The auditorium filled with the sound of Scottish bagpipes, but not playing the familiar tunes of folk classics such as Amazing Grace or Auld Lang Syne; it was the famous guitar intro from AC/DC’s 1990 track Thunderstruck as re-interpreted by the Red Hot Chilli Pipers. The performance by the Scottish ensemble, who won the BBC’s *When Will I Be Famous* television show in 2007 and conquering stages in Scotland and worldwide with energetic bagpipe rock, was one of the highlights of this year’s European Society of Endodontology (ESE) congress in Edinburgh.

The 14th biennial ESE meeting, which was the second held in the UK (the first was the London congress in 1995), saw a record attendance of more than 1,400 endodontic specialists from 50 countries. They had been invited to join a comprehensive lecture programme discussing key issues such as the rights and wrongs of different instrumentation as well as the realities of microbial biofilms and the challenges of 3-D imaging.

New this year was a significant offering of 20-minute presentations that illustrated the latest clinical findings from research groups throughout Europe and further afield.

At the accompanying trade show, the company W&H presented its new anaesthetic system Anesto that allows targeted local anaesthetisation of individual teeth. SybronEndo, a gold sponsor of the meeting, said that its successful TF rotary NiTi files are now available in apical sizes 30, 35 and 40. French Acteon had its EndoSuccess range of tips for apical surgery on display.

“This was a record-breaking blockbuster for the ESE and we were delighted to have been able to host an event of such quality and size in Edinburgh. Each of our invited speakers brought their own style and insights, producing a varied and balanced programme for a large and diverse audience. ESE has become a beacon meeting, an exceptional gathering for scholarship, fellowship and discovery,” said Prof John Whitworth from Newcastle University and President of the British Endodontic Society.

Delegates at the General Assembly elected former ESE secretary Prof Claus Löst as new president. Prof Löst is currently Clinical Director of the Center of Dentistry, Oral Medicine and Maxillofacial Surgery at the Tübingen University Hospital in Germany. He will succeed incumbent president Prof Gunnar Bergenholtz from Sweden at the beginning of 2010. More staff changes are expected to be announced soon. Amongst others, treasurer Prof Dag Ørstavik from Norway will step down.

The Executive Board proposed the co-funding of a symposium in July 2010 with the Pulp Biology and Regeneration Group of the International Association for Dental Research, which will address the topics of inflammation and regeneration.

ESE, founded in April 1982, is a federal organisation representing national endodontic and dental societies in 27 European countries. The next congresses will take place in Rome (Italy) in 2011 and in Lisbon (Portugal) in 2013.
Successful crown preparations start at the diagnosis. Early detection of the need for full coverage restoration can minimise many difficulties associated with the preparation of a tooth for a crown, obtaining an accurate impression, and the achievement of a precise fitting, long-lasting, esthetic restoration. Proper diagnosis is the all important first step.

The importance of vision
The second most important ingredient is vision. The dental operating microscope (DOM) has shown itself to be valuable in endodontics, but it is just as valuable or more valuable with restorative efforts. High magnification above 4X is necessary to impose/create good finish lines that are easy to impress and tempurate. Magnification of 2X-24X is available with the DOM. Management of gingival health and biologic width is important to the overall final look of the crown and the cleanliness by the patient. A poor finish line and a poorly positioned finish line results not only in poor impressions and final restoration fit but also makes for poor fitting provisionals.

If one cannot find their own finish line, one cannot properly trim and fit the provisional restoration and remove any temporary cement properly. When patients return, gingival tissues can be irritated making the placement of the final restoration challenging. If by chance one does achieve a good fit, then when the soft tissue heals, the junction of the final restoration and the tooth may be visible and the overall esthetics ruined.

Good patient management
Working at high magnification with the DOM requires good patient and procedural management. If the patient is moving or uncomfortable, then the operator cannot focus and concentrate on proper reduction or the task of placing a solid, conservative finish line on the tooth. Therefore, the third most important ingredient in crown prep success is the dental rubber dam.

For most, using a dental dam for a crown prep is a widely misunderstood concept. Simply put, the rubber dam is the most under-utilised, inexpensive and simple piece of equipment an operator can incorporate into his/her crown preparation protocol. With a little training, dentists and assistants can learn techniques that will benefit all individuals involved in the restoration of a tooth or teeth. Note in all of the photographs that a dental dam is in place before and after.

Tissue management is the fourth concern and this points back to the number one concern of early diagnosis versus waiting until a tooth is severely decayed or broken down. Working deep subgingival and in irritated tissues exponentially complicates the task of crown preparation. Hemorrhagic areas, or those that are deep subgingival, can be difficult to visualise and control. Early diagnosis can minimise these tissue complica-

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Dr Craig Barrington discusses crown preparation techniques utilising the dental operating microscope.

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Slides 1-10 are before and after photos of crown preparations accomplished on the shown teeth.

