tooth morphology and discusses its relationship to endodontic procedures.

OP04 - EVALUATION OF THE CLINICAL EFFICACY OF A NOVEL ENDODONTIC KINEMATICS

Pirani C[1], **Iacono F[1]**, La Rosa G[2], Chaniotis A[1], Pedullà E[2]

[1]Private Practice, [2]Department of General surgery and Medical Surgical Specialties, Catania, Italy

Aim

To compare the clinical efficacy of conventional and novel endodontic kinematics used in combination with Nickel-Titanium (NiTi) instruments.

Summary

Twenty curved root canals were endodontically in vivo treated by two trained operators following a standardized protocol. Shaping procedures were accomplished with HyFlex EDM files (Coltène/Whaledent, Altstätten, Switzerland) used with CanalPro Jeni Motor (Jeni Mode) (Coltène/Whaledent, Altstätten, Switzerland). As control, XSmart Plus motor (Denstply Maillefer, Baillagues, Switzerland) was used with the same instrumentation sequence following manufacturer suggested settings. Working length (WL) was determined using an electronic apex locator (Root ZX, Morita, Tokyo, Japan) and radiographically confirmed. Irrigation was continuously performed with 5 ml of 5.25% NaOCl (Niclor 5 Ogna, Muggiò, Italy) and 3ml of 10% EDTA (Tubuliclean Ogna, Muggiò, Italy) solutions. Canals were obturated with carrier-based system and AH Plus (Dentsply–DeTrey, Konstanz, Germany) and evaluated with a post-operative x-ray. Temporary filling was applied (Coltène Whaledent, Altstätten, Switzerland). Intensity of post-operative pain was registered using a visual analogue scale (VAS) at 6,12,24,48h and 7d after treatment. Operators recorded the feeling in using the preparation system (Instrument/Kinematics) in terms of procedural accidents (instrument breakage, blockage), number of passages to reach the WL and instrumentation time. Oral health related quality of life (OHRQoL) of patients was recorded.
Data were collected from both clinical assessment and radiographic evaluation. Procedural accidents with both kinematics were not recorded. Instrumentation time and number of passages were lower in Jeni mode and OHRQoL data were comparable between the tested kinematics.

Key learning points

- The incidence of procedural accidents was not influenced by the instrumentation kinematics.
- The use of novel hybrid kinematic as Jeni mode can reduce the operator stress and instrumentation time during instrumentation of curved canals.
- Oral health related quality of life was not affected by the shaping kinematics.

OP05 - COMPARATIVE EVALUATION OF NOVEL ROTARY FULL-SEQUENCED FILE SYSTEM WITH OPTIMAL GLIDE PATH MOTION (OGOP90) AND DIFFERENT KINEMATICS ON APICAL DEBRIS EXTRUSION- AN IN-VITRO STUDY

Ali A[1], Arslan H[2], Büker M[3]

[1]Pacific Dental College And Hospital, Udaipur, India, [2]faculty of dentistry Department of Endodontics, Faculty of Dentistry, Medeniyet University, Istanbul, Turkey, [3]faculty of dentistry Department of Endodontics, Mersin University, Mersin, Turkey

Aim:
The purpose of this study was to investigate the effect of rotary file system used with optimal glide path motion (OGOP90) and different kinematics on apical extrusion
Pain following endodontic treatment is the most common problem precepted by the patients. Its prevalence rate ranges between 3-58%. The etiology of this pain is multi-factorial and, debris extrusion is considered as one of the ethologic factors.

Methodology:
Following institutional ethical Committee approval,seventy-five single rooted mandibular premolar were decoronated to establish a standard working length of 15 mm.
The teeth will be randomly divided into 5 groups according to different kinematics (n: 15). The Neolix EDMax full sequence files were used according to the groups given below.
Group 1: CW 360 rotation motion
Group 2: Reciproc motion
Group 3: OGP90 (CW 90, CCW 90--- CW 90, CCW120) special endo motor motion
Group 4: CW 90, CCW90
Group 5: CW 90, CCW 120
Debris collection
a). Before the instrumentation
Weights of empty and numbered Eppendorf tubes were determined using an electronic balance.
b). During instrumentation
Debris were collected according to Myers & Montgomery' s protocol (1). Eppendorfs tubes were kept in an incubator at 70 0 C for 5 days to evaporate the irrigant and, weighed for 3 times.

Statistical analysis & Results:
Data were collected and analyzed by multivariate analysis of variance and the t test. Differences were considered statistically significant at $P < .05$.

Key learning points:
Complete instrumentation of the entire root canal seems desirable while performing the endodontic shaping procedure. Finding a technique which extrudes the least amount of debris under these conditions is then desirable.

Keywords: Debris extrusion, Neolix EDMax file, post-operative endodontic pain.

OP06 - A NOVEL APPROACH TO CANAL PREPARATION. IN-OUT TECHNIQUE

Witkowski G[1]

[1]Private Practice, Olsztyn, Poland

During my presentation I would like to present and discuss novel approach to canal preparation called IN-OUT Technique. As we all know all instruments cut dentin in the canal space. Despite the movement they all create debris which is transported with the instrumentation to apical zone. When clinician reads a leaflet of any instrument its suggested to use 3 pecking motions with each instrument. This classic technique is well known and this type of movement. Unfortunately, when we discuss about the cleanness of the endodontic space this classic approach is wrong. With the in-out technique the introduction in the canal space is done only 1 time in every move and combined with proper irrigation techniques. It helps to reach apical area in a safe and predictable way. Also due to this technique the amount of the fractured files is very reduced. During the presentation I will introduce all the details of in-out technique and how it can improve everyday endodontic practice even for the beginner.

OP07 - VALIDATION OF A NEW CBCT AUTOMATED METHOD TO EXPLORE ROOT CANAL TRANSPORTATION

Michetti J[1], Liron F[2], Pham D[1], Basarab A[3], Diemer F[2], Kouame D[1]

[1]irit Cnrs Umr 5505, Toulouse, France, [2]ufr Odontologie Departement Endodontie, Toulouse, France, [3]creatis Inserm Umr 5220 U1206, Villeurbanne, France, [4]clement Ader Institute, Toulouse, France

AIM

To assess the ability of cone beam computed tomography (CBCT) to automatically explore root canal transportation (RCT) on endodontic training blocs with J-shaped canals (ETB).

Methodology

The proposed method is based on conventional CBCT acquisitions (CS 8100 3D®, 75µm). A dedicated image processing framework, including image restoration and root canal segmentation, is developed for automatic 3D canal exploration. To assess reliability of the measurements, RCT performed by ProTaper Gold® was explored on sixteen ETB by two examiners. Two acquisitions of each simulator were performed in quick succession before and after preparation. Improvement of the CBCT image quality was achieved by averaging successive acquisitions to reduce noise. Working length and RCT were automatically evaluated. Results were compared to those provided by a standard method using coloration, 2D photographs and manual measurements (MM). Reproducibility of measurements (ICC) and processing time were evaluated. The comparison of the measurements was done using the Pearson correlation analysis (r) and with the method of Bland and Altman.

From the 9 equidistant levels, a strong correlation coefcient was found between CBCT and MM for RCT (r=0.93). The average differences (CBCT-MM) were 0.0µm±40µm for RCT and -0.1mm±0.3mm for the working length. The CBCT-based method provides measurements twice faster and a better reproducibility (ICC=0.99) than the usual MM (ICC=0.68).

Based on the proposed in vitro image enhancement technique and canal segmentation, CBCT is shown to provide a fast and easy canal exploration. The proposed method can inform both quantitatively on working length, curvature and canal diameter, and qualitatively with 2D cross sectional images perpendicular to the canal axis and with 3D reconstructions. For a resolution of 75µm, this image processing tool combined with automated registration might allow the use of CBCT to accurately explore root canal transportation.

Results

Our research validates fast canal transportation evaluation with 75µm-resolution CBCT

OP08 - APICAL PREPARATION SIZE DILEMMA: BALANCED APPROACH

Waheed Sharawy W[1]

[1]Primary Health Care Corporation, Doha, Qatar

Optimum debridement of the pulp space is the paramount objective of root canal treatment. Root canal instrumentation and irrigation chemicals facilitate achieving this objective, plus providing space for root-filling materials. There are currently many file systems in the market and different philosophies being instructed for root canal instrumentation, but the rising question here is how large is large? In other words, when to stop shaping to have a clean apical third. This question needs to be answered in light of the enormous refinement of irrigation methods over the years, from traditional syringe needle delivery to machine-assisted activation systems. Irrigation activation will enhance the delivery of irrigation solutions to mechanically inaccessible areas of the complex root canal system, which traditional instruments cannot access because of anatomic complexities.
In conclusion, to achieve safe & efficient root canal treatment, a delicate balance between irrigation & instrumentation is the proper way to address success.

Learning objectives:
1. The role & limitations of root canal instruments.
2. Appreciating the great benefits of irrigation activation.
3. Apical preparation size is not the primary determinant of success but only part of others.
4. Developing a balanced strategy between mechanical & chemical components of root canal treatment to preserve root canal dentine while achieving successful results.

OP09 - EVALUATION IN VITRO OF THE PERFORMANCE OF R MOTION FILE WITH REGARD OF APICAL DEBRIS EXTRUSION UNDER DIFFERENT RECIPROCATING ANGLES

Al Omari T[1], Arıcan B[2], Atav Ateş A[3]

[1]Jordan University Of Science And Technology, Irbid, Jordan, [2]Bachcesehir University, Istanbul, Turkey, [3]Istinye University, istanbul, Turkey

Aim: The extrusion of debris of new released endodontic files should be studied to enhance patient satisfaction and improve treatment success. The aim of this study was to evaluate the effect of different reciprocating angle and speed on apical debris extrusion of R-Motion (RM) compare it with Reciproc Blue (RB) in in-vitro conditions.

Methodology: Sixty lower premolars that has straight root canals were randomly assigned to three groups: RM-R (Reciproc All Mode), RM-WO (WaveOne ALL mode), and Reciproc Blue with glide path (RB) (Reciproc ALL mode). During treatment, apically extruded debris was collected in pre-weighed Eppendorf tubes and the treatment time was recorded. The amount of debris was calculated by subtracting pre- instrumentation and post-instrumentation weight of tubes. Data were statistically analyzed using the One-way ANOVA and Tukey Pairwise Comparisons test.

Results: All samples extruded debris beyond the apex. RM groups were extruded less amount of debris than RB-G. In RM-R group extruded debris was numerically less than RM-WO group ($P > .05$) and significantly less than RB-G group ($P < .05$). (One-way ANOVA test; $P < .05$). The preparation time required by RB was similar to that that by RM file in both motions (One-way ANOVA test; $P < .05$).

Conclusions: The tested files caused debris extrusion beyond the apex, regardless of the motion used. RM-R caused less debris extrusion than the other tested groups. Further studies are needed to come out to a conclusion about the performance depending on the reciprocating angles regarding debris extrusion, cutting efficiency, shaping ability, and cyclic fatigue.

OP11 - A NEW ALGORITHMIC FILE MODEL FOR SHAPING OF CURVED ROOT CANAL

Galal M[1], Ismail A[1]

[1]Restorative and Dental materials department, Oral and Dental Research Institute, National Research Centre, Cairo, Egypt, [2]Misr International University, Cairo, Egypt

Aim: to create a new algorithmic 3D file model for shaping the complex curved root canal system.

Summary: Recently, the revolution in rotary NiTi instruments has grown to improve the endodontic therapy. New generations of NiTi files with new morphologic features and metallurgy have been introduced to increase their performance and decrease their limitations. A Computer Aided Design (CAD) software was used to build a new Algorithmic file model with new design features and different metallurgy. Mathematical analysis of the new file model was performed using finite element analysis to study its mechanical behavior under bending condition and to compare it with the recent NiTi endodontic instruments. The results showed that the new Algorithmic file model showed the least amount of von Mises stress during testing of bending compared with the recent rotary endodontic files. This study showed that the design features and the metallurgy of the new algorithmic file model affected it performance and reduced the risk of the file failure. Using artificial intelligence in the future in conjunction with recent advances in radiology will allow the customization of the file design for each canal according to its morphology.

Key learning points:

- Numerical analysis for the design features of a new algorithmic 3D file model during bending.
- Numerical analysis for the effect of different metallurgy of a new 3D algorithmic file model during bending.
-
- Using artificial intelligence in the future to customize the file design according to root canal morphology.

OP12 - FUTURE INSTRUMENT CUSTOMIZATION FOR ROOT CANAL PREPARATION.

(AN INNOVATIVE ALGORITHMIC FILE MODEL FOR SHAPING NARROW CANALS)

Galal Ismail A[1], Galal M

[1]*Restorative and Dental Materials Department, Oral and Dental Research Institute, National Research Centre, Egypt, Egypt,* [2]*Misr International University, Egypt*

Aim: To design a novel three dimensional algorithmic file model addressing narrow canals

Summary: There is consensus that the main goal of root canal treatment is the healing of apical periodontitis in addition to a well retained functional tooth. Root canal anatomical complexities have always been a challenging obstacle hindering the accomplishment of complete and centered root canal instrumentation. With the advent of rotary Nickel Titanium instruments, along came instrument failure through cyclic and torsional fatigue. More than a couple of hundred brands of instruments have invaded the market suggesting new generations implying enhanced root canal preparations and reducing the incidence of instrument separation. In this study, a novel three dimensional algorithmic file model was designed using a computer aided design software with different metallurgy and cross sectional configurations along the file. Numerical analysis of the model was done using finite element method comparing its torsional behavior with the current nickel titanium rotary files. Upon torsional testing, this file performed efficiently in narrow canals with the least amount of stresses compared to the recent endodontic files. Accordingly, by incorporating artificial intelligence via computational models and algorithms, this newer technology in addition to a series of radiographs will allow for future customization of files addressing different canal complexities.

Key learning points

- Analyzing limitations of current rotary nickel titanium instruments in addressing canal complexities
- Comprehending the finite element analysis of a novel file design with different metallurgy and cross sectional designs under torsional analysis compared to other files
- Exploring the concept of applying artificial intelligence in future instrument customization in root canal preparation

OP13 - ARITHMETIC CROWN-DOWN INSTRUMENTATION TECHNIQUE, A SAFE AND REPRODUCIBLE SOLUTION FOR SHAPING SEVERELY CURVED ROOT CANALS

Elkholy M[1]

[1]The British University In Egypt, El Sherouk City, Egypt

AIM

The proposed technique aims to provide a safe and reproducible technique for shaping the severely curved root canal. The technique presents a new method of crown-down instrumentation that prevents over flaring and avoids instrument separation.

Summary:

The mechanical preparation of the root canal is inevitably impacted by the variations in root canal anatomy, such as the angle of the canal curvature, the radius of curvature, and the location of the curvature. Preparation of curved canals may alter the original canal anatomy, which can affect the outcome of endodontic treatment if it prevents complete instrumentation to the apical constriction.

The proposed technique presented here aims to combine both McSpadden's Zone technique and the Tactile Controlled Activation (TCA) technique using controlled-memory NiTi instruments with some modifications to overcome the pitfalls of ZT and TCA. The Arithmetic Crown-down Dynamic Tactile (ACDT)technique divides the root canal is divided into 2 portions according to the canal curvature: the coronal zone and the apical zone. Also, a formula was used to calculate the maximum insertion depths of higher tapered instruments to prevent over flaring of the canal and preserve peri-cervical dentine. ACDT kinematics recommend activating martensitic nickel-titanium rotary files upon dentinal engagement with 3 apical strokes.

Key learning points:

• Challenges encountered when shaping curved canals.
• Advantages of the ACDT instrumentation technique.
• Application of the ACDT in shaping various canal curvatures.

OP14 - A NOVEL TECHNIQUE TO FABRICATE ARTIFICIAL TEETH MODEL WITH SIMULATED ROOT CANAL USE FOR PRE-CLINICAL ENDODONTIC TRAINING

Jawami A[1]

[1]Faculty of Dentistry, Universiti Teknologi MARA, Malaysia

Aim: To present a novel technique to fabricate artificial resin maxillary central incisor with simulated root canal use for pre-clinical endodontic training.

Summary: 3D printing technologies seem to be promising however their implementation in certain dental school is complicated and expensive. This novel technique show alternative method to produce artificial teeth model. Firstly, impression of inner side of polycarbonate crown maxillary central incisor is taken using silicone putty to obtain the shape of the prepared crown. Then, the root is wax up using dental base plate wax to create the root form. Sprue former is place at the prepared buccal crown surface using wax to create space for clear resin injection. Finger spreader size Fine-fine(FF) or Fine(F) is use as simulated standardized straight canal template. The finger spreader is insert at the palatal surface until the end of apical area. The whole tooth template then immerse in the silicone to create the mould. Once the silicone has set, remove the tooth model by cutting small area without removing the finger spreader. Then, clear resin is inject trough the sprue area and then the mould is place in denture pressure pot to remove any air voids. Once the resin set, remove the artificial teeth resin model from the silicone mould. The sprue part and finger spreader is remove from the artificial teeth. Finally, prefabricated polycarbonate crown is cemented on teeth model to have the final product of artificial teeth with simulated root canal. The root canal is accessible after the access cavity preparation.

Key Learning Point: This novel technique is easy, low cost and allow to produce in a large quantity of standardised resin artificial teeth model with root canal use for teaching pre-clinical endodontics.

OP15 - ENDODONTIC COMPLICATIONS PERFORMED BY UNDERGRADUATE DENTAL STUDENTS

Kaya Büyükbayram I[1], Al-shammari S[1]

[1]*Istanbul Aydın University Faculty of Dentistry, Istanbul, Turkey*

The aim of this study was to determine the endodontic complications performed by the 4th and 5th year students and to reveal the differences in the forms and rates of complications.
A questionnaire was given to the 4th and 5th year students of Istanbul Aydın University, Faculty of Dentistry in 2019-2020 academic year. Root canal treatments were performed using stainless steek K files and canals were obturated by lateral condensation. At the end of each root canal treatment, students were surveyed with 22 questions. The questions were about the details of treatment and the complications
A total of 102 students, 49 from the 4th and 53 from the 5th year, participated in the study. Of the 283 completed root canal treatments, 130 were performed by the 4th year and 153 by the 5th year.
Complications were observed in 19.8% (n=56) of the 283 treated teeth
The most common clinical complication was related to root canal instrumentation (n=41) of which overinstrumentation (56.1%), was followed by ledge formation (41.5 %). The ledge formation rate of 4th year students' complications (%61,9) was significantly higher than that of 5th year students (20%) ($p<0.05$).
Complications related to root canal obturation was observed in 32 teeth of which %56.3 was underfilled and %43.8 were overfilled.
Complications related to anesthesia occurred during the treatment of 15 teeth. The rate of anesthesia related complications in 4th year students (4.6%) was significantly higher than in 5th year students (0%) ($p<0.05$).

