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. This month's questions were answered by members of the Canadian Academy of Pediatric Dentistry (CAPD). The CAPD is organizing a conference on early childhood caries and invites all dentists to attend. For more information on the conference, please see opposing page.

QUESTION 1

What is ectopic eruption of the maxillary molars, and how should it be managed?

Background

Ectopic eruption refers to a path of eruption that results in resorption of part or all of the root of the adjacent primary tooth. This condition most often occurs with the first permanent maxillary molars, the mandibular lateral incisors and the maxillary canine. This article focuses on ectopic eruption of the first permanent molar and resorption of the distal root of the second primary molar; in some cases, eruption of this tooth is inhibited by the distal portion of the primary molar crown. The extent of resorption can be seen on a bitewing radiograph but may not be evident on a small film unless it is optimally positioned. The problem can become quite advanced before it is identified, and the patient may report discomfort. It is important to differentiate between ectopic eruption and pericoronitis (**Figs. 1** and **2**).

The reported prevalence of ectopic eruption with the permanent first molar is 3% to 4%. The suggested causes are larger-than-normal teeth, smaller-than-normal maxilla and abnormal angulation of the erupting molar.

In about two-thirds of cases, the ectopically erupting molar "jumps" the distal edge of the primary molar; in this situation, the tooth moves distally and erupts without any intervention. There is usually no pain associated with this condition, although the primary molar may have sufficient root resorption to cause an abscess, through development of a communication between the oral cavity and the pulp of the primary tooth. In many patients, the condition is diagnosed only during the clinical examination and is then confirmed with a bitewing or periapical radiograph showing the ectopically erupting first molar (**Fig. 2**).

Management

Unerupted or Partially Erupted Molar

If the impacted molar has not erupted or is partially erupted, no action is required beyond watching and waiting. In at least half of these cases, the teeth will self-correct, and eruption will proceed normally. Continue to monitor the primary molar for any abnormal signs or symptoms following root resorption. According to Kurol, reversible (self-correcting) ectopic molars will have freed themselves by the time the patient reaches 7 years of age, whereas irreversible (i.e., locked-in) ectopic molars will not resolve. This author recommends that the diagnosis of ectopic eruption be made by the time the child reaches 7 or 8 years of age.

An observation period of 3 to 6 months or longer may be required.

Persistent Blockage of Impacted Molar

If the impacted molar remains blocked, the goal of treatment is to move the ectopically erupting molar away from the second primary molar and to allow it to erupt while maintaining the primary molar. The following treatment options (listed in order of increasing frequency) can be used:

- *Brass-wire separator:* If little or none of the first molar is clinically visible, and only a small amount of movement is required, a 20-mm brass

Figure 1: Partially erupted tooth 16.

Figure 2: Periapical radiograph showing ectopically erupting tooth 16.

wire can be passed through the contact area between the first permanent molar and the second primary molar. Local anesthesia (buccal and palatal) is necessary for the initial procedure. After initial placement, the wire is tightened every 2 weeks until the molar is forced distally and able to erupt. The wire is then removed.

- *Band-and-spring appliance:* If the occlusal surface of the first permanent molar is visible, a band can be placed on the second primary molar with an attached distalizing spring, which is then activated; a metal button on the first permanent molar is used as the point of application of force. The end of the spring can also be bonded to the impacted molar directly, although it can be difficult to obtain a dry surface. The appliance is then evaluated every 2 weeks until the impacted molar is able to erupt. The basic design of the band-and-spring appliance can also be incorporated into a bilateral appliance if additional stability or maintenance of leeway space is required.
- *Extraction of the second primary molar:* Extraction of the second primary molar is sometimes the only treatment possible, if resorption of this tooth is too extensive to allow the tooth to be salvaged. Space loss is certain in these cases, so a plan is needed to handle the deficiency. Allowing the first permanent molar to erupt and then placing a space-regaining appliance is usually the best option. Distal shoe space maintainers do not regain the space lost and may be difficult to place. A periapical radiograph is essential to determine whether the second permanent premolar is present; if it is congenitally absent, the first permanent molar can be allowed to drift mesially without any need for space maintenance.

