Point of Care

The "Point of Care" section answers everyday clinical questions by providing practical information that aims to be useful at the point of patient care. The responses reflect the opinions of the contributors and do not purport to set forth standards of care or clinical practice guidelines. Readers are encouraged to do more reading on the topics covered. If you would like to contribute to this section, contact editor-in-chief Dr. John O'Keefe at jokeefe@cda-adc.ca.

QUESTION 1

What is the treatment sequence for a tooth that requires both root canal treatment and crown lengthening?

Background

When treatment is needed for a compromised tooth, the practitioner must first decide if the tooth is restorable and if enough tooth structure remains to support a restoration. If it is decided that the tooth is to be retained but that it will need both crown lengthening and endodontic treatment, decisions are then needed on the sequence of treatment, in particular, the point at which root canal treatment should be completed.

In the context of symptoms related to endodontic involvement, pulpectomy should be performed first, but there must be enough tooth structure to place a rubber dam clamp, so as to allow proper isolation of the tooth and prevent leakage of saliva. The overall aim of treatment is to reduce symptoms by cleaning, shaping and medicating the root canal system.

During the endodontic procedure, bacterial contamination from saliva must be prevented. To ensure that the rubber dam clamp is stable once it is put into place, some pretreatment measures may be needed, e.g., gingivectomy to expose tooth structure for the clamp to grip or placement of build-up material on the remaining crown to facilitate stable placement of the clamp. A third but less desirable approach is to isolate the tooth being treated by clamping the gingiva. Portions of cotton rolls can be used to cushion the effect of the jaws of the rubber dam clamp.

Instrumenting and Medicating the Canals

Some teeth may require treatment of one or more calcified canals and/or endodontic retreatment. In this situation, the instrumentation should be completed to within 1 mm of the apical foramen,[1] and it is desirable to obtain an acceptable working length for instrumentation and to disinfect the canals before crown lengthening is undertaken. If there is canal blockage that cannot be negotiated, then combined crown lengthening and apical surgery could be considered.

Consideration is sometimes given to completing the endodontic treatment before crown lengthening, perhaps in one visit. If the tooth can be adequately isolated by a rubber dam and sealed from saliva leakage into the root canal system, then restoration with a permanent filling material (post-and-core build-up) after endodontic treatment would be acceptable. For teeth that cannot be properly isolated by a rubber dam, it is best not to complete the root canal treatment before crown lengthening. If endodontics are completed and a temporary filling material is placed in the tooth, there is a risk that the temporary filling could leak before the patient has a periodontal consultation and/or books an appointment for the crown-lengthening procedure. If the interval after completion of root canal treatment lasts 2 or 3 months, there is also a risk that the root canal system will be contaminated; such contamination can occur within days of exposure to bacteria.[2] Under this circumstance it is best to perform the endodontic retreatment, rather than proceeding with tooth build-up. If the cotton pellet placed over the obturation material is "wet" after removal of the temporary filling material or if there is a foul odour after removal of the access filling, then coronal leakage has occurred. Studies of this phenomenon have shown that within a couple of weeks of gutta-percha being exposed to bacteria, most of the root canal system becomes contaminated.[3]

It is undesirable to perform endodontic treatment twice if there has been a delay in the crown-lengthening procedure and coronal leakage has occurred. For this reason, and to ensure the best biological outcome, it is more appropriate to obturate the root canal after the crown-lengthening procedure. Obturation and coronal restoration can usually be done several weeks after the crown-lengthening surgery.

If there has been coronal leakage after instrumentation and medication of the canals, then calcium hydroxide paste can be applied as an antibacterial agent, provided that the problem is simply leakage and not dislodgement of the entire access filling from the tooth. After the periodontal surgery, the canal can be disinfected with sodium hypochlorite followed by a final rinse with 15% to 17% ethylenediaminetetra-acetic acid (EDTA) solution to open the dentinal tubules before obturation.[4]

In summary, the appropriate sequence of treatment for a tooth that requires both endodontic treatment and crown lengthening and that cannot be adequately isolated for placement of a permanent restoration begins with instrumentation and medication of the canals; this allows confirmation that the full working length can be achieved. Crown lengthening is then performed, followed by obturation of the tooth. Tooth build-up can follow immediately, as the tooth can now be adequately isolated under a rubber dam, which prevents salivary contamination. Removing bacteria, the main cause of endodontic failure, and preventing recontamination should be the main focus of the overall treatment. This treatment sequence will minimize the risk of bacterial contamination of the obturation material and yield the best biological outcome.

