APICECTOMY: WITH OR WITHOUT RETROGRADE FILLING?

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Aim: apicectomy is usually adopted to treat apical pathologies with no response to orthograde endodontic therapy. The aim of this technique is to achieve periradicular tissue regeneration by confining any potentially harmful agents through the apical sealing of the root canal system. We report a case of endodontic surgery after orthograde treatment using bioceramic sealer and none retrograde canal instrumentation.

Methods: a 45 years-old female patient came to our clinic presenting a recurrent fistula from the element 1.2, devitalized few months ago. RX-Opt and periapical radiographs revealed a radiolucent lesion of about 1 cm of diameter. Because of the failure of previous treatments and the apical reabsorption, we decide to perform retreatment of tooth 1.2 with bioceramic sealer and apicectomy.

Results: Protapers Gold and bioceramic sealer "Fill Root" with single cold cone closure were used. Approximately 2 months later, we performed the surgical apicectomy, cutting the last 4 mm of the roots without retrograde instrumentation. The patient was clinically and radiographically controlled every month, showing clear signs of healing in the periapical area. Microscopical analysis of the apex was performed.

Conclusions: apicectomy with no retrograde instrumentation could be used to treat tooth with very compromise radicular structure. Microscope analysis shows the ermetic closure of the bioceramic sealer in the new apical foramen.

MICRO-CT STUDY ON SHAPING ABILITY OF GENTLEFILE AND RECIPROC BLUE

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Aim: to evaluate shaping ability with a new stainless steel rotary systematic (Gentlefile. GF; MedicNRG, Kibbutz Afikim, Israel) compared with a single-file nickel-titanium instrument (Reciproc Blue, RB; VDW, Munich, Germany), through micro–computed tomography (micro-CT) analysis.

Methods: twenty isthmus-containing mesial roots of mandibular molars with a curvature of 15°-35° were pre-scanned through micro-CT at an isotropic resolution of 12 µm and randomized to one of the two experimental groups (n = 10) according to the instruments used for canal preparation: Gentlefile (GF; #23/.04) and Reciproc Blue R25 (RB; #25/.08). The matched preoperative and postoperative images were examined to determine the canal transportation, untouched areas, volume and surface area increases. In addition, the shaping time was recorded. Data were statistically analyzed using the student's t test with a significance level of 5%.

Results: no significant differences were observed in the percentage of the untouched areas between the two groups (P >.05). The RB group showed a statistically greater increase in volume and surface area than the GF group (P <.05). The GF group resulted in significantly less transportation, in the apical portion, than the RB group (P <.05). In terms of shaping time, no significant differences emerged between the two groups (P >.05).

Conclusions: instrumentation with GF and RB files produced similar percentage of untouched areas in isthmus-containing mesial root canals. GF ensured this result with less apical transportation and dentin removal than the RB group.

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RELIABILITY OF THE ABIAD'S RUBRIC FOR STUDENT SELF-ASSESSMENT OF ACCESS CAVITIES

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Aim: rubrics, defined by achievement levels and criteria in a grid format, are widely encouraged for learning assessment and student self-assessment. Only few rubrics exist specifically for access cavity assessment and a version was proposed by Abiad in 2017. This tool has been used for pre-clinical training, but its reliability has never been assessed. This study aimed to evaluate the reliability of Abiad's rubric.

Methods: fifty access cavities in 3D-printed teeth (25 incisors and 25 molars) were evaluated by five students previously trained on the Abiad's rubric. Evaluations were repeated after a one-week interval. Subsequently, two experienced operators (gold standard) assessed the access cavities. Inter-rater, intra-rater and agreement between each student's evaluation and the gold standard were assessed using Gwet's Agreement Coefficient test. The reliability relative to the sum of the scores was calculated with the Intra-Class Correlation Coefficient (ICC) method.

Results: inter-rater agreement was weak for both incisor (ICC: 0.4114; CI: 0.1896 - 0.6369) and molar (ICC: 0.4006; CI: 0.1446 - 0.6454) assessments. Intra-rater agreement was moderate for all raters, ranging from 0.6147 (ICC: 0.2974 - 0.8097) to 0.7358 (ICC: 0.4866 - 0.8743). Agreement between raters and the gold standard ranged from minimal (ICC: 0.2146, CI: 0.1511 - 0.5436) to weak (ICC: 0.4508, CI: 0.0207 - 0.7287).