Conclusion
The frequency of endodontic complications performed by undergraduate dental students appears to be high with conventional endodontic education.
The most common clinical complication was related to root canal instrumentation followed by obturation and anesthesia.
The study suggests relevant guidance for 4th year students while performing endodontic treatment, especially during instrumentation of the root canals to avoid ledge formation.

OP16 - PRECLINICAL 3D-PRINTED LABORATORY SIMULATION OF DEEP CARIES AND THE EXPOSED PULP REDUCED STUDENT ANXIETY AND STRESS, WHILE INCREASING CONFIDENCE AND KNOWLEDGE IN VITAL PULP TREATMENT

Chevalier V[1], Dessert M[1], Fouillen K[1], Lennon S[2], Duncan H[2]

[1]University of Bretagne Occidentale, Brest University Hospital, Brest, France, [2]Division of Restorative Dentistry and Periodontology, Dublin Dental University Hospital, Trinity College Dublin, Dublin, Ireland

Aim: To evaluate the impact of a preclinical laboratory session using 3-D printed teeth simulating caries on dental student stress, anxiety, confidence and knowledge when treating deep caries and pulp exposure.

Methodology: This two-centre controlled study based in two European dental schools, randomly distributed students into two groups: a vital-pulp-treatment (VPT) lecture-only (control) group and a VPT-lecture combined with a VPT-laboratory (experimental) group. All students attended the lecture. Two weeks later (timepoint-T1), both groups completed questionnaires and scales to evaluate their stress (Stress-VAS), anxiety (STAI Trait (T) and State (S)), self-confidence and knowledge. Thereafter, only the experimental group attended the laboratory session demonstrating the techniques of selective caries removal and partial pulpotomy on a commercial 3D-printed tooth. Two-weeks later (timepoint-T2), the participants from both groups repopulated the same questionnaires and VAS. The control group had the laboratory session after study completion. The statistical analysis was performed with Statistica® (significance p=.05). The homogeneity between the two samples was checked by Khi² and Student tests. Stress-VAS, STAI-S, confidence and knowledge scores were compared within, and between the two groups, at T1 and T2, with a repeated measures ANOVA test (+/-Tukey post-hoc test).

Results: The groups comprised of 54 students each, with no statistical difference between the groups regarding demographic, academic data and STAI-T score. The two groups had no significant differences in Stress-VAS, STAI-S, confidence and knowledge scores at T1 while they presented a significant difference in stress, anxiety and confidence scores at T2, but with no significant difference in knowledge score. However, knowledge score, as other parameters, improved significantly between T1 and T2 in the experimental group.

Conclusions: An additional laboratory session using 3D-printed teeth that simulated deep caries and pulp exposure management, significantly reduced student stress and anxiety and increased their confidence, highlighting opportunities for undergraduate education development in Endodontics.

OP17 - PULP CAPING IN SYMPTOMATIC UNDER-AGE PATIENTS: A CASE SERIES

Krokidis A[1]

[1]National & Kapodistrian University of Athens, Athens, Greece

Aim: The aim is to present a case series of symptomatic molars (throbbing pain, pain in cold and hot stimuli) of patients form 10 -16 of age treated with direct pulp caping with bioceramic materials.

Summary:
The maintenance of vitality in teeth with deep carious lesions has always been an important issue, especially in young patients with either undeveloped or even fully developed roots. The objective always in such cases is to maintain the vitality in order to delay the advancement of the treatment. Pulp caping has always been a treatment option, even if the materials used previously for different reasons were not as performant as needed. Even if the passing from calcium hydroxide to MTA has been really effective in the outcomes of such interventions, tooth discoloration remained an issue and obviously MTA handling was never easy. With the introduction of second generation bioceramic materilas the problems of handling and discoloration almost disappeared.
During the lecture a case series of symptomatic molars with deep carious lesions will be presented, which were all treated following the same pulp caping protocol. The operative protocol will be described and results will be presented.

Key learning points:
- Evaluation of capabilities of pulp caping technique.
- Definition of a precise, effective and successful operative protocol.
- Comprehension and evaluation of the limits of such technique for the maintenance of tooth vitality.

OP18 - CRYOTHERAPY FOR HAEMOSTASIS AND POST-OPERATIVE PAIN CONTROL FOLLOWING FULL PULPOTOMY IN PERMANENT MANDIBULAR MOLAR TEETH WITH PARTIAL IRREVERSIBLE PULPITIS

Logani A[1], Kumar V[2], Akhil V[3]

[1]AIIMS CDER, NEW DELHI, INDIA, [2]AIIMS CDER, NEW DELHI, INDIA, [3]AIIMS CDER, NEW DELHI, INDIA

Aim: To assess and compare the effect of cryotherapy (2.5 ºC normal saline) with 2.5% sodium hypochlorite (NaOCl) solution on time taken to achieve haemostasis and post-operative pain control following full pulpotomy

Methodology: Fifty deep occlusal or proximal carious mature permanent mandibular first and second molar teeth with the clinical and radiographic diagnosis of symptomatic partial irreversible pulpitis without periapical rarefaction (PAI≤ 2) were included. After full pulpotomy, depending on the method to achieve haemostasis, the teeth were randomly assigned. In the cryotherapy group (n=25), an indigenously developed cryotherapy unit was used to continuously irrigate the radicular pulp with 2.5ºC normal saline at a flow rate of 8ml/minute. In the NaOCl group (n=25), a size #2 sterile cotton pellet moistened with 2.5% NaOCl was applied over the radicular pulp. Time taken to achieve haemostasis was recorded. The pulpotomy was completed with white mineral trioxide aggregate, and the tooth was restored with resin-modified glass ionomer cement and bulk-fill composite resin. Pre- and post-operative pain was assessed using an 11-point Numerical Rating Scale at 24, 48, and 72 hours. The data were analyzed using the Fischer's exact test, two-sample t-test, two-sample Wilcoxon rank-sum test, Friedman Test, Wilcoxon Signed Rank Test and ANCOVA. The significance level was predetermined at $p<0.05$.

Results: The time taken to achieve haem
ostasis was 5 ± 1.04 and 5.48 ±1.44 minutes in the cryotherapy and the NaOCl solution group, respectively ($p>.05$). At 24, 48, and 72 hours, both groups experienced significant pain reduction ($p\leq0.05$). Cryotherapy application had a significant effect on postoperative pain reduction at all time intervals ($p\leq0.05$) when compared to NaOCl application.

Conclusion: Cryotherapy can be used for achieving haemostasis and post-operative pain control following pulpotomy

OP19 - INTENTIONAL REPLANTATION REVISITING: FACTORS AFFECTING THE SUCCESS

Hamed M[1]

[1]Faculty of Dentistry, Al Azhar University, Cairo, Egypt

Intentional replantation was considered, by many authors, as the last treatment option for management of failed endodontic cases that can't be treated by nonsurgical approach or not amenable for surgical intervention due to anatomical considerations or patient medical status. The retardation of this procedures since it's invention by Aboelkasem Elzahrawy may attributed to the most recorded complication after intentional replantation which are ankylosis and external root resorption, but with the advent of atraumatic extraction techniques as periotome assisted extraction ,physics forceps and orthodontic assisted extraction techniques, the literatures record a reasonably raised success rates of the procedure which may give the chance for the intentional replantation to be considered as a "treatment option "rather than "the last treatment option".

It is worthy to discuss, in this lecture, beside a traumatic extraction technique, there are multiple factors that affect the success of intentional replantation which may be the handling technique, extra alveolar time, splinting technique, size of the periapical defect and presence or absence of root defects.

Objectives:

1- Mention the common and uncommon indications of intentional replantation.
2- Spotlight on the standard technique for intentional replantation.
3- Shed light on the drawbacks of intentional replantation.
4- Discussing the factors affecting the success of intentional replantation.

OP20 - INTENTIONAL REPLANTATION

Mustafa R[1]

[1]Jordan University Of Science And Technology, Irbid, Jordan

Despite high success rate of primary root canal treatment up to 85%, the failure may occur and new pathosis may develop. It is generally accepted that orthograde nonsurgical retreatment is the first-line approach for treatment of failure cases and high success rates of up to 81% have been quoted. The operator must however distinguish certain fundamentally different clinical scenarios in which a patient may want to keep a tooth but neither re-root canal treatment nor apical surgery. Intentional replantation (IR) may offer a solution in these cases of symptomatic persistent periapical lesions.
In this oral presentation, Intentional replantation (IR) definition and history, indications, contraindications, case selection, prognostic factors, risk and benefits of IR, clinical procedure with case procedure steps (supported with case photos) and an overall success rate with updated evidence-based literature will be presented briefly.
IR is the purposeful, atraumatic extraction of a tooth and, after surgical endodontic manipulation (root end resection, instrumentation, and apical sealing), returning it to its original socket. IR concept has been described in dentistry for hundreds of years.

Key points:

- Understanding IR indications, contraindications, and case selection.
- Understanding IR techniques and recent modifications (instruments, materials)
- Importance of good communication with patient about IR.
- Success and survival rate of IR.
- IR procedure can be done by general dentist and endodontist.

OP21 - A PROSPECTIVE CLINICAL STUDY INVESTIGATING THE EFFECTIVENESS OF PARTIAL PULPOTOMY USING TWO MATERIALS AFTER RELATING PREOPERATIVE SYMPTOMS TO A NEW CLASSIFICATION OF PULPITIS: REFLECTIONS

Careddu R[1], Duncan H[1]

[1]*Dublin Dental University Hospital, Dublin, Ireland*

AIM

To propose a partial pulpotomy protocol for the treatment of deep and extremely deep carious lesions using a new and established classification system for pulpitis. A secondary aim is to compare the use of two commercial hydraulic calcium silicate materials (HCSMs) from a practical clinical perspective, analysing their respective advantages and disadvantages.

SUMMARY OF THE TALK

The most appropriate management of deep and extremely carious lesions on vital teeth remains controversial with a lack of consensus remaining among educators, general dentists and endodontists. The principle issues are the predictable assessment of pulp status and the level of invasiveness when treating the exposed pulp. In this presentation we will discuss the advantages of the Wolters classification (2017) over current diagnostic systems for the evaluation of pulpitis and the subsequent use of a precise partial pulpotomy protocol in order to preserve pulp vitality. During the presentation, the performance of two HCSMs will be compared for a range of pulpal diagnosis and followed up for one year. A step by step partial pulpotomy protocol will be proposed, linking clinical procedure with the latest indications for pulp management available in literature. Indications, advantages, disadvantages and use of the two materials will be discussed from the operator point of view and clinical results analysed with respect to diagnosis and resulting prognosis.

KEY LEARNING POINTS

- Highlight the advantages of a new pulpal classification system over traditional dichotomous reversible and irreversible systems
- Discuss of practical and predictable partial pulpotomy protocol suitable for management of deep and extremely deep carious lesion
- Analyse prognosis factors associated with management of symptomatically exposed pulps, highlighting which cases are likely to be more successful than others.

OP22 - CASE SELECTION FOR SUCCESSFUL PULPOTOMY IN SYMPTOMATIC PERMANENT MATURE TEETH

Santos J[1]

[1]University of Coimbra, Coimbra, Portugal

Aim: To present case selection criteria for partial/complete total pulpotomy in symptomatic permanent mature teeth clinical management.

Pulpotomy or pulp amputation consists of the removal of the vital pulp's coronal portion as a means of preserving the vitality of the remaining radicular portion. This approach has been recommended and widely accepted as treatment for carious or mechanic pulp exposure of permanent immature teeth, with pre-operative normal or reversible pulp inflammation. In recent years, improved biological knowledge about pulp regeneration and the development of new bioactive materials has increased interest in this vital pulp therapy procedure. Nowadays, pulpotomy has been suggested as an alternative to non-surgical root canal treatment (pulpectomy) for the management of mature permanent posterior teeth with irreversible pulpitis. The increasing clinical evidence of good outcome results obtained with those clinical protocols has encouraged both European Society of Endodontology and American Association of Endodontists to release position statements accepting pulpotomy as a definitive treatment modality for this clinical scenario, in order to maintain the pulp's protective mechanisms and healing capacities.
However, the success of pulpotomy greatly depends on i) elimination of infected dentin and pulp tissue, and ii) the pulpal immunocompetence/level of inflammation. Both aspects cannot be currently reliably determined, and clinicians must rely on a meticulous intraoperative assessment of the pulp tissue status, level of amputation and bleeding control of the remaining pulp tissue to decide whether this approach is expected to be successful or if traditional pulpectomy technique should be carried out.

Key learning points:
1) Elucidate case selection criteria for partial/complete pulpotomy;
2) Highlight the relevance of intraoperative pulp status assessment;
3) Explore the influence of bleeding control time on the prognosis.

OP23 - COMPARATIVE EFFICACY OF MATERIALS USED IN PATIENTS UNDERGOING PULPOTOMY OR DIRECT PULP CAPPING IN CARIOUS TEETH: A SYSTEMATIC REVIEW AND META-ANALYSIS

Fasoulas A[1], **Keratiotis G[1]**, Spineli L[2], Pandis N[3], De Bruyne M[1], De Moor R[1], Meire M[1]

[1]Section of Endodontology, Department of Oral Health Sciences, Ghent University, Ghent, Belgium, Ghent, Belgium, [2]Midwifery Research and Education Unit, Hannover Medical School, Hannover, Germany., Hannover, Germany, [3]Department of Orthodontics and Dentofacial Orthopaedics, University of Bern, Bern, Switzerland., Bern, Switzerland

Aim

The purpose of this presentation is to report a systematic review of RCTs on different materials used in patients undergoing pulpotomy or direct pulp capping in carious teeth.

Summary

Randomized controlled trials comparing capping agents used for direct pulp capping (DPC) or pulpotomy in carious teeth were included. A search of 4 databases and 2 clinical trial registries was carried out up to 28/2/21

Screening, data extraction and risk of bias (RoB) assessment of studies were performed in duplicate and independently. The primary outcome was clinical and radiological success; secondary outcomes included continued root formation, tooth discoloration and dentin bridge formation. The RoB was assessed using the Cochrane RoB tool 2.0. The certainty of the evidence was assessed by using the GRADE approach.

21 RCTs were considered eligible out of 4599 hits. The RoB assessment indicated a moderate risk of bias among the studies. Due to clinical and statistical heterogeneity, performing network meta analysis was not possible. An ad hoc subgroup analysis revealed strong evidence of a higher success of DPC with MTA compared to calcium hydroxide (CH). The GRADE assessment revealed moderate strength of evidence for DPC and mature teeth, and low to very low strength of evidence for the remaining subgroups.

The relevance of these findings is discussed in light of the operative protocol for the cariously exposed pulps.

Key learning points

- 10 products have been reported in 21 RCT's as pulp capping agents.
- MTA and CH are the most frequently studied interventions (20 and 14 trials), followed by BD 5-trials, Theracal and PRF - 3 trials, and CEM and PRF- 2 trials.
- The only comparison that was suitable for meta-analysis was CH vs MTA.
- A superiority of MTA compared to CH was revealed; this superiority could be supported in cases of DPC or mature teeth.

OP25 - NANO INTRACANAL MEDICAMENTS; A NEW ERA FOR ROOT CANAL DISINFECTION BEGINS

Nashaat Y[1]

[1]Prof of endodontics, Faculty Of Dentistry;October 6 University, , egypt

Aim: Assessment of the use of nano intracanal medicament in root canal disinfection from different perspectives.

Summary: A successful endodontic treatment depends on eradication of all the bacteria. The achievement of microbicidal doses becomes critical in the endodontic environment, because bacteria may aggregate to form a biofilm or enter a stationary phase, thus acquiring a resistant phenotype. Therefore, disinfection of the root canal is a major determinant in the healing of periapical tissues. Although the chemo mechanical preparation and use of antimicrobials are effective in reducing the bacterial load, some bacteria can still persist.

Local use of Antibiotics as intracanal medicament have been reported to be effective in reducing bacterial numbers in the root canal systems of infected teeth which help to reduce the periapical inflammatory reaction including clastic-cell mediated resorption. Because root canal infections are polymicrobial a single antibiotic may not be effective in root canal disinfection.

Nanotechnology is progressing as a promising field that is developing in various medical and dental applications because of their great broad spectrum antibacterial effectiveness and suggested biocompatibility.

Cytotoxicity is the capacity of a material to impact cellular viability, measured at various physiological endpoints as reduction in cell growth and proliferation, necrosis, apoptosis, or combinations of these aspects. Evaluation of cytotoxic activity of nano intracanal medicaments is of great importance as it affects the biological and physiological behavior of these cells. Using an intracanal medicament of high antibacterial efficacy and low cytotoxic effect is an optimum goal in root canal disinfection which could be achieved using Nano technology.

Key learning points:

- Understanding the microbial flora of infected root canals
- Highlighting the importance of intracanal medicaments in root canal disinfection
- Discussing the antibacterial efficacy as well as the biocompatibility of newly introduced nano intracanal medicaments.

OP26 - ANATOMICAL FEATURES AND TREATMENT OF LESIONS IN THE PREMAXILLARY ZONE

Soldati C[1], Darvizeh A[1], Tocchio C[1]

[1]Università Vita Salute S. Raffaele Milano, Milano, Italy

Aim of the Presentation:
To show the premaxillary zone features treating two surgical cases of endodontic lesion and nasopalatine duct cysts

Summary:
Treatment of lesions in the anterior maxillary zone (also known as the premaxillary zone) has a strong impact upon dental and gingival aesthetics and function. The most common procedures in this region include among others, endodontic surgery and elimination of cysts.
Consequently, adequate knowledge of the anatomy, with regard of morphology and dimensions of the nasopalatine canal, is essential to optimize surgical planning and avoid possible complications in this region. Anatomically, the nasopalatine canal is a relatively long and narrow structure located on the maxillary midline. It contains both the nasopalatine nerve (terminal branch) and the descending palatine artery. This bone canal communicates the roof of the oral cavity with the floor of the nasal cavity.
Identification of the individual anatomical variants, particularly regarding the neurovascular structures, is an essential step to achieve a good outcome in treatments of this region.
Another important aspect is soft tissue management. Before flap surgery the anatomic structure of the mucosa needs to be assessed and a correct timing must be kept with the minimum possible trauma; for instance, when possible, a design of the flap allowing to avoid post-surgery recessions should be preferred.