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QUESTION 2

How should interappointment intracanal dressing be used during the treatment of nonvital teeth with periapical radiolucencies?

Background

The treatment of teeth with pulpal necrosis and periapical lesions is a topic of concern in the field of endodontics because these teeth have the highest rates of treatment failure. Bacteria lodged in the root canal system play an important role in the initiation and perpetuation of pulpal and periapical diseases (**Fig. 1**). Anaerobic microorganisms, especially gram-negative bacteria, predominate in necrotic root canal systems and in the apical and periapical areas of teeth with pulpal necrosis and periapical radiolucencies. Gram-negative microorganisms have different virulence factors that can be toxic to apical and periapical tissues. They also contain lipopolysaccharide (LPS), an endotoxin in the cell wall released during the death of bacteria that can stimulate inflammatory reactions leading to periapical bone resorption.

Disinfection of the root canal system is extremely important for tissue healing and successful endodontic treatment. In addition, the use of intracanal dressing after instrumentation is highly recommended in root canal treatment of teeth with periapical lesions. Such dressings will help in reducing bacterial levels, particularly by penetrating areas such as dentinal tubules and canal irregularities that cannot be reached by instruments or irrigation solutions.[1]

Calcium hydroxide ($Ca(OH)_2$) is the most commonly indicated intracanal medicament for treating endodontic infections and is apparently the only compound that can inactivate the LPS of gram-negative bacteria.[2] When dissolved in water, $Ca(OH)_2$ dissociates into hydroxide (OH^-) and calcium (Ca^{2+}) ions. The hydroxide ions elevate the pH within the root canal and also produce an alkaline environment in the surrounding tissues after diffusing into the dentinal tubules. Not only is the high pH bactericidal, but it also inhibits osteoclastic activity, preventing bone resorption.[3] Besides its chemical properties, $Ca(OH)_2$ acts as a physical barrier to bacterial penetration into the root canal, thus preventing re-infection.

$Ca(OH)_2$ is available as a powder and must be mixed with a vehicle to form a paste before being placed in the canal. The vehicle plays an important role in the biological action of $Ca(OH)_2$, which is determined by the velocity of ionic dissociation of the Ca^{2+} and OH^- ions. Aqueous vehicles such as sterile water or saline solution promote rapid ion liberation and should be used to make $Ca(OH)_2$ for intracanal dressing. Viscous vehicles such as glycerine, polyethylene glycol and propylene glycol are water-soluble substances that release Ca^{2+} and OH^- ions more slowly over extended periods. These should be used for longer term dressings in the management of apexification and root resorptions, to ensure that the paste remains in the root canal for a longer period.[4]

The time needed for $Ca(OH)_2$ to optimally disinfect the root canal is still unknown and may be related to the type of microorganisms involved, the location of the microorganisms in the root canal system, the presence or absence of a smear layer and the presence or absence of a root canal exudate. Previous researchers have recommended at least 2 weeks for effective antimicrobial action.[4,5]

The chemomechanical step of root canal treatment is the most important for eliminating microorganisms, but the use of an intracanal dressing seems warranted during the treatment of nonvital teeth with periapical radiolucencies.

Procedure

Once the shaping procedure is completed, the canals should be thoroughly rinsed with sodium hypochlorite (NaOCl) to remove any organic

Figure 1: Mandibular central incisor with necrotic pulp, apical resorption and large periapical radiolucency.

components and then rinsed with a solution such as ethylenediaminetetra-acetic acid (EDTA), citric acid or MTAD root canal cleanser (BioPure, Tulsa, Okla.), to remove the smear layer. This extremely important step must be done before placement of the $Ca(OH)_2$ dressing because it opens the dentinal tubules and facilitates diffusion of the dressing through the whole canal system up to the peripheral areas of the root. After suction and drying with paper points, the canal is ready to receive the intracanal dressing. The $Ca(OH)_2$ powder should be mixed with the vehicle and then delivered into the root canal. A variety of techniques can be used to accomplish this, but lentulos are most often used to spin the $Ca(OH)_2$ into the root canal system. It is important to ensure that the dressing fills the whole space previously occupied by the pulp. To prevent leakage and re-infection, a cotton pellet should be placed in the pulp chamber and a temporary restoration used to restore the access cavity. This intracanal dressing should remain in the root canal for at least 2 weeks (**Figs. 2** and **3**). In the case presented here, the $Ca(OH)_2$ medicament was left for 12 weeks because of patient scheduling. The decrease in size of the periapical lesion after this time is shown in **Fig. 4**. Removal of the intracanal dressing should be done by rinsing with NaOCl and a chelating solution, while instrumenting the root canal walls with files. **Figure 5** shows the incisor after obturation.

