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Like many other dental and medical specialties, endodontics has evolved and changed over the years. The changes that have occurred in the last 10 years, however, have been of great magnitude and profundity. The microscope, ultrasonic units with specially configured tips, superbly accurate microchip computerized apex locators, flexible nickel-titanium files in rotary engines, and greater emphasis on microscopic endodontic surgery have totally changed the way endodontics and endodontic surgery are practiced. Comparing these changes with formocresol medication, K-file and radiographic determination of working length are truly dramatic. These changes are bringing the specialty of endodontic practice into the twenty-first century with greater precision, fewer procedural errors, less discomfort to the patient, and faster case completions. Seven key advancements in endodontics were made in the last decade. This article discusses these advancements and their applicability to everyday practice.

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The incorporation of the microscope in clinical endodontics has had profound effects on the way endodontics is done and has changed the field fundamentally. This article outlines the key prerequisites for the use of the microscope in nonsurgical endodontic procedures, discusses which procedures benefit from using the microscope, and addresses the issue of cost versus patient benefit.

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The advent of nonsurgical ultrasonic tips has opened up a new horizon in endodontic treatment. There are a number of nonsurgical

endodontic ultrasonic systems currently available in the market and it is difficult to review all of them. Based on similarities among different instrument systems, an attempt has been made to classify instruments into broad categories. This article describes the utility of each type of ultrasonic tip and the principles behind its usage. These instruments may be area specific or use specific, but can be used in an area other than the one for which they are specifically designed if the general principles regarding ultrasonic tips are understood and applied.

Electronic Apex Locator

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Euiseong Kim and Seung-Jong Lee

Locating the appropriate apical position always has been a challenge in clinical endodontics. The electronic apex locator (EAL) is used for working length determination as an important adjunct to radiography. The EAL helps to reduce the treatment time and the radiation dose, which may be higher with conventional radiographic measurements. According to recent publications, the accuracy of frequency-dependent EALs appears to be much higher compared with traditional-type EALs (simple resistance type or impedance type). This article reviews the history and the working mechanism of the currently available EALs, and suggests the correct usage of the apex locator for a better canal length measurement.

Nickel–titanium: Options and Challenges

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Michael A. Baumann

The introduction of nickel–titanium (NiTi) as material for endodontic instruments about 15 years ago opened many new perspectives. Many dentists and scientists see a benefit in using NiTi files. Initial problems such as frequent fractures and the uncertainty of the best way to use them have been solved. Other challenges such as enhancing the cutting ability or optimizing the speed, torque, and fatigue are currently being addressed. Some clinicians are skeptical because they see this approach as too mechanical. Nevertheless, the combination of anatomic, biologic, and pathophysiologic knowledge with the use of NiTi instruments is a large step forward in optimizing the quality of root canal treatment worldwide.

The ProFile System

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Yeung-Yi Hsu and Syngcuk Kim

The ProFile instruments were among the first nickel–titanium (NiTi) instruments to be marketed. This article describes the unique file design, clinical performance, safety concerns, and clinical applications of this system. Guidelines for NiTi rotary instrument usage need to be followed to minimize complications and maximize benefits.

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Thomas Clauder and Michael A. Baumann

This article reviews the design and clinical use of the ProTaper NT file system.

The LightSpeed System 113
Fred Barbakow

This article describes the use of an innovative, engine-driven, rotary, root canal preparation instrument. The geometric design of this nickel-titanium instrument is totally different from currently marketed manual or engine-driven stainless steel or nickel-titanium instruments. The thin, taperless, noncutting shafts of LightSpeed instruments maximize the flexibility of the nickel-titanium alloy, particularly in the larger sizes. The three basic designs of the LightSpeed cutting heads and three different methods for using the LightSpeed system are described. LightSpeed instruments enable larger apical preparations in curved canals with less coronal flaring than is possible with most other techniques.

The K3 Rotary Nickel–titanium File System 137
Richard E. Mounce

The K3 rotary nickel-titanium file system by SybronEndo is a state-of-the-art rotary nickel–titanium endodontic instrumentation method that combines excellent cutting characteristics with a robust sense of tactile control and excellent fracture resistance. The K3 has universal applicability across a wide range of clinical indications. Although it is a complete instrumentation system, future possibilities for hybrid instrumentation techniques that combine the best features of K3 with other rotary systems hold promise.