In summary, ectopic molars are usually predictors of a future discrepancy between tooth size and arch length; an orthodontic referral may be indicated.

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Further Reading

Casamassimo PS, Christensen JR, Fields HW Jr. Treatment planning and management of orthodontic problems. In: Pinkham JR, Casamassimo PS, McTigue DJ, Fields HW Jr, Nowak A, editors. Pediatric dentistry. 4th ed. Philadelphia: W.B. Saunders Company; 2005. p. 477–512.

Dean JA, McDonald RE, Avery Dr. Management of the developing occlusion. In: McDonald RE, Avery DR, editors. Dentistry for the child and adolescent. 8th ed. St. Louis: C.V. Mosby Company; 2004. p. 659–61.

Kennedy DB, Turley PK. The clinical management of ectopically erupting first permanent molars. *Am J Orthod Dentofacial Orthop* 1987; 92(4):336–45.

Kurol J. Early treatment of tooth-eruption disturbances. *Am J Orthod Dentofacial Orthop* 2002; 121:588–591.

QUESTION 2

What is the best method for restoring extensive carious lesions on primary molars?

Background

Because of their durability, stainless steel crowns are the most economical restoration for primary molars.[1] Nevertheless, many parents and some dentists do not favour their use. Because of the narrow buccolingual dimensions and the relatively flat interproximal contour of the primary molars, restoration of interproximal carious lesions of moderate severity may result in overextended Class II restorations with unsupported enamel at the buccal and lingual margins. Under function, loss of the unsupported marginal enamel leads to open margins and subsequent recurrence of decay. This may in turn lead to failure of the restoration and possibly pulp necrosis of the tooth (**Figs. 1** and **2**). Stainless steel crowns are effective restorations for primary molars with multisurface carious lesions, interproximal lesions that have undermined the marginal ridge or extensive dental caries; they are also appropriate for pulp-treated molars and decayed molars with cervical decalcification.

Despite the clinical utility of stainless steel crowns, only a small proportion of general dentists consider them as a restorative option. For example, only 7% of British general dentists presented with a case scenario for which published national guidelines recommended a stainless steel crown stated that they would place this type of crown. Participants in the exercise offered a number of reasons for avoiding this type of crown, including difficulty in fitting the crowns and poor esthetic results.[2]

Placement of a Stainless Steel Crown

Although the unappealing appearance of a stainless steel crown is the main reason for parental objections, the esthetic limitations are often accepted when the shortcomings of extensive intracoronal restorations and the benefits of the stainless steel option are explained. Parents often do not understand the differences between a preformed stainless steel crown, which can be placed during a single appointment, and the precious metal or ceramic crowns used for permanent teeth, which require multiple appointments. They usually consent to a stainless steel crown when they learn that the fee and the time required are less than for permanent crowns. Parents are also motivated to accept a stainless steel crown when they are informed of the lower risk of retreatment

Figure 1: Isthmus fracture in an overextended mesio-occluso-distal restoration on a mandibular second primary molar. The tooth was abscessed, as indicated by the parulis, and was extracted.

Figure 2: Overextended disto-occlusal restoration on a mandibular first primary molar resulted in loss of unsupported enamel at the distobuccal margin of the restoration. Placement of a stainless steel crown is indicated to remedy the failed Class II restoration.

Figure 3: Preparation for placement of a stainless steel crown in the mandibular right first primary molar. Occlusal reduction has yielded a relatively flat occlusal surface (in this case, a calcium hydroxide liner was applied in the areas of deepest caries excavation). Circumferential reduction has been completed to just below the gingival margin. The bur can pass easily through the mesial and distal interproximal contact points, which indicates adequate interproximal reduction.

