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Chapter 1 : Endodontics (ENDO) < Virginia Commonwealth University

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Advances in Endodontics The equipment, techniques, and products that are optimizing care One could argue endodontics is an area of dentistry that is often taken for granted. It lacks the glamour of esthetics, the relative novelty of implants, and the reputation for multidisciplinary care of restorative dentistry. The HPRC found that of the Endodontics is undoubtedly an incredibly vital and important part of many practices. It is also a field that is continually evolving and improving, though perhaps in a quieter way than some of its specialty counterparts. This month, Inside Dentistry examines innovations covering four key areas of modern endodontic practice. Rico Short addresses key issues in treatment planning and deciding between endodontics and implants. James Bahcall examines advances in nickel-titanium file systems and what they mean for efficiency. These four topics cover all aspects of the endodontic workflow, from diagnosis and treatment planning to final restoration, highlighting the technology and techniques that are moving endodontics forward. As you evaluate each one, consider the ways they can make endodontic treatment more predictable and successful for your practiceâ€”and help you provide your patients with optimal care. For example, the operating microscope, ultrasonics, and rotary instruments have all facilitated the delivery of exceptional patient care. Like these advancements, cone-beam computed tomography CBCT technology aids in the diagnosis and treatment of increasingly challenging and complex cases. The clinical exam and two-dimensional radiography provide foundational diagnostic data. Inconclusive clinical testing or radiographic findings, however, necessitate further diagnostic inquiry. Periapical radiographs are limited in that significant bone is required to visualize apical radiolucencies and because superimposition of anatomical structures further obscures apical pathology. In these instances, CBCT imaging may prove useful, as it detects smaller areas of osteolysis than those visualized by periapical radiographs. Like obscure apical pathology, root fractures benefit from CBCT diagnostics. While isolated periodontal defects and J-shaped radiographic bony defects suggest fracture pathology, periapical radiographs rarely visualize fractures. CBCT imaging can, in some cases, capture root fractures in the scan volume. In cases where the fracture is not visible on the scan, three-dimensional 3D patterns of radicular bone loss support fracture diagnostics. As root fractures necessitate extraction, accurate diagnosis is essential to prevent both the maintenance of hopeless teeth and the extraction of healthy teeth. Similar to fracture diagnostics, CBCT imaging aids in the assessment of dental trauma. The American Association of Endodontists trauma guidelines, which were revised in , recommend CBCT evaluation for traumatized patients. These images discern the extent and direction of dental and alveolar fractures, degree of periodontal ligament damage, and presence of other injuries. This information dictates appropriate treatment and offers more comprehensive prognostic expectations. CBCT imaging is exceptionally useful in the treatment of resorption. While periapical radiographs depict resorptive defects, they provide little information regarding the extent of the defect and the presence of perforations. CBCT imaging, on the other hand, provides both of these key pieces of information, thus obviating the need for exploratory root canal therapy and better directs clinical resources toward saving teeth with a reasonable expectation of a favorable outcome. Recurrent pathology in previously endodontically treated teeth is best assessed with CBCT imaging. Retreatment outcomes are most favorable when the cause of failure is identified and corrected. In many cases, failure causes may be obvious based on clinical or radiographic data. When both the restorative and endodontic treatment appears sufficient despite the presence of pathology, however, CBCT scans may visualize the presence of untreated canal anatomy or fracture pathology. Like in cases of resorption, this prevents exploratory treatment and offers more accurate prognostic expectations. Just as it aids in diagnosis, CBCT imaging facilitates endodontic treatment. This information directs practitioners in their search for these spaces. In the unfortunate event of an intraoperative complication such as a perforation or instrument separation, CBCT scans evaluate the extent of the issue and allow practitioners to determine the feasibility of correction. While CBCT imaging provides useful data in many instances, it may not be appropriate in all