Conclusions: biad's rubric demonstrated poor reliability for student self-assessment, maybe due to the subjective nature of most rubric items. The implementation of a more reliable tool for assessing access cavities is warranted.

COMPARISON BETWEEN TRADITIONAL SHAPING TECHNIQUE AND "SLIDING SELECTIVE BRUSHING MOTION"

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Aim: to demonstrate whether the use of a file with a smaller taper in a Sliding Selective Brushing Motion (SSBM) movement, in shaping an oval canal, is less invasive than the traditional technique which involves the use of a file with a taper major used with a pecking technique. Therefore, to demonstrate whether with the SSBM technique it is possible to sacrifice less dentin substance, allowing the correct obturation of the oval canals.

Methods: have been used extracted lower premolars with oval-shaped single channels. 20 samples were selected, 10 for each group (A and B). Group A corresponds to the teeth instrumented with a traditional shaping technique with axial pecking movements without any lateral movement of the instrument, using Protaper Gold instruments. Instead, Group B is represented by teeth instrumented with an experimental technique called "Selective Sliding Brushing Motion" with VdW Rotate sequence. The same irrigation and canal closure protocol was followed for both groups.

Results: using micro-CT it was seen that at the level of the coronal third in the SSBM technique the canal has a more oval conformation and more faithful to the starting canal anatomy

Conclusions: the SSBM technique guaranteed better canal shaping in each root third with a lower percentage of untouched dentinal areas compared to the traditional technique. It also maintained the anatomy of the oval canal, unlike the traditional technique in which the removal of dentin occurred more to the detriment of the dentin area corresponding to the minor axis of the canal lumen.

INFLUENCE OF DENTIN AGE ON THE BOND STRENGTH PROPERTIES OF RADICULAR DENTIN

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Aim: aging produces irreversible modifications to the dentinal tissue. A gradual reduction in the diameter of the dentinal tubules lumen, due to an accumulation of minerals, and the cross-linking of inter-tubular collagen fibers are the most evident changes. These alterations may significantly affect the bonding ability of adhesive materials. The aim of this study was to assess whether aging had a role on root canal adhesion through the analysis of the adhesive strength.

Methods: thirty-two glass-fiber posts were luted into the root canals of human anterior teeth, in young (under 20) and old (over 60) patients, using a self-adhesive resin cement (iCEM) and a self-etching bonding system plus resin cement (Clearfil Universal Bond Quick + Clearfil DC Core Plus). The roots were sectioned into 1 mm slices, sorted in coronal and apical, and bond strength was measured using a micro push-out test. Analysis of the failure mode was carried out through stereomicroscope (40X). Fracture were classified as adhesive (between cement and dentin), cohesive (inside the cement or at the post-cement interface) or mixed.

Results: the push-out test showed a higher bond strength in the older group, irrespective of the canal area considered. The self-adhesive cement performed significantly better in the older group compared to the younger one. The majority of the failures were adhesive.

Conclusions: the tested adhesive cements, especially the self-adhesive cement, performed better on older substrates. This be coherent with the fact that these materials create a direct chemical link with the hydroxyapatite, and so, a stronger bond may be expected where the mineral component is more represented, as in older dentin. Therefore, in elderly root canal treated radicular dentin, simplified luting strategies as single step self-adhesive resin cements may be a reliable option.

EFFECT OF SURGICAL GLUE ON HEMORRHAGE CONTROL AND QUALITY OF LIFE AFTER ENDODONTIC SURGERY

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Aim: to evaluate the influence of a surgical hemostatic glue (IfaBond, Dipromed, Italy, n-hexyl-cyanoacrylate) on postoperative bleeding and quality of life (QoL) of patients compared to traditional hemostatic solutions.

Methods: were included patients with a diagnosis of apical periodontitis in endodontically treated teeth, where the possibility of orthograde endodontic treatment was ruled out. Recruited patients were assigned to two groups: the first with the use of surgical glue and the second with the use of ferric sulfate. The level of bleeding and surgical field visibility were recorded. Patient quality of life was assessed through a questionnaire. The lesion size was assessed in volume in mm^3 by CBCT and in diameter in mm by periapical x-ray, along with the presence or absence of cortical bone.

