observed were often considered distressing to the patient and relatives.

Procedures

All described oral care procedures, with the most common being use of a swab or sponge to clean and moisten the mouth. Ice chips and/or frozen juices were also used. In addition, lip balm was applied to relieve mouth dryness. Most descriptions did not provide details of the procedure. A discussion forum that offered more detail was begun by the wife of a cancer patient who was asking how to help her husband through chemotherapy and radiotherapy. The forum participants directed her to specific procedures to manage loss of taste sensation, painful mouth ulcers, difficulty swallowing, and mucositis. One blog described procedures as simply part of the hospice regulations, but they were being delivered at irregular times and could be dangerous for the patient.

Emotions

Participants tended to have a neutral attitude and feelings toward oral care procedures described as technical acts to address symptoms and provide routine care. However, many authors expressed their emotions related to oral care. One felt a general sense of anger toward the hospice staff and described the oral procedures as irregular, incorrect, and dangerous. One mentioned the disgust of some family members when she swabbed her grandmother's mouth, which was done to appease her family because they wanted the patient to be more comfortable. Other emotions included worry, guilt, and trauma. One author worried that her actions caused her father unnecessary distress. Another expressed guilt related to being unable to do anything to help as the loved one was dying a painful death.

The emotional responses could not be separated from the context of the reports. Most of the palliative care patients were terminally ill, which influenced the expressions of emotion.

DISCUSSION

Palliative care is designed to provide relief from pain, stress, and other symptoms. It's aimed at delivering a better quality of life for the terminally ill patient and his or her family. From the descriptions of oral care delivery and oral conditions given in these blogs and discussion forums, it appears that these patients are not receiving sufficient attention to their oral health needs. In addition, the families are not experiencing a better quality of life as they visit with their terminally ill relatives.

Clinical Significance

There is little information to guide oral care delivery to terminally ill patients. Some information has been suggested by the World Health Organization and the National Institute for Health and Care Excellence (NICE) in England, but these sources rely more on expert opinion than on any evidence-based guidance. These preliminary insights into the area of oral health for palliative care patients should spark others to perform the much needed research in this area so that oral care can be undertaken before the palliative care patient's quality of life becomes compromised by unaddressed or poorly addressed oral symptoms.

Bernardes Delgado M, Burns L, Quinn C, et al: Oral care of palliative care patients—Carers' and relatives' experiences. A qualitative study. *Br Dent J* 224:881-88, 2018

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PEDIATRIC DENTISTRY

Managing unerupted maxillary incisors

BACKGROUND

Often failure of eruption of the maxillary incisors is noticed in children age 7 to 9 years. Reasons for eruption failure include space loss, obstruction, and trauma. Although no high-quality randomized clinical trials have investigated treatment interventions for this problem, the clinical guidelines for the management of unerupted maxillary incisors in children were recently updated by the Clinical Governance Directorate of the British Orthodontic Society through the Faculty of Dental Surgery at the Royal College of Surgeons of England (FDSRCS Eng). A review of the diagnostic approach, management options, and recommendations for practice was offered.

DIAGNOSTIC CONSIDERATIONS

When more than 6 months has elapsed since a child's maxillary incisor has erupted, the maxillary incisors have not erupted more than 1 year after the mandibular incisors, or the normal eruption sequence has deviated significantly, the dental

Box 1. Local Factors Associated with Delayed Eruption of the Maxillary Incisors

Early extraction or loss of primary teeth (with or without space loss)
Prolonged retention of primary teeth
Crowding in the upper labial segment
Previous trauma
Localised pathology (supernumerary teeth, odontomes, cystic formation)

(Courtesy of Seehra J, Yaqoob O, Patel S, et al: National clinical guidelines for the management of unerupted maxillary incisors in children. *Br Dent J* 224:779-785, 2018.)

professional should be concerned. Several local factors are associated with delayed eruption of the maxillary incisors (Box 1 and Fig 1). Among the more common are physical obstruction caused by supernumerary teeth or odontomes, trauma to the primary dentition contributing to dilacerations of the permanent successor(s), cleft lip and palate, and systemic conditions that cause multiple supernumerary teeth as part of their oral manifestation. Historically, the maxillary central incisor is the third most commonly impacted tooth. In addition, failure of eruption associated with maxillary permanent incisors is more common when other inherited dental anomalies are also present.