clinical settings. Clinicians must consider the need for imaging on a case-by-case basis to avoid exposing patients to unnecessary radiation. When used properly, however, its versatility makes it an excellent tool in modern endodontics. She is also assistant clinical professor of endodontics at Tufts University School of Dental Medicine. Short, DMD If natural teeth cannot be saved, dental implants are an excellent treatment option. In cases where a tooth can be saved, or when a root canalâ€"treated tooth has failed to heal, an implant should not be used as the silver bullet. When it comes to selecting treatment modalities, the general dentist has been somewhat biased against endodontic treatment by a perceived high rate of treatment success and the reported ease of placing single-tooth implants. Unfortunately, the patient is at risk of not getting the proper treatment if he or she does not have an evidence-based opinion on the type of treatment needed from their dentist. Survival rates of single-tooth implants and restored endodontic treated teeth have been found to be equal,1 although clinical trials directly comparing these treatment approaches are lacking. In fact, studies analyzing these treatments are difficult to compare for a variety of reasons. When assessing relative success or failure of endodontics, for example, most studies use both clinical and radiographic measures, whereas most studies of single-tooth implants focus on survival ie, implant does not need to be removed. In addition, differences exist when analyzing the anatomy of the case in a follow-up. Postoperative complications are another consideration. An evidence-based study found that although failure rates were similar for endodontically treated teeth and implants, implants had a higher rate of postoperative complications. For general practitioners and specialists, the decision to learn to properly place implants is a personal one. In , I attended a practice management seminar for endodontists. The practice management coach told me that my practice would be in jeopardy if I did not start placing implants within the next 3 years. I had to stop and ask myself if I should consider it. It was a very tough question, especially during the economic downturn. Ultimately, I decided that if it were my tooth, I would want the most qualified dentist or specialist to perform the procedure. I decided to focus on being the best endodontist I can possibly be. Despite the rising interest in implants, my practice has been sustained during these rough economic times because people still want to save their natural teeth. In all areas of dentistry, clinical treatment decisions must always be in the best interest of the patient and should be based on the best, most current evidence-based studies. Because they have similar success rates, the decision to extract a tooth and place an implant or pursue endodontic treatment must be based on more than just statistical outcomes. As practitioners, we are ethically bound to inform patients of all reasonable outcomes, and this includes letting them know that there are specialists with further training and expertise who can handle root canal cases, whether simple or complex. In my opinion, dental professionals should not give up on a tooth that can be endodontically treated. At that point, an implant would usually be the next best option for a high rate of success and to ensure optimal oral health. If you are not sure if a tooth can be endodontically treated, refer the case to an endodontist in your area. Considering the most current and accurate evidence-based information available, what you would want if it was your tooth? Would you want to save your tooth if possible with endodontic treatment or place an implant? Iqbal MK, Kim S. For teeth requiring endodontic treatment, what are the differences in outcomes of restored endodontically treated teeth compared to implant-supported restorations? Int J Oral Maxillofac Implants. Retrospective cross sectional comparison of initial nonsurgical endodontic treatment and single-tooth implants. About the author Rico D. Due to the superelasticity of the alloy, NiTi files allow for improved tracking around curved canals when compared to stainless steel hand files. In addition, NiTi rotary files also are associated with significantly faster canal preparation, stay centered in a canal better, and do not transport the apex as much as stainless steel hand files. NiTi files extrude significantly less debris apically than hand files and help to reduce ledging and zipping of canals during preparation. Zipping is caused when a file creates an irregular area by opening up the apical region away from the curve of the canal. Over the past 20 years, endodontic rotary NiTi files have significantly improved in regards to speed of usage rpm in the electric slow-speed handpiece, file taper, clinical technique, metallurgy, and file design. This increase in rotational speed allows for improved file efficiency and effectiveness in removing tooth dentin within a canal. Stainless steel hand file instruments have a 0. This increase in taper enables the dentist to efficiently enlarge the canal, thus creating a continuous taper of the canal that improves irrigation flow and canal obturation. The clinical technique used with rotary NiTi

files in endodontic treatment has also changed through the years. The last file size that can be taken to working length in a canal is considered the master apical file. Advancements in rotary NiTi file testing by university researchers and industry have provided a better understanding of the effects that torsional stress and cyclic fatigue have on rotary file separation. Through this dental material science research, file manufacturers have been able to develop files with different NiTi metallurgy preparation through various heat and chemical treatments, along with making changes in file design eg, flutes, cross-section. These newer rotary files have improved resistance to file separation and enhanced clinical performance. Another current advancement in NiTi files has been the development of reciprocating quarter or half rotation motion files. This change in file design and clinical file motion has helped to reduce the number of actual files needed to properly prepare a root canal system and has also demonstrated significantly less cyclic fatigue stress on the file during clinical usage. A Passing Fad or Here to Stay? This wider taper had the primary purpose of achieving gutta-percha condensation in the apical third. We therefore needed to minimize the sealer interface and replace it with something less soluble, such as gutta-percha. All these mechanical requirements for MSI came to an end when pure, nano-particulate bioceramics were introduced to the endodontic field and were shown, through research, not to have the same limitations as the old sealers. The superior qualities of bioceramics, addressing all the shortcomings of the previous generations of sealers, marked the end of an era, the era in which MSI ruled endodontic obturation. This led to a fresh discussion over the role of MSI and the logic of removal of excessive coronal dentin merely to accommodate condensers, spreaders, or thermoplastic gutta-percha carriers become the subject of re-examination. Chemically pure nano-particulate bioceramics have unleashed the power of adhesive endodontics and have allowed us to re-engineer root canal preparation sizes without considering obturation limitations of old sealers. At last, we can count on the sealer to provide its intended function of providing the seal rather than minimizing it. And that endodontic instrumentation can be streamlined and become less dependent on larger tapers. It was then shown that it can be adequately cleaned with 0. This movement towards minimally invasive tapered preparation has improved the fracture resistance of teeth in the critically important coronal one third of the root. This biomechanically driven endodontic treatment philosophy based on improving the long-term restorative outcome of an endodontically treated tooth is the basis for restorative endodontics. In that sense, bioceramics and the resulting restorative endodontics are not fads.

Chapter 2 : Endodontology - Predoctoral Program | Temple University - Maurice H. Kornberg School of De

With clinical practice the electronic apex locator may become a valuable aid in routine endodontics, but even more so in special clinical situations when the radiographic image of the root apices is unclear, when there is suspicion of a root perforation or root fracture, when radiographs are contraindicated, etc.