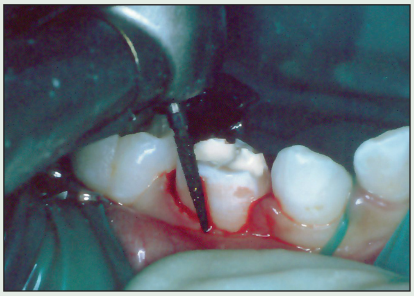

Figure 4: The buccal prominence is reduced but not eliminated. The subgingival constriction of the tooth is required for retention of the stainless steel crown.

Figure 5: This mandibular molar crown is seated from the lingual to the buccal aspect of the molar to allow easy placement of the stainless steel crown.

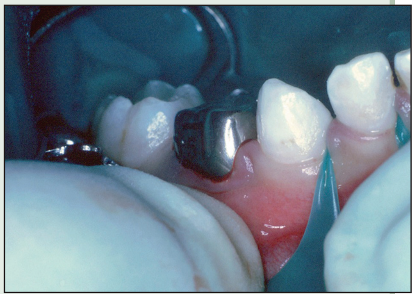

Figure 6: The finished stainless steel crown, with excess cement removed.

relative to large Class II restorations, especially for the first primary molars.

Consider the following suggestions to simplify fitting and placement of a stainless steel crown:

1. Use a precrimped and precontoured stainless steel crown.
2. Perform adequate occlusal reduction (approximately 1.5 mm). For simplicity, the occlusal surface can be reduced until it is relatively flat.
3. Apply minimal taper to the circumferential crown preparation. Circumferential reduction should extend to just below the gingival margin; this process should remove sufficient enamel and/or dentin to allow the bur to pass easily through the mesial and distal interproximal contact areas (**Fig. 3**).
4. A functional cusp bevel or additional reduction of the mandibular buccal and maxillary palatal cusps will be required.
5. Reduce but do not eliminate the buccal prominence (**Fig. 4**). The subgingival cervical constriction provides retention for the crown.
6. Smooth and contour the line and point angles to prevent interferences during seating of the crown.
7. Seat the maxillary crowns by engaging the buccal margin of the crown against the buccogingival aspect of the molar and rotating the crown in a palatal direction. For mandibular crowns, engage the lingual margin of the crown on the lingual aspect of the preparation, and seat the crown by rotating it from the lingual to the buccal aspect of the molar (**Fig. 5**).
8. Use the smallest crown size that will seat completely.
9. Remove all excess cement expressed from the gingival margin before the cement sets fully.

Satisfactory fit of a stainless steel crown is made possible through well-adapted margins, mesial and distal contact, proper occlusion and gingiva that are not blanched (**Fig. 6**). As with all clinical procedures, proficiency comes with practice and training. However, dentists who institute stainless steel crowns for primary molars and improve their facility with placement will soon see the short-term and long-term benefits.

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References

1. Randall R. Preformed metal crowns for primary and permanent molar teeth: review of the literature. *Pediatr Dent* 2002; 24(5):489–500.

2. Threlfall AG, Pilkington L, Milsom KM, Blinkhorn AS, Tickle M. General dental practitioners' views on the use of stainless steel crowns to restore primary molars. *Br Dent J* 2005; 199(7):453–5.

QUESTION 3

When is it appropriate to use nitrous oxide and oxygen inhalation for children?

Background

The family dentist must often provide dental treatment to anxious, frightened or even uncooperative children. Even among children who are cooperative at the initial appointment, behaviour may deteriorate if a series of dental appointments is required to treat a specific condition.[1] Hence, the need to manage children's anxiety and thus to foster the development of healthy attitudes toward dentistry is paramount.