Real World Endo Sequence File 159
Kenneth A. Koch and Dennis G. Brave

As a result of the quest for a better, simpler technique, Real World Endo in partnership with Brasseler USA has developed a new endodontic file and sequence. It is hoped that this file and sequence will satisfy many of the current demands of modern root canal therapy and be user friendly. This article discusses the benefits of a fully tapered preparation, the general design of rotary files, and the specific design and use of Real World Endo Sequence File.

The Hybrid Concept of Nickel–titanium Rotary Instrumentation 183
Helmut Walsch

The idea of the hybrid concept is to combine instruments of different file systems and use different instrumentation techniques to

manage individual clinical situations to achieve the best biomechanical cleaning and shaping results and the least procedural errors. The hybrid concept combines the best features of different systems for safe, quick, and predictable results. Several hybrid instrumentation sequences are presented and their limitations are discussed.

Obturation of the Root Canal System

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Samuel I. Kratchman

With all the new technology that has been introduced in endodontics, there are now several ways to instrument and obturate root canals. Practitioners often develop their own “hybrid” technique after sharing ideas with several colleagues. The purpose of this article is to describe a technique of obturation, hoping that others may incorporate some aspects into their own “hybrid” style.

MicroSeal Systems and Modified Technique

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Francesco Maggiore

The MicroSeal technique was introduced in 1996 and consists of a nickel–titanium (NiTi) spreader, a NiTi condenser, a gutta percha heater, a gutta percha syringe, and a special formulation of gutta percha available in cones or in cartridges. It is considered a thermomechanical compaction technique that uses a rotary instrument to plasticize the gutta percha and move it within the root canal apically and laterally. The MicroSeal technique together with the author’s modifications may be a very important tool in the hands of the endodontist. The MicroSeal system is able to preserve a conservative preparation and provide an adequate penetration by the obturation instruments in the apical third. Knowledge of the technique’s indications and limitations represents an important step in the learning curve for those practitioners who are willing to incorporate a new obturation method into their clinical techniques.

Conventional Endodontic Failure and Retreatment

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Ralan Wong

Technologic advancements in dentistry and specifically endodontics have vastly improved the quality of care rendered to patients. These advancements allow clinicians to gain insight into the retreatment of failing root canals. Due to training, practice, and patience, clinicians can expand their capabilities alongside of these technologic advancements to perform endodontic retreatments with increased success.

Perforation Repair and One-step Apexification Procedures

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Samuel I. Kratchman

As with any dental treatment, procedural mishaps can occur during root canal therapy. One such occurrence is the perforation of a root

or pulpal floor. After a perforation occurs, the goals are to “sterilize” (decontaminate) the site and then seal the perforation. The material most widely used in endodontics to seal perforations is mineral trioxide aggregate (MTA). MTA is extremely biocompatible, and it has been shown histologically that osteoidlike material grows right into MTA. The technique of one-step apexification offers an alternative to drawn-out cases with several medicament-changing appointments that often result in a failed attempt at root-end closure. With the favorable histologic response of MTA, this material is the best current choice for this procedure. Completion of these cases in an effective and efficient way allows for permanent restorations to be done in a more timely manner, prolonging the longevity of these teeth.

Modern Office Design in the “Information Age”

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Garrett Guess

This article reviews the process of reaching the goal of modernizing a new or existing endodontic office. Incorporating computer-based technologies in the office requires significant planning, best achieved by forming a technology goal that addresses budget, knowledge base, and infrastructure issues. Making the transition to the modern dental practice is expensive and time-consuming but also profitable and exciting. Soon, all dental offices will be using digital radiographic systems, video systems, and patient charting programs that use no paper documentation. As the computer familiarity and staff knowledge base increases with the growing use of computers in society overall, finding the office personnel able to harness the efficiency and power of the technology in the dental office will be easier. Through careful planning and formation of a reasonable technology goal, updating an old office or creating a new modern endodontic practice with the technologies of today can be an enjoyable reality from which clinicians and their patients can benefit.

Endodontic Working Width: Current Concepts and Techniques

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Yi-Tai Jou, Bekir Karabucak, Jeffrey Levin, and Donald Liu

Root canal morphology is a critically important part of conventional and surgical endodontics (root canal therapy). Many in vitro studies have recorded the scales and average sizes of root canals, but there have been few clinical attempts to determine the working width. In the absence of a study that defines what the original width and optimally prepared horizontal dimensions of canals are, clinicians are making treatment decisions without any support of scientific evidence. This article provides definitions and perspectives on the current concepts and techniques to handle working width—the horizontal dimension of the root canal system—and its clinical implications.

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