Results: it was demonstrated that in 67% of cases using hemostatic glue, there was significant bleeding control ($p < .001$), while only 44% of cases using ferric sulfate showed such significance. It was also demonstrated greater bleeding control in the hemostatic glue group compared to the control group. It was observed that once the hemostatic agent was removed, there was equal or increased bleeding compared to initial bleeding in cases with surgical glue, while in cases using ferric sulfate, bleeding was reduced. No significant differences were found between the two groups in ter oh QoL.

Conclusions: the results show positive outcomes regarding hemorrhage control with surgical glue, especially in cases of large periapical lesions with important bleeding. Furthermore, the easy removal of surgical glue is an advantage in terms of both operative times and post-removal bleeding. This would imply better clotting and consequently better healing. However, a larger number of patients is needed to confirm the preliminary results obtained.

AVOIDING THE WASHOUT OF BIOCERAMIC SEALERS USING FIBRIN GLUE: A *IN VITRO* STUDY

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Aim: Well-Root PT®, a bioceramic putty, exhibited a significantly greater susceptibility to washout during the removal of the hemostatic material from the surgical crypt compared to SuperEBA®, as shown in our previous study. This tendency may impact retrograde sealing. To prevent washout and preserve the biological advantages that bioceramics have over older sealers, we developed a protection for the retro-obturation using Tisseel®, fibrin glue, a biocompatible and reabsorbable material. The purpose of our study is to compare the washout susceptibility of retrograde obturation made by Well-Root PT with and without Tisseel protection.

Methods: we collected twenty-four extracted teeth and divided them in: Group A (n = 12) - Retrograde obturation made of Well-Root Pt; Group B (n = 12) - Well-Root PT protected by Tisseel. Alveoli in pig mandibles were selected using CBCT for microsurgery. Microsurgical endodontic treatment was performed. Once the retrograde obturation was completed, ferric sulfate was removed with high speed instruments under abundant irrigation for twenty seconds. The washout was evaluated by measuring the distance between the filling left in the retro-cavity and the resection surface on sample scans.

Results: samples treated with Tisseel showed significantly minor washout than the ones without the protection.

Conclusions: Tisseel showed to be a suitable protection for the retrograde obturation in order to avoid washout, ensuring at the same time the osteoinduction provided by the release of calcium hydroxide from the bioceramics, thanks to its reabsorbability.

MICRO CT ANALYSIS OF SEALING CAPACITY OF DIFFERENT MATERIALS APPLIED ON RESECTED ROOT APEX

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Aim: evaluate the sealing capacity of One-Fil as an apical sealing material applied on apicoectomy's surface.

Methods: 20 root canals were instrumented using Ni-Ti rotary instruments and obturated with single cone technique using One-Fil sealer. Apicoectomy at 3 mm from the apex was performed. 10 roots were equally divided into 2 groups. *Positive Control Group (GCP):* on the apicoectomy's surface a retrograde cavity of 3 mm was created and filled with MTA, and *Negative Control Group (GCN):* the apicoectomy's surface was left uncovered. 10 roots formed the *Surface Sealing Material group (SSM):* a layer of One Fil was spread on resected surface. All roots were scanned with micro-CT after orthograde root canal obturation (t_0) and after apicoectomy (t_1). Amira software was used for the quantification of the following volumes *inside the entire Sndodontic Space (ES*), at 1 mm and 3 mm from root apex, at t_0 and t_1: *Volume of Voids (VoV)* inside intracanalar materials, between them, between them and dentine.

Results: the Kruskal-Wallis test indicated a significant difference in the *total VoV (tVoV)* between the 3 groups both at 1 mm and at 3 mm only at t_1: in GCN and SSM the tVoV after apicoectomy was decreased, in GCP was increased. The same test showed: no statistical difference between tVoV of GCP, GCN and SSM at 1 mm in t_1, but at 3 mm and in ES the difference was significant with GCP being the one with higher tVoV. In GCP the voids in ES were mainly located between the intracanalar materials and the dentine

Conclusions: applying One-Fil on resected root apex could lower the chance of apical microleakage.

AN *IN VITRO* STUDY ASSESSING A NOVEL DEVICE FOR QUANTIFYING CANAL CLEANLINESS

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Aim: the aim is to assess the *in vitro* sensitivity and accuracy of a new device called Endocator in quantifying the presence of organic debris inside an artificial root canal.