Soft tissue outcome is greatly influenced by various factors which are an appropriate flap design, correct papilla management, flap elevation, flap advancement, wound closure, stability of the wound, and post-operative care.
All these aspects can be achieved using dedicated microsurgical instruments as blades and retractors and using magnification appliances during the most critical steps.
A treatment case of endodontic cyst and another of nasopalatine duct cyst are shown as example of premaxillary zone ‘surgery.

Key learning points
- nasopalatine duct cyst
- endodontic cyst
- endodontic surgery

OP27 - IMPORTANCE OF DIAGNOSIS AND CASE MANAGEMENT IN TEETH WITH PERIAPICAL PATHOLOGY AND PRESENCE OF OPEN APEX

Nieto Suárez J[1], Estevez Luaña R[1], Perez Alfayate R[1], Conde Villar A[1], Valencia de Pablo O[1]

[1]Universidad Europea De Madrid, Madrid, España

The complete formation of a permanent tooth occurs 3 years after its eruption in the mouth. The formation can be altered for various reasons, preventing a complete maturation. Therefore, it is critical for the patient to receive an accurate diagnosis as soon as possible. The presence of open apex is a challenge for the clinician. Therapeutic options include apexification, inducing the formation of an artificial barrier by placing a biocompatible material.
We are dealing with a patient who came for an appointment due to inflammation in the upper anterior region. After diagnostic tests, we found involvement in several teeth; tooth 12: Pulp necrosis with symptomatic apical periodontitis; tooth 11: Pulp necrosis with symptomatic apical periodontitis and tooth 21: previously treated with symptomatic apical periodontitis. As they presented different apical diameter, root canal treatment was chosen for tooth 12, and apexification for tooth 11 and 21.

OP28 - BIODENTINE APICAL PLUGS IN THE TREATMENT OF TRAUMATIZED IMMATURE TEETH WITH LARGE PERIAPICAL LESIONS

Georgiadou A[1]

[1]*International University of Catalonia,UiC, Barcelona, Spain*

AIM

The aim of this presentation is to describe the management of traumatized non-vital teeth with an open apex,requiring elimination of bacteria from the root canal system and induction of apical closure.In this clinical case two central incisors with immature apices involved in extensive apical radiolucencies were treated endodontically by apexification procedure with the use of tricalcium silicate–based material (Biodentine).

SUMMARY

A 25-year-old female was referred to the Endodontic Department of the Universitat Internacional de Catalunya, Spain to receive endodontic treatment in the anterior incisors (1.2-2.1),which were included in a 4-unit metal ceramic bridge.During the clinical examination tenderness to vertical and horizontal percussion and no response to cold test was noticed.Previously treated tooth(2.1) with symptomatic apical periodontitis and pulp necrosis(1.1,1.2)with chronic apical abscess was diagnosed.The radiographic examination revealed the presence of immature apices in the central incisors associated with periapical radiolucency. The treatment option was to treat the canals using Biodentine(Septodont, Saint-Maur-des-fosses,France) which is a tricalcium silicate cement that possesses adequate handling characteristics and acceptable mechanical and bioactivity properties. An apical plug formation for 5 mm was performed and the rest of the canal was filled with injectable gutta percha(B&L,Biotech).For the lateral incisor a primary endodontic treatment (VDW Rotate,35.04)was performed using warm vertical compaction technique.Two visits were performed,with interim calcium hydroxide paste applied between appointments. After the treatments the crowns were sealed with flowable composite (SDR,Dentsply) and a provisional bridge was cemented.At the 3 months follow up, healing of the sinus tract was observed, likewise improvement of periapical healing. Patient was completely asymptomatic throughout this period.

KEY POINTS

On the basis of sealing ability and biocompatibility, apexification treatment with Biodentine was applied in the present case.

The favorable clinical and radiographic outcome in this case demonstrated that Biodentine may be an efficient alternative to the conventional apexification materials.

OP30 - ENDODONTIC REGENERATION: MYTHS VS. FACTS

Abo Hatab T[1]

[1]*Syrian Private University*

Title of presentation:
Endodontic regeneration: myths vs. Facts.

OP31 - LARGE BONE LESIONS OF THE JAWS: DIFFERENTIAL DIAGNOSIS AND SURGICAL TREATMENT

Tocchio C[1], Soldati C[1], **Darvizeh A[1]**

[1]Università Vita Salute S. Raffaele Milano, Milano, Italy

Aim of the presentation

To present clinical cases in which it is necessary to make a differential diagnosis between lesions of endodontic origin and non-endodontically related lesions addressing the correct treatment

Summary of the talk

In situations where suspicious lesions of undetermined origins are encountered, it is important for clinicians to consider non-endodontic and perhaps non-odontogenic sources to properly diagnose the condition in order to provide appropriate treatment. Differential diagnoses may include cysts, anatomic variations, and neoplastic lesions. Diagnostic dilemmas and misperceptions can be prevented, and ineffective treatment avoided by thoroughly reviewing the patient's medical and dental histories, making a careful examination of the head and neck followed by a dental vitality testing and employing a detailed radiographic exam. The use of new diagnostic tools, such as CBCT imaging, may provide detailed high-resolution images of oral structures and help to make the initial diagnostic hypothesis and plan the treatment. When a source of the lesion is not found, other pathology should be considered. Histopathology remains mandatory for the definitive diagnosis of the lesions. Early diagnosis of any lesion significantly improves the outcome of treatment, and in cases of non-endodontic lesion, it significantly improves the patient's prognosis

In this speech same cases referred for an endodontic treatment, but ultimately diagnosed as non-endodontic are shown.

Key Learning Points

- Endodontic lesions
- Non endodontic lesions
- Cysts
- Differential diagnosis
- Surgical Approach

OP32 - SURGICAL RETREATMENT – THE PAST OR THE FUTURE OF ENDODONTIC SURGERY?

Weissman A[1]

[1]Department of Endodontics, Hadassah Medical Center, Faculty of Dental Medicine, Hebrew University of Jerusalem, Jerusalem, Israel

The aim of this presentation is to highlight possible advantages of surgical retreatment (SR) compared to endodontic microsurgery (EMS).
In the past SR was performed by using Hedstrom files held with a haemostat to clean and shape the root canals. This technique gained limited popularity.
In the present EMS is commonly practiced. It involves apical root resection of 3 mm followed by a 3 mm ultrasonic root-end preparation. This technique has a predictable success rate of about 90% after 1-2 years.
Well, if it's not broken why fix it?
In cases of long posts terminating at the apical third, a 3 mm resection might leave insufficient canal length for retrograde preparation, plus it impairs the crown to root ratio. But maybe the most important shortcoming of EMS is that the 3 mm retro-preparation doesn't address the infected coronal part of the canal.
Reports have shown that the short term 90% success rate of EMS dropped by 5-8% after 2-4 years and that this decline continued after more than 4 years.
The proposed SR technique is characterized by a minimal root-end resection followed by a maximal length retro-preparation performed with ultrasonic files. Our study demonstrated that the short term 93% success rate of this technique have dropped by only 2.6% at the 4 years long term follow up.
In conclusion SR is a more conservative technique compared to EMS and may offer better outcome in the long run.

Key learning points:
SR is more conservative in terms of root structure compared to EMS
SR is aimed at addressing the entire root canal compared to the limited 3 mm retro-preparation of EMS
SR have provided better long term results compared to EMS

OP33 - CURRENT UPDATE ON TARGETED ENDODONTIC MICROSURGERY

Antal M[1]

[1]University Of Szeged, Szeged, Hungary, [2]University of Sharjah, Sharjah, United Arab Emirates

Aim:
With the help of modern diagnostic methods and advanced treatment options in dentistry, such as retrograde preparation under a microscope, the success rate of endodontic treatments rose steeply. However, even these methods are not 100% successful, and the operator factor is still a crtitical determinant of success. Should all attempts fail, surgical removal of the apex and the inflamed periapical tissues is a routine intervention. Computer-assisted static guided surgery has become widespread in implant dentistry as it significantly enhances the accuracy of implant placement. Just like implant placement, surgical removal of the apex requires high precision and accuracy. Thus, it is logical to utilize the same instrumentarium (CBCT imaging, 3D digital planning and 3D printed patient-specific surgical templates) in this indication as well. An increasing number of publications demonstrate this approach.

Summary
The presentation will review the development of targeted (guided) endodontic microsurgery starting from the first preclinical study in 2007 up to the latest innovations. The evolution of the approach will be discussed, as well as the innovative steps which have led to fully guided endodontic surgery with a trephine bur. Relevant preclinical and clinical research from our research group will also be discussed, demonstrating the background of our technique, which has now been described in numerous case reports.

Key Learning Points
-understand the evolution of guided endodontic surgery
-identify the difficulties and limitations of the technique
-understand the basics of the digital planning of apical surgery to be carried out with a static surgical guide (template)
-understand the principles of computer-assisted, guided apical surgery

OP34 - DECOMPRESSION OF A LARGE SIZE THROUGH AND THROUGH MAXILLARY LESION ULTIMATELY SOLVED WITH AN ENDODONTIC MICROSURGICAL APPROACH USING L-PRF REGENERATION TECHNIQUE

Gonçalves N[1], Martins J[1], Pereira M[1], Gingeira A[1]

[1]Faculdade De Medicina Dentária Da Universidade De Lisboa, Lisboa, Portugal

Aim: According to the European Society of Endodontology one of the recommendations to conduct an endodontic microsurgery includes the persistence, or emergence, of disease after root-canal treatment. This clinical approach allows the removal of an extensive apical lesion, and simultaneously to address the endodontic cause of the infection. Moreover, it allows an option for patients that reject replacing former fixed prosthodontics or conducting an orthograde endodontic retreatment. For certain cases of large periapical cystic lesions, the conservative decompression may be used before, or instead of, apical surgery. Additionally, the use of leukocyte platelet rich fibrin (L-PRF) is an easy and cost-effective way to obtain high concentrations of growth factors for soft and hard tissue regeneration in wound healing.

Methodology: A 62 year-old Caucasian male presented to FMDUL Endodontics Department with a palatal swelling on maxillary left central and lateral incisors, both presenting previous root canal treatments. Periapical radiography and cone beam computer tomography (CBCT) revealed a periapical radiolucent lesion with a considerable size. A cyst decompression was proposed and controlled monthly. After 3 months the drain was removed and the endodontic microsurgery performed. Blood was taken from the patient and L-PRF was obtained after centrifugation. The lesion was enucleated, 3mm root-end resection was conducted, and apical retropreparation and retroobturation, with MTA, was performed on both teeth. The bone defect was filled with the L-PRF membranes previously obtained. Lesion was sent for analysis.

Results: The anatomopathological analysis revealed a cyst diagnosis. Clinical and periapical radiography and CBCT imaging follow-ups noted absence of clinical symptoms, healthy periodontal tissues and periapical healing.

Conclusion: This case shows it's possible to reduce a large sized lesion, with decompression procedures, making the microsurgical approach more predictable and capable of achieving faster tissues regeneration, which may be potentiated by using autologous blood concentrate as a regeneration graft.

OP35 - APPLICATION OF COLD ATMOSPHERIC PLASMA AND OZONE THERAPY IN THE TREATMENT OF LARGE CYST-LIKE PERIAPICAL LESIONS

Pavelic B[1], Pavlovic I[1], Bago I[1], Segovic S[1], Anic I[1]

[1]School Of Dental Medicine, University of Zagreb, Croatia, Zagreb, Croatia

Aim

To present the positive therapeutic effect of cold atmospheric plasma and ozone application in the treatment of large cyst-like lesions in periapical region.

Summary

The success of the therapeutic procedure in the treatment of cyst-like lesion depends on its size, shape and histological characteristics. In the treatment of large cystic lesions associated with infection of the dental pulp, in addition to primary endodontic procedure, surgical therapy is often recommended.

The high freqency generator Ozonyx (Biozonix, München, Germany) is used for the producing of cold atmospheric plasma and ozone gas. The cold atmospheric plasma therapeutic field is created by using glass probes filled with noble gas that emits electromagnetic energy, while ozone is prepared using a specially designed KP-syringe.

Cold atmospheric plasma is applied inside the root canals and above the soft tissue (in the lesion area) while ozone is instilled into the root canals and into the lesion during the decompression procedure.

Key Learning Points

- Use of the cold atmospheric plasma and ozone, as an additional therapeutic procedure to the endodontic and decompression therapy, results in complete healing of cyst-like lesions
- Compared to other antimicrobial agents, no case of allergic or toxic reaction to the surrounding biological tissue has been described in the available literature, so far.
- The positive initial clinical experiences require further monitoring of this type of bio-oxidative procedure in the treatment of large cyst-like lesions, whether administered alone or in combination with other forms of therapeutic procedure.

OP36 - EVALUATION OF THE SEALING ABILITY OF THREE ROOT CANAL SEALERS

Kelmendi T[1]

[1]University of Prishtina "Hasan Prishtina", Faculty of Medicine, Dental School, Prishtina, Republic of Kosova

Aim of this study was evaluation in vitro of coronal leakage of three different endodontic sealers with two different instrumentation techniques.

Summary: Obturation of the root canal is one of the most important goals of the endodontic treatment, although several factors are related to treatment failures, including inadequate apical and coronal seal, over- or under instrumentation, inadequate restorations. There are lot of types of root canal sealers, but there is no ideal sealer and still coronal leakage is considered a significant factor in endodontic failure. Literature mainly addresses the different types of sealers but little attention has been given to the bioceramic-based root canal sealer.
For this study we selected 96 single-rooted teeth. Teeth were divided into three groups according to root canal sealer. Group 1 were obturated with RealSeal. Group 2 were obturated with Ketac Endo. Group 3 were obturated with Sure-Seal Bioceramic Root Canal Sealer. Groups were subdivided into two subgroups (a and b) according to the root canal instrumentation technique. Subgroups a canals were instrumented with K-Flexofiles, in subgroups b canals were instrumented with ProTaper. The coronal portion of each root was placed in contact with inoculum of Enterococcus faecalis in Tryptic Soy Broth (TSB) culture media. Each root tip was placed in one bottle containing sterile TSB.

Results: Statistical analysis showed that there was significant difference between the subgroup 1a (RealSeal-step back) and 2b (Ketac Endo-crown down) and between the subgroups 2a (Ketac Endo-step back) and 2b (Ketac Endo-crown down) .

Conclusion:
According to our findings the root canals obturated with Sure-Seal Bioceramic Root Canal Sealer showed significantly longer duration of resistance to bacteria penetatrion than the canals obturated with RealSeal and Ketac Endo.
Key learning points: dental leakage, root canal sealers, instrumentation technique.

OP37 - DISINFECTION OF GUTTA-PERCHA CONES FOR INCREASED WETTABILITY: EFFECT ON SURFACE TOPOGRAPHY, CHEMICAL SURFACE MODIFICATIONS AND SURFACE FREE ENERGY

Felicjan K[1], Abram A[2], Drnovšek N[2], Kocjan A, Fidler A[1,3]

[1]Department of Restorative Dentistry and Endodontics, University Medical Centre Ljubljana, Slovenia, , ,
[2]Department for Nanostructured Materials, Jožef Stefan Institute, 1000 Ljubljana, Slovenia, , ,
[3]Department of Endodontics and Operative Dentistry, Faculty of Medicine, University of Ljubljana, Slovenia, ,

Aim: to evaluate the surface topography, chemical surface, and surface free energy changes of guttapercha induced by the disinfection.

Methodology: Guttapercha specimens (n=21) of three different manufacturers (Dentsply – DS, Diadent - DD, and VDW) were prepared in divided into three groups, i.e., control, NaOCl (immersed in 5,25% NaOCl for 2 mins) and CHX (immersed in 2% chlorhexidine for 2 mins). Topographic changes were evaluated with profilometry and scanning electron microscopy analysis (SEM). Chemical modifications were evaluated with EDS and FTIR. Surface energy was evaluated with a tensiometer and measured the contact angles with water (polar) and diiodomethane (apolar). The Owens-Wendt-Renkel-Kaelble (OWRK) method was used to calculate the predicted surface free energy of the samples.

Results: Both disinfectants decreased the surface roughness. The EDS evaluation of samples from DD and VDW revealed the exposure of zinc oxide. In contrast, FTIR evaluation of DS samples revealed carboxylation of double bonds (C=C) and formation of esters and ketones. Both disinfectants increased the surface free energy and decreased wetting angles, resulting in increased wettability. The mean surface energy (mN/m) for groups was: control 28.3, 33.7,36.2, NaOCl 38.7,42.3,42.7, and CHX 39,30.2,40.2 for VDW, DD and DS, respectively.

Conclusion: Both NaOCl and CHX caused an increase in surface free energy of guttapercha. Chairside chemical disinfection with 5,25 % NaOCl and 2% CHX for 2 minutes is therefore recommended, as it is effective against microbial contamination and promote wetting with both hydrophobic and hydrophilic sealers.

The work was supported by the Ministry of Higher Education, Science and Technology of the Republic of Slovenia, under grant numbers P3-0293 and J3-2519.

OP38 - ANTIMICROBIAL ACTIVITY OF ROOT CANAL SEALERS AGAINST AN ENDODONTIC MULTISPECIES BIOFILM

Kapralos V[1], Sunde P[2], Camilleri J[3], Karygianni L[4]

[1]Nordic Institute Of Dental Materials, Oslo, Norway, [2]Department of Endodontics, Institute of Clinical Dentistry, Faculty of Dentistry, University of Oslo, Oslo, Norway, [3]School of Dentistry, Institute of Clinical Sciences, College of Medical and Dental Sciences, University of Birmingham, Birmingham, United Kingdom, [4]Department of Clinical Oral Microbiology and Immunology, Clinic of Conservative and Preventive Dentistry, Center of Dental Medicine, University of Zurich, Zurich, Switzerland

Aim:
The aim of the present study was to evaluate the initial bacterial adhesion and biofilm formation upon the surfaces of 4 endodontic sealers.