The use of inhalational sedation with nitrous oxide and oxygen is both effective and generally safe. Such sedation may reduce anxiety, provide some analgesia and help the child to sit still for treatment.[2] It may also help the child accept procedures perceived as unpleasant, such as injection of local anesthetic. Ideally, the patient is in a state of analgesia and anxiolysis: conscious and able to respond normally to verbal commands, with stable vital signs and no significant risk of losing protective reflexes, and able to return to pretreatment mobility.[3–7]

Nitrous oxide is a colourless gas with a weak sweet smell. It causes central nervous system (CNS) depression and euphoria with little effect on the respiratory system or the protective reflexes of the airway.[2–7] Uptake is rapid, and it is absorbed quickly from the alveoli and is held in solution in the serum. Nitrous oxide is relatively insoluble, passing down a gradient into other tissues and cells in the body, such as the CNS. It is excreted quickly from the lungs. Nitrous oxide has minimal effect on blood pressure, causing a slight increase in peripheral resistance and a slight decrease in cardiac output.[2–7]

Nitrous oxide sedation has a quick onset and recovery (within 2 to 3 minutes), and the drug can be titrated easily. Most children will accept nitrous oxide and oxygen inhalation therapy and are enthusiastic about the experience; they sometimes report dreaming or being on a "space ride."[7] However, other children will not accept this type of sedation, becoming distressed by feelings of loss of control or claustrophobia. Some children find the nasal mask confining and unpleasant.[8] Before deciding to use nitrous oxide and oxygen inhalation therapy, the dentist should consider the following factors: alternative behavioural management options, the extent of the planned dental treatment, the effect on quality of dental care, and the patient's emotional development as well as physical condition.

Although nitrous oxide and oxygen inhalation therapy has many uses for certain groups of children (**Box 1**), it has several limitations. The drug is not very potent, and the dentist must also use traditional (nonpharmacologic) behaviour management techniques, including "tell, show, do" and positive reinforcement. The patient must have no nasal obstructions, be willing to wear the nasal mask and be willing to breathe through the nose. The nasal mask may interfere with local anesthesia by infiltration for the maxillary anterior teeth.

Box 1 Uses of nitrous oxide and oxygen inhalation therapy[2]

• To reduce or eliminate anxiety
• To reduce physical reactions to dental treatment
• To enhance communication and patient cooperation
• To raise the patient's pain reaction threshold
• To increase the patient's tolerance for longer appointments
• To aid in the treatment of mentally or physically disabled or medically compromised patients
• To reduce gagging
• To potentiate the effect of other concomitant sedatives

Assessment of Patients

Children who may benefit from nitrous oxide and oxygen inhalation therapy[2] include those who are potentially cooperative but fearful or anxious; patients with mental, physical or medical special health care needs; patients whose gag reflex interferes with dental treatment; patients for whom profound local anesthesia cannot be achieved; and cooperative children undergoing lengthy procedures.

It is important to review the patient's medical history and perform a physical assessment (**Box 2**) before administration of nitrous oxide and oxygen inhalation therapy. In addition, the presence of any contraindications should be verified (**Box 3**).

Whenever possible, appropriate medical specialists should be consulted before administering analgesic or anxiolytic agents to patients with

Box 2 Assessment of patient before administration of nitrous oxide and oxygen sedation

Medical history
• Allergies and previous allergic or adverse drug reactions • Current medications, including dose, time, route and site of administration • Diseases, disorders or physical abnormalities; pregnancy status • Details of previous hospital admission, including date and reason
Physical assessment

• Respiratory system
  · Airway patency (nasal and oral)
  · Brodsky tonsil and adenoid classification[9]
  · Breath sounds on inspiration and expiration
• NPO (nothing by mouth) status

Box 3 Contraindications to use of nitrous oxide and oxygen sedation

• Young age (< 2 years)
• Moderate or extreme uncooperativeness
• Inability to breathe through the nose with the mouth open
• Chronic obstructive pulmonary disease
• Severe emotional or psychiatric disturbance
• Substance abuse
• First trimester of pregnancy[10]
• Treatment with bleomycin sulfate[11]

significant underlying medical conditions (e.g., severe obstructive pulmonary disease, congestive heart failure, sickle cell disease,[12] acute otitis media or recent tympanic membrane graft[13]).