Methods: the new device analyzes luminescence generated through an enzyme cycling process, targeting adenosine triphosphate (ATP), adenosine diphosphate (ADP), and adenosine monophosphate (AMP) found in organic residues. Testing was conducted on five single-canal resin blocks, which were not instrumented to prevent debris creation, and the only variables were related to artificial contaminations and subsequent debridement. Repeatability of the device was assessed through 3 consecutive samplings performed by a single operator for each block.

Results: the results were analyzed using the Endoscore (ES) and relative light unit (RLU) scales. Descriptive analysis and comparison between the 5 resin blocks and the 3 consecutive sampling were performed. Significance was found only in the comparison between the first and third measurements both for ES ($p = 0.00115999$) and RLU ($p = 0.00532749$). Its high sensitivity allowed it to detect minimal, non-visible organic debris contamination, even in new canals that were not instrumented or contaminated by organic tissues.

Conclusions: endocator was able to determine small variations of canal contamination in a controlled laboratory environment, demonstrating precise and reliable measurements. This device represents a significant advancement towards a more evidence-based approach to deciding when to conclude the shaping and cleaning procedure.

COMPARISON OF TWO METHODS FOR THE REMOVAL OF GLASS FIBER POST

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Aim: to compare the times to remove a glass fiber post from an endodontically treated tooth using a tungsten carbide bur for endodontic use compared to conventional endodontic ultrasonic method.

Methods: thirty straight, single-rooted extracted teeth were endodontically treated *ex vivo*. The post space was prepared to 9 mm in depth using Largo's burs sized 1-2-3 and a glass fiber post was cemented using composite resin cement. Specimens were randomly assigned to tungsten carbide bur (Endo Tracer, Komet), mounted on endodontic motor, and ultrasonic methods for post removal (CAP 3, Satelec). Retreatment was performed under microscope (Leica M320) and time retrieval was measured. Data were analyzed using Student's t-test.

Results: the average removal time was 187.6±66.0 seconds for Endo Tracer and 1133,5±346,6 second for ultrasonic group with significant difference between the groups ($p < 0{,}001$). One perforation was recorded for tungsten carbide bur.

Conclusions: Endo Tracer can be considered as a promising alternative to ultrasonication for glass fiber post removal. It can remove posts up to 10 times faster than ultrasonic method. However, the use of the microscope is recommended because of the reduced field of view determined by the endodontic handpiece head. Further researches should investigate overheating and crack formation comparing methods mentioned in this study.

INFLUENCE OF CEMENTATION TECHNIQUE ON TIME REQUIRED FOR PREFABRICATED POST REMOVAL

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Aim: to compare the times to remove a prefabricated metal post from an endodontically treated tooth luted with resin and zinc oxyphosphate cements.

Methods: thirty straight, single-rooted extracted teeth were endodontically treated *ex vivo*. The post space was prepared to 6 mm in depth using Largo's burs sized 1-2-3 combined with dedicated burs of post-space preparation. A metal prefabricated post (Vario X, Komet) was cemented with two different materials: 15 teeth with dual cement (Core X Flow, Dentsply Sirona) and 15 with zinc oxyphosphate (De Trey Zinc, Dentsply Sirona). After two weeks, metal post were removed using ultrasounds. Retreatment was performed under microscope (M320, Leica) and time retrieval was measured. Data were analyzed using Student's t-test.

Results: the average removal time was 84.33±56.7 seconds for the zinc oxyphosphate group and 848,8±242.9 second for dual cement group with significant difference between the groups ($p < 0.001$).

Conclusions: removal of prefabricated metal post is slower (approximately 10 times) if cementation is performed with a dual resin cement instead of zinc oxyphosphate ($p < 0.001$). The qualitative investigation highlighted a greater consumption of root dentin during the removal of the prefabricated metal post.

The removal of prefabricated metal post should weaken dental structure when dual cement was used for luting. Alternatively, the clinician might opt for endodontic surgical retreatment. Using of microscope is strongly recommended during retrieval of metal post luted with resin cement in order to reduce dentine consumption.

STRUCTURAL AND MORPHOLOGICAL ANALYSIS OF DENTAL PULP STONES

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Aim: the study aims to analyze the composition, morphology, and distribution of dental Pulp Stones (PS) using a multidisciplinary approach.