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Slides 14 and 15 show the final restoration cemented.
tions. Good tissue management protocol is paramount to the success of the final restoration.

Radiosurgery instruments
Lasers have been in dentistry for quite some time but their cost and other fundamental limitations make them difficult to acquire and use. However, radiosurgery has been around for years and is an affordable and useful instrument that can solve many problems regarding finish line visualisation, finish line exposure, and hemorrhage control. In addition, this simple, conservative machine can make cord placement quick and simple by preserving the gingival architecture.

The Parkell unit with a #118 tip allows the creation of a very conservative “trench” around a tooth. In combination with good visualisation from the dental operating microscope (DOM), and good patient and procedural management with the rubber dam, we can reliably create a finish line, expose it, place a cord if necessary and impress it.

With a radiosurgical unit, inflamed tissue can be removed such that the healthier tissue is exposed to our hemostatic agents. Healthy hemorrhagic tissue responds better to hemostatic agents than inflamed hemorrhagic tissue. When inflamed tissue are encountered, use of high magnification and the radiosurgical tip to conservatively contour or remove this nuisance tissue can provide predictable result. Removing tissue “thickness” and not modifying tissue “height” can leave the gingival tissue in proper position such that we achieve nice esthetics in our final result.

Handpiece and bur choices
The final item and of least concern in this protocol is handpiece choice and bur choices. There is existing debate between electric versus air driven hand pieces and over which bur is best for which task. The specification of a particular handpiece or bur, would be similar to directing an artist over which paintbrush to use. “What works in one’s hands” is the most important factor and that changes from individual to individual and situation to clinical situation. If a practitioner will meet the diagnosis, magnification, isolation and tissue management protocol, then burs and handpiece choices will fall into place with time and experience. I typically use an air driven handpiece and an assortment of Axis turbo diamonds.

In a stepwise fashion for an individual crown prep, the primary concern is achievement of proper anesthesia such that the patient is comfortable in all capacities. Once this is done, the rubber dam is placed. I use a split or “slit” dam technique. The key to success with this rubber dam technique and crown preparations is the distance at which the holes or place apart from each other. Generally speaking, holes are punched too close together for this technique. It is best to punch the holes at a distance from each other on the dam that essentially matches the true anatomical distance between the teeth to be isolated.

Next step: occlusal reduction
Once the tooth is isolated and the patient is confirmed to be comfortable, the next step is the occlusal reduction. This makes the tooth shorter and allows better access and visualisation for the axial reduction. If there is an existing restoration in the form of an alloy or composite filling, it is removed, and the tooth is reduced to the level of this restoration. Existing restorations usually provide a fine guide to getting nice occlusal clearance without having to verify prior to the next step. Hopefully, I have not diminished the importance of this step as I know this can make or literally break a final restoration.

Doing the occlusal reduction first allows me to get “warmed up” and work out any kinks in terms of patient issues, patient positioning, handpiece water flow or bur choice etc before moving to the more complicated axial reduction. On the upper arch the full crown preparation is done with a mirror and indirect vision. On the lower arch, I will do ¾ of the procedure choice and bur choices.
with direct vision and then fin-

The axial surface reduced first depends on which tooth is being treated. For example, I am right-handed, so on an upper right first molar I reduce the palatal side first and then move to the interproximals. On an upper right first molar I break contact on the mesial first, moving from the palatal side breaking the contact towards the buccal side.

This is the easier of the two surfaces to break. First, it is further forward in the mouth and therefore easier to reach and second, it is a shorter contact as it is against a premolar. Following the mesial contact break, I continue around the tooth through the mesio-buccal line angle onto the buccal surface. I then break the distal contact, also moving from the palatal side to buccal direction. The most challenging area to prep on an upper right first molar is the disto-buccal line angle. So I prepare the tooth as far as I can through the distal contact and around the disto-buccal line angle. I then complete the buccal reduction and connect the buccal finish line at the disto-buccal line angle.

Mirror position is critical to achieve a solid finish line on the entire tooth including the DB line angle. These steps, for me, remain true for most upper right teeth with difficulties being increased as we move more posteriorly and considering patient limitations in anatomy, patient attitude, tooth anatomy and exisitng restorations or decay.

Axial reduction

The steps for axial reduction on the upper right arch mirror themselves on the upper left arch. On the upper left arch I first reduce the buccal and break contact from the buccal to palatal di-

The lower arch is different from the upper arch in that direct vision can be utilised for most of the preparation. The buccal reduction is done first on both lower arches and interproximal contact is broken in a buccal to lingual direction starting with the mesial contact first. Once both mesial and distal contacts have been broken, the lingual reduction is accomplished. For a lower tooth, the disto-lingual line angle tends to be the most difficult area to visualise so this is the part that is refined using indirect vision.

