Management Considerations for Pediatric Oral Surgery and Oral Pathology

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Purpose

The purpose of this guideline is to define, describe clinical presentation, and set forth general criteria and therapeutic goals for common pediatric oral surgery procedures and oral pathological conditions.

Methods

This guideline was originally developed by the Council on Clinical Affairs and adopted in 2005. This document is a revision of the previous version, last revised in 2014. It is based on a review of the current dental and medical literature related to pediatric oral surgery, including a systematic search of the PubMed®/MEDLINE database using the terms: pediatric, oral surgery, extraction, odontogenic infections, impacted canines, third molars, supernumerary teeth, mesiodens, mucocele, eruption cyst, eruption hematoma, attached frenum, ankyloglossia, gingival keratin cysts, Epstein pearls, Bohn's nodules, congenital epulis of newborn, dental lamina cysts, natal teeth, and neonatal teeth; fields: all; limits: within the last 10 years, humans, English, clinical trials. Papers for review were chosen from the list of articles matching these criteria and from references with selected articles. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experience researchers and clinicians. In addition, the manual Parameters of Care: Clinical Practice Guidelines for Oral and Maxillofacial Surgery,[1] developed by the American Association of Oral and Maxillofacial Surgeons (**AAOMS**), was consulted.

General considerations

Surgery performed on pediatric patients involves a number of special considerations unique to this population. Several critical issues deserve to be addressed.

Preoperative considerations

Informed consent

Before any surgical procedure, informed consent must be obtained from the parent or legal guardian. For more information, refer to AAPD's Guideline on Informed Consent.[2]

Medical evaluation

Important considerations in treating a pediatric patient include obtaining a thorough medical history, obtaining appropriate medical and dental consultations, anticipating and preventing emergency situations, and being prepared to treat emergency situations.[3]

Dental evaluation

It is important to perform a thorough clinical and radiographic preoperative evaluation of the dentition as well as extraoral and intraoral soft tissues.[3-5] Radiographs can include intraoral films and extraoral imaging if the area of interest extends beyond the dentoalveolar complex. Surgery involving the maxilla and mandible of young patients is complicated by the presence of developing tooth follicles. Alteration or deviation from standard treatment modalities may be necessary to avoid injuring the follicles.[6] To minimize the negative effects of surgery on the developing dentition, careful planning using radiographs, tomography,[7] cone beam computed tomography,[8] and/or 3-D imaging techniques[9] is necessary to provide valuable information to assess the presence, absence, location, and/or quality of individual crown and root development.[6]

Growth and development

The potential for adverse effects on growth from injuries and/or surgery in the oral and maxillofacial region markedly increases the potential for risks and complications in the pediatric population. Traumatic injuries involving the maxillofacial region can adversely affect growth, development, and function. Therefore, a thorough evaluation of the growing patient must be done before surgical interventions are performed to minimize the risk of damage to the growing facial complex.[3]

Behavioral evaluation

Behavioral guidance of children in the operative and perioperative periods presents a special challenge. Many children benefit from modalities beyond local anesthesia and nitrous oxide/oxygen inhalation to control their anxiety.[2,10] Management of children under sedation or general anesthesia requires

ABBREVIATIONS
AAOMS: American Association of Oral and Maxillofacial Surgeons.
AAPD: American Academy Pediatric Dentistry.

extensive training and expertise.[2,11] Special attention should be given to the assessment of the social, emotional, and psychological status of the pediatric patient prior to surgery.[12] Children have many unvoiced fears concerning the surgical experience, and their psychological management requires that the dentist be cognizant of their emotional status. Answering questions concerning the surgery is important and should be done in the presence of the parent.