The cause of eruption failure is determined through a detailed medical and dental history, a careful intraoral examination, and intraoral radiographs as indicated. The history should document any hereditary or environmental factors as well as any trauma the patient suffered. Clinical features to be noted include spacing and rotations of teeth as well as displacement of permanent teeth. Labial or palatal swellings may also indicate the site of an unerupted incisor. Having angled or inclined adjacent teeth can reduce the availability of space for a permanent maxillary incisor.

Clinicians should obtain periapical views and/or an upper standard occlusal radiograph to determine the presence and position of maxillary incisor teeth and underlying developmental anomalies or pathologic conditions. A cephalometric radiograph can help locate and assess unerupted, malformed, or misplaced incisors. If further information is needed, the use of cone beam computed tomography (CBCT) can provide clear 3-dimensional views of impacted and ectopic teeth and associated structures. For dilacerations of an incisor root, CBCT can help in treatment planning. However, because the effective dose of radiation is greater with CBCT than with conventional radiographs, it should only be prescribed when the information needed cannot be adequately obtained using lower-dose imaging.

MANAGEMENT

Principles of Management

The general principles for the management of delayed eruption of impaction of the permanent maxillary teeth are (1) provision of adequate space in the dental arch and (2) removal of any obstruction to eruption. Specific considerations include whether to further promote eruption through surgical exposure of the incisor and whether orthodontic traction should be employed. Definitive treatment must take into account patient factors (medical history, age, and compliance) as well as dental factors

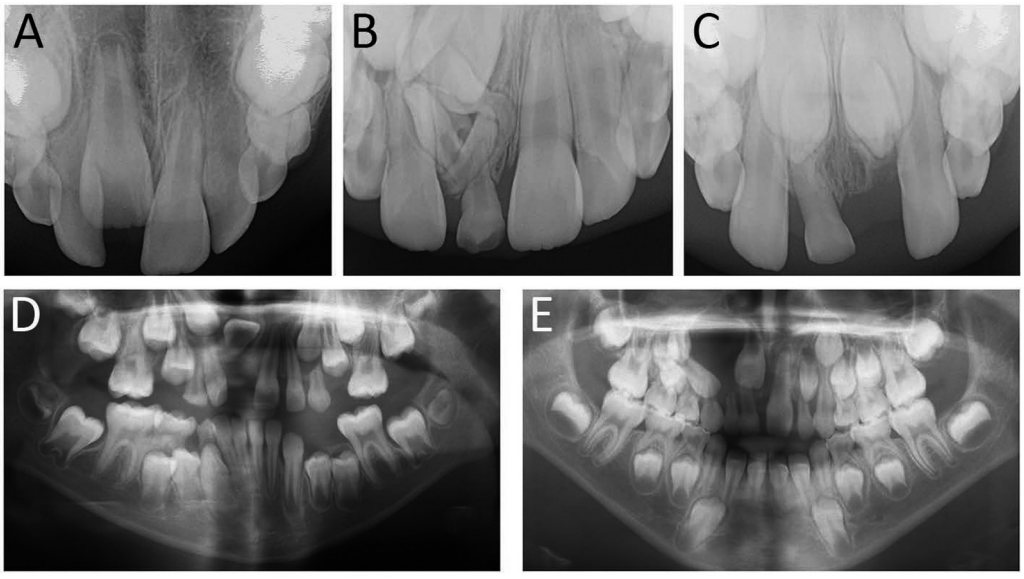

Figure 1. A, Delayed eruption of an 11 due to localized space loss. **B,** Delayed eruption of an 11 due to the presence of multiple supernumerary teeth. **C,** Delayed eruption of both maxillary central incisors due to the presence of paired tuberculate supernumerary teeth. **D,** Dilaceration of an 11 due to previous trauma. **E,** Cystic region in the anterior maxilla impeding eruption of the 11 and causing displacement of the 12. (Courtesy of Seehra J, Yaqoob O, Patel S, et al: National clinical guidelines for the management of unerupted maxillary incisors in children. *Br Dent J* 224:779-785, 2018.)