Ruddle, USA February 18, There are enormous differences in opinion regarding the best methods for shaping root canals. A review of the literature reveals virtually no agreement on a variety of fundamental clinical issues. There is ongoing controversy regarding the sequence of canal preparation, working length, and the use of patency files. There is vigorous debate related to the question of how large to prepare the apical foramen. There is no consensus regarding deep shape, or what is the appropriate percentage taper of a canal that ensures a root canal system can be both three-dimensionally cleaned and filled. There is confusion trying to identify and integrate the best technologies and instruments. In the final analysis, although science and basic research can illuminate our clinical endeavors, ultimately, it is by our clinical actions that our success as a healing profession is measured. Fortuitously, Dr Herbert Schilder described the most predictably successful concepts for shaping canals, cleaning in three dimensions, and filling root canal systems. Schilderian endodontics continues to serve as a powerful beacon of light to guide any clinician on the journey toward greater clinical confidence and success. Schilder described his Envelope of Motion technique, where a series of precurved reamers were selected, utilized from the smaller to bigger sizes, and rotated so they would randomly cut dentin on the withdrawal stroke. Schilder also emphasized the sequence of preparation where he removed restrictive dentin from the coronal two-thirds of the canal before initiating procedures in the typically more complicated apical region of the canal. Especially in longer, smaller diameter, and more curved canals, the tips of these 0. Following pre-enlargement procedures, files were completely loose within the body of the canal and could be more predictably directed apically. Over many years, the pre-enlargement technique has grown in popularity, as this method for shaping canals has proven to be predictably successful. However, the method Schilder described frequently required many instruments, several recapitulations through a series of files and reamers, and as such, is perceived to be difficult and time-consuming. To address this perception, the ProTaper system Dentsply Tulsa Dental Specialties was developed to both duplicate and simplify the Schilder technique. In use, this progressively tapered design replicates the Schilderian Envelope of Motion technique and serves to significantly improve flexibility, cutting efficiency, and safety. This feature allows each instrument to safely follow the secured portion of a canal, while the small flat on its tip enhances its ability to find its way through soft tissue and debris. The shaping files Shaping File No. The S1 and S2 files have D0 diameters of 0. The Auxiliary Shaping File, termed SX, has no identification ring on its gold-colored handle and, with a shorter overall length of 19 mm, provides excellent access when space is restrictive. The SX file has a D0 diameter of 0. Because SX has a much quicker rate of taper between D1 and D9 as compared to the other ProTaper Shaping files, it is primarily used after the S1 and S2 files to more fully shape canals in coronally broken down or anatomically shorter teeth. From D4â€”D14 each instrument has a decreasing percentage taper which serves to improve flexibility, reduce the potential for dangerous taper-lock, and reduce the potential to needlessly overenlarge the coronal two-thirds of any given canal. ProTaper shaping technique Endodontic outcomes are improved when instruments pass through the access opening, effortlessly slide down smooth axial walls, and are easily inserted into the orifice. The potential to consistently shape canals and clean root canal systems is significantly enhanced when the coronal two-thirds of the canal is first pre-enlarged, followed by preparing its apical one-third Fig. Sequencing the preparation facilitates shaping canals and cleaning root canal systems. Complete endodontic treatment is the foundation of perio-prosthetics Fig. The canals of this mandibular molar were shaped with ProTaper files and three-dimensionally filled. Note the flowing shapes, apical onethird curvatures, and multiple portals of exit. Based on the pre-operative radiographs, ISO 0. However, in this method of canal preparation, these instruments are initially limited to the coronal two-thirds of a root canal. The 10 and 15 hand files may be utilized within any portion of the canal until they are loose and a smooth reproducible glide path is confirmed. The loose depth of the 15 file is measured and this length