Summary:
AH Plus, Guttaflow bioseal, Guttaflow 2 and BioRoot RCS were prepared in cylindrical specimens (5mm diameter) and assessed for initial bacterial adhesion (2 hours) and biofilm formation (64 hours) using a 10 bacterial-species model: Actinomyces oris, Campylobacter rectus, Enterococcus faecalis, Fusobacterium nucleatum, Parvimonas micra, Porphyromonas gingivalis, Prevotella intermedia, Selenomonas sputigena, Streptococcus oralis, and Veillonella dispar. Dentin discs (5mm diameter) were used as controls. The total bacterial counts were calculated (CFUs/cm2) after the direct exposure of the endodontic sealers in different aging stages (freshly mixed, 1 day, and 28 days) to initial (2h) and mature (64h) multispecies biofilms. Live/Dead-staining and fluorescence in situ hybridization (FISH) was further performed upon sealer surfaces followed by confocal laser scanning microscopy (CLSM) of the mature (64h) multispecies biofilms.
Among the 4 sealers and the different aging stages, freshly mixed as well as 1-day AH Plus and BioRoot RCS significantly inhibited initial bacterial adhesion (2h) compared to dentine discs ($p < 0.05$), whilst only freshly mixed AH Plus presented a statistically significant decrease of mature biofilm (64h) formation. Guttaflow bioseal and Guttaflow 2 at all aging stages did not inhibit initial bacterial adhesion or mature biofilm formation ($p > 0.05$).

Key learning points:
- Freshly mixed and 1-day sealers (AH Plus and BioRoot RCS) showed antimicrobial activity against initial bacterial adhesion (2h)
- Only freshly mixed AH Plus inhibited biofilm formation (64h)

OP39 - SYNCHRONIZED HYDRAULIC CONDENSATION OBTURATION TECHNIQUE

Chawshli M[1]

[1]Chawshli Group, ERBIL, Iraq

Greeting the scientific committee, I am a lecturer from Kurdistan, it is my dream to give an oral presentation at this massive event, my lecture will be on bioceramic sealer endodontics, I will be concentrating on the modern obturation technique which is called synchronized hydraulic condensation obturation technique with different kinds of BC sealer, I am going to share my own clinical photos which are taken under high magnification of dental microscope and evidence-based clinical recorded HD videos, also I will share the latest studies provided about the BC sealers and the success rate with proper prognosis, I have more than 100 root canal treated cases under follow up with before and after CBCT images which I am going to share the most interested ones in my lecture, my lecture will concentrate the future of the obturation techniques which will be evidence-based in the following next years.
Hope you accept me and I will give my best for the event.

OP40 - POSTOPERATIVE PAIN FOLLOWING ROOT CANAL FILLING WITH BIOCERAMIC VS. TRADITIONAL FILLING TECHNIQUES: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

Mekhdieva E[1], Del Fabbro M[2,3], Alovisi M[1], Comba A[1], Scotti N[1], Tumedei M[2,4], Carossa M[1], Berutti E[1], Pasqualini D[1]

[1]Endodontics and Restorative Dentistry, CIR Dental School, Department of Surgical Sciences,University Of Turin, Italy, 10126 Turin, Italy, [2]Department of Biomedical, Surgical and Dental Sciences, University of Milan, Italy, 20122 Milan, Italy, [3]IRCCS Orthopedic Institute Galeazzi, Milan, Italy, 20161 Milan, Italy, [4]Department of Medical, Oral and Biotechnological Sciences, University "G.d'Annunzio" of Chieti-Pescara, Chieti, Italy, 65122 Chieti, Italy

This meta-analysis aimed to evaluate postoperative pain (POP) following root canal filling (RCF) with gutta-percha/bioceramic sealer (BCS) vs. gutta-percha/traditional sealer (TS) techniques. Electronic databases were searched for randomized trials. Subgroup analyses were performed for analgesic intake, flare-ups, postoperative time (24/48 h), pulp status, and retreatment. The search yielded 682 records, and nine studies were selected. BCS was associated with significantly lower POP vs. TS at 24 h (P = 0.04) and 48 h (P = 0.0005). In addition, non-significant trends favoring BCS for analgesic intake at 24 h (P = 0.14), flare-ups (P = 0.24) and obturation techniques at 24 h (P = 0.41) and 48 h (P = 0.33), non-significant trends for lower POP with TS vs. BCS 24 h and 48 h in vital teeth (P = 0.50, P = 0.18, respectively), and for lower POP with BCS vs. TS in non-vital teeth at 24 h and 48 h (P = 0.16, P = 0.84, respectively). POP was numerically lower with TS vs. BCS at 24 h (P = 0.65) and 48 h after retreatment (P = 0.59). Moreover, POP did not vary between fillers when the treatment was over single (P = 0.28) or multiple visits (P = 0.50). BCS was associated with significantly lower short-term POP, and with a trend for lower analgesic intake and flare-up incidence, as compared to TS.

OP41 - CYTOCOMPATIBILITY AND OSTEOGENIC POTENTIAL OF CALCIUM SILICATE-BASED ENDODONTIC SEALERS

Ismael S[1]

[1]Faculty of Dentistry, The British University In Egypt, Cairo, Egypt, [2]Center of Innovative Dental Sciences (CIDS), The British University in Egypt, Cairo, Egypt

AIM

Even despite maintaining adequate caution during obturation, there still is a risk of penetration of sealer components and the products of its degradation into the periapical tissues. This can elicit an unfavorable local inflammatory response, thus contributing to delayed healing or failure in treatment despite appropriate root canal shaping and disinfection. The aim of this lecture is to present the outcome of an in-vitro investigation assessing the cytocompatibility as well as the osteogenic potential of some calcium silicate-based endodontic sealers (EndoSequence Hi-Flow, Neo-MTA sealer, Bio-C sealer and AH-plus BCSealer) on human periodontal ligament stem cells (hPDLSCs) in comparison with the epoxy resin-based sealer (AH Plus).

Methodology

hPDLSCs were isolated, cultured and their mesenchymal phenotype characterized by flow cytometry. The in-vitro potential for multi-lineage differentiation of the hPDLSCs was analyzed in osteogenic, adipogenic and chondrogenic media. The proliferation rate of the hPDLSCs growing in the presence of the various endodontic sealer eluates was evaluated using the MTT assay, in which 3 dilutions were prepared and cell viability was analyzed after 1, 3 and 7 days of culture growth.The osteogenic potential was determined by the activity of alkaline phosphatase (ALP), calcium deposits with Alizarin Red Staining (ARS) and real time RT-PCR with primers specific for known markers of osteogenesis such as osteocalcin (OC), RUNX-2 and Osteoprotegrin(OPG). Data were analyzed with two-way ANOVA or one-way ANOVA with Bonferroni's post hoc test.

Key Learning Points

• Implementing hPDLSCs to study the cytocompatibility and osteogenic differentiation of endodontic materials with relevant clinical applications.
• Cytocompatibility and osteogenic potential of the recently introduced AH-plus BC Sealer.

OP42 - BIOLOGICAL INTERACTION BETWEEN CALCIUM SILICATE-BASED ENDODONTIC CEMENTS AND HUMAN DENTAL STEM CELLS

Sanz J[1]

[1]*Universitat De València*

The aim of this oral presentation is to elucidate the biological properties of calcium silicate-based cements, by assessing their interaction with human dental stem cells. Available evidence on the topic will be categorized and discussed.

The content of the presentation will be divided into 4 sections. In the first section, the main characteristics of dental stem cells will be discussed, including: dental pulp stem cells (DPSCs), periodontal ligament stem cells (PDLSCs), stem cells from human exfoliated deciduous teeth (SHEDs), and dental follicle stem cells (DFSCs). In the second section, the main biological properties of calcium silicate-based cements will be exhibited, namely ion release, calcium hydroxide production, cytocompatibility, and biomineralization. In the third section, available evidence on the biological interaction between calcium silicate-based cements and dental stem cells will be discussed. In the fourth and last section, the clinical implications of the previously discussed biological interactions will be assessed.

It is hoped that the audience gains an insight into the biology behind calcium silicate-based cements, a group of commonly used materials in daily clinical endodontic practice.

OP43 - EPOXY SILICATE-BASED VS. TRICALCIUM SILICATE-BASED ROOT CANAL SEALERS IN DIFFERENT CLINICAL SCENARIOS

Solomonov M[1]

[1]Endodontic department Sheba Hospital IDF, Kiryat Ono, Israel

Root canal obturation is a critical determinant of the success of endodontic treatment. The ideal root canal sealer should provide adhesion between it and the canal wall when set, establishes a hermetic seal, radiopaque, have fine particles of powder to allow an easy mix with liquid, has no shrinkage on its setting, not discolour the tooth structure, bacteriostatic or at least does not encourage bacterial growth, has a slow setting time, insoluble in tissue fluids, a tissue tolerant and soluble in the solvent .Several groups of endodontic sealers are available nowadays. Presently, no sealer satisfies all the criteria.
The presentation aims to review the properties of Epoxy resin -based and Tricalcium silicate-based root canal sealers and considerations for choosing the suitable sealer according to the clinical situations: vital and non-vital cases, ona visit and multiple visit approach, perforations and different types of resorption, cracked tooth and ergonomic consideration. A plenty cases from Endodontic department and private practice will be discussed

OP44 - CLINICAL OUTCOME OF NON-SURGICAL ROOT CANAL TREATMENT AND RETREATMENT OF TEETH WITH APICAL PERIODONTITIS USING COLD HYDRAULIC CONDENSATION WITH CERASEAL BIOCERAMIC SEALER: A RETROSPECTIVE ANALYSIS

Cardinali F[1]

[1]Private Practice, Ancona, Italy

Aim

To evaluate the outcome of non-surgical canal treatment and retreatment in teeth with clinical and/or radiographic signs of apical periodontitis using CeraSeal (Metabiomed, South Korea) and Cold Hydraulic Condensation Technique (CHCT).

Summary

The obturation of the root canal system is a critical step of the non-surgical root canal treatment in order to achieve a positive outcome of the therapy: as a matter of fact an high percentage of endodontic failures are associated with incomplete root canal obturation and apical periodontitis presence.
The possibility to get a fluid-tight seal is crucial to prevent percolation of bacteria and it depends on the properties of the sealer and on the obturation technique.
Hydraulic Calcium silicate-based sealers properties are driving a paradigm change in obturation towards a more sealer-centric philosophy.
The purpose of this presentation is to evaluate the outcome of non-surgical canal treatments done in a private practice between 2017 and 2020 in teeth with apical periodontitis. All cases, including initial and retreatment, were obturated with CeraSeal and CHCT independently of the endodontic anatomy. Outcome was evaluated based on clinical and radiographic findings at recall, with a minimum 2-years follow-up. Teeth were classified as healed or healing (success), or not healed (failure). The results obtained support the conclusion that the use of bioceramic sealers with the CHCT is more than a valide option for obturation in teeth with apical periodontitis, especially considering other parameters as post treatment pain and speed of healing.

Key Learning Points

- Describe the clinical techniques for using bioceramic sealers in root canal obturation according with the endodontic anatomy
- Evaluate the benefits and limitations of bioceramic sealers
- Implement obturation strategies to get a positive outcome for non-surgical canal treatment and retreatment in teeth with clinical and/or radiographic signs of apical periodontitis

OP45 - TOOTH DISCOLORATION EFFECT OF A NOVEL CALCIUM SILICATE BASED MATERIAL - BIOFACTOR MTA

Mutlu S[1], **Akbulut M[2]**

[1]Necmettin Erbakan University, Health Vocational School, Türkiye, [2]Necmettin Erbakan University, Faculty of Dentistry, Turkey

Aim: The objective of this in vitro study was to evaluate the tooth discoloration induced by Biodentine (Septodont, France), Angelus MTA (Angelus, Brasil) and BIOfactor MTA (Imicryl, Turkey).

Summary: Fifty-five mandibular molar teeth were used in this study. Access cavities were prepared and the pulp tissue was extirpated. The prepared cavities were rinsed with 2.5% NaOCl, 17% EDTA and saline solutions. Cavities were dried and Biodentine, Angelus MTA or BIOfactor MTA were placed in the pulp chambers of the teeth (n=17). Five samples were used as control. Then the cavities were sealed with glass ionomer cement. The color was assessed with spectrophotometer on the midbuccal surface of teeth at 5 time points (initial, 1 week, 1 month, 3 month, and 6 month) and the color change values (ΔE) were calculated. Data was statistically analyzed using Shapiro Wilk test and post hoc Bonferroni test. The level of statistical significance was set at 0.05. No statistically significant differences were found among the tooth discoloration values of materials at 1 week and 1 month ($p>0.05$). On the 3rd and the 6th month the highest ΔE value was found in Biodentine group whereas the lowest in control group ($p<0.05$).

Key Learning Points:

- This study was designed to investigate the potential and progression of tooth discoloration caused by different calcium silicate-based materials over a 6-month period of observation.
- The findings of this study suggest that the tested materials discolored tooth structure to various degrees, which was observed by the variation in the ∆E values.
- All materials induced similar tooth discoloration on 1 week and 1 month.
- BIOfactor MTA showed a moderate tooth discoloration whereas Biodentine caused the most severe color alteration on teeth.

OP46 - ENDODONTIC DIAGNOSIS AND HEALING ASSESSMENT OF PERIAPICAL LESIONS – INTRAORAL PERIAPICAL RADIOGRAPHS VS HIGH RESOLUTION CBCT SCANS CASE SERIES

Cristescu Rosu A[1], Chaniotis A, Pangica A[1], **Manea S[1]**, Cosac D[1]

[1]Titu Maiorescu University, Bucharest, Romania

Aim

To investigate the advantage of using the high resolution CBCT examinations in endodontic diagnosis and to investigate the different patterns of periapical lesion healing after non-surgical root canal treatment, assessed by two-dimensional periapical radiographic examinations compared to high resolution CBCT examinations.

Summary

A case series of non-surgical root canal treatment procedures with preoperative periapical lesions were followed up for healing assessment. All cases were treated by endodontic specialists. Healing was assessed both with intraoral periapical radiographs and high resolution CBCT radiographic examinations.

All cases have shown big differences in the healing assessment with the periapical radiographic examinations compared to the one assessed by CBCT scans.

Some symptomatic cases were assessed initially as having no lesions on the intraoral periapical radiographs, but the following CBCT scan revealed a lesion.

Also, although some cases were assessed as completely healed from the periapical radiographic examination, the CBCT scans revealed incomplete healing.

Key learning points

Endodontic diagnosis and healing assessment of periapical lesions with intraoral periapical radiographs has many limitations.

CBCT evaluation of periapical lesions overcomes the limitations of the intraoral periapical radiographs.

OP47 - HOW TO DEAL WITH LARGE CYSTIC-LIKE PERIAPICAL LESIONS: DIAGNOSIS, CLINICAL MANAGEMENT AND OUTCOME

Ruiz Sánchez X[1], Abella F[1], Durán-Sindreu F[1], Roig M[2]

[1]Department of Endodontics, Universitat Internacional De Catalunya, Barcelona, Spain, [2]Department of Restorative Dentistry, Universitat Internacional De Catalunya, Barcelona, Spain

Aim

To describe the diagnosis and the clinical protocol to manage large cystic-like periapical lesions and guarantee a favorable outcome after endodontic therapy (treatment and retreatment).

Summary

Large cystic-like periapical lesions represent a great challenge for clinicians. There is some controversy in the literature regarding the outcome of endodontic therapy according to the size of periapical lesions.

The general belief that large periapical lesions will not respond to conservative endodontic treatment suggests that surgical therapies will be needed to achieve healing.

Nevertheless, the main concern for practitioners is to preoperatively diagnose if the lesion is a granuloma, an abscess, a pocket cyst or a true cyst. Histopathology studies have shown that the majority of lesions will correspond to granulomas, apical abscesses or pocket cysts.

This indicates that the majority of lesions will heal after conservative endodontic therapies, while true cysts due to the discontinuity between the apical foramen and the lesion itself makes the cyst self-sustaining, producing a negative response after root canal disinfection procedures.

Apical patency, periapical overinstrumentation, intracanal dressing with calcium hydroxide, decompression, intracanal puncture, aspiration through the gingival tissues or surgical techniques, such as marsupialization and enucleation have been reported as techniques to achieve periapical healing.

In this case series, several large cystic-like periapical lesions managed with non-surgical treatment and retreatment procedures will be presented and discussed showing long-term healing.

Key learning points

- To describe the pathogenesis and histology of large cystic-like periapical lesions and true apical cysts.
- To understand that all periapical lesions (granulomas, abscesses or cysts) are caused by intraradicular or extraradicular infection regardless of their histopathological characteristics.
- To present a clinical protocol focused in infection control including decompression, apical patency and intracanal dressing with calcium hydroxide which guarantees a predictable treatment outcome after non-surgical endodontic treatment or retreatment.

OP48 - FINDING THE SCOPE FOR THE EFFICACY OF DENTAL IMAGING IN CRACK TEETH DIAGNOSIS, A SCOPING REVIEW

Sadr A[1], Hegde S[1], Zhou X[1]

[1]*University Of Sydney, Sydney, Australia*

Aims:
This study aims to review the demonstrable levels of test efficacy of radiographs of a cracked tooth at different depths and extensions of crack.

Introduction:
A cracked tooth can be described as an incomplete dentine fracture in a vital tooth, mainly in the posterior, but this condition may occasionally involve pulp. Cameron, in 1964, first used the term 'Cracked tooth syndrome (CTS). As the symptoms are so varied, getting a correct diagnosis of CTS is challenging even for an experienced dental practitioner. Differential diagnoses of the pain caused by CTS could be other conditions like temporomandibular joint disorder, headaches, or ear pain, making the diagnosis a time-consuming or frustrating task for the clinician and the patient. Early diagnosis of CTS at the stage of vital pulp is crucial as it may prevent the extension of fracture into the pulp. Early diagnosis also results in a restoration that avoids further microleakage and pulpal or periodontal involvement, thus avoiding much complex treatment or tooth loss.
An efficient or ideal diagnostic tool should identify the critical issues and aid meaningfully in disease diagnosis and patient management. The efficacy of a radiographic test must be reflected beyond just the image quality and diagnostic accuracy. In this presentation, a review of radiographic tools for diagnosing cracks and their efficacy will be discussed.