(retained primary teeth, position of the impacted incisor, developmental stage of the impacted tooth, nature of any obstruction to eruption, and unfavorable root formation).

Options

Any obstruction hindering eruption or causing impaction should be removed. Usually the obstruction is caused by a supernumerary tooth or odontome. Generally, once removal is accomplished, between 49% and 91% of permanent maxillary incisors will erupt spontaneously. The time to eruption can be as long as 18 months. To obtain the best results, removal should be accomplished with minimal disturbance of the follicle of the unerupted incisor, although no evidence indicates this to be required.

Should space creation be required along with removal, space can be created with a simple removable appliance or with fixed appliances with or without extraction of the primary canines. Overall treatment time is significantly reduced by using fixed orthodontic appliances before surgical intervention.

Orthodontic Treatment

Surgical exposure of the maxillary incisor tooth may be indicated after the obstruction has been removed. Usually, early orthodontic traction enhances facilitated eruption. However, no evidence indicates whether unerupted permanent maxillary incisors should be surgically exposed when the obstruction is removed or if spontaneous eruption should be allowed to occur first. Between 30% and 54% of impacted permanent maxillary incisors require further surgical intervention to accomplish eruption. The surgeon should weigh the known risks of repeat general anesthesia against the possible advantages of performing surgical exposure and bonding of an orthodontic attachment at the surgery for the removal of supernumerary teeth. The attachment can be used later if needed to align the incisor, avoiding a second exposure to general anesthesia. The success of surgical exposure plus orthodontic traction exceeds 90%, with height of the impacted incisor influencing duration of treatment.

Either an open exposure or closed eruption procedure can be used to promote the eruption of maxillary incisors. Open exposure is useful when there is soft tissue impaction and the tooth occupies a superficial position just under the mucosa. In closed eruption, the surgeon raises a mucoperiosteal flap incorporating the attached gingiva and bonds an attachment to the impacted incisor before the flap is replaced into original position. The attachment should include a gold chain or traction ligature to facilitate the application of orthodontic force. Longitudinal comparisons of closed versus open eruption show longer clinical crowns and decreased bone support when open eruption is performed.

One consideration is whether the incisor must be removed, which will require the retention of space for later replacement. Either a fixed or removable prosthesis can be used initially, but an implant-retained prosthesis may be considered for long-term space maintenance.

In addition, if the unerupted permanent maxillary incisors are ankylosed, various treatment options can be tried. These include a watch-and-wait protocol with possible composite build-up for minor infraocclusion, repositioning of the ankylosed incisor, extraction followed by orthodontic space closure, decoronation of the incisor to preserve the width and vertical height of the alveolar bone, and extraction followed by replacement with a conventional or implant prosthesis. The effectiveness of each of these various interventions is as yet lacking high-level evidence.

Autotransplantation can provide a physiologically sound tooth and maintain the alveolar process. The long-term survival rates are good with this approach. The main disadvantage is poor morphology of the tooth, which will require extensive restoration. Functional occlusion can also be compromised, or rapid external root resorption can develop, leading to premature loss of the transplanted tooth.

RECOMMENDATIONS

The guidelines developed from current evidence are as follows:

- Patients age 7 to 9 years with unerupted permanent maxillary incisors should be evaluated for the presence of any space deficiency or obstruction inhibiting eruption. Vertical position, displacement, and root development of the impacted incisor should also be investigated. Presence of a supernumery tooth is the most common cause of obstructed eruption.
- For patients under age 9 years with an immature permanent maxillary incisor, the dentist should observe the site for 9 to 12 months to see if spontaneous eruption occurs before taking further steps.
- For patients age 9 years or older with an unerupted permanent maxillary incisor, the dentist should consider surgical exposure plus bonding of an orthodontic attachment, especially if the unerupted incisor is high.
- The dental surgeon should minimize the number of surgical interventions and accomplish as much as possible in a single operation whenever feasible.