Figure 2: A radiograph is taken to determine working length.

Figure 3: Appearance of the root canal after 2 weeks with calcium hydroxide ($Ca(OH)_2$) intracanal dressing.

Figure 4: The periapical radiolucency decreased after the $Ca(OH)_2$ dressing was left in the root canal for 12 weeks.

Figure 5: Radiograph showing canal obturation and bone healing 24 weeks after initiation of treatment.

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QUESTION 3

Intraoral and perioral piercings: What can I say and what can I do?

Background

The ancient practice of body piercing has become common in Western cultures in the past decade, particularly among adolescents and young adults of all socioeconomic levels. Cultural ideals largely influence the types of piercing that are common in different parts of the world. In North America and Europe, piercing is done for self-expression, fashion, pleasure, individuality and spirituality and also "just for kicks." Common intraoral and perioral locations for piercing include the tongue and lip (**Fig. 1**); less common sites include the cheek, labial and lingual frenula (**Fig. 2**), and uvula.

Dentists should be aware of piercing procedures, the associated risks and the management of complications. For example, the person may not receive adequate instructions for post-piercing care, which leads to a greater risk of complications. Patients with complications of oral piercing are usually sent to dentists because either the physician is uncomfortable treating oral complications or the complication mimics a dental problem.

What to Say to Patients with Piercings

Patients with intraoral and perioral piercings should be cautioned about potential injuries to the dental hard and soft tissues and the risks of infection. Levin and others[1] reported that among 389 patients with piercings, 225 (57.8%) were unaware of the dangers of intraoral piercing, and several case reports have documented oral and systemic complications. These complications include hemorrhage leading to hypotensive collapse, nerve damage, infectious disease (HIV infection, hepatitis, tetanus), hypertrophic scarring, mucogingival defects, fractured teeth, cracked tooth syndrome, tooth abrasion, speech modification, interference with airway management, infection, Ludwig's angina, endocarditis, hyperplasia requiring surgical removal of the piercing, or aspiration or ingestion of the hardware.[2]

What to Be Aware of after Piercing

Intraoral and perioral jewellery can cause mucogingival defects.[3] These deformities present on the gingiva as cleft-like defects, recession or no recession in the area of the piercing. More commonly, the defect occurs on the mandibular central incisors, on the lingual aspect for a tongue piercing and on the labial aspect for a labret or lip piercing.[4] Among people with nontraditional body piercing, the most commonly pierced oral sites are the tongue (81%) and the lip (38%).[1] The likelihood of labial gingival recession was 7.5 times greater among people with a labret (lip piercing) than among unpierced individuals.[5]

Treatment for this defect is permanent removal of the oral jewelry and placement of a full-thickness flap or subepithelial connective tissue graft. Patients with oral piercings should undergo routine comprehensive periodontal assessments even if no gingival recession is noted, because severe attachment loss can be inconspicuous.

Oral piercing, particularly tongue piercing, is strongly correlated with chipping, fracture and cracking of the teeth and with incisal abrasion. De Moor and others[6] reported that 80% of patients with tongue piercing manifested some loss of tooth structure and chipping of porcelain crowns. In addition, there appears to be a positive correlation between the length of barbells used in tongue piercing and hard-tissue damage (**Fig. 3**). It has been suggested, though not proven, that acrylic jewelry is less damaging to the hard tissues than metal jewelry (**Fig. 4**). There are case reports of cracked tooth syndrome of the molar in patients with longer-stem barbells placed in the tongue, possibly due to movement of the long stem and the patient's penchant for clenching the

Figure 1 : A tongue barbell and lip ring 3 years after placement.

Figure 2: A maxillary labial frenulum ring 2 years after placement.

Figure 3: A tongue barbell 2 years after placement. Tooth 36 was fractured by the long barbell, which led to the need for endodontic therapy and a crown.

Figure 4: It has been suggested that acrylic balls on tongue barbells (rather than metal balls) will cause less trauma to the hard tissues.

dorsal cap between the teeth.[4] Possible preventive measures include removing the device, placing a shorter bar to prevent biting, and use of a nightguard or splint.