Key learning points:
- A review of Cracked tooth syndrome, its different classification, symptoms and diagnosis and treatment
- Radiographic aspects for distinguishing cracks
- Efficacy of radiographic tools to diagnose cracks

OP49 - DIAGNOSTIC ASPECTS AND TREATMENT PLANNING IN CASES WITH EXTREMELY OBLITERATED AND SUPPLEMENTARY ROOT CANALS - CBCT IMAGING AND MICROSCOPE VISUALIZATION

Kiefner P[1], Gliga A

[1]*Dental Office Endodontics And Dental Traumatology, Stuttgart, Germany*

This presentation describes the use of the CBCT and dental microscope in cases with supplementary or obliterated root canals. The main aim of this presentation is to present the possibilities and limitations of the CBCT examination in the diagnsotic and planning phase and to show the advantages of optical magnification throughout the entire root canal treatment

Localizing and accessing supplementary and obliterated root canals in order to reach the goals of the endodontic treatment is a challenge for every endodontist. When dealing with root canal obliterations treatment planning needs accurate information regarding the morphology of the root canal(s) and the position of the coronal orifice(s) in order to avoid iatrogenic damaging of the tooth. Teeth referred by general practitioners were treated over a period of 8 months using the same protocol: clinical and radiographic inspection, diagnostic CBCT examination and intra-operative inspection aided by the dental microscope. When the root canal outline was not visible on the orthoradial radiograph the CBCT examination was the next diagnostic step in order to identify the root canal outline. Using optical magnification root canal orifices could be localized in 95 % of all cases, even then when radiographic and CBCT examination failed to show any canal outline. The overall success rate in finding, cleaning, shaping and filling obliterated root canals is similar with cases having normal root canal dimensions. The use of the CBCT examination and microscope visualization can improve the overall success rate in localizing obliterated root canals.

Key learning points

- understanding the possibilites and limits of the CBCT in the planning and diagnostic phase of the endodontic treatment
- understanding the benefits in using the dental microscope in localizing and accessing root canals
- learning how to avoid iatrogenic errors when dealing with supplementary and severely obliterated root canals

OP50 - ROOT CANAL TREATMENT STRATEGIES: MANAGING CHALLENGES FOR BETTER OUTCOMES

Zogheib C[1]

[1]Saint Joseph University, Beirut, Lebanon, [2]Lebanese Society of Endodontology, Lebanon

Aim

To present clinical strategies in a minimal invasive concept from mechanochemical debridement to bioactive obturation aiming for long term root canal treatment success.

Summary

The primary goal of endodontic therapy is the long-term preservation of a functional tooth by preventing or treating apical periodontitis. However, multiple factors could impact endodontic outcomes such as the quality of the restoration and structural integrity of the tooth after root canal preparation. Recent research efforts are currently directed to better dentin structure preservation during RCT. The contemporary approach is to minimise structural changes during root canal therapy, which may result in a strategy that can be labelled 'minimally invasive endodontics'. This presentation addresses current clinical strategies combined to research data aiming for better outcomes and highlighting tooth structure conservation to enhance longevity after root canal treatment. We will also discuss actual success rate in endodontic treatment based on clinical reliable studies.

Key learning points

. This presentation addresses current clinical strategies combined to research data aiming for better outcomes

. It highlights the conservation of tooth structure to enhance longevity after root canal treatment.

OP51 - DO MEDICO-LEGAL CONSIDERATIONS INFLUENCE THE DECISION-MAKING PROCESS IN ENDODONTIC TREATMENT? A SYSTEMATIC REVIEW OF THE LITERATURE

Rosen E[1], **Merzlak I[1]**, Baram S[1], Bjørndal L[2], Pigg M[3], Tsesis I[1]

[1]Department of Endodontics, School of Dental Medicine, Tel Aviv University, Tel Aviv, Israel, [2]Department of Cariology and Endodontics, Faculty of Health and Medical Sciences, Department of Odontology, University of Copenhagen, Copenhagen, Denmark, [3]Department of Endodontics, Faculty of Odontology, Malmö University, Malmö, Sweden

Aim: The aim of the study was to review systematically the medico-legal considerations that may influence the evidence-based decision-making process in endodontics.

Summary of the talk: Defensive medicine is a concept where the fear of liability claims and lawsuits may dictate the level of the professional behavior of practitioners to an extent that may impair the quality of care. The endodontics field is unique and therefore has its own special aspects that must be taken into consideration in the decision-making process.
This systematic review included suitable studies written in English that reported the various medico-legal considerations and lawsuits that influence the evidence-based decision-making process in endodontics. All articles published between the years 1966-2021 were screened by a systematic search of electronic databases. Articles identified as suitable, were subjected to data extraction, assessment of the methodologic quality, and data synthesis and analysis in accordance with the PRISMA 2020 Protocol.
None of the articles submitted to full text evaluation fulfilled the criteria, resulting in a lack of data regarding the characteristics of the medico-legal considerations that influence the evidence-based decision-making process in endodontics.
The novelty of the current study is that the assessment of medico-legal considerations as an additional factor may affect clinical decision making. The role of medico-legal considerations in the treatment decision-making process has not yet been studied in endodontics, even though endodontic claims represent the most frequently filed malpractice suits in dentistry.

Key learning points:
- Although it is reasonable to assume that, as in all other medical professions, medico-legal considerations significantly affect the decision-making process in endodontics, evidence-based data regarding the characteristics of such potential medico-legal considerations is lacking.
- The need for future evidence-based research to elucidate the relevant factors is of outmost significance in order to optimize patient outcomes and minimize superfluous and possibly damaging procedures.

OP52 - PSYCHOLOGICAL FACTORS ASSOCIATED WITH PAIN IN PATIENTS UNDERGOING ENDODONTIC PROCEDURES

Sadr A[1], Gholamrezai A[2], Gray Mcneilage A[2], L. Randall C[3], P. Kapos F[3], Ashton-James C[2]

[1]University Of Sydney, sydney, Australia, [2]Pain Management Research Institute, Northern Clinical School,the university of Sydney, Sydney, Australia, [3]University of Washington, Washington DC, United states

Aims and Objectives:
The project's primary aim is to find the scope of psychological predictors of pain before and after endodontic treatment and to determine whether there is an association between the psychological profiles of patients with orofacial pain

Summary of the Oral presentation:
About 5-10% of individuals who undergo endodontic or minor oral surgical procedures experience persistent pain after the procedure and some of these individuals develop orofacial chronic pain. Optimal pain management is biopsychosocial, meaning that it addresses the biological contributors to pain and the psychological and social contributors. Evidence for the efficacy and acceptability of psychological interventions for acute and chronic pain management has proliferated over the past 25 years. However, psychological approaches to pain management in dentistry are scarce. To identify or develop psychological interventions to modulate pain associated with endodontic procedures, we started to investigate the scope of evidence for psychological predictors of pain experienced before, during, and after endodontic procedures. In this presentation, a summary of our psychological predictors found in the first phase of scoping review will be discussed with a quick mention of future interventions. The findings of this project may help in considering the psychological profile as a predictor of optimal outcome in the therapy of endodontic pain, reducing patient complaints and increasing predictability for case selection.

Key learning points:
- An introduction and key reasons for pain during and after endodontic therapy
- Psychological predictors for endodontic pain with a background summary and some key points management in that regard
- Clinical implication of our review results to optimise long term treatment outcome

OP53 - MANAGEMENT AND TREATMENT PLANNING FOR THE AGEING PATIENT

Basturk F[1]

[1]*Istanbul Gelisim University, Istanbul, Turkey*

Aim: Europeans are living longer than ever before and the age profile of society is rapidly rising. However, there is a lack of information amongst clinicians regarding the attitudes towards and treatment planning for older patients. This presentation aims to describe how we, clinicians, should examine, diagnose and care for our ageing patients.

Summary: In the early 20th century, an average life span was 50 years or younger. According to the most current demographic data, the average life expectancy at birth is 70 years, worldwide. Today, 8.5 percent of people worldwide are aged 65 and over. This constitutes to approximately 600 million people. This number is expected to be 2 million by the year 2050, 80% living in developing countries. In the near future, clinicians will serve a growing number of older people. This will become one third to two thirds of our workload.
With the ever-growing number of elderly population and the increase in the life expectancy, more elderly patients are now demanding endodontic treatment. Clinicians will face more calcified canals, more difficult cases and more clinical stress. Therefore, more patience, clinical knowledge and experience is going to be needed like never before. In this presentation, a clinical example of how to take care, accurately diagnose and treat a frail elderly in the oldest olds category in an endodontic setting will be explained thoroughly.

Key learning points:
How do we age?
What measures should the clinicians take before/ during/ after a dental appointment for an elderly patient?
Does endodontic treatment planning change for elderly patients?

OP54 - ROOT CANAL TREATMENT OUTCOME IN PEDIATRIC PATIENTS WITH AND WITHOUT GENERAL ANESTHESIA

Elbahary S[1]

[1]*Tel Aviv University*

Previous studies report that endodontic treatment may be performed under general anaesthesia (GA), though the literature on the outcome of dental treatment and particularly in endodontics is lacking.
This retrospective observational cohort study compares the outcome of root canal treatment (RCT) under GA to RCT under local anaesthetia (LA) in permanent teeth for children with mature and immature teeth.
The sample consisted of 365 primary RCT's in children age ranged from 8-15 that was made by single operator.
the recall rate was 81%. The follow up time ranged from 12 to 91 months, with mean of 31.5 months. The total success rate of all samples was 90% healed and 10% failed. In the GA group the total success rate was significantly higher comparing to the non-GA group (98% healed and 85% diseased, respectively, p<.001). Teeth with full formation had significantly higher success rate comparing immature teeth, (p=.004) (94% vs. 84% healed). Lesion size had significant effect on the success rate, as teeth with lesion size above 5mm, small then 5mm and no PA lesion had the following healing rate respectively, 80.6%, 90.6% and 94.9% (P<0.05).
The rate of healing was not significantly associated with age, tooth type, pulp diagnosis, sinus tract, root resorption, or follow up period.
In conclusion, the practice of endodontic treatment under GA should be encouraged when indicated. Avoiding GA, although indicated, may have an negative impact on pediatric patients oral health quality of life. It is a challenge to perform high quality endodontic treatment in young ages, with a will of retaining functional teeth.
According to the current study, when it is imperative to preform endodontic treatment under GA, when it is carried out by endodontic specialist with immediate restoration a high success rate can be achieved.

OP55 - SHOULD CBCT BE USED ROUTINELY TO EVALUATE OUTCOME OF ROOT CANAL TREATMENTS?

Guerreiro Viegas O[1], **Brochado Martins J[2]**

[1]Private Practice limited to Endodontics, Amsterdam, The Netherlands, [2]Academic Center for Dentistry Amsterdam - ACTA, Amsterdam, The Netherlands

The outcome of non-surgical root canal treatments has been assessed for nearly 90 years with periapical radiographs combined with clinical tests. The limitations of 2D radiographs are numerous, and they cannot consistently detect the presence or assess the extent of apical periodontitis. CBCT was shown to have a significant impact on the diagnosis of teeth with periradicular disease. In this presentation, the outcome of root canal treatments determined by CBCT and radiographs will be discussed and compared. The advantages and limitations of every method will be highlighted in order to reach a conclusion about the routine use of CBCT for endodontic outcome evaluation.

Learning Objectives:

1. At conclusion, participants should be able to analyze the conditions that might justify using CBCT for outcome evaluation.
2. At conclusion, participants should be able to describe the validity of using CBCT to detect periapical lesions.
3. At conclusion, participants should be able to discuss the impact of using CBCT to assess the outcome of root canal treatment.

OP56 - A NOVEL ULTRASONIC CANAL IRRIGATION SYSTEM: MECHANISM OF ACTION AND CLEANING EFFICACY

Park E, Ahn Y, Shon W

[1]Seoul National University Dental Hospital, Seoul , Republic of Korea

Aim of the presentation

The aim of this presentation was to introduce a novel irrigation device, the Remosonic System (RS), which has been recently developed to clean the root canal system. The RS mechanism of action (MOA) was presented, and the cleaning efficacy was compared with currently used irrigation methods: syringe irrigation sonically and ultrasonically activated irrigation.

Summary of the talk

Compared with conventional endodontic treatment, which creates enough space to deliver the irrigants to the root canal system, the pursuit of preserving dentin has focused on conservative endodontics. The RS has been designed to provide powerful acoustic waves within the irrigants to effectively clean the root canal system with minimal cavity access and conservative instrumentation.

The RS has been developed to optimise cavitation in the root canal system, contribute to cleaning and ensure safety. Since high-power ultrasound waves are generated by a transducer inside the handpiece, which means remotely from a pulp chamber or canals, the RS delivers the controlled soundwaves to the root canals, not requiring a tip or an insert.

High-speed visualisations were carried out to illustrate the bubble dynamics characterisation and the mechanism of action of the RS. Moreover, in vitro studies of biofilm-mimicking hydrogel removal from a simulated isthmus model and calcium hydroxide removal from mandibular molar root canals were performed to evaluate cleaning efficacy.

Key Learning Points

- Comparison between gas and vapour cavitation bubbles and their cleaning efficacy in the aspect of microfluid dynamics using high-speed visualisations to understand the MOA of the Remosonic System.
- Strategies to avoid the formation of stable (gas) bubbles and their accumulation in the RS.
- Understanding how the RS has translated the findings of the microfluid dynamics to the clinical settings

OP57 - NEW WAVES IN ENDODONTIC IRRIGATION

Fayek H[1]

[1]Faculty Of Dentistry The British University In Egypt, Cairo, Egypt

POINTS

Audience will be guided with information about few new potential irrigation solutions that may replace or adjunct the AIM

The aim of this lecture is to provide information about some of the new irrigation solutions in endodontics and exploring the possibility of their replacing sodium hypochlorite.

SUMMARY

All researches in medical fields nowadays are choosing the natural ways for treatments of diseases. In endodontics the star of irrigating solutions is the sodium hypochlorite, no matter what new irrigating solutions are introduced it always took the lead in-spite of its disadvantages and known complications but we always chose it for its advantages.

In an attempt to find an irrigation solution that overcomes the shortcomings of the sodium hypochlorite and compete with it in the advantages. This lecture will throw light using published research on some of the new different irrigants available in aspects of their sources , composition , action and effect either on tooth structure or sometimes instruments used in the canal shaping.

KEY LEARNING

sodium hypochlorite in Endodontic practice

OP58 - THE EFFECT OF HYPOCHLOROUS-ACID ON DISSOLVING BOVINE PULP TISSUE

Bozkurt D[1], Terlemez A[1]

[1]*Necmettin Erbakan University, Konya, Turkey*

Aim: To evaluate the effect of hypochlorous-acid (HOCl) on dissolving bovine pulp tissue.

Summary: Sixty bovine pulp tissue samples (approximately similar weights, 50mg±5mg) were randomly divided into six experimental groups (n=10): Group I-5.25% NaOCl, Group II-2.6% NaOCl, Group III-1.3% NaOCl, Group IV-HOCl, Group V-17% Ethylenediaminetetraacetic acid (EDTA), Group VI-Distilled-Water. Pulp samples were immersed in coded solutions in ten minute intervals for the first three-hours, after that they were removed from the solution in sixty-minute intervals. The pulp tissue was removed and rinsed with distilled water to eliminate any excess blood before drying on filter paper. The difference in the weight of the tissue sample was measured before and after the exposure to the test solution, until no weight could be measured with the remaining existing tissue up to a total of one week. The time required for the solutions to dissolve the tissue (min) divided by the initial weight and tissue loss per minute calculated as mg/min. The data were statistically analyzed using the Kruskal–Wallis and Mann–Whitney U-tests. The results showed that a significant tissue dissolution in the chlorine-containing groups (HOCl and NaOCl), while no significant tissue dissolution occurred in distilled water and 17% EDTA groups. There was a significant difference between HOCl and NaOCl solutions ($p<0.01$). On the other hand, there was no significant difference between 5.25% and 2.5% NaOCl ($p=0.128$), whereas a significant difference between them with 1.3%NaOCl solution ($p<0.01$) was visible.

Key Learning Points:

- Although the tissue dissolution rate of HOCl was less than NaOCl, it could completely dissolve the pulp tissue.
- Irrigation with hypochlorous acid could be beneficial in endodontic practice, especially to avoid complications related to irrigation overflow of teeth with open apex.

Funding: None
Conflict of interest: The authors deny any conflicts of interest related to this study.

OP59 - SURFACE FREE ENERGY AND WETTING OF ROOT DENTIN SURFACE TREATED WITH DIFFERENT IRRIGATION PROTOCOLS

Pavlova K[1], Abram A[2], Kocjan A[2], Fidler A[1,3]

[1]Department of Restorative Dentistry and Endodontics, University Medical Centre Ljubljana, Slovenia, [2]Department for Nanostructured Materials, Jožef Stefan Institute, 1000 Ljubljana, Slovenia, [3]Department of Endodontics and Operative Dentistry, Faculty of Medicine, University of Ljubljana, Slovenia, ,

Aim: To evaluate the effects of irrigants on the surface free energy of canal wall dentine using the sessile drop technique.

Methodology: Twenty-five extracted human upper incisors were decoronized and each root was sectioned longitudinally into 2 slices. A standardized smear layer was created by polishing the inner surface under distilled water, the samples were randomly assigned to five experimental groups (n = 10) with different treatments as follows, with each irrigant effective for 2 mins:

1. 2.5 % NaOCl (control).
2. 2.5 % NaOCl + 20 % EDTA.
3. 2.5 % NaOCl + (20 % EDTA+ 0.5 % Tween 80).
4. 2.5 % NaOCl + 20 % EDTA + 2.5 % NaOCl.
5. 2.5 % NaOCl + 20 % EDTA + (2.5 % NaOCl + 0.5 % Tween 80).

The surface free energy was measured by water and di-iodomethane contact angles on the dentine using the OWRK method. Statistical analysis was performed by the Levene's, Kruskal-Wallis, and Dunn's tests.

Results: The irrigation protocol in group 4 resulted in the highest surface free energy of root dentin. Surface free energy was the lowest in group 2 and significantly lower compared to the group 4 ($p<0.05$). The addition of Tween 80 in group 3 increased the surface free energy of root dentin, but without significant difference compared to group 2.

Conclusion: The surface energy of root dentin was highest after NaOCl + EDTA + NaOCl treatment and lowest after NaOCl + EDTA treatment. Based on the surface free energy of canal wall dentine, it can be concluded that the NaOCl + EDTA + NaOCl protocol is useful for both hydrophilic and hydrophobic sealers.

The work was supported by the Ministry of Higher Education, Science and Technology of the Republic of Slovenia, under grant numbers P3-0293 and J3-2519.

OP60 - EFFICACY OF CALCIUM HYDROXIDE–LOADED POLY(LACTIC-CO-GLYCOLIC ACID) BIODEGRADABLE NANOPARTICLES AS AN INTRACANAL MEDICAMENT FOR ANTIMICROBIAL ACTIVITY AGAINST ENDODONTOPATHOGENIC MICROORGANISMS IN A MULTI-SPECIES BACTERIAL-FUNGAL BIOFILM MODEL: AN EX VIVO STUDY

Leelapornpisid W[1]

[1]Department of Restorative Dentistry and Periodontology, Faculty of Dentistry, Chiang Mai University, Chiang Mai, Thailand

Aim
To evaluate the antimicrobial activity of calcium hydroxide–loaded poly(lactic-co-glycolic acid) biodegradable nanoparticles on multi-species bacterial-fungal biofilms ex vivo.