transferred to the ProTaper S1 and S2 files. Shape the coronal two-thirds The secured portion of the canal can be optimally pre-enlarged by first utilizing S1, then S2. Prior to initiating shaping procedures, the pulp chamber is filled with a full strength solution of NaOCl. To optimize safety and efficiency, the Shaping files are used, like a brush, to laterally and selectively cut dentin on the outstroke. Strategically, this brush-cutting action can be used to eliminate cervically positioned triangles of dentin, more effectively shape into fins, isthmuses, and canal irregularities, or to relocate the coronal aspect of a canal away from furcal danger. If any ProTaper file ceases to easily advance within the secured portion of a canal, withdraw it, and recognize that intrablade debris has deactivated and pushed the instrument off the wall of the canal. Upon removing each Shaping file, visualize where the debris is located along its cutting blades to better appreciate the region within the canal that is being prepared. Following the use of each Shaping file, irrigate, recapitulate with a 10 file to break up debris, and move it into solution, then re-irrigate. Without pressure, and in one or more passes, S1, then S2, is used in this manner until the depth of the 15 hand file is reached. Scout the apical one-third When the coronal two-thirds of the canal is shaped, then attention can focus on apical one-third procedures. With the pulp chamber filled brimful with a viscous chelator, the apical one-third of the canal is fully negotiated and enlarged to at least a size 15 hand file, working length confirmed, and patency established. At this time, a decision must be made between whether to finish the apical one-third with rotary or hand instruments. However, certain canals exhibit anatomical challenges that necessitate a reciprocating handle motion in order to move precurved 10 and 15 files to length. When there is an irregular glide path, then the apical one-third of a canal may be advantageously finished with precurved manual ProTaper instruments. Shape the apical one-third When the apical one-third of the canal has been secured, then the pulp chamber is filled brimful with NaOCl. The ProTaper sequence is to carry the S1, then the S2, to the full working length. Float, follow, and brush as previously described until the terminus of the canal is reached. S1, then S2, will typically move to length in one or more passes depending on the length, diameter, and curvature of the canal. Following each ProTaper file, irrigate, recapitulate with a 10 file, then re-irrigate. After using the Shaping files, particularly in more curved canals, working length should be reconfirmed, as a more direct path to the terminus has been established. At this stage of treatment, the preparation can be finished using one or more of the ProTaper Finishing files in a non-brushing manner. The F1 is selected and passively allowed to move deeper into the canal, in one or more passes, until the terminus is reached. When the F1 achieves length, the instrument is removed, its apical flutes are inspected, and if they are loaded with dentin, then visual evidence supports, the shape is cut. Following the use of F1, flood the shaped canal with irrigant, recapitulate, and confirm patency, then re-irrigate to liberate debris from the canal. Fully shaped canals hold an effective volume of irrigant that, when activated EndoActivator, Advanced Endodontics , can potentially circulate, penetrate, and clean into all aspects of the root canal system. If the 20 hand file is snug at length, then the canal is fully shaped and, if irrigation protocols have been followed, ready to pack. If the 25 file is snug at length, then the canal is fully shaped and ready to pack. If the 50 hand file is loose at length, then use alternative NiTi rotary or manual files to finish the apical extent of these larger, easier, and more straightforward canals. ProTaper shapes are easy to fill utilizing a ProTaper matching gutta percha master cone in conjunction with a warm vertical condensation technique Fig. As an alternative, a well-shaped canal can be readily and completely filled with a ProTaper carrier-based obturator. The ProTaper sequence is always the same regardless of the tooth or anatomical configuration of the canal being treated Fig. This chart summarizes the ProTaper shaping technique. The ProTaper sequence is always the same regardless of the length, diameter, or curvature of the canal. The green color represented the anatomical contours before instrumentation, whereas the red color indicated the shape after instrumentation. The results from this investigation are clinically relevant, and a portion of the data is available for review Figs. The advantages of the Shaping files to brush laterally and selectively cut dentin on the outstroke are summarized below: The Shaping files were essentially loose within a canal during the majority of their work. The coronal aspect of the canals were safely relocated away from an external root concavity. A brush-cutting action achieved a centered preparation and maximized remaining dentin. Note the successful relocation of the canals at this level Fig. Note the ProTaper shapes are round and centered within the root Fig. Note the ProTaper shape perfectly includes the original canal diameter Fig. This figure compares

before and after instrumentation with the S1, S2, and F1 files. Note the shapes are full, smooth flowing, and centered, and the files have physically contacted virtually all the internal anatomy Fig. Conclusion There is a continuous parade of new files that come to market annually. All of these file systems are claimed to be superior, in one way or another, due to alleged improvements in metallurgy, cutting efficiency, safety, and simplicity. Regrettably, when any given set of rotary files is used incorrectly, either intentionally or unintentionally, then the message delivered is flawed, irrelevant, and fails to honestly disclose true clinical performance. In these times of unprecedented claims, it would be wise to pause and remember those early pioneers, like Dr Herbert Schilder, whose relevant contributions helped create the biological and clinical foundation on which we stand. For new technologies to be meaningful, clinical results must hold up to scientific scrutiny, compliment time-honored principles, and work successfully in the hands of countless dentists. The ProTaper concept provides a set of instruments with unique geometries that, when sequenced and used correctly, affords extraordinary efficiency and safety. A complete list of references is available from the publisher. Contact info Dr Clifford J.