A patient who presented with irregular incisal wear on the maxillary and mandibular lateral and central incisors (discrepancy of 2 mm) was found to have the habit of chewing on a lower lip ring piercing. The patient refused to remove the device but agreed to use a labret piercing instead of a ring to make habitual chewing more difficult. The patient's incisal plane was reconstructed only after the chewing habit was broken.

Oral piercing tends to be associated with deviant behaviour, which may explain reports of patients who remove their oral piercings before dental appointments. Intraoral and perioral piercings should therefore be included in the differential diagnosis for any case of chipped or fractured teeth, cracked tooth syndrome, mucogingival deformities or inflamed soft tissue.

Conclusions

Oral piercing has spread within Western culture over the past decade. This contemporary phenomenon has many implications for those with oral piercings and for oral health care professionals. Dentists need to be able to educate patients on the risks involved and to manage the complications. It is also recommended that all medical and dental practices offer a leaflet or other resource to allow patients to become better informed about oral piercing and its complications.

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QUESTION 4

How can dentists contribute to managing obstructive sleep apnea in children?

Background

Although many children occasionally exhibit benign snoring, this symptom sometimes indicates obstructive sleep apnea syndrome (OSAS). This syndrome is characterized by prolonged or intermittent episodes of partial or full obstruction of the airways during sleep, which affects ventilation and normal sleeping patterns.[1]

Up to 12.1% of children snore, and between 0.7% and 10.3% of all children are reportedly affected by OSAS.[2] OSAS affects girls and boys equally until the age of puberty and begins most frequently between the ages of 2 and 5 years, a period that coincides with peak incidence of hyperplasia of the tonsils and adenoids. This, along with retrognathia, macroglossia and a narrow palate, are risk factors for OSAS in the pediatric population.[3] Affected children may show agitation, enuresis, attention deficit, teeth grinding, difficulties in school, somnolence, growth retardation[3] and even cardiovascular problems.[4]

A dentist evaluating the teeth and surrounding bone structure can screen for OSAS using the most common risk factors and symptoms (**Fig. 1**). The most widely used tool for confirming a diagnosis of OSAS is polysomnography, for which the patient spends the night in hospital, where a number of parameters are recorded during sleep, including respiration, heart activity and brain waves. However, for children, it is usually simpler to measure these variables at home.[3]

Following diagnosis of OSAS, the physician tries to identify contributing medical conditions and evaluates the potential benefits of various treatments. First-line therapy includes treating allergies, dealing with obesity, performing adenoidectomy and tonsillectomy to improve air flow and promoting normal craniofacial development. Second-line therapy may include the use of continuous positive airway pressure (CPAP) devices, which have yielded satisfactory results for many patients and which are well tolerated by children.[5] In conjunction with these treatments, the dentist can work with the doctor and other health care professionals by evaluating the teeth and surrounding bone and recommending the use of appropriate fixed and removable dental appliances. This contribution is all the more important if the patient refuses medical treatment or if medical treatment does not produce satisfactory results.

Dental Management of Sleep Apnea

In adults, mandibular advancement splints such as the Klearway (Great Lakes Orthodontics, Tonawanda, N.Y.), the Silencer (Silencer Products International Inc. Surrey, B.C.), the TAP (Airway Management Inc., Dallas, Tex.) and the SomnoMed MAS (SomnoMed Ltd., Crows Nest, Australia) constitute a good alternative for patients with mild to moderate sleep apnea who refuse or cannot tolerate positive airway pressure treatment. A group of researchers from the American Academy of Sleep Medicine[6] and a systematic review by the Cochrane Collaboration[7] have concluded that, despite their favourable effect in adults, the role of these appliances has yet to be systematically assessed in children; furthermore, their use in growing children may have major limitations.

When a child has an obstruction or narrowing of the upper airways that may be related to an orthodontic problem, such as a Class II skeletal relationship or a constricted hard palate, direct intervention by the dentist becomes necessary.

Of the various pediatric treatments that dentists can provide, 2 minor orthodontic procedures may be used to enlarge the airways and reposition the back of the tongue:

- Myofunctional (or mandibular advancement) appliances may be used to correct a Class II relationship by guiding the mandible to grow more toward the front of the mouth and thus to expand the upper airways.[8]
- Rapid palatal expansion using screw-mounted appliances may be used to enlarge the maxillary arch in the posterior crossbite or to relieve palatal constriction affecting the nasal cavity.[9]

In cases of craniofacial syndromes or malformations, surgery may be necessary. At the end of the child's growth phase, certain clinicians recommend mandibular or bimaxillary advancement surgery to help expand the airways.[10] However, because these approaches are irreversible, they must be undertaken with extreme caution.