Methods: 20 sound extracted molars were collected from Università Politecnica delle Marche dental clinic. Inclusion criteria involved the presence of radiopaque areas within the pulp chamber and canals, indicating calcified nodular formations. Exclusion criteria included the presence of root caries, fractures or cracks, and previous endodontic treatment, determined using a microscope with 10x objective. Selected teeth had connective tissue residues and debris manually removed, then preserved in a 0.5% (w/w) chloramine solution at room temperature. The samples were initially analyzed using micro-computed tomography and subsequently sectioned sagittally for histological examination on one axial dental surface and for scanning electron microscopy coupled with energy-dispersive X-ray spectroscopy on the other, to quantify the chemical elements in the considered samples.

Results: results revealed the presence of calcified agglomerates with a calcium and phosphate matrix, predominantly deposited at the predentin level by odontoblasts. PS appeared as ectopic mineralization structures along the pulp's connective tissue or at the dentin/pulp interface, visible as radiopaque, dense masses occupying the pulp chamber volume, either entirely or partially.

Conclusions: PS exhibit uncertain etiology, considerable variability in composition, shape, and location, posing potential clinical challenges during endodontic treatment.

µCT ANALYSIS OF TWO FIBER POST CEMENTATION TECHNIQUES USING UNIVERSAL RESIN CEMENT

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Aim: the aim of the study was to evaluate the formation of gaps and voids in the root canal after adhesive cementation of a fiber post using universal resin cement (URC) with and without the application of universal adhesive (AD) by computerized microtomography (µCT).

Methods: ten human mandibular molars were selected based on selected inclusion criteria. After endodontic treatment and preparation of the post site, the specimens were divided into two groups (n = 5) based on the different cementation technique: URC+AD group, AD was applied prior to URC placement; URC group, URC post cementation was performed without the application of the AD. After placement of the post, the excess was removed and polymerization took place. Gaps and voids in the interface were evaluated quantitatively and qualitatively by µCT. The Mann-Whitney test was used for statistical evaluation ($p < .05$).

Results: quantitatively, there were no significant differences in the percentage of voids between the two groups ($p > .05$). However, the shape of the voids appeared to be different: The URC+AD group showed spherical and oval voids, whereas the URC group showed laminar voids. The location of the voids along the cementation interface was also different: URC+AD group reported voids mainly in the middle third, whereas URC group reported voids mainly in the coronal third.

Conclusions: the two cementation techniques seem to show significant differences in void formation along the cementation interface. However, further studies are required to evaluate the bond strength of the cementation techniques tested.

IN VITRO INTRATUBULAR ANTIBACTERIAL ACTIVITY OF TWO BIOCERAMIC SEALERS

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Aim: to evaluate the intratubular antibacterial activity of two bioceramic sealers against an *Enterococcus faecalis* biofilm.

Methods: 40 extracted sound human lower incisors with a mature root apex and a single straight canal were decoronated and underwent endodontic treatment with the WaveOne Gold rotary system up to size 35.06, using NaOCl 5.25% as an irrigant between each file. Sample roots were then sterilized, inoculated with *E. faecalis* suspension and incubated in anaerobiosis for 14 days to allow biofilm formation. Root canal obturation was performed according to the randomization groups: A) NeoSealer Flo; B) AH Plus Bioceramic; C) positive control - no obturation; D) negative control - no bacterial inoculation. The specimens were embedded in resin and sectioned transversely to obtain two 500-µm sections from each root region (coronal, middle, apical) for a total of 240 sections. Bacterial viability was assessed by a LIVE/DEAD staining assay and analyzed by laser confocal microscopy.

Results: no significant differences in bacterial viability were retrieved between group A and B for all root regions. A significant difference was found between bioceramic groups and control groups. Also, a significant difference was found between coronal and apical thirds in bioceramic groups.

Conclusions: the two tested bioceramic sealers showed similar significant antibacterial activity against *E. faecalis* biofilm compared to controls, with viable bacteria significantly more abundant in the coronal than in the apical third for both bioceramics.

ANALYSIS OF THE CYCLIC FATIGUE STRENGTH OF NEW GENERATION ENDODONTIC INSTRUMENTS

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Aim: during endodontic treatments, separation of NiTi files is a serious concern to increase resistance, new heat-treated files have been introduced. The aim of this study was to compare the cyclic fatigue resistance of four different heat-treated files in a simulated root canal.