Chapter 3 : Fellowship in Advanced Clinical Endodontics Bahrain

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Philosophy of the Advanced Education Program in Endodontology An advanced program of study, designed to qualify specialists in Endodontics, should provide a background of understanding of the biological sciences, as well as of the behavioral and social sciences. The purposes of such a program are to prepare an individual to practice, to teach or to engage in research and to meet the requirements of a certifying board. The program will afford instruction in basic biological sciences such as biochemistry, pharmacology, immunology, pathology, microbiology, genetics and others. The philosophy of such a program is intended to prepare them for independent decision-making. The students are asked to prepare reports, search the literature and discuss topics in seminars. There is less emphasis on formal lectures and more emphasis on group discussion. Keeping abreast of current literature, as well as knowledge of landmark articles from the past literature is necessary for a deep-seated understanding of the field of endodontology. The literature is critically evaluated for research design, findings and conclusions. The scientific method is thus explored and evaluated. Research is an integral part of the learning process. Students are expected to participate in research activities within the department. Fully equipped, departmental laboratory facilities are available to support basic research in such areas as: Additional research facilities, as well as expertise, is available through collaborative arrangements with departments within Temple University School of Medicine. Clinical research will also be supported and encouraged. A protocol for a proposed investigation must be prepared and presented to a panel of basic scientists. Following such critical evaluation and acceptance of the protocol, the student is encouraged to begin his research project. Clinical aptitude is encouraged by clinical practice. Students are given basic instructions in techniques; concurrently, they practice endodontics in the clinic. Instruction is based on the philosophy that there should be freedom to explore various techniques. Instructors are always available for consultation. The students are encouraged to try out various techniques and no attempt is made to restrict them to any specific technique. To expand the horizons of the students, visiting teachers and clinicians are invited to address the students, to participate in panel discussions with them. The students are also encouraged to attend local, state and national meetings and conferences to hear other points of view. The developing concepts and philosophies of the students are subsequently allowed expression in the second year when the students are asked to lecture, lead group discussions and teach predoctoral dental students. Relation of the Clinical Training to Other Clinical Disciplines All the advanced education students are taught the same core curriculum of basic sciences. They make seminar reports to each other and discuss various clinical problems in other disciplines. Due to their close proximity, periodontal students and endodontic students work together and consult each other frequently when combined problems exist. Seminars with teachers of other disciplines are arranged, e. To comprehensively prepare competent residents to initially practice endodontics Objective 1. To provide the residents with an in-depth foundation knowledge of relevant biomedical, clinical and behavioral sciences as they correlate to the theory and practice of endodontics. To provide the residents with a sufficient number of diagnostic, nonsurgical, and surgical clinical experiences which will result in being proficient and competent in the practice of endodontics. To prepare the residents to effectively treat medically compromised patients alone or in concert with other dental and medical professionals. To provide the residents with the opportunity to present and discuss their clinical cases with the endodontic faculty and fellow students, as well as with faculty and students in other dental disciplines. To prepare the residents with knowledge and skills for the certification by the American Board of Endodontics. To educate and train endodontic residents to provide skilled endodontic care which integrates the best evidence with current technology, clinical expertise and patient values Objective 6. To provide the resident with opportunities to work with and evaluate new instruments and techniques. To prepare the residents to apply current technological developments and best available scientific evidence into their clinical practice. To prepare the residents to be to be ethical,

compassionate and professional endodontists. To prepare the residents to have a meaningful research experience that results in a written document in a publishable format Objective 9. To educate and train residents in the basic principles of research methodology, biostatistics, and data analysis, in order to prepare them for conducting a research project. To prepare the residents to critically evaluate the dental literature. To have residents document their research work with a written manuscript in a publishable format. Create the desire and sense of obligation and responsibility to contribute to the perpetuation and growth of the field of endodontics Objective To provide the residents with the training necessary to teach endodontics at all levels. To inspire residents to support, serve and contribute to the perpetuation and growth of the field of endodontics. However, recent graduates with strong academic credentials are also encouraged to apply. Since English is the language of instruction at Temple University Kornberg School of Dentistry, adequate proficiency in both verbal and written comprehension and expression of English is a prerequisite for admission to the Certificate in Endodontology program. The admissions process ensures a fair, unbiased and non-discriminatory selection of candidates. Temple University encourages both domestic and foreign applicants. Official transcripts from all colleges, universities and dental schools attended, including GPA and class rank. Applicants must send official transcripts from their study at undergraduate colleges directly to Temple University Kornberg School of Dentistry, Department of Endodontics. Please do not send undergraduate college transcripts to PASS as they will not accept them. Please make checks payable to: Temple University Kornberg School of Dentistry. Three letters of recommendation from dental school faculty or supervisors; a minimum of two must be from faculty members who can evaluate your clinical skills. The application deadline is August 1st Upon review of all completed applications, the Endodontics Program Admissions Committee will extend invitations for interviews to those applicants being seriously considered for acceptance. Interviewees are required to come to Temple University for a personal interview; however, granting of an interview appointment does not guarantee admission into the program. The address for the check and transcripts is:

Chapter 4 : 11 Endodontic Techniques | Pocket Dentistry

The Guide to Clinical Endodontics outlines the current best practices in endodontic diagnosis and treatment. Developed and regularly updated by endodontists, the Guide includes indications for treatment, explanation of procedures and objectives for the scope of endodontics including vital pulp therapy, surgical and nonsurgical endodontics.