Methodology
Human root dentine blocks were prepared (n = 40), and multi-species suspensions containing each of 1.5 x 106 CFU/mL Candida albicans, Enterococcus faecalis, and Streptococcus gordonii in brain heart infusion (BHI) were incubated within the root canals for 21 days. Canals (n = 10/group) were then medicated with saline solution (negative control), chlorhexidine (positive control), calcium hydroxide, and calcium hydroxide–loaded poly(lactic-co-glycolic acid) for 7 days. Samples taken from the 0.1 mm root canal dentine by drilling with Ash Steel Burs No.5 were cultured in broth for 24 hours. Cell growth was detected by culture on BHI agar. The data was analysed with Pearson chi-square with Mann–Whitney test ($p < .0001$).

Results
The ex vivo tooth model demonstrated that calcium hydroxide–loaded poly(lactic-co-glycolic acid) medicament significantly reduced the number of viable cells in the multi-species bacterial-fungal biofilms ($p < .0001$) compared to conventional calcium hydroxide: less than 10 cells of organisms survived after exposure to the agent for 7 days.

Conclusion
Calcium hydroxide–loaded poly(lactic-co-glycolic acid) had antimicrobial activity against multispecies bacterial–fungal biofilms and thus has potential as a medicament for endodontic therapy.

OP61 - MICROBIOTA STATUS AND ORAL HEALTH IN PROFESSIONAL RUGBY PLAYERS: A CASE- CONTROL STUDY

Diemer F[1,2,4], Minty M[1,3,4], Canceill T[1,4], Lé S[1,3,4], Loubieres P[3], Mallet J[1], Blasco-Baqué V[1,3,4]

[1]Toulouse University, Toulouse, France, [2]Clément Ader Institute, UMR-CNRS 5312., Toulouse, France, [3]INSERM U1048, Institut des Maladies Métaboliques et Cardiovasculaires (I2MC), Toulouse, France, [4]CHU Toulouse, Service d'Odontologie , Toulouse, France

Objective: Elite athletes are prone to develop oral diseases, which could increase the risk for injuries. The aim of this study was to evaluate the oral health and the composition of oral microbiota of elite rugby players compared to the general population.

Methods: We set up a case-control study by screening 24 professional rugby players (PRG) and 22 control pa- tients (CG) for dental and gingival examinations and performed a taxonomic analysis and a predicted functional analysis of oral microbiota.

Results: The Decay, Missing and Filled (DMF) teeth index (5.54 ± 6.18 versus 2.14 ± 3.01; p = 0.01) and the frequency of gingivitis (58,33% versus 13.63%) were significantly increased in PRG compared to CG. PRG were characterized by a dysbiotic oral microbiota (Shannon Index: 3.32 ± 0.62 in PRG versus 3.79 ± 0.68 in CG; p = 0.03) with an increase of Streptococcus (58.43 ± 16.84 versus 42.60 ± 17.45; p = 0.005), the main genus implicated in caries. Predicted metagenomics of oral microbiota in rugby players was suggestive of a cariogenic metagenome favourable to the development of caries.

Conclusions: Our study shows that the oral health of PRG was poorer than the general population. PRG are characterized by a dysbiotic oral microbiota with an increase of the relative abundance of Streptococcus genus, positively correlated to the weight and negatively correlated to the diversity of oral microbiota.

Clinical significance: Dental screening should be included in the medical follow-up of professional rugby players as a part of their health management. New strategies such as using probiotics like Lactobacillus could help to control the dysbiosis of oral microbiota.

OP62 - THE MICROBIOME OF ENDODONTIC INFECTIONS AND ITS ASSOCIATION WITH CLINICAL FEATURES

Georgiou A[1], van der Waal S[2], Crielaard W[1], Zaura E[1], Brandt B[1]

[1]Department of Preventive Dentistry, Academic Centre for Dentistry Amsterdam (ACTA), Amsterdam, the Netherlands, [2]Department of Endodontics, Academic Centre for Dentistry Amsterdam (ACTA), Amsterdam, the Netherlands

Aim: To describe the endodontic infection of teeth with primary and secondary apical periodontitis and explore differences related to symptomatology.

Summary: Twenty-nine teeth with primary or secondary apical periodontitis were extracted and cryo-pulverized. Amplicons based on the V4 hypervariable region of the 16S rRNA gene were sequenced using Illumina MiSeq. The data was processed in line with the UPARSE pipeline and subsampled at equal depth (6400 reads/sample). The microbiome profiles were ordinated using Principal Component Analysis (PCA) and tested for differences between groups with permutational multivariate analysis of variance (PERMANOVA) using the Bray-Curtis distance. If significantly different, the microbial profiles were further analyzed using the LDA effect size biomarker (LEfSe) discovery tool. The 334 thousand sequences that passed quality filtering were clustered into 276 Operational Taxonomic Units (OTUs) and classified into 126 genera or higher taxa. The predominant genus in the entire sample set was Fusobacterium. The microbiomes of the endodontic infections were significantly associated with endodontic status (primary/secondary infection) ($F=2.2$, $P=0.015$) as well as with the presence or absence of pain ($F=2.3$, $P=0.013$). There were no associations between gender and microbiome or gender and the presence or absence of pain. The relative abundance of several OTU s differed based on pain existence. For example, Streptococcus, Prevotella 7 and Bifidobacterium were more abundant in asymptomatic, while Fretibacterium, and Peptostreptococcus in symptomatic apical periodontitis. The Streptococcus OTU was further identified as S. mutans and was even the second most abundant OTU in asymptomatic teeth. Secondary apical periodontitis showed a higher relative abundance of e.g. Tannerella and Mogibacterium OTU.

Key learning points:

- The microbial profile of primary endodontic infection differed from that of secondary.
- The presence or absence of pain in apical periodontitis was related to the microbial ecology of the root canal.

OP63 - THE USE OF BACTERIOPHAGES IN COMBINATION WITH ANTIBIOTICS AGAINST PERSISTENT ROOT CANAL INFECTIONS CAUSED BY ENTEROCOCCUS FAECALIS

Voit M[1], Trampuz A[2,3,4], González Moreno M[2,3]

[1]Dept. of Operative, Preventive and Pediatric Dentristry Charité - Universitätsmedizin Berlin, Berlin, Germany, [2]Centrum für Muskuloskeletale Chirurgie Charité - Universitätsmedizin Berlin, Berlin, Germany, [3]BIH Center for Regenerative Therapies (BCRT), Berlin, Germany, [4]PRO IMPLANT Foundation, Berlin, Germany

Aim:
Enterococcus faecalis appears with a high prevalence in root canals with persistent infections. Inability to eradicate E. faecalis in the canal system may lead to recurrent infection and treatment failure.
E. faecalis may additionally become an opportunistic pathogen leading to life threatening systemic infections.
Here we evaluated the activity of newly isolated bacteriophages (phages) against laboratory strains and clinical isolates of E. faecalis as a single treatment or in combination with different antibiotics.

Methodology:
Sixteen E. faecalis strains were used to screen for lytic phages in different collected sewage sources. The isolated phages were enriched via propagation from a single plaque in solid culture. The phages's host range among the 16 E. faecalis strains was evaluated and five different lytic phages were selected for further characterization in terms of virion morphology and killing-kinetics against each E. faecalis host strain. To investigate the antibiofilm effect of antibiotic and phages, E. faecalis biofilm was grown on porous glass beads and treated with different combinations of antibiotics and the phages alone or in staggered combinations. Isothermal microcalorimetry (IMC) was used to monitor the heatflow and the accumulated heat over 48 h to analyze the bacterial activity and biofilm reduction.

Results:
A significant biofilm reduction was observed in all tested strains when phage was combined with antibiotic; a combination with gentamicin showed a higher reduction compared to vancomycin. A combination of vancomycin, gentamicin and phage could not achieve any advantage over the combination gentamicin and phage.

Conclusion:
The combination of bacteriophages and antibiotics seems to be a promising option to treat infections caused by E. faecalis. Concerning the aggravating problematic of multiresitant bacteria, new antibiofilm strategies are needed.

OP64 - EFFECT OF ASEPTIC APPROACH IN ENDODONTIC FLARE-UPS (A LITERATURE REVIEW)

Elli M

Despite all the advances in endodontics, post-treatment and/or inter-treatment flare-ups remain one of the greatest concerns every practitioner performing endodontic procedure faces.

The aim of this presentation is to review and discuss:
- The etiological and risk factors for this complication.
- The role of microorganisms in endodontic flare-ups.
- Strategies that can be adopted to minimize its occurrence with emphasis on an aseptic approach.

Ethological factors:

1. Microbial Factors:
- Several studies have found a significant relationship between certain types of microorganisms such as Bacteroides Melaninogenicus and pain.

These microorganisms produce endotoxin which in turn activates the Hageman factor. The activated Hageman factor leads to the production of bradykinin which is a potent pain mediator.

2. Mechanical factors:
- Extrusion of infected debris.
- Introducing the instruments to the apical parts of the canal before eliminating the coronal bacterial load.
- Missing parts of the Root canal system.

3. Chemical factors:
- Chemical irritation of periapical tissue in case of extrusion.
- Ineffective irrigation, failing to chemically clean the anatomical complexities.

Risk Factors:
- Patient: demographics, general health, pulp, and periodontal status.
- Therapeutic procedures: number of visits, retreatment, and intracanal medicaments.

Strategies to minimize the risk of flare-up:

Almost all factors are directly or indirectly related to the microbial cause. Therefore, the following steps are suggested:
- Proper isolation and aseptic approach.
- Eliminating coronal bacterial load before introducing the instruments to the apical parts. (Crown down approach)
- Accurate working length and preserving apical constriction to limit the extrusion of debris.
- Adopting a preparation technique/system that results in minimum extrusion of debris.
- Effective irrigation policy to remove debris and chemically clean the anatomical complexities.
- Hermetic obturation contained within the boundaries of the root canal system and proper coronal seal to prevent reintroduction of microorganisms.

OP65 - THE INFLUENCE OF APICAL PERIODONTITIS ON CIRCULATORY INFLAMMATORY MEDIATORS IN PERIPHERAL BLOOD

Georgiou A[1], Twisk J[2], Crielaard W[1], Ouwerling P[3], Schoneveld A[4], **Van Der Waal S[1,5]**

[1]Department of Preventive Dentistry, Academic Centre for Dentistry Amsterdam, University of Amsterdam and Vrije Universiteit, Amsterdam, Netherlands, [2]Department of Epidemiology and Data Science, Amsterdam UMC, Location VU University Medical Center, Amsterdam Public Health Research Institute, Amsterdam, Netherlands, [3]Tandheelkundig Centrum Molenvliet, Alphen aan den Rijn, Netherlands, [4]Department Central Diagnostic Laboratory, Division LAB, UMC Utrecht, Utrecht, Netherlands, [5]Department of Endodontics, Academic Centre for Dentistry Amsterdam, University of Amsterdam and Vrije Universiteit, Amsterdam, Netherlands

Aim: To explore the influence of apical periodontitis (AP) in inflammatory markers in blood of otherwise healthy individuals and to depict the inflammatory profile of the healing after tooth extraction.

Summary: This a prospective case-control intervention study, during which, individuals with a diagnosis of apical periodontitis of one affected tooth were included, along with a control group matched for age and gender. A broad panel of inflammatory mediators in blood was examined longitudinally in all subjects during 6 visits. In the case of the AP subjects, the tooth with AP was extracted at the third visit. Results were analysed by linear regression analyses and linear mixed model analyses. A total of 53 subjects was included in the study, 27 with AP and 26 without. Fifteen females and 12 males were included in the AP group, and 14 females and 12 males in the control group. At baseline, G-CSF ($P<0.001$), IL-1β ($P=0.03$) and IL-4 ($P=0.01$) were significantly lower in AP subjects than in controls. Comparison of the differences between baseline and the last visit, i.e., three months after the tooth extraction, showed a significant reduction in IL-10 ($P=0.03$) and IL-12p70 ($P=0.01$).

Key learning points:

- The immunologic profile of chronic apical periodontitis in one tooth and its healing profile reveals a systemic low-grade inflammation through compensatory immunosuppression.
- A larger AP-lesion or multiple lesions could disrupt the balance that the system is trying to maintain, resulting in loss of homeostasis.
- These results should be taken into consideration by the clinician in the treatment-decision-making process.

OP66 - EVALUATION OF SERUM PRO-DIABETIC INFLAMMATION LEVELS IN SUBJECTS AFFECTED BY CHRONIC APICAL PERIODONTITIS AND IN-VITRO STUDY OF THEIR POTENTIAL IMPACT ON INSULIN RESISTANCE

Multari S[1], Bergandi L[2], Baima G[1], Alovisi M[1], Comba A[1], Carpegna G[1], Scotti N[1], Pasqualini D[1], Berutti E[1]

[1]Department of Surgical Sciences, Dental School, Endodontics, University of Turin,, Turin, , [2]Department of Oncology, University of Turin, Turin,

Aim

The aim of the study was to evaluate if apical periodontitis(AP) could be associated to a higher pro-diabetic inflammatory cytokines serum levels and to an impaired insulin sensitivity, and if root canal treatment could determine their decrease, restoring the insulin response.

Methodology

A case-control study was designed and implemented at the University of Turin–Dental School. 30 healthy, consenting patients, younger than 55 years, were enrolled and they were divided into 2 groups, AP group, composed of 15 patients with a diagnosis of AP for at least one tooth and scheduled for a primary endodontic treatment and control group, composed of 15 subjects without oral infections.

LPB, TNF-a, IL-1 b, IL-6, IL-8 serum pro-diabetic inflammation levels were measured by enzyme linked immunosorbent assay(ELISA) before performing the treatment, at 6 and 12 months after root canal treatment in AP group, and at the same time intervals in the control group.

Then, the sensibility to the insulin was assessed in an in vitro study using both human fibroblast and pancreatic cell lines after their exposure for 24 hours to the serum of patients belonging to AP, before and after root canal treatment, and to control group, in order to verify if higher serum levels of cytokines could induce an insulin resistance status.

Preliminary results have shown that serum levels of IL-8 and IL-6 were significantly higher in AP patients when compared to the control group($p<0.001$) accompanied by a significant reduction of the in vitro sensitivity to insulin stimulus. Moreover the significant decrease of both IL-6 and IL-8($p<0.02$ and $p<0.001$ respectively) levels after successful root canal treatments have led to the restoration of cellular insulin response, suggesting that it is plausible a correlation with apical periodontitis and the onset of a prediabetic condition.

Keywords: Apical periodontitis, Pro-diabetic cytokines, Endodontic medicine, systemic diseases

OP67 - ATTENUATED DEVELOPMENT OF APICAL PERIODONTITIS WITH AGE- A MURINE MODEL

Goldman E[1], Reich E[1], Roshihotzki B[1], Saketkhou M[1], wald S[1], Goldstein A[2], Klein Y[1], **Abramovitz I[2]**, Klutstein M[1]

[1]Institute of dental sciences, Hebrew University, Jerusalem, Israel, [2]Endodontic department, Hadassah medical center, Jerusalem, Israel

Aim:
Older age is associated with reduced immune function. Our aim was to study how age affects the development of Apical periodontitis (AP).

Summary of the talk:
AP was induced in mice, and 2 age groups were compared (young: 6-8 weeks, adult: 8-10 months). The teeth and jaws were histologically processed and stained by Hematoxylin Eosin (H&E), Brown and Brenn (B&B), and tartrate-resistant acid phosphatase (TRAP). In addition, the samples were scanned by micro-computerized tomography (micro-CT) to evaluate the canal volume, apical constriction area, and the volume of the PA lesions. On the cellular level, cell density in the PA region was computationally assessed on H&E slides by a colorimetric evaluation software. Moreover, immune cell populations from the lesion were characterized by flow cytometry and immunofluorescence. The young group presented more canals with necrotic radicular pulp compared to the adults. There was no difference in bacteria location in the canals between the groups. Canal volume and apical constriction size were larger in the young mice compared to the adults. The periapical cell density was higher in the young group compared to the adults while the dominant immune cells in the lesions were neutrophils. All leukocyte types tested were present in higher numbers in the lesions of the young mice compared to adults, although the neutrophil presented the highest young/adult ratio. Immunofluorescence demonstrated the location of neutrophils in the lesion. More multinucleated osteoclasts were present in the lesions of the young mice, in correlation to the higher volume of bone resorption in the lesions of the young group.

Key learning points:
* The immune reaction to AP stimuli was attenuated in the adult mice compared to the young.
* The possible mechanisms for this phenomenon include mechanical and immunological age-related changes.

OP68 - THERMOSENSITIVE TRANSIENT RECEPTOR POTENTIAL (TRP) ION CHANNELS IN HUMAN DENTAL PULP CELLS

Marincsák R[1], Kunka Á[2], Bohács J[1], Lisztes E[2], Racskó M[2], Bágyi K[1], Kovalecz G[3], Kelemen B[2], Tóth B[2]

[1]Department of Operative Dentistry and Endodontics, Faculty of Dentistry, University of Debrecen, Debrecen, Hungary, [2]Department of Physiology, Faculty of Medicine, University of Debrecen, Debrecen, Hungary, [3]Department of Pediatric and Preventive Dentistry, Faculty of Dentistry, University of Debrecen, Debrecen, Hungary

Aims

The sensation of temperature and pain is closely associated with TRP channels expressed on sensory fibres, but TRP channels expressed on non-neural cells can also shape sensory functions in normal and inflamed conditions. Therefore, we aimed at investigating the presence and function of sensory TRP channels under normal and inflamed conditions in cells isolated from human dental pulp.

Summary

Dental pulpal cells (DPCs) were isolated from the pulp of healthy human molar teeth and primary cell cultures were established. The expression of thermosensitive TRP ion channels was investigated at the mRNA level using quantitative qRT-PCR in cultured DPCs under normal and inflamed conditions. Channel functionality was studied by using specific agonists and antagonists while intracellular Ca2+ concentration was measured. To simulate inflammation, cells were exposed to ligands activating the pattern recognition Toll-like receptors (TLRs). We found that TRPV3, TRPV4 and TRPA1 isoforms are present in DPCs in a functionally active form. We also found that the cold-sensitive TRPA1 was significantly upregulated by polyinosinic:polycytidylic acid, an activator of TLR3. Our results raise the possibility that TRP ion channels expressed in non-neural cells of the pulp may influence pulpal sensitivity and may serve as potential targets in the treatment of pulpitis, the most common dental inflammation.