Materials and Methods: the files compared in this study were ProTaper Gold F2, ProTaper Ultimate F2, FQ® 25.06, and Blueshaper 25/06. Twenty-five instruments per group were tested in a canal milled in a special metal template, with curvature angle of 90° and curvature radius of 3 mm. The movement of each file was recorded with a video camera up to the moment of fracture. The Number of Cycles to Fracture (NCF) was estimated using the formula NCF = time to fracture (s) × RPM/60. Statistical analysis was carried out using IBM® SPSS® Statistics software.

Results: the Blueshaper had lower cyclic fatigue resistance, with an average NCF value of 20.467±1.7. The FQ files had the best performance, with an NCF of 54.717±8.4. No significant difference was observed in the NCF values of the ProTaper Ultimate F2 and the ProTaper Gold F2.

Conclusions: thermal and thermo-mechanical treatments increase the resistance of NiTi files in curved canals. However, when choosing the file system, other factors should be considered. Among them the taper, the cross section design and the rotation speed of the files. Based on our results, we can conclude that there are significant differences between the various instruments in canals with severe curvatures. Notably, the FQ® Files resisted the longest before separating.

A CBCT STUDY OF THE ENDODONTIC ANATOMY OF MANDIBULAR SECOND MOLARS

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Aim: the aim of this study is to use CBCT images to examine the number of roots and root canal configurations of permanent mandibular second molars in a group of patients selected from the Dental Clinic of the Vita-Salute-San Raffaele Hospital in Milan. The choice of mandibular second molars is based on the frequent presence of anatomical complications in these dental elements.

Methods: 100 CBCTs were selected, equally distributed between 50 male and 50 female patients aged between 19 and 70 years. The selection criteria included:

- presence of both mandibular second molars, free of restorations and caries that could have affected the anatomy of the root canal system.
- Presence of fully developed roots.
- Absence of inflammatory apical resorptions and significant periodontal lesions.

Results: 98% of molars had two roots, 2% had one root. In monoradiculate molars, we detected a C-SHAPED canal configuration in a total of 2% of cases. Regarding endodontic anatomy in mandibular second molars, in our study Vertucci's configurations 1, 2 and 4 proved to be the most common in right molars, while configurations 2, 3 and 5 were the most frequent in left molars. This information confirms that there is no anatomical symmetry between right and left mandibular molars.

Conclusions: mandibular second molars present extreme morphological variability that can make their endodontic treatment complex. CBCT is confirmed as a fundamental aid for a detailed, three-dimensional study of dental anatomy, overcoming the limitations of traditional periapical radiography.

ENDO-TREATED PREMOLARS' STRENGTH WITH FIBER POSTS AND COMPOSITES UNDER CYCLIC FATIGUE

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Aim: physical and mechanical properties of frequently used glass fiber reinforced endodontic posts and composite resins are relevant to increase the retention and resistance of the tooth-restoration system. Hollow posts have been recently designed for delivering the luting cement through the post hole, thus enhancing the post-dentin interface by reducing the risk of air bubbles formation.

Methods: combinations of two types of endodontic posts, a compact and a hollow glass fiber post, and three types of composites, a 3M traditional one, a Kulzer traditional one and a Kulzer bulk-fill composite, were investigated. Teeth were subjected to fatigue cycling and the strength of restored teeth was detected through static tests applying a perpendicular vertical force to the occlusal plate.

Results: there is no statistical difference between hollow and compact fiber post restorations. Bulk-fill restoration retains a mean higher fracture strength (1345 N±223 N) than the mean of both traditional composite restorations (1179 N±256 N); Kulzer traditional composite restoration retains higher fracture strength than 3M one.

Conclusions: glass fiber hollow posts show interesting biomechanical characteristics together with practical clinical advantages. Clinicians, when restoring a tooth, should evaluate the direction of occlusal forces in order to decide whether to use a more elastic composite – like the bulk-fill one – to improve mechanical properties and reduce the possibility of fractures.

RETRACTED ARTICLES IN ENDODONTICS: A SYSTEMATIC REVIEW

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Aim: retraction is a mechanism to rectify the scientific literature and inform readers of articles containing such seriously flawed or erroneous content or data that their findings and conclusions cannot be relied upon. These errors can originate from honest mistakes or fraudulent behaviors, with the latter considered more frequent than the former. Recently, concerns arose from the increasing number of retracted articles in the bio-medical field, including dentistry. The objective of this study was to identify retracted articles in the endodontic-related literature and outline their main characteristics.