The three phases are: In the last decade it has become common practice to use an operating microscope during the various phases of endodontic treatment. The microscope offers magnification, but almost as important, it gives excellent light directly through the lenses into the access cavity. This gives the operator tremendous advantages, especially in difficult cases, and in straight root canals it is possible to observe the canal all the way to the apical foramen. A certain magnification and the direct light into the access cavity make it easier to locate and instrument the canals. Preparation for Treatment Preparation for treatment entails the establishment of the root canal to be treated in an aseptic field of operation. It consists of the preparation of an adequate access cavity, the secure placement of a rubber dam, and disinfection of the rubber dam, the tooth, and the pulp chamber. Access Cavity The objective of the access cavity is to provide as unobstructed an access to the root canal s of the tooth as possible. When mishaps occur during the instrumentation and obturation phases of the treatment, they can most frequently be attributed to an inadequately or incorrectly prepared access cavity. The most common mistake is an access opening that has been made too small. As a result, canals are missed or the manipulation of the root canal instruments is unnecessarily hindered by the cavity walls. Also, tissue may be left behind in the coronal pulp, especially in the pulp horns, leading to discoloration of the tooth. On the other hand, tooth structure should not be removed indiscriminately since that would lead to an unnecessary weakening of the tooth and would complicate the restorative procedures. The access cavity should expose the entire pulp chamber, including the pulp horns. In addition, cusps may have to be reduced to provide proper access to certain canals or to prevent uncontrolled fractures if they are weak. Before the preparation of the access cavity begins, a good radiograph of the crown of the tooth, taken with a long-cone paralleling technique, is studied Fig. Especially the distance from an occlusal or incisal point of reference to the roof of the pulp chamber is noted. This distance may be marked on the bur to be used for the penetration of the crown to the pulp. Carious dentin is always removed, and fillings and restorations which might prevent a direct view to the root canals are removed as well. Also, all undermined cusps are reduced at this time in order to prevent crown-root fractures which might jeopardize the treatment of the tooth. For the actual penetration to the pulp chamber, a long-shank round carbide bur is used in a low-torque ultraspeed handpiece. A long-shank bur is not necessarily used because of the distance to be penetrated, but more because it allows for better visibility and a better possibility of angling the bur correctly in relation to the long axis of the tooth. Porcelain crowns are penetrated by standard-length, round, diamond-coated burs and the access cavity is then finished with the long-shank carbide bur. When the penetration to the pulp has been achieved, the roof of the pulp chamber is removed by pulling strokes with the bur from the chamber in an occlusal or incisal direction Fig. In this way the entire pulp chamber is exposed without overhangs of occlusal tooth substance and without danger of perforations laterally or in the furcation region. The coronal pulp tissue, vital or necrotic, is then removed. A round bur no. A double-ended endodontic explorer DG which offers two angles of probing is then used to locate the orifices of the root canals on the floor of the pulp chamber. The use of the explorer will also indicate whether the access cavity is adequate or whether, as is often the case, a cavity wall has to be flared more or a cusp be cut to improve the access to the canals. Often it will be evident clinically and radiographically that a root canal is calcified in the orifice area. The microscope is then extremely useful. Sometimes a rigid explorer may be used to penetrate the calcified material. Other times a long-shank bur is used to remove hard tissue to expose the canal. Since the exact location of the root canal is not always known, the bur is used with careful shaving motions in the orifice area. The explorer is used at frequent intervals in an effort to break through the calcified tissue. The access cavity preparation is complete when the root canals have been located and are accessible for treatment. The distance between the occlusal surface and the roof of the pulp chamber should be determined prior to the preparation of an endodontic access cavity. The roof of the pulp chamber is then

carefully removed with outward pulling strokes of the bur. The access cavity is prepared prior to the application of a rubber dam to ensure maximal visibility of the teeth and the relationship between their crowns and roots. This will prevent root perforations and is especially important during the location of the root canal orifices. However, all subsequent treatment is carried out aseptically with the use of a rubber dam. Rubber Dam A rubber dam is placed on a tooth to be treated endodontically mainly for three reasons: In addition, there are other advantages with the use of a rubber dam. It makes the treatment faster and, in many ways, less difficult in that it physically eliminates any interference from the oral environment. Normally, only the tooth to be treated is exposed through a hole in the rubber dam Fig. A medium-weight dam will give a good seal around the tooth, usually without the use of a dental floss ligature. A wide variety of clamps are available to hold the rubber dam in place Fig. A rubber dam frame of a radiolucent material that can be left in place during the taking of radiographs should be used Fig. The frame should also make it possible to cover the nose of the patient to prevent contamination of the field of operation by nasal microorganisms. If the tooth to be treated is severely broken down, it may be practical to restore it temporarily before the root canal treatment begins. This is also done to strengthen the tooth, but mainly to facilitate the placement of a well-sealing rubber dam. A quick and adequate method, if enough retention is available, is to restore the tooth with a resin after acid-etching the remaining tooth structure Fig. In such instances the pulp chamber may be filled with tightly packed cotton pellets to prevent the resin from blocking the root canal orifices and to facilitate an easy recapitulation of the access cavity. In severely broken-down molar teeth, an orthodontic band may be useful to ensure asepsis. The band must fit snugly at the cementalâ€”enamel junction and should be about 2 mm high to allow an adequate hold for the rubber dam clamp and easy access to the root canals. The floor of the chamber is again packed with hard cotton pellets and the band is filled with zinc oxiphosphate cement and cemented to the tooth. When the cement has set, the cotton pellets are removed, the access cavity is recapitulated, and the preparation is redefined as needed. If the tooth is fractured at the gingiva, a slight gingivectomy, preferably using electrosurgical instruments to prevent bleeding, may make it possible to apply an adequate rubber dam. In such instances it is also possible to apply the rubber dam to teeth adjacent to the one to be treated Fig. Only the tooth to be treated is exposed and the rubber dam is held in place by a clamp placed on this tooth and the use of a rubber dam frame. This is imperative in order to maintain a bacteria-free field of operation. The frame is outside the rubber dam for demonstration purposes only. A wide variety of clamps are available for most clinical situations. A dry field of operation is now readily obtained. The rubber dam is attached to neighboring teeth and although not ideal, protects the patient and helps establish a dry, clean field of operation. However, great care must be taken during the use of root canal irrigants and other medicaments in such situations. Special considerations in the preparation of access cavities in the various groups of teeth are discussed in Chapter When the rubber dam has been applied and the tooth to be treated is effectively sealed from the oral environment, an aseptic field of operation is established. The access cavity, the tooth, and the rubber dam are disinfected by effective surface-active agents, usually chlorhexidine or iodine preparations combined with hydrogen peroxide or ethanol. Root Canal Instrumentation At this time, the instruments used for the preparation of the access cavity and the application of the rubber dam are removed, and a tray with sterile instruments to be used for the root canal instrumentation is made available Fig. Regardless of technique used, step-back or crown down, hand instruments or motorized instruments, before the actual instrumentation begins the length of the root canal is determined. A small K-file, most often no. The apical level of instrumentation is determined based on the location of the tip of the file in relation to the apex of the root as seen in the radio-graph. The length of instrumentation from an occlusal or incisal point of reference, i. Please note that it is the apex of the root that most often serves as the radiographic landmark and not the apical foramen or apical constriction. The reason for this is that the apex of the root is almost always distinguishable in a radiograph, whereas the foramen rarely is. Obviously, in the few instances when the apical foramen is actually seen radiographically, it should be used to determine the working length. Electronic devices are available to determine the location of the apical foramen of teeth. The use of these so-called electronic apex locators is based on the hypothesis that the electrical resistance between the periodontal ligament and the oral mucosa is virtually constant. The instrument is calibrated by measuring the resistance between the gingival crevice and