Peri- and post-operative considerations
Metabolic management of children following surgery frequently is more complex than that of adults. Special consideration should be given to caloric intake, fluid and electrolyte management, and blood replacement. Comprehensive management of the pediatric patient following extensive oral and maxillofacial surgery usually is best accomplished in a facility that has expertise and experience in the management of young patients (i.e., a children's hospital).[3,4]

Recommendations

Odontogenic infections
In children, odontogenic infections may involve more than one tooth and usually are due to carious lesions, periodontal problems, or a history of trauma.[13-15] Untreated odontogenic infections can lead to pain, abscess, cellulitis, and difficulty eating or drinking. In these children, dehydration is a significant consideration; prompt treatment of the source of infection is imperative.

With infections of the upper portion of the face, patients usually complain of facial pain, fever, and inability to eat or drink. Care must be taken to rule out sinusitis, as symptoms may mimic an odontogenic infection. Occasionally in upper face infections, it may be difficult to find the true cause. Infections of the lower face usually involve pain, swelling, and trismus.[13] They frequently are associated with teeth, skin, local lymph nodes, and salivary glands.[13] Swelling of the lower face more commonly has been associated with dental infection.[15]

Most odontogenic infections can be managed with pulp therapy, extraction, or incision and drainage.[3] Infections of odontogenic origin with systemic manifestations [e.g., elevated temperature (102 to 104 degrees Fahrenheit) facial cellulitis, difficulty in breathing or swallowing, fatigue, nausea] require antibiotic therapy. Severe but rare complications of odontogenic infections include cavernous sinus thrombosis and Ludwig's angina.[3,13] These conditions can be life threatening and may require immediate hospitalization with intravenous antibiotics, incision and drainage, and referral/consultation with an oral and maxillofacial surgeon.[3,13]

Extraction of erupted teeth
Maxillary and mandibular anterior teeth
Most primary and permanent maxillary and mandibular central incisors, lateral incisors, and canines have conical single roots. In most cases, extraction of anterior teeth is accomplished with a rotational movement, due to their single root anatomies.[3] However, there have been reported cases of accessory roots observed in primary canines.[16-18] Radiographic examination is helpful to identify differences in root anatomy prior to extraction.[16-18] Care should be taken to avoid placing any force on adjacent teeth that could become luxated or dislodged easily due to their root anatomy.

Maxillary and mandibular molars
Primary molars have roots that are smaller in diameter and more divergent than permanent molars. Root fracture in primary molars is not uncommon due to these characteristics as well as the potential weakening of the roots caused by the eruption of their permanent successors.[3] Prior to extraction, the relationship of the primary roots to the developing succedaneous tooth should be assessed. In order to avoid inadvertent extraction or dislocation of or trauma to the permanent successor, pressure should be avoided in the furcation area or the tooth may need to be sectioned to protect the developing permanent tooth.

Molar extractions are accomplished by using slow continuous palatal/lingual and buccal force allowing for the expansion of the alveolar bone to accommodate the divergent roots and reduce the risk of root fracture.[3] When extracting mandibular molars, care should be taken to support the mandible to protect the temporomandibular joints from injury.[3]

Fractured primary tooth roots
The presence of a root tip should not be regarded as a positive indication for its removal. The dilemma to consider when managing a retained primary tooth root is that removing the root tip may cause damage to the succedaneous tooth, while leaving the root tip may increase the chance for postoperative infection and delay eruption of the permanent successor.[3] Radiographs can assist in the decision process. Expert opinion suggests that if the fractured root tip can be removed easily, it should be removed.[3] If the root tip is very small, located deep in the socket, situated in close proximity to the permanent successor, or unable to be retrieved after several attempts, it is best left to be resorbed.[3] The parent must be informed and a complete record of the discussion must be documented. The patient should be monitored at appropriate intervals to evaluate for potential adverse effects.

Management of unerupted and impacted teeth
There is a wide clinical spectrum of disorders of eruption in both primary and permanent teeth in children. These may be syndromic or non-syndromic and include ankyloses,[19-23] secondary retention,[24] or tooth impaction. Clinically, it may be difficult to differentiate between the various disruptions; however, there have been many reports to assist the clinician in making a diagnosis There is increasing evidence that there is a genetic etiology for some of these eruption disruptions which may help in a definitive diagnosis.[25] Management will depend on whether the tooth/teeth affected is likely to respond to orthodontic forces. If not, surgical extraction is the preferred treatment option.