Key learning points

- TRP channels are molecular sensors of temperature and nociception
- Thermosensitive TRP channels are expressed by cultured human dental pulp cells
- The expression of certain TRP channels is significantly affected by inflammatory signals which may shape pulpal sensory functions

OP69 - MANAGEMENT OF EXTERNAL CERVICAL RESORPTION

Mohamed K[1]

[1]*International University Of Catalonia, Sant Cugat del Valles, Spain*

Introduction:
External Cervical Resorption (ECR) has attracted the interest of Endodontists and Dental Clinicians for its complex and invasive pattern, and researchers have observed that there are various degrees of ECR progression. In this case report, I will be presenting the management of external cervical resorption in maxillary central incisors.

Aim and objective:
To stop the resorption progression and reduce the inflammation in the palatal tissues.

Clinical History
A 19 years old male patient arrived at the hospital's clinic in the International University of Catalonia (Barcelona) with the following chief complaint: "he does not like the color of his tooth and the tooth is moving forward" - tooth number 1.1.
The patient's medical history showed that the patient was medically fit, and according to the American Society of Anaesthesiologists, the patient classified as ASA1. After reviewing the patient's dental history, it revealed that the patient previously had an orthodontic treatment. Regarding tooth 1.1, he had a history of traumatic injury in 2011, a regeneration treatment in 2011, and internal bleaching in 2017. Based on clinical and radiographic findings of the previously treated tooth, transient apical resorption was made. Pre-operative three dimensional radiographs showed external cervical resorption and resorption of the palatal bone.
Treatment planned as follows: to raise a flap and clean the resorption area with trichloroacetic acid under complete isolation, to restore the resorption by nana-filled composite, and splint the tooth using semi-rigid splint.

Conclusion:
External cervical resorption is identified as a very dynamic and continuously evolving process, therefore knowledge on the variants of the resorption is necessary to be able to evaluate the progression of the resorption, and to diagnose and plan which approach might be helpful in such cases.

Key Learning Points:
- Diagnosis (Radiographic and clinical examination)
- Management of External Cervical Resorption
- Indirect restoration

OP70 - ECR MANAGEMENT BASED ON PERIODONTAL STATUS

Churlinov M[1]

[1]Dr. Fernando Durán-Sindreu, Barcelona, Spain

The aim of this case report is to emphasize the interpretation of clinical symptoms together with CBCT, “portal of entry” probing and loss of epithelial attachment in external cervical resorption diagnosis, classification and most importantly treatment of choice.

Making ECR diagnosis and classification based on two-dimensional image, together with clinical symptoms and findings can be challenging as other factors such as circumferential spread, pulpal involvement (S. Patel et al. 2018) as well as portal of entry and pain (A. Mavridou; S. Patel et al. 2018) should be taken into account. Using three-dimensional image is inevitable in determining the treatment approach; based on defect accessibility, tooth restorability and operator skills ability. Additionally, “portal of entry” probing and symptoms, together with a CBCT examination should be considered when concluding whether the ECR is in “resorbing” or “reparative” stage as described by A. Mavridou et al. 2016a, 2017b.
Clinical symptoms and intraoral tests should be correlated with additional predisposing factors such as secondary occlusal trauma, when defining pulp vitality and periapical diagnosis. It is important to mention that most of the external cervical resorptions are not causing endodontic pathology and should not be treated as such, but should be rather treated as of periodontal pathology and pulp vitality should be maintained whenever possible. As described by many authors, cervical external resorptions are occurring below the epithelial attachment, which does not always match it’s cervical location. Measuring, and taking into considerations the epithelial attachment loss is crucial, when choosing the treatment option and defect accessibility.
Finally, external cervical resorptions prognosis and predictability is not only associated with it’s depth, circumferential spread and symptoms, but also from the periodontal health after the treatment.

OP71 - MANAGEMENT OF ROOT RESORPTION USING BIOMATERIALS BASED SCAFFOLDS– A SCOPING REVIEW

Suresh N[1], Varghese A, Suresh J

[1]Meenakshi Academy Of Higher Education And Research, Chennai, India, [2]Meenakshi Academy of Higher education and research, Chennai, India, [3]Meenakshi Academy of Higher education and research, Chennai, India

AIM

The aim of this scoping review is to scope the available literature regarding the use of biomaterials for the management of root resorption.

Summary of the talk:

Root resorption (RR) is either a physiologic or a pathological condition that is associated with tooth structure loss caused by clastic cells. The incidence of resorption varies from 8 to 50% after trauma. Involvement of multi tissue interface makes the treatment and healing of root resorption complex. The paradigm shift of using biomaterials in Endodontics has been expanded to the treatment of root resorption too.

Methods:

Scoping review was performed based on PRISMA – scoping review guidelines. A literature search was performed in PUBMED, SCOPUS to identify recent clinical studies (case report, case series, observational studies) involving the use of biomaterials in the management of root resorption. Two authors performed the screening and inclusion of articles based on full text reading. A total of 40 articles were included. Data extraction was performed by two authors and in case of conflicts, it was resolved using a third authors.

Key Learning Points:

- Evidence regarding the effective healing of resorption with using biomaterial/biomaterial-based scaffolds will be discussed. Randomized trials are not possible in assessing treatment outcome in resorption with various interventions, thus a scoping review on prospective, retrospective studies and case series / reports was attempted.
- The use of biomaterials and the treatment outcomes was assessed using core outcome set proposed by Kenny et al in 2017 for dental trauma. A total of 6 domains will be discussed.
- Biomaterials and regenerative endodontic principles are a promising alternative treatment strategy for root resorption. However, It was observed that predominantly most studies did not have uniform method of reporting resorption

OP72 - EXTERNAL CERVICAL ROOT RESORPTION: A TREATMENT APPROACH STRATEGY AND ITS 10-YEAR OUTCOME

Mavridou A[1], Lambrechts P[2]

[1]UGhent, Ghent, Belgium, [2]KULeuven, Leuven, Belgium

Aim

In this work we propose a stepwise clinical approach strategy on how to treat External Cervical Resorption (ECR) cases. The 10 year outcome of this approach is also included.

Summary

This treatment approach strategy is based on the retrospective analysis of 274 teeth with ECR. It consists of three steps, namely diagnosis, treatment planning and evaluation. The uniqueness of this approach in comparison to the previously published ones is that, apart from the extent of resorption other factors such as the existence of bone-ingrowth, pain, size and position of the portal(s) of entry, probing feasibility etc. are also considered. Based on these criteria, three treatment options were selected: 1) monitoring 2) extraction or 3) treatment by internal, external or a combination approach. Each selection is explained by indicative clinical examples. The outcome of the overall and individual treatment options, for up to ten years, was evaluated by descriptive statistical analysis.

The overall survival rate for this strategy was 84.6% (for 3 years), 70.3% (5 years), 42.7% (8 years) and 28.6% (10 years). The external treatment approach had the higher survival rate. A monitoring approach is also a valid approach for teeth having ECR.

Key learning points

-How to treat ECR cases with a step-wise approach.
-What is the outcome of this treatment approach.

OP73 - DECISIONS AND TOOLS DURING NON-SURGICAL RETREATMENT

Habib M[1]

[1]Lebanese Society Of Endodontology, Achrafieh, Lebanon, [2]Saint Joseph University, Endodontic Department, Beirut, Lebanon

Root canal treatment difficulties are usually noticed in rare and difficult root canal configurations. Most of the time, endodontic complexities are deep splits, long curved sinuous roots and anatomical aberrations.
Moreover, obstacles might be added making the root canal therapy even more challenging to achieve. Obstacles could be calcifications, either pulp stones or obliterated canals, and sometimes inexistent pulp chamber space.
Failure does occur during endodontic primary treatments; the dentist's duty should always be to investigate the root cause before moving forward. Also, previously treated teeth might have added difficulties like missed anatomies, iatrogenic errors, metallic or carbon fiber obstructions. This is why, taking the decision to retreat a previously done root canal treatement is not always an easy task for both patient and clinician.
In such cases, after dismantling the coronal access, the operator should be armed with specific tools like cone beam CT imaging, ultrasonic tips, magnification and experience to be able to face the demanding challenges at hand. In this presentation, we will highlight anatomical variations with specific added obstacles. Cases will show the use of CBCT in diagnosis, fiber post removal and management of missed canals retreatments. The aim here is to underline the importance of diagnosis and visibility while dealing with such treatments that are managed with the help of cbct, ultrasonics and microscopy.

Key learning points:

- Magnification and microscopy role in retreatments
- The role of ultrasonics in endodontics
- The Use of Cone Beam Computed Tomography in diagnosis, decision making and treatment
- Detecting MB2 in root canal retreatments
- How to suspect, confirm and look for a missed canal in maxillary first molar

OP74 - EFFECT OF DIFFERENT RETREATMENT FILE SYSTEMS ON THE APICALLY EXTRUDED DEBRIS

Ozturk S[1], KELES A[1], Tuncel B[1]

[1]*Hacettepe University Faculty Of Dentistry Department Of Endodontics, Ankara, Turkey*

Aim

To compare the amount of apically extruded debris by four different retreatment file systems during root canal retreatment.

Summary

The primary goal of root canal treatment is to eliminate microorganisms and complete the filling of the root canal. Sometimes root canal treatment may fail and there are various treatment options after failure. At first, orthograde retreatment of root canal treatment should be considered. Dentin debris and irrigants may extrude from the apical foramen to the periapical area during retreatment. It is known that different amounts of apical extrusion occur in each instrument type.

In our study, 64 single-rooted mandibular premolar teeth were selected. The crowns are flattened and the working lengths were standardized to 19 mm. Root canals are prepared up to F4 of the ProTaper Universal file system. After chemo-mechanical preparation, teeth were filled with lateral compaction by using AH Plus sealer. An Eppendorf tube was used for each sample. Each tube was weighed 3 times before retreatment on a precision scale, and the average of all of them was recorded. After 1 week of incubation at 37 °C, samples were fixed to the stoppers and placed on the eppendorf tubes. Afterwards, the teeth were randomly divided into 4 groups: MicroMega Remover (Coltene), Reciproc blue (VDW), Protaper Universal retreatment system (Dentsply), D Race (FKG). During the retreatment procedure, 10 mL of distilled water was used until the working length was reached. Tubes were kept at 70 °C for 5 days so that the liquid evaporated completely and only debris remained. Tubes were weighed 3 times again. Statistical analysis showed that Reciproc Blue extruded a minimal amount of debris. It was not significantly different than Protaper Universal Retreatment System.

Key Learning Points

-All systems extruded a small amount of debris
-Reciproc Blue showed a minimal amount of extruded debris

OP75 - NOSURGICAL ENDODONTIC R-TREATMENT WITH PERIAPICAL LESION IN A FIRST MANDIBULAR MOLAR

Villatoro Herrera M[1]

[1]Universidad Internacional De Catalunya, Sant Cugat del Valles, Spain

An endodontic retreatment is defined by American Association of Endodontists (AAE) as the "procedure to remove root canal filling materials from the tooth, followed by cleaning, shaping, and obturating canals." The outcome of an endodontic treatment is generally assessment on clinical as well as radiological findings; the prevalence of apical periodontitis (AP) in root filled teeth has been reported to be on average of 40% One of most common therapeutical options are non-surgical orthograde treatment and surgical treatment. If we have achieve a good prognosis we have to think the prosthetic rehabilitation of the teeth we are treatment. It is also known as overlay denture, overlay prosthesis, and superimposed prosthesis. Following the correct diagnosis.

The following case is a male patient, which refer pain in 36 tooth, and increasing the symptomology. Intraoral examination shows a deficient restoration, pain at percussion test; in the x-ray examination shows a radiolucency in the distal root of the tooth and radiolucency in the mesial area that follows crestal bone until the second third of the mesial root and is caused by the deficient restoration and the extend of the contact point in the axial area. As well show in the x-rays the poor root canal treatment in tooth 35, and in the tooth 36 are radiolucency in the mesial and distal apical roots.

We decide to give at patient an endo re- treatment having the knowledge of this cases are categorized as high complexity and as such referral to specialist settings should be considered to help improve treatment outcomes and having in mind that the success rate of endodontic retreatment based in the literature was over 70% - 81%. Hence the situation, we decide to achieve in 3 of the teeth and using Dietschi protocol.

OP76 - ANTIBACTERIAL EFFECTIVENESS AND CLINICAL OUTCOME IN RETREATMENT OF TEETH WITH ENDODONTIC INFECTION

Zandi H[1]

[1]University of Oslo, Oslo, Norway

AIM

To compare the clinical and radiographic outcome of retreatment of root filled teeth with infection using either 1% NaOCl or 2% CHX and investigate the influence of bacterial infection on the long-term clinical outcome.

Methodology

The success rate of endodontic retreatment of root-filled teeth with infection has been reported to vary from 62% to 85%. This is lower than for initial treatment of necrotic unfilled teeth. The main goal of endodontic treatment is the elimination of the microbial load or its reduction to a level that allows healing to take place.

During this lecture, potential causes of failure during endodontic (re)treatment will be discussed. Moreover, the role of irrigation solutions such as sodium hypochlorite and chlorhexidine at various concentrations will be explored. The focus will be the translation of microbiological research findings into clinical practice. This presentation will evaluate the impact of preoperative infection and the efficacy of antibacterial treatment during retreatment of previously root canal treated teeth and their long-term prognosis.

Results

Reasons for failure of (re)treatment of teeth with endodontic infections focusing on the microbiological causes will be discussed. Furthermore, the impact of antimicrobial treatment using common irrigation solutions on the clinical outcome, and the impact of the level of preoperative infection on the control of infection and on the clinical outcome will be evaluated.

OP78 - THE PLATFORMLESS TECHNIQUE: A MINIMAL INVASIVE APPROACH IN THE MANAGEMENT OF SEPARATED INSTRUMENTS

Gliga A[1,3], Imre M[2], Grandini S[3], Marruganti C[3], Gaeta C[3], Kiefner P[4]

[1]Department of Operative Dentistry, Faculty of Dental Medicine, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania, [2]Department of Complete Denture, Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania, [3]Department of Medical Biotechnologies, Unit of Endodontics, Periodontology, Restorative and Paediatric Dentistry, University of Siena, Siena, Italy, Siena, Italy, [4]Practice for Endodontology and Dental Traumatology, Stuttgart, Germany

Aim:
To present the possibilities of conserving dentine and removing minimum amount of healthy tissue within the management of separated instruments.

Summary:
Retrieving separated instruments is always a challenge and many cases do not display the expected post-operative X-ray, since altering the endodontic morphology creates unfavorable imaging results revealing the destruction of root structure.
The procedure of removing a separated instrument increases the risk of intra-operative iatrogenic errors, however patience, skills and experience can help clinicians avoid unnecessary tissue damage.
A series of clinical cases along with a detailed description of the procedures will demonstrate efficiency and feasibility of the platformless technique. The separated instruments removed in the presented cases have been exposed without creating a platform or use any gates glidden burs, therefore the reason the method was named after. The only tools used were: endodontic reciprocating files, ISO 10 Micro Opener and ISO 15 Ultrasonic K-file. Although no device or expensive instrument was used, the results presented confirm that partial or complete internal curvature bypass of the separated instrument enables the clinician to remove the file from inside the root canal without affecting or with minimum interference with the desired canal shaping.

Key Learning Points:
- Understand a minimal invasive technique
- Learn how to find and expose the tip of a separated instrument without creating a platform
- Estimate the expectations and plan the approach for a predictive and appreciable result

OP79 - MANAGEMENT OF MISSED CANALS AND BROKEN FILE IN A MANDIBULAR LATERAL INCISOR

Tsotou F[1]

[1]UIC University, Barcelona, Spain

Aim: To describe the management of a failed endodontic treatment in a mandibular lateral incisor (Type III Vertucci's classification) with an unsuccessful attempt of localization of the main canal and the presence of a separated file in a false canal.

Summary: A 72-year-old patient was referred to the Endodontic Department of the University Dental Clinic (CUO, UIC Barcelona) for the evaluation of the left mandibular lateral incisor (tooth 32).
Based on clinical and radiographic findings a diagnosis of previously treated tooth with asymptomatic apical periodontitis was performed. The cone-beam computed tomography (CBCT) revealed a Type III Vertucci's anatomy with a missed main canal and a separated file in a false created canal. The tooth was planned for non-surgical root canal retreatment.
The treatment was plan consisted in the modification of the access cavity, localization and preparation of the main canal, removal of separated file with ultrasonic tips and localization of the second canal. Obturation using thermomechanical condensation technique was completed and the tooth was restored directly using composite resin.

Key Learning Points:

- A thorough knowledge of the anatomical variations of the root canal system is imperative to guarantee a successful endodontic treatment.
- The use of 3-D imaging techniques (CBCT) should be considered in previously treated teeth that present an endodontic failure to establish a suitable treatment plan, especially in cases in which a complex anatomy is suspected.
- The systematic use of a surgical microscope and ultrasonic endodontic tips facilitates and standardizes access cavity preparation, the canal localization and removal of separated files.

OP80 - A RARE CASE REPORT OF THE PRESENCE OF THE SECOND MESIO-BUCCAL CANAL (MB2) DURING ROOT CANAL TREATMENT OF AN UPPER LEFT SECOND DECIDUOUS MOLAR (ULE)

Humdani A[1], Malik K[1]

[1]*Department of Restorative Dentistry, Birmingham Dental Hospital, Birmingham, UK*

Aim

Literature on the incidence of the MB2 canal in deciduous molar teeth is limited. MB2 can be present in up to 95% of maxillary permanent molar teeth and missed canals greatly contribute to root canal treatment (RCT) failure.

Methodology

An 18-year-old female patient presented with recurrent abscesses from a retained ULE.
Clinical and radiographic examination revealed a minimally restored permanent dentition, hypodontia of the LL5 and LR5 and a retained ULE. The ULE was visible on smiling, not mobile or associated with periodontal pocketing but had a diffuse apical radiolucency. Treatment options for the ULE included extraction with or without prosthetic replacement or RCT. The patient opted for RCT.
RCT was carried out over 2 appointments using a microscope and 4 canals were identified. Patency was achieved and an electronic apex locator was used navigate the MB, MB2, DB and P canals. Sodium hypochlorite and EDTA were used to clear and irrigate the root canal system, which was prepared with hand files and the Protaper system. An intracanal non-setting Calcium Hydroxide dressing was placed between appointments. Obturation was carried out with warm vertical gutta percha (GP) condensation using System B. Obtura was used to backfill with thermo-plasticised GP. A Class II direct coronal restoration was then placed.