the lip. An endodontic instrument attached to the crevice electrode is then inserted into the root canal until the same electrical resistance is registered. It is then assumed that the tip of the instrument has reached the periodontal ligament at the apical foramen. With clinical practice the electronic apex locator may become a valuable aid in routine endodontics, but even more so in special clinical situations when the radiographic image of the root apices is unclear, when there is suspicion of a root perforation or root fracture, when radiographs are contraindicated, etc. In addition, the instrument offers an excellent opportunity for quick and, if needed, frequent checks on whether the correct working length is actually maintained during the instrumentation phase of the treatment. The electronic apex locator has a definite place in modern endodontic therapy. Extirpation of the pulp. When the working length has been established, the pulp of vital teeth is removed. A K-type instrument with as large a diameter as possible is introduced into the canal to the predetermined apical level of instrumentation. The instrument is then rotated as much as possible in contact with the root canal wall in an effort to sever the pulp at this level. If this is successful, the pulp may come out in one piece and a pulp stump with a clean-cut wound is left behind in the root canal Fig. If it is not successful, the pulp tissue will instead be removed in bits and pieces during the subsequent instrumentation of the canal. It contains hand instruments needed during the aseptic phase of the treatment as well as a holder with root canal instruments. The root canal instruments: K-files size 15â€”80 , Hedstrom files size 15, 20, 30, 40, and 50 , finger spreaders size B and D. The tray itself should remain sterile throughout the treatment. The anatomical pliers are used to move instruments from the tray to the lid. In multirooted teeth and especially in roots with more than one canal it is advantageous to use different types of root canal instruments to readily determine which canal is which. In these radiographs, Hedstrom files are consistently used in palatal and lingual canals and K-files in buccal canals. In nonvital teeth with ischemic necrosis, the pulp may be extirpated using the same method.

Chapter 5 : Multirooted Endodontics Two-Day Workshop - University of the Pacific

DENTISTRY TODAY February The field of endodontics is undergoing a continual evolution in terms of materials and techniques, as well as growth in the number of patients who can benefit from endodontic treatment.