Once all occlusal and axial reduction has been accomplished, the next step is tissue management and cord placement. I start with the radiosurgical unit with a #118 tip to create a conservative trough around the tooth, mostly removing tissue thickness and/or reducing any vol-

One of the main reasons we use polyvinyl siloxane impression materials is be-

Tissue management and cord placement

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Size 00 cord is soaked in a hemostatic agent from the start of the procedure. Literature sup-

About the author

Dr Craig M Barrington, BDS is a 1996 graduate of the University of Texas Health Scien-

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The difficulty varies depending on the tooth being treated and/or patient, tooth limitations.

in place, the cord placement is a simple, pressureless and a step followed by copious air/ water syringe rinse. In the time that it takes to place the cord and rinse, most, if any hemorrhage will be controlled.

Now the sharpness and po-

gles or irregularities in the prep.

Full-arch impressions

A full-arch impression is taken with a single tray for the arch that contains the prepared tooth. For the opposing arch, a full arch alginate impression is taken. With full-arch impres-

Once all the impressions are taken, a provisional is fab-

Rinsing and drying

Once all refinements are accomplished, the preparation is rinsed and dried and for the first time, the entire prepara-

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Now the sharpness and position of the finish line can be re-evaluated and refined. An ultrasonic unit is used, with the irrigation on, to clean the crown preparation of calce-

Rinsing and drying

Once all refinements are accomplished, the preparation is rinsed and dried and for the first time, the entire preparation is evaluated in one view. The uniformity of the axial reduction and the position of the gums with relation to the cord, and the cord with relation to the finish line are all evaluated. The axial reduction should have uniform thickness throughout the different positions as different areas need more reduction and some need less based on material and esthetic de-

Once all the impressions are taken, a bite registration is usu-

A full-arch impression is taken with a single tray for the arch that contains the prepared tooth. For the opposing arch, a full arch alginate impression is taken. With full-arch impres-

One of the main reasons we use polyvinyl siloxane impression materials is because they are reusable. If adequate strength and thickness of this material is not obtained, through proper radiosurgical troughing technique, then it may tear upon separation of the model. Having an impression tear after the first pour, limits the ability to fabricate a well fitting restoration.

When a clear “tooth-tissue-cord”, visible, sharp finish line is present, the rubber dam is removed and the preparation is evalu-

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Treatment a calcified mandibular molar: A Modern Day Protocol

Rafael Michiels, DDS, MSc presents a case study showing old dogs can use new tricks for success

Endodontics has evolved enormously in the last few decades. However, the basic principles from the past are still up to date. This case report gives an example of how the old principles are carried out with newer techniques, devices and materials.

History & Diagnosis
A 37-year-old female patient, was referred to our practice for a problem with the lower right second mandibular molar (4.7). She had no health issues, and was given an ASA score of 1.

The referring dentist opened the tooth, because of an acute pulpitis due to an extensive carious lesion disto-lingually. She had difficulties in locating the mesial canals because the pulp chamber was heavily calcified. She placed calciumhydroxide cement in the pulp chamber to preclude the possibility of the entrance of germs in the oral secretions into the pulp chamber. This should be the invariable rule.

However in a recent survey only 5.4 per cent of general dental practitioners used the rubber dam in their endodontic routine.

Visualisation and magnification can greatly help clinicians in cases like this one. Without the use of a surgical operating microscope it is very difficult to locate canals when there is much calcification. “You cannot treat, what you cannot see” is a quote that is regularly heard, but it hits the nail on the head. Visualisation and magnification were obtained through the surgical operating microscope (Opmi Pico, Carl Zeiss Belgium, Zaventem, Belgium). Photos were taken with a Canon powershot A650 IS (Canon Belgium, Diegem, Belgium).

In order to get a very easy and cheap procedure and should be incorporated in every endodontic routine.

Shaping was done with Protapers S1, S2 and F1 in the mesial canals and up to Pro taper F2 in the distal canal. This gives the canal sufficient taper, but a small apical diameter. Many controversies are present about shaping the apical diameter. I prefer an apical diameter of at least a size 50, because I rinse with a 50-gauge irrigation needle. In this manner the NaOCl can come into direct contact with the apical dentin.

Isolation is one of the fundamental principles in endodontics and is more than 100 years old. Already in 1864 Sanford C. Bar num developed the rubber dam and it was generally accepted that its use was necessary to achieve a good isolation and a better prognosis.

"The first step in the treatment of a tooth... is the adjustment of rubber dam over the diseased tooth to preclude the possibility of the entrance of germs in the oral secretions into the pulp chamber. This should be the invariable rule."

Cleaning was performed with NaOCl 5 per cent, which was ultrasonically activated with an irrigate tip (Satelite, Mérignac Cedex, France) several times throughout the procedure. The ultrasonic activation of the irrigating solution results in more removal of organic tissue, debris and planktonic bacteria. It is a very effective and cheap procedure and should be incorporated in every endodontic routine.

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