Informed consent must be obtained from the parent and must be documented in the patient's chart. Pretreatment dietary precautions must be taken before the appointment. The patient's record must include the indication for use of nitrous oxide and oxygen, the dose administered, the duration of the procedure and the post-treatment oxygenation procedure.

Administration of Nitrous Oxide and Oxygen

Nitrous oxide and oxygen should be administered only by appropriately licensed individuals (or under their direct supervision), according to provincial law or the guidelines of the provincial licensing body. The responsible dentist must be trained in the use of such agents and appropriate emergency response should a problem occur.

Selection of an appropriately sized nasal mask will help to ensure that the child actually receives the delivered gas and will prevent leakage into room air. An oxygen flow rate of 5 to 6 L/min is acceptable to most patients. Nitrous oxide is added to the oxygen by titration until the desired effect is achieved. The total flow rate can be adjusted after observation of the reservoir bag. The bag should pulsate gently with each breath and should not be either over- or under-inflated. Initiation with 100% oxygen for 1 to 2 minutes followed by titration of nitrous oxide in 10% intervals is recommended. During analgesia/anxiolysis induced by nitrous oxide and oxygen, the concentration of nitrous oxide should not routinely exceed 50%. The nitrous oxide concentration may be lower during easier procedures (e.g., restorations) and higher during more stimulating ones (e.g., extraction, injection of local anesthetic). During treatment, the patient's respiratory rate and level of consciousness should be monitored visually. Once the flow of nitrous oxide is terminated, 100% oxygen should be delivered for 3 to 5 minutes.[3] Nitrous oxide is 34 times more soluble than nitrogen in the blood, and diffusion hypoxia may occur. The patient must regain pretreatment responsiveness before discharge.

The patient's response to commands serves as a guide to the level of consciousness. Continual clinical observation of responsiveness, colour, and respiratory rate and rhythm are required. Pulse oximetery may be used. If any other pharmacologic agent is used, or if the patient is taken to a deeper level of sedation, monitoring guidelines appropriate for the level of sedation must be followed.[14]

An appropriate scavenging system is needed to avoid nitrous oxide pollution and health hazards related to occupational exposure. Both delivery and scavenging equipment must be periodically evaluated and maintained.

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References

1. Venham L, Bengston D, Cipes M. Children's response to sequential dental visits. *J Dent Res* 1977; 56(5):454–9.

2. American Academy of Pediatric Dentistry Council on Clinical Affairs. Guideline on appropriate use of nitrous oxide for pediatric dental patients. *Pediatr Dent* 2005-2006; 27(7 Reference Manual):107–9.

3. Paterson SA, Tahmassebi JF. Paediatric dentistry in the new millennium: 3. Use of inhalation sedation in paediatric dentistry. *Dent Update* 2003; 30(7):350–6, 358.

4. Krauss B, Green SM. Sedation and analgesia for procedures in children. *N Engl J Med* 2000; 342(13):938–45.

5. Mace SE, Barata IA, Cravero JP, Dalsey WC, Godwin SA, Kennedy RM, and others. Clinical policy: evidence-based approach to pharmacologic agents used in pediatric sedation and analgesia in the emergency department. *J Pediatr Surg* 2004; 39(10):1472–84.

6. Kinouci K, Tanigami H, Tashiro C, Nishimura M, Fukumitsu K, Takauchi Y. Duration of apnea in anesthetized infants and children required for desaturation of hemoglobin to 95%. The influence of upper respiratory infection. *Anesthesiology* 1992; 77(6):1105–7.

7. Hogue D, Ternisky M, Iranour B. The responses to nitrous oxide analgesia in children. *J Dent Child* 1971; 38(2):129–33.