Semester course; 96 laboratory hours. Restricted to first-year students. Utilizes laboratory exercises to review basic concepts and introduce the more complex technical procedures required to practice the clinical specialty of endodontics. Semester course; 13 seminar hours. Provides through a series of seminars, an in-depth knowledge of those specific areas of oral pathology that apply to endodontics. Management of Medical Emergencies in the Dental Office. Semester course; 20 seminar hours. Provides through a series of seminars, an in-depth level of knowledge in the management of medical emergencies in the dental office. Semester course; 58 lecture hours. Presents a series of lectures on clinical endodontic topics in order to familiarize the students with clinical endodontic procedures either in conjunction with or prior to the "Endodontic Topic Literature Reviews" on these specific clinical topics. Semester course; 1 lecture hour. Covers the basic principles of endodontics in preparation for clinical endodontics. Principles of Endodontics Lab. Semester course; 4 laboratory hours. This lab course teaches the basic technical skills of endodontics in preparation for clinical endodontics. Endodontic Topic Literature Review. Semester course; 58 seminar hours. May be repeated for credit. Must be taken every semester of the program. Reviews topic literature pertaining to the scientific basis for endodontic procedures and the materials and techniques utilized in the clinical practice of endodontics. Discusses content of the reviewed literature and critically evaluates by means of abstracts and study questions. Semester course; 28 seminar hours. Requires students to present a seminar once each month in which difficult diagnostic cases, patient management problems and complex treatment cases are critiqued and treatment options discussed. Endodontic Management of the Medically Compromised Patient. Semester course; 14 seminar hours. Must be taken for two consecutive semesters. Provides students, through a seminar series, with an in-depth level of knowledge in the endodontic management of the medically compromised patient. Endodontic Current Literature Review. Semester course; 18 seminar hours. Provides a review of current journal literature that pertains to the scientific basis for endodontic procedures, materials and techniques currently being used in the clinical practice of endodontics. Discusses and critically evaluates the content of the reviewed literature. Requires written abstracts of all reviewed articles. Semester course; clinical sessions. Variable for credits. Must be taking both fall and spring of the first and second years of the program for 5 credits each semester. May be taken in additional semesters as needed to complete clinical training; credit will vary based on circumstances. Permits students to receive supervised training in every type of clinical endodontic procedure. Provides students with experience in the management and treatment of cases which are the same types of complex non-surgical and surgical cases treated in a specialty practice of endodontics. Senior Selective in Advanced Clinical Endodontics. Semester course; 4 clinical hours per week. This clinical course is designed to develop advanced skills in treating endodontic cases beyond the scope of those expected in basic clinical competency of a dental student. Semester course; 1 lecture contact hour. An application course designed for the student to gain experience and demonstrate proficiency in the application of clinical endodontic knowledge to the diagnosis and management of complex clinical endodontic problems. Emphasis is placed on differential diagnosis and management of clinical endodontic problems. This course builds on the principles of diagnosis and treatment of disease of the pulp and periradicular tissues and injuries of the dental pulp. This course continues to place emphasis on the prevention of disease and maintenance of the normal pulpodentin complex. Designed to develop clinical skills and provide experience in the diagnosis, treatment planning, treatment, prognosis, follow-up care and clinical patient management in cases involving the pulp and periradicular tissues. Emphasis is placed on the management of common clinical problems that may be encountered in the general practice of dentistry. This course emphasizes and elaborates on the rationale and treatment techniques presented in the D-2 didactic and laboratory course. Yearlong course; 1 clinic session per week. Emphasis is placed on the management of common clinical endodontic problems that may be encountered in the general practice of dentistry. Guidance from faculty will encourage the student to

synthesize and integrate techniques taught in previous endodontic courses and labs into a logical and systematic approach to the delivery of quality endodontic care to the patients. Students receive CO grading in the fall and a pass or fail grade and earned credit in the spring.

Chapter 6 : Fellowship in Advanced Clinical Endodontics Dubai

Essential Endodontics course-excellent refresher or introductory course! The course opens with an overview of the biology of the endodontium and the apical periodontium. It then provides detailed descriptions of the etiology and pathogenesis of endodontic diseases, examination and diagnostic techniques, and treatments.

This article has been cited by other articles in PMC. To evaluate the success of certain methods that can be used in the removal of separated instruments from different levels in curved and straight canals. Instrument removal attempts were undertaken on 63 straight and 30 curved canals containing a pre-fractured instrument using the ultrasonics under the visualization of an operating microscope or conventional methods. In straight canals, a Masseran Kit was additionally used to these techniques. The success of instrument removal in relation to the techniques used and the location of the fragments in the root canal were evaluated. Successful treatment was defined by the removal or complete by passing of the fragments. The overall success rate was found In straight canals, also the success rate was the highest with ultrasonics This was followed by conventional method When the success rate was investigated according to the location of the broken instruments, the lowest rate was found in the apical third of root canal. Location of the fragment and the shape of the root canal influence the success of fractured instrument management. Ultrasonics under the visualization of an operating microscope was found to be an effective removal method. NiTi rotary instruments show a high incidence of instrument fracture despite their favorable qualities. Instrument fractures during root canal treatment hinder the clinician from optimal preparation and obturation of the entire root canal system. This affects the long term prognosis of root canal treatment negatively. Removal of the fractured segment, bypassing and sealing the fragment within the root canal space or true blockage are chosen approaches. The prognosis of leaving the broken instruments versus removing them from the canal have been discussed in the literature. The removal of the broken fragments with traditional methods is time consuming, risky and has limited success. These tips vibrate to loosen the obstruction causing minimal damage to the canal walls. The enhanced vision with magnification and illumination from a microscope allows clinicians to observe the most coronal aspects of broken instruments and to remove them without any perforations. All of the procedures of this technique are performed under the direct visualization and illumination of an operating microscope. If separated instruments lie partially around canal curvatures and straight line access is prepared to the coronal of the fractured instrument segments, they can be removed. The removal of the broken instrument segments that are apically located to the curvature of the canal is usually not possible. Access cavities were prepared and the pulp tissue was removed. Instruments were notched with a knife edge bur 2. Rotary notched instruments were run at different pressures with a high-torque handpiece to break the instruments and impact them to three different levels of the canal walls. Molar teeth were then radiographed from buccolingual direction and single rooted teeth from mesiodistal direction Figure 1.

Chapter 7 : Clinical Endodontics - Health Studies

The Section of Endodontics offers training in endodontics to foreign- and domestic-trained dentists. This program will provide the most current training in the knowledge, techniques, and skills of clinical endodontics.

Chapter 8 : Formats and Editions of Techniques in clinical endodontics [blog.quintoapp.com]

Graduate endodontic students receive a major part of their didactic training during the first year and are instructed in diagnostic and therapeutic techniques in clinical endodontics as a part of their patient care activities.

Chapter 9 : Advances in Endodontics | ID | blog.quintoapp.com

This program combines updates about the latest techniques, instruments and clinical strategies in endodontic therapy.

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