Methods: the Medline and Scopus databases were searched in January 2024. Additional records were identified by consulting the online database www.retractionwatch.com. Retracted articles concerning endodontic topics and the relative retraction notes were retrieved and relevant data extracted.

Results: sixty-three articles were identified, published between 2004 and 2022, with a mean of 3.1±2.2 retracted articles per year. The number of retracted articles per year did not significantly grow over time. The average time between the article and retraction note publication was 40.4±36.1 months. The majority of articles originated from Asia and were in vitro studies. Only 11% articles were retracted due to honest errors. The main reasons of retraction were image/data manipulation (19%), plagiarism (17%), unavailability of raw data (10%), authorship issues (10%) and publication process issues (10%). A single research group accounted for 17 retractions.

Conclusions: unlike the dental field, the number of retracted articles in endodontics has not increased significantly over the time period considered. Despite this, controls against research misconduct must be increased to preserve the credibility of scientific research.

PUBLICATION RATE OF ENDODONTIC POSTERS PRESENTED AT THE CDUO NATIONAL CONGRESS

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Aim: since 1993, the national congress of the Collegio dei Docenti Universitari di Discipline Odontostomatologiche (CDUO) has been the most important multidisciplinary event involving all Italian schools of Dentistry. The aim of this study was to retrospectively evaluate the characteristics and fate of the posters presented in the editions from 2015 to 2019 under the category "Endodontics".

Methods: abstracts of the posters presented in the category Endodontics from 2015 and 2019 were retrieved from the proceedings and reviewed. The following data were extracted: year, title, authors, affiliation, topic and study design. PubMed, Scopus, and Google Scholar were searched up to April 2024 to determine if each abstract was subsequently published as full article in an indexed journal. The publication rate was calculated and relevant data were extracted from each published article.

Results: we evaluated 118 abstracts. The year with the highest number of abstracts was 2016 (n = 31). The prevalent topics were "mechanical instrumentation" (n = 37), "chemical preparation/disinfection" (n = 25) and "instruments" (n = 10). The most contributing school was Università di Torino (n = 22). The prevalent study design was "*in vitro*/*ex vivo* study". Forty abstracts (33,9%) were published as full articles and collected a mean of 39 citations. The average time between the abstract presentation and the article publication was 11,5±14,0 months. The most contributing journals were the *Journal of Endodontics* (n = 6) and the International Endodontic Journal (n = 5).

Conclusions: the publication rate of endodontic posters presented at the CDUO National Congress is comparable to the rate calculated for other dental conferences. Several studies resulted in high-impact articles, confirming the scientific value of Italian research in Endodontics.

MANAGEMENT OF PAIN DURING ACUTE IRREVERSIBLE PULPITIS: "THE HOT TOOTH"

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Aim: the aim of this paper is to research the causes of the "Hot Tooth" and adopt the recommendations, suitable tools and techniques, suggested by literature, as a strategy to be followed to improve pain control during root Canal Therapy (CT). The treatment of irreversible pulpitis in the acute phase involves root canal therapy, an endodontic treatment of pulpectomy and contouring with cleansing of the root canal system and three-dimensional obturation of the same with bioactive and biocompatible materials and cements. Deep anesthesia is sometimes difficult to achieve even for an experienced operator, local anesthesia techniques such as infiltration and alveolar nerve block are not very effective as single injections in cases of irreversible acute pulpitis.

Methods: this paper considers various reviews that have analyzed the problem of pain control during acute pulpitis, in case of a "Hot Tooth" for effective patient management. Causes about the refractoriness to local anesthetics of hot teeth are described, literature on the subject is reviewed, and what is suggested about treatment strategies for these teeth. Some studies regarding other teeth with irreversible pulpitis are also described, and these recommendations can be adapted to the management of any other dental element or oral condition.

Conclusions: pain control in Endodontics before, during and after treatment is of paramount importance for effective patient management. Standard local anaesthetic solutions and infiltration techniques with volume augmentation and additional tooth-specific injections allow the dentist to initiate treatment and medicate the endodontium for pain relief. All this should be followed by modulable postoperative pain control strategies that follow the patients and the specific pathological conditions being treated.