In conclusion, although additional studies are needed to evaluate the effectiveness of OSAS treatments in children, it is clear that these patients

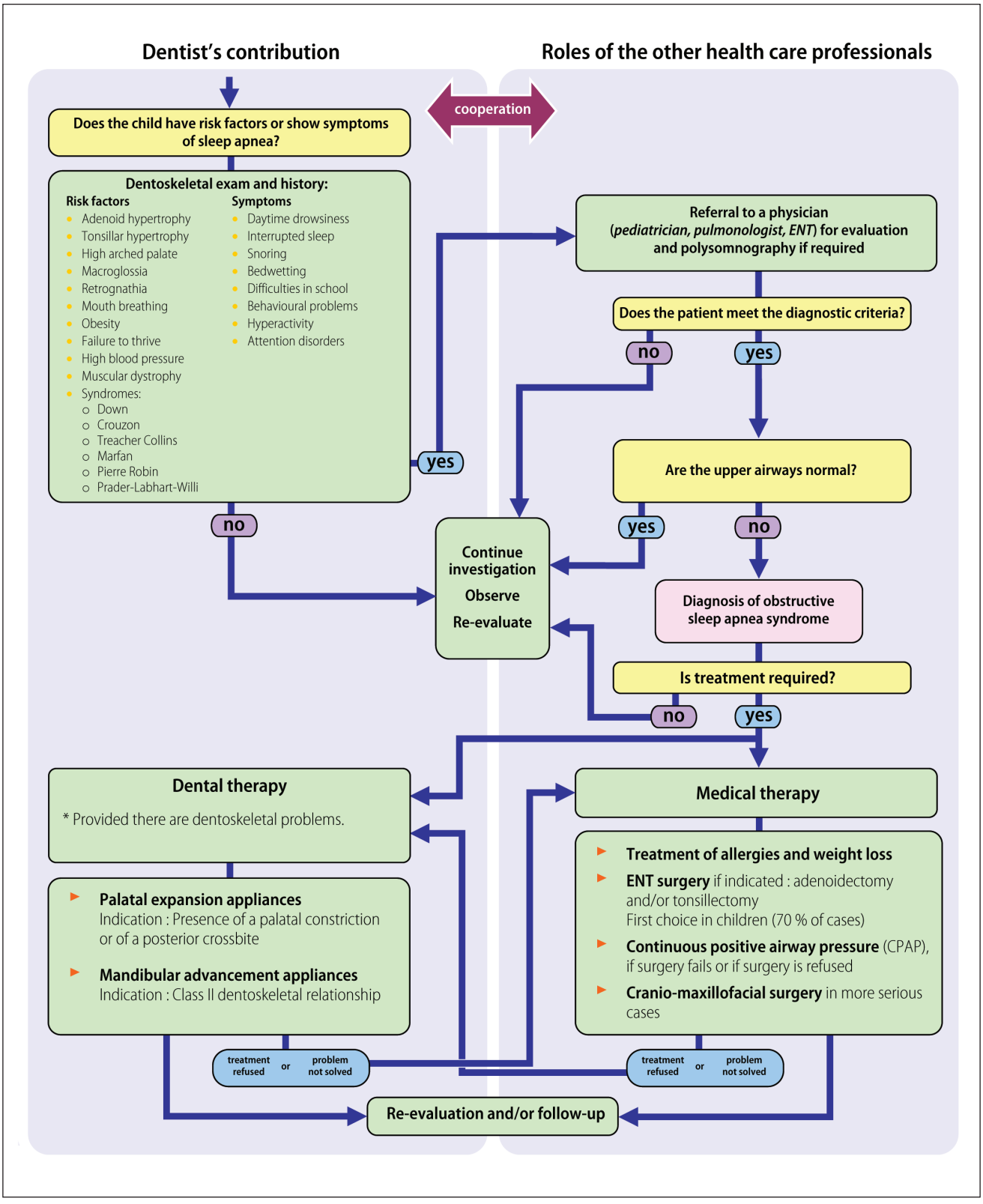

Figure 1: Algorithm for the dental management of sleep apnea in children. ENT = ear, nose and throat.

benefit from a multidisciplinary approach that includes the dentist.

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