Clinical Significance

Unerupted or impacted permanent maxillary incisors can occur in response to developmental and/or environmental factors. The result is poor dental and facial esthetics, compromised malocclusion, and loss of space for either an eventual eruption or a replacement. The best course of action should be undertaken early in the patient's dental care. This will help to obtain the best dental, functional, esthetic, and psychosocial benefits for the patient.

- Because younger patients may have difficulty complying with surgery and traction with a removable or fixed appliance, the dentist should carefully assess each individual patient's capabilities and maturity.
- Any dilacerated permanent maxillary incisors should be aligned in the dental arch using a closed surgical approach and orthodontic traction if possible.
- A multidisciplinary approach ensures that all aspects of care are considered, which can affect timing of interventions, best choice of surgery, and best position of any attachment, all of which will optimize the chance of obtaining a favorable outcome.

Seehra J, Yaqoob O, Patel S, et al: National clinical guidelines for the management of unerupted maxillary incisors in children. *Br Dent J* 224:779-785, 2018

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Articaine better against post-procedure pain in children

BACKGROUND

The relief of pain is a vital part of dentistry, particularly when the patient is a child. The most widely used local anesthetics (LAs) are lidocaine hydrochloride, which is considered the gold standard, and articaine hydrochloride. A systematic review and meta-analysis was done to identify the best LA solution for routine dental treatment in children.

METHODS

The systematic search was conducted in the Cochrane CENTRAL Register of Controlled Trials, MEDLINE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), EMBASE, and SCI-EXPANDED (ISI Web of Knowledge) databases. In addition, key journals and bibliographies through June 2017 were also reviewed. The goal was to identify original research that compared articaine with lidocaine for dental treatment in children. Six randomized controlled trials (RCTs) were included in the final analysis.

RESULTS

The subjects were all age 16 years or younger. Three studies did not report subjects' mean age.

The dosage and amounts of articaine and lidocaine differed between studies, with just 2 comparing equivalent concentrations of the 2. Others varied amounts, with the maximum dose being calculated based on body weight.

Simple treatment was defined as a single extraction or routine operative treatment. In contrast, complex dental treatment included multiple extractions or crowns and surgical procedures. Just 2 studies reported on anesthesia in complex treatment scenarios.

Outcomes were all reported at the patient level. Either the patient aided by the parent or the parent alone reported on treatment outcome and adverse events. Among the postoperative complications were lip-biting, cheek biting, pain at the injection site, tooth tenderness, and aching in the jaw. Most information was gathered in postoperative phone calls. No significant differences in adverse events were noted between articaine and lidocaine.

Self-reported pain levels measured during the dental procedure were the same whether lidocaine or articaine was used. However, articaine was superior to lidocaine for reducing postoperative pain intensity. The difference between the 2 agents in respect to pain level reached statistical significance.

DISCUSSION

The quality of the evidence obtained in this study was low, but indicated that articaine given via infiltration and lidocaine administered as an inferior dental nerve (IDN) block had the same efficacy for routine dental treatments. No difference was noted between patient-reported pain during the treatment procedure, but articaine had greater efficacy than lidocaine for relieving post-procedure pain. There was no difference in the occurrence of adverse events between the 2 agents.

Clinical Significance

Pediatric patients experienced less pain after their dental procedure when they received articaine anesthesia compared to lidocaine anesthesia. Both agents appear to be equally safe and effective in all other aspects. This indicates that articaine may be a better choice for pediatric patients, since parents have to deal with the child's discomfort after the procedure, and having less pain is always considered a good thing when you're talking about children.