8. Stach DJ. Nitrous oxide sedation: understanding the benefits and risks. *Am J Dent* 1995; 8(1):47–50.

9. Brodsky L. Modern assessment of tonsils and adenoids. *Pediatr Clin North Amer* 1989; 36(6):1551–69.

10. Rowland AS, Baird DD, Shore DL, Weinberg CR, Savitz DA, Wilcox AJ. Nitrous oxide and spontaneous abortion in female dental assistants. *Am J Epidemiol* 1995; 141(6):531–7.

11. Fleming P, Walker PO, Priest JR. Bleomycin therapy: a contraindication to the use of nitrous oxide-oxygen psychosedation in the dental office. *Pediatr Dent* 1988; 10(4):345–6.

12. Ogundipe O, Pearson MW, Slater NG, Adepegba T,Westerdale N. Sickle cell disease and nitrous oxide-induced neuropathy. *Clin Lab Haematol* 1999; 21(6):409–12.

13. Fish BM, Banerjee AR, Jennings CR, Frain I, Narula AA. Effect of anaesthetic agents on tympanometry and middle-ear effusions. *J Laryngol Otol* 2000; 114(5):336–8.

14. American Academy of Pediatrics; American Academy of Pediatric Dentistry, Cote CJ, Wilson S; Work Group on Sedation. Guidelines for monitoring and management of pediatric patients during and after sedation for diagnostic and therapeutic procedures: an update. *Pediatrics* 2006; 118(6):2587–602.

QUESTION 4

What is the best management approach for molar incisor hypomineralization?

Background

Developmental defects affecting first permanent molars are common in children and adolescents. These defects are variously described as "hypoplastic," "hypomineralized," "non-fluoride hypomineralized" or "cheese" molars. However, the term molar incisor hypoplasia (MIH) is now commonly used to refer to hypomineralization of 1 or more of the first permanent molars; MIH may also often involve incisor teeth and not necessarily result in a macroscopic defect of tooth tissue.[1]

The cause of these defects is unclear. Although genetic factors have been linked to such defects as amelogenesis imperfecta, environmental influences are more difficult to identify. Exposure to high levels of dioxins (in breastmilk), respiratory diseases, brain hypoxia and childhood illnesses have all been associated with enamel defects.[2,3]

Clinically, such defects are seen as white-yellow or yellow-brown demarcated opacities that vary greatly in their distribution, size, colour and shape. The enamel is soft and, on eruption, chips away easily exposing dentin. These teeth are porous, more susceptible to plaque accumulation and at high risk of becoming carious.[4]

Although the removal of these compromised first permanent molars is often the preferred option, the timing of such extractions should form part of a comprehensive orthodontic strategy. As such, these teeth must be maintained without sensitivity and with minimal posteruptive breakdown until they can be electively removed or definitively restored.

Figure 1a: Newly erupted permanent incisors with evidence of opacities on the labial surfaces.

Figure 1b: On eruption of the upper first permanent molars, both molars had evidence of significant developmental disruption.

Early Identification of MIH

Regular dental reviews around the time of eruption of the first permanent molars and incisors are needed to identify the problem early. It is particularly important that parents of children with a coexisting special health care need (e.g., a chronic medical condition or disability) are informed of the increased risk of MIH and its consequent impact on caries risk. When incisors erupt before the molars, the presence of an opacity on the labial surface of a newly erupted incisor is another strong indicator of MIH (**Figs. 1a** and **1b**).

Prevention of Caries

MIH poses a very high risk of dental caries. Preventive strategies should promote exposure to fluoride (the use of adult strength toothpaste at around 1000 ppm F^-), parental assisted toothbrushing and a reduction in the frequency of exposure to cariogenic substrates. The use of warm water when brushing can reduce the sensitivity of these teeth, which is a disincentive to effective oral hygiene.