IMPACT OF THE NINJA ENDODONTIC ACCESS CAVITY ON THE FRACTURE RESISTANCE IN ENDODONTICS

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Aim: the accurate execution of endodontic access is crucial for the success of therapy, influencing various phases of canal treatment. Minimally invasive dentistry, emphasizing dentin preservation, is gaining approval. However, scientific evidence supporting this perspective is limited, and doubts have been raised about its impact on canal treatment phases. Clinical studies explore the risk of dental fractures during endodontic treatment, considering the removal of dental tissue. The present review aims to compare the teeth fracture resistance with ultraconservative or Ninja Access Cavity (NAC), to those with Traditional Endodontic access Cavity (TEC).

Methods: the revision protocol followed the indications of the Cochrane Handbook, and were recorded in Inplasy, while the drafting of the manuscript was based on PRISMA. The search phase involved consulting and extracting bibliographic references from three databases: SCOPUS (962), Science Direct (1283), PubMed (1514), and a registry in the Cochrane Library (274), resulting in a total of 4033 articles.

Results: the results of the systematic review, after the study identification and selection process, included a total of 5 studies. The aggregated Standard Mean Difference (Std.MD) between the two groups (NAC *vs* TEC) was calculated, applying fixed-effects models. The mean difference value was found to be: 0.97 C.I.: [0.65, 1.29]; Chi2 36.88, df = 9 (P <0.0001), I^2 = 76%; The Std.MD value was unfavorable for TEC. The data obtained from the meta-analyses can provide positive indications to clinicians dealing with endodontic treatment with a specific cavity design.

Conclusions: the ultraconservative techniques clearly exhibit a cavity design that demonstrates better fracture resistance, implying greater resilience to masticatory loads compared to traditional endodontic accesses.

PREVALENCE OF ROOT FENESTRATIONS IN THE ITALIAN POPULATION: A PRELIMINARY STUDY

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Aim: Root Fenestrations (RFs) can affect endodontic procedures. Literature indicates an association with hypochlorite incident and facial pain related to overfilling. Because of the clinical impact, the aim of this work was to determine the prevalence of RFs in an Italian subpopulation.

Methods: 34 CBCT images (voxel size 0.125 mm) belonging to an Italian subpopulation, with a total of 332 dental elements, were analyzed for the prevalence of RF. All CBTC images included complete maxillary dental arches, up to second premolar. Their prevalence and distribution were recorded according to the involved tooth, gender and type, in accordance with Davies' classification.

Results: the prevalence of RFs in the examined population was 35%, with preference of the female gender (p <0.05). With respect to the dental elements considered, the prevalence was 5.4%, with greater involvement of the first premolar (10%) and canine (7.5%). The most represented types were type I (61%), II (21%) and IV (16%). In 50% of the involved apices, the foramen was in contact with the buccal mucosa.

Conclusions: in the subpopulation examined, RFs were frequent, with predilection of the female gender. RFs involved the apical third in 77% and were most prevalent in the first premolars and canines. CBCT with voxel size 0.125 mm is an effective examination in identifying the prevalence of RFs.

YOUTUBE AS A SUPPLEMENTAL LEARNING RESOURCE AMONG UNDERGRADUATE DENTAL STUDENTS

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Aim: the objective of this study was to investigate, through a survey, the use of YouTube® by dental students. Subsequently, the educational value of YouTube® videos on 3 hot topics in endodontics was evaluated.

Methods: the 3-, 4-, 5-, and 6-year dental students from the University of Parma were invited to complete an online questionnaire consisting of 20 multiple-choice questions regarding their use of YouTube®. Subsequently, YouTube® videos were searched for on the following topics: "root canal filling with single-cone technique and Calcium Silicate Cements (CSCs)", "regenerative endodontics" and "guided endodontics". Relevant were extracted from each video, and a specific scoring system was applied to evaluate the scientific soundness, the overall quality, and the educational value.

Results: although only a minority of students responded that they accessed the YouTube® platform primarily for study purposes, 93.3% of dental students watched videos for educational pursuit, particularly for the disciplines of Restorative Dentistry, Prosthodontics, and Endodontics. Among the videos on Endodontics, the most viewed were those on access cavity opening.

Further analysis of 64 selected videos revealed that the majority were uploaded by private users and came from the United States. The average duration was 19.3±23.5 minutes and the average number of views was 6707 (min 13 - max 44487). 46% of the videos on root canal filling with single-cone technique and CSCs had significant commercial bias. 71.8% of the videos were judged to be useful or highly useful for the student.

Conclusions: YouTube videos currently represent an important auxiliary learning source for dental students, however there are currently no control mechanisms to verify the soundness of the information conveyed.