Results

At the 8 year review, the patient was asymptomatic. The ULE remained clinically and radiographically disease free indicated a successful outcome.

Conclusions

Due to the resorptive nature of deciduous roots, there is limited research on the root canal anatomy of deciduous molars. The second permanent premolars have the highest incidence of congenital absence, and this case highlights that retention and restoration of the deciduous predecessor can be successful. Also, space and alveolar maintenance subsequent to retaining deciduous teeth is advantageous in cases where prosthetic tooth replacement may be required long term.

OP81 - RESTORE WHEN? HOW? WITH? AN OVERVIEW ON THE RESTORATION OF THE ENDODONTICALLY TREATED TOOTH

Zaman M[1]

[1]Leeds Dental Institute, United Kingdom

AIMS:
To explain the impact of root canal treatment on a tooth in terms of stiffness, discolouration, and prognosis. We also aim to discuss appropriate assessment and decision making to restore endodontically treated teeth with direct composite, conventional crowns, onlays, and post crowns.

SUMMARY:
In this talk, the effects of root canal treatment on the prognosis of anterior and posterior teeth will be presented. Additionally, the importance of conservative access cavity preparation and appropriate methods to restore compromised teeth using direct and indirect methods will be discussed based on current evidence. An overview of traditional restorative materials such as composite, ceramics, and gold will be provided along with clinical situations where these are best suited will be provided.

KEY LEARNING POINTS:
After the talk, the delegates should be able to
1. Update their knowledge around pre-treatment restorability assessment and be able to appropriately assess a tooth from a prosthodontic, periodontic, and endodontic point of view to ensure predictable treatment can be delivered
2. Acknowledge the impact of conservative access cavity preparation, root canal instrumentation, and solvents on the stiffness of teeth.
3. Understand the concept of ferrule and the importance of this to predictably restore teeth with indirect restorations
4. Develop an understanding of post and core build-ups and selecting appropriate materials for a clinical situation.

OP82 - LONG-TERM CLINICAL EVALUATION OF DIRECT RESIN COMPOSITE RESTORATIONS IN VITAL VS. ENDODONTICALLY TREATED POSTERIOR TEETH – RETROSPECTIVE STUDY UP TO 13 YEARS

Lempel E[1], Lovász B[2], Bihari E[1], Krajczár K[1], Jeges S[3], Tóth Á[3], Szalma J[2]

[1]Department of Restorative Dentistry and Periodontology, University Of Pécs, Medical School, Pécs, Hungary, [2]Department of Oral and Maxillofacial Surgery, University of Pécs, Medical School, Pécs, Hungary, [3]Faculty of Sciences, University of Pécs, Pécs, Hungary

Aim

This retrospective study evaluated and compared the survival rate of Class II posterior direct resin based composite (RBC) restorations made in vital teeth (VT) and endodontically treated teeth (ETT). The influence of risk factors on the long-term performance of restorations was also investigated.

Summary

Patients (n=245) receiving RBC posterior restorations between 2004 and 2012 were selected. A total of 597 restorations (485 in VT, 112 in ETT) with minimum 2.5-3 mm remaining cusp thickness, made with the same brand of RBC and adhesive, were evaluated using the USPHS criteria. Data were analyzed with Mann-Whitney, Chi-square and Fisher's Exact Test, Extended Cox-regression and Kaplan-Meier analysis ($p<0.05$). Relative risk ratio was estimated for each evaluated parameter. The mean observation period was 8.6 ± 2.3 years. An annual failure rate in VT and ETT of 0.08% and 1.78%, respectively, was detected. The reasons of failures included restoration fracture, secondary caries in VT; vertical root fracture, cusp fracture, restoration fracture, secondary caries and loss of adhesion in ETT. Significantly better performance was observed in RBCs of VT for each evaluated parameter. Among the evaluated risk factors only occlusal stress affected negatively the survival of RBC in ETT (Hazard Ratio 37.1; CI95% 8.4-163.7). Although, there is significant difference in the success rate of RBCs in VT (98.97%) and ETT (76.8%), the long-term (6-13 years) durability of Class II RBCs with 2.5-3 mm cusp thickness in ETT is also clinically acceptable. The presence of occlusal stress decreases the survival of RBCs in ETT.

Keywords:

- Endodontically treated teeth
- Class II restoration
- USPHS evaluation
- Longevity

OP83 - CAD-CAM FABRICATED INDIRECT RESTORATIONS OVER TWO ENDODONTICALLY RETREATED MANDIBULAR MOLARS

Proestaki E[1]

[1]UIC Barcelona International University of Catalonia, Barcelona, Spain

Aim

This clinical case presentation aims to describe the technical management of two non-surgical endodontic retreatments in two mandibular molars and their post-endodontic restorative treatment.

Summary

Patient presented to our university clinic with symptoms of pain in the region of the left lower molars. The clinical examination showed the presence of old infiltrated restorations on teeth 3.6 and 3.7 and pain to percussion. After radiographic examination we observed, that both molars had previous endodontic treatments of inadequate quality, existence of screw metallic posts in their distal roots and presence of radiolucencies which surrounded both their mesial and distal roots.

The diagnosis was previously treated teeth with symptomatic apical periodontitis (American association of Endodontists). The proposed treatment was non-surgical endodontic retreatments for both 3.6 and 3.7 followed by indirect restorations.

The two non-surgical endodontic retreatments were fully operated and completed under the use of DOM. Following, an evaluation of the remaining tooth structure took place, according to which we decided to proceed with the construction of an overlay-veneer for the tooth 3.6 and an onlay for the tooth 3.7. The restorations were CAD-CAM fabricated using the material CERASMART and cemented according to the recommended cementation protocol for the aforementioned material. Six months after, we controlled the patient, who was free of any signs and symptoms and we also observed radiographic healing.

Key learning points

- The presence of a high quality coronal restoration following root canal treatment is an equally significant factor to the quality of the root canal treatment in terms of eliminating apical periodontitis.
- Due to the clinical importance of the coronal restoration the clinician has to evaluate carefully in every individual case all the parameters which affect the decision for: the final restoration type (direct restorations, indirect partial or full coverage restorations), material choice and cementation techniques.

OP84 - COMPLEX AESTHETIC TREATMENT ON ANTERIOR MAXILLARY TEETH CAUSED BY COMPLEX CARIES TROUGH COMBINATION OF ENDODONTIC AND RESTORATIVE WITH INTERDISCIPLINARY APPROACH - A CASE REPORT

Masa M[1], Lina R[1], Zubaidah N[2], Yuanita T[2]

[1]Resident Department of Conservative Dentistry, Airlangga University, Surabaya, Indonesia, [2]Staff Department of Conservative Dentistry, Airlangga University, Surabaya, Indonesia

Background: Dental and facial disorders have a detrimental effect for each person's performance and decrease their self confidence aesthetically. It is critical for the dentist to plan the treatment carefully especially on anterior teeth with the goal of synchronizing the shape and color of the teeth to achieve the required esthetics.

Aims: To present a case of maxillary anterior teeth with complex caries, through combination of endodontic and restorative treatment for recovering its original function and aesthetic.

Case: The 36 years old female patient came to RSGM Unair with complex caries on anterior maxillary teeth number 13,12,11,21,22,23. The patient frequently complained of pain on the right maxillary tooth, and pus frequently drained. The patient felt bad about her performance and affect her self confidence. She visited the clinic to repair her teeth and to get its form and function aesthetically. Medical history showed no systemic diseases.
Diagnosed: Maxillary right and left canines were diagnosed with normal pulp. Maxillary central incisors, maxillary left lateral incisor were diagnosed with pulp necrosis and also periapical lessions as an asymptomatic apical periodontitis; maxillary right lateral incisor was diagnosed as pulp necrosis with chronic apical abscess.
Case Management: Complex aesthetic treatment is carried out in collaboration with Endodontist to carry out root canal treatment followed by insertion of post retention using fiber posts and cast posts with opaquer then covered with lithium disilicate crowns and indirect lithium disilicate veneers. The patient was referred to an oral surgeon for extraction procedure. Then, the patient was referred to a prosthodontist for continuing the prosthodontic dental procedure. A partial denture was inserted for rehabilitating masticatory function.

Conclusion: Anterior teeth with complex caries can be managed through endodontic and restorative treatment to recover its performance and function aesthetically. This interdisciplinary treatment can improve speech and mastication functions.

OP85 - RESTORATIVE MANAGEMENT OF DENTAL TRAUMA

Tanvir M[1], Khalid S[1], Green D[1]

[1]*Birmingham Dental Hospital, United Kingdom*

Aim

- Discuss the restorative management of dental trauma referred to the restorative department at the Birmingham Dental hospital

Summary

- Discuss the sequelae of dental trauma including discolouration, pulp canal obliteration, external/ internal root resorption, incomplete root resorption and ankylosis
- Summarise cases with the sequelae mentioned above and their restorative management (immediate, short-term and long-term management)
- Discuss the importance of meticulous management and planning of such cases to achieve optimal clinical, technical and aesthetic outcomes

Key learning points

- Understand the sequalae of traumatised teeth
- Discuss the investigations required to aid treatment planning
- Discuss the restorative management of the sequalae of dental trauma
- Discuss a series of cases showing the stages of restorative management to include:
- Apexification using Mineral Trioxide Aggregate and Biodentine
- Surgical management of resorptive lesions
- Negotiation of pulp canal obliteration

OP86 - UNCONSCIOUS RACIAL BIAS MAY AFFECT DENTISTS' CLINICAL DECISIONS ON TOOTH RESTORABILITY: A RANDOMIZED CLINICAL TRIAL

Patel N[1], Mannocci F, Patel S, Cotti E, Bardini G

[1]*Kings College London*

Aim: To determine whether different treatment decisions are made for Black versus White patients and to determine whether such differences (if any) are related to the presence of explicit or implicit racial bias.

Methods: In this single center cross-sectional survey, 57 dentists were given a clinical scenario in combination with a patient's relevant clinical photographs and radiographs depicting either a Black or White patient presenting with a decayed tooth and associated symptoms of irreversible pulpitis. Explicit bias was measured through a questionnaire, which evaluated participants' course of treatment, strength of recommendation, and their perception of patients' dental cooperativeness. Implicit bias was evaluated through brief implicit associate tests.

Results: Recommendation for root canal treatment (RCT) in the White patient condition was significantly higher than in the Black patient condition ($\chi 2 = 4.77$, $P < 0.05$). Overall, participants were significantly more likely to recommend root canal treatment to White patients ($t = 2.46$, $P = 0.0172$) and significantly more
likely to recommend extraction forBlack patients ($t = 3.03$, $P = 0.0034$). In total, 91.23% and 78.95% of all participants displayed high Brief Implicit Association Test race and cooperation scores, respectively, showing a pro-White bias in both categories. This trend was shown to be irrespective of the patient condition.

Conclusions: Dentists' decision making was affected by the race of the patient, resulting in a greater likelihood of extractions (less RCT) for Black patients presenting with a broken-down tooth and symptoms of irreversible pulpitis.

OP87 - ENDODONTIC CONSIDERATION IN FIBER POST CEMENTATION

Alnahlawi T[1]

[1]Syrian Private University, Damascus, Syria

Aim:
The aim of this presentation is to highlight the different endodontic procedures that will affect the proper cementation of fiber post when chosen to restore endodontically treated teeth.

Summary:
The proper application of fiber post and cementation inside the root canal, when restoring teeth after root canal treatment, is an important factor preventing the later on microleakage that could happen due to the lack of bonding to radicular dentine, influencing the prognosis of the endodontic treatment.
The different irrigation solutions and protocols used during root canal treatment will behave negatively or positively influencing the formation of oxygen rich layer covering the radicular dentine supposed to bond the dual cure cement to retain the fiber post.
On the other hand, the selection of root canal sealer type, while obturating the root canal system, plays an important role in the sufficient polymerization of the resin component of the bonding agent and the resin cement, with direct influence on the application time of the fiber post, whether chosen to be in the same, or on the next visit of root canal obturation.
Not neglecting also the influence of polymerization technique whether it was dual or light cure, taking in our consideration the light curing tip design to provide the best-delivered light curing intensity as deep as possible to provide better bonding agent and cement polymerization.

OP88 - CORRELATION BETWEEN ROOT CANAL TAPER AND RESIDUAL RESISTANCE OF POST AND CORE RESTORED MAXILLARY PREMOLARS

Palopoli P[1], Pugno N[1], Moccia E[1], Pasqualini D[1], Scotti N[1], Comba A[1], Berutti E[1], Alovisi M[1]

[1]Department of Surgical Sciences, Dental School, Endodontics, University of Turin, Turin, Italy, Turin, Italy

Aim: To investigate the effect of canal taper on the residual cervical dentin volume and the fracture resistance of maxillary premolars restored with and without fiber post and with full-crown preparation.

Summary: Thirty maxillary premolars were selected, micro-Computed Tomographic (micro-CT) scanned and divided into three groups. In the group TN, shaping was achieved with TruNatomy up to Prime Shaping File (#26, .04), in the group B4U with .05 taper instruments up to #23, while in the group PTN ProGlider and ProTaper Next were used up to X2 (#25, .06). Afterwards, specimens were obturated with a single cone and bioceramic sealer and micro-CT scanned. Then a mesio-distal MOD cavity was prepared with interproximal margins placed 1 mm above the CEJ and residual 2 mm thickness oral and buccal walls. In the subgroup FP, a fiber post (FP) was luted in the palatine root followed by a composite restoration, while in the subgroup NFP no FP was used. Afterwards, all specimens were prepared for a full-crow restoration with a 1 mm chamfer margin design and 1.5 mm occlusal reduction and micro-CT scanned. The volume of removed dentin in the cervical third was analysed in the preoperative, post-shaping and post-restoration micro-CT scans. Specimens were submitted to static fracture resistance test. The mean dentin removed volume after full-crown preparation resulted higher than the amount spared with different shaping systems in both groups. For FP and NFP subgroups, the mean dentin removal in the cervical third resulted similar. No significant differences among fracture resistance resulted in both TN and PTN groups. Regardless of the presence of a fiber post, the spare of cervical dentin during instrumentation resulted not related to the final cervical dentin volume after full-crown preparation and to tooth fracture resistance.

OP89 - A COMBINATION OF LONG AND SHORT FIBERS FOR INDIVIDUALIZED POST SOLUTIONS TO REINFORCE ROOT CANAL TREATED TEETH – DATA GATHERED FROM OWN IN VITRO STUDIES

Fráter M[1]

[1]Faculty of Dentistry, University of Szeged, Hungary

Aim of this presentation is to show what seems to be currently the solution for individualized FRC post fabrication utilizing both long and short fibers.

Summary: Everyday use of adhesive dentistry and the subsequent development and spreading of biomimetic dentistry changed the way root canal treated teeth are restored in the past years. As newer and newer restorative materials are being developed, reinforcement of such teeth is a valid option. However, it has become clear that conventional FRC posts are not satisfactory for this purpose. More and more articles are justifying the need for individualized posts to potentially reinforce root canal treated teeth. Short fiber-reinforced composites (SFRCs) have gained popularity in restoring deep posterior cavities due to their unique mechanical features. The in vitro testing of SFRCs has been the main focus of the Biomechanical Research Group in Szeged since 2014 (Fráter and co-workers). As a part of this process the Group developed the Bioblock technique aiming to reinforce endodontically treated teeth. As more and more data was gathered on this technique, it became evident that the usage of only SFRCs to form an individualized post (Bioblock technique) is not the best solution in all situation, and should be improved. The more tooth structure is missing and the more tensile forces are rising, the more long fibers should be incorporated into the individualized post. The lecture would like to show what results led to the need for modification of the Bioblock technique and how long and short fibers should be used simultaneously during the restorative procedure. The concept will be supported by published in vitro studies performed by the Group.

Key learning points:

- problems with conventional FRC post
- properties of SFRCs
- pros and cons of the Bioblock technique
- combining long and short fibers for individualized posts

OP90 - BOND STRENGTH AND MMPS ACTIVITY OF RADICULAR DENTIN OBTURED WITH DIFFERENT BIOCERAMIC SEALERS

Dirutigliano A[1], Comba A[1], Pasqualini D[1], Alovisi M[1], Scotti N[1], Mazzoni A[2], Breschi L[2], Berutti E[1]

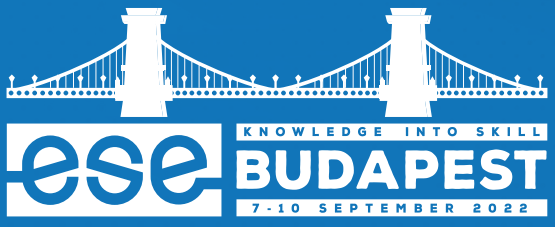
[1]Department of Surgical Sciences, Dental School Lingotto, University of Turin., Turin, italy, [2]Department of Biomedical and Neuromotor Sciences, DIBINEM, University of Bologna Alma Mater Studiorum, Bologna, Italy

Aim: Evaluation of radicular bond strength and dentinal MMPs activity with different endodontic sealers (traditional vs bioceramic), filling techniques (warm vs cold) and adhesive protocols (self etch SE vs etch and rinse ER).

Methods: 128 single root teeth, were selected and endodontically treated. Samples were randomly divided in the following groups: (G): warm filling with ZoE sealer (G1); cold filling with resin based sealer (G2); cold filling with bioceramic sealer (G3); warm filling with bioceramic sealer (G4). After 7 days, an 8 mm post space was prepared with dedicated drills and each group was divided into 2 subgroups according to the adhesive adhesive procedure (SE vs ER) employed for cementation.
Sample were analyzed with micro push-out test, half at T0 and T12 months.
Additional 16 molars were prepared in accordance with the described groups for in situ zymography analysis at T0 and T12 months.
Obtained data were statistically analysed with ANOVA test and significance was set for $p<0.05$.

Results: Radicular bond strength was significantly influenced by adhesive protocol and ageing ($p < 0.05$) in accordance with MMPs activity analysis. In addition, obturation technique (Warm vs Cold) demonstrated a significant impact on enzymatic activity, while no differences were found for endodontic sealers.

Conclusion: The results showed that bioceramic sealers should not alter the radicular dentin bond strength and endogenous enzymatic activity. The heat produced during the root canal obturation might modify the internal enzymatic activity, however this aspect requires further investigation.



ESEBIENNIALCONGRESS.COM