Promotion of Mineralization

Promoting mineralization of affected enamel through the uptake of calcium and phosphate will potentially enhance the enamel's mechanical properties and reduce susceptibility to further breakdown. The development of casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) technology provides a way to deliver calcium and phosphate to the tooth surface in a supersaturated medium stabilized by casein phosophopeptide.[5] In addition to promoting mineralization, CPP-ACP will further inhibit carious demineralization. Products incorporating this technology include MI Paste (GC Corporation, Tokyo, Japan) and Trident Chewing Gum (Cadbury Adams USA LLC, Parsippany, N.J.). Although clinical data on these products are limited, anecdotal evidence supports the application of MI Paste at least twice daily directly to affected teeth as being associated with a rapid reduction in sensitivity in affected children, which in turn optimizes oral hygiene. MI Paste is best applied digitally,

Figure 2: Lower arch view of a young patient with MIH affecting the 2 first permanent molars, protected with Fuji VII (examples of both the pink and white types).

Figure 3a: Preoperative view of an early mixed dentition showing caries superimposed on hypomineralized first permanent molars.

Figure 3b: Maxillary view of the same child, 2 years after placement of stainless steel crowns.

rather than via a toothbrush, as it has a viscous consistency that tends to clog in the bristles.

Maintenance of Existing Tooth Structure

The restoration of molars with MIH poses significant challenges. Traditionally, management has been surgical with the removal of compromised tissue and its replacement with a restorative material. However, the success of conventional restorative techniques is compromised in these teeth. Amalgam, being non-adhesive, requires the removal of excessive tooth tissue for mechanical retention, leaving the residual tooth vulnerable to fracture. The quality and integrity of the interface between resin-based restorative materials and hypomineralized enamel is also inadequate,[6] leading to microleakage, marginal breakdown, sensitivity, reinfection and further deterioration.[7]

Clinically, not only are these teeth often extremely sensitive and require the use of robust local analgesia, but they are also often difficult to access physically in young patients. Temporization and maintenance of existing tooth structure can be achieved in these suboptimal clinical conditions through the use of glass ionomer cements and, in particular, the low-viscosity autocured Fuji VII (GC Corporation). This material, which is promoted for protection of fissures, allows asymptomatic preservation of the compromised molar for many years with regular maintenance (**Fig. 2**).

If a more definitive, although still temporary, restoration is required, the solution probably lies in the preformed metal crown (**Figs. 3a** and **3b**). However, placement of such a crown requires excellent analgesia and patient cooperation, which may not be forthcoming. In addition, consideration must be given to the long-term management of teeth restored in this fashion. If the tooth is maintained into adulthood, it can present significant challenges to the adult prosthodontist and may still require extraction and replacement with other forms of prostheses such as an implant.

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References

1. Weerheijm KL, Jalevik B, Alaluusua S. Molar-incisor hypomineralisation. *Caries Res* 2001; 35(5):390–1.
2. Holtta P, Kiviranta H, Leppaniemi A, Vartiainen T, Lukinmaa PL, Alaluusua S. Developmental dental defects in children who reside by a river polluted by dioxins and furans. *Arch Environ Health* 2001; 56(6):522–8.
3. Jalevik B, Noren JG, Klingberg G, Barregard L. Etiologic factors influencing the prevalence of demarcated opacities in permanent first molars in a group of Swedish children. *Eur J Oral Sci* 2001; 109(4):230–4.
4. Leppaniemi A, Lukinmaa PL, Alaluusua S. Nonfluoride hypomineralizations in the permanent first molars and their impact on the treatment need. *Caries Res* 2001; 35(1):36–40.
5. Reynolds EC. Remineralization of enamel subsurface lesions by casein phosphopeptide-stabilized calcium phosphate solutions. *J Dent Res* 1997; 76(9):1587–95.
6. William V, Burrow MF, Palamara JE, Messer LB. Microshear bond strength of resin composite to teeth affected by molar hypomineralization using 2 adhesive systems. *Pediatr Dent* 2006; 28(3):233–41.
7. Mejare I, Bergman E, Grindefjord M. Hypomineralized molars and incisors of unknown origin: treatment outcome at age 18 years. *Int J Paediatr Dent* 2005; 15(1):20–8.