Impacted canines
Tooth impaction may occur due to a mechanical obstruction. Permanent maxillary canines are second to third molars in frequency of impaction.[26] Early detection of an ectopically erupting canine through visual inspection, palpation, and radiographic examination is important to maximize success of an intervention.[27] Routine evaluation of patients in mid-mixed dentition should involve identifying signs such as lack of canine bulges and asymmetry in pattern of exfoliation. Abnormal angulation or ectopic eruption of developing permanent cuspids can be assessed radiographically.[27] When the cusp tip of the permanent canine is just mesial to or overlaying the distal half of the long axis of the root of the permanent lateral incisor, canine palatal impaction usually occurs.[26] Extraction of the primary canines is the treatment of choice to correct palatally displaced canines or to prevent resorption of adjacent teeth.[26] One study showed that 78 percent of ectopically erupting permanent canines normalized within 12 months after removal of the primary canines; 64 percent normalized when the starting canine position overlapped the lateral incisor by more than half of the root; and 91 percent normalized when the starting canine position overlapped the lateral incisor by less than half of the root.[26] If no improvement in canine position occurs in a year, surgical and/or orthodontic treatment were suggested.[26,27] A Cochrane review[28] and a systematic review[29] reported no evidence to support extraction of primary canines to facilitate eruption of ectopic permanent maxillary canines. A prospective randomized clinical trial demonstrated that extraction of primary canines is an effective measure to correct palatally displaced maxillary canines and is more successful in children with an early diagnosis.[30] Consultation between the practitioner and an orthodontist may be useful in the final treatment decision.

Third molars
Panoramic or periapical radiographic examination is indicated in late adolescence to assess the presence, position, and development of third molars.[5] AAOMS recommends that a decision to remove or retain third molars should be made before the middle of the third decade.[1] Evidence-based research supports the removal of third molars when pathology (e.g., cysts or tumors, caries, infection, pericoronitis, periodontal disease, detrimental changes of adjacent teeth or bone) is associated and/or the tooth is malpositioned or nonfunctional (i.e., an unopposed tooth).[31-33] A systematic review of research literature from 1984 to 2013 concluded there is no evidence to support[31-34] or refute[1] the prophylactic removal of disease-free impacted third molars. Factors that increase the risk for surgical complications (e.g., coexisting systemic conditions, location of peripheral nerves, history of temporomandibular joint disease, presence of cysts or tumors)[32,33] and position and inclination of the molar in question[35] should be assessed. The age of the patient is only a secondary consideration.[35] Referral to an oral and maxillofacial surgeon for consultation and subsequent treatment may be indicated. When a decision is made to retain impacted third molars, they should be monitored for change in position and/or development of pathology, which may necessitate later removal.

Supernumerary teeth
Supernumerary teeth and hyperdontia are terms to describe an excess in tooth number. Supernumerary teeth are thought to be related to disturbances in the initiation and proliferation stages of dental development.[16,36] Although some supernumerary teeth may be syndrome-associated (e.g., cleidocranial dysplasia) or of familial inheritance pattern, most supernumerary teeth occur as isolated events.[16]

Supernumerary teeth can occur in either the primary or permanent dentition.[16,37-39] In 33 percent of the cases, a supernumerary tooth in the primary dentition is followed by the supernumerary tooth complement in the permanent dentition.[40,41] Reports in incidence of supernumerary teeth can be as high as three percent, with the permanent dentition being affected five times more frequently than the primary dentition and males being affected twice as frequently as females.[16,37,38]

Supernumerary teeth will occur 10 times more often in the maxillary arch versus the mandibular arch.[16] Approximately 90 percent of all single tooth supernumerary teeth are found in the maxillary arch, with a strong predilection to the anterior region.[16,39] The maxillary anterior midline is the most common site, in which case the supernumerary tooth is known as a mesiodens; the second most common site is the maxillary molar area, with the tooth known as a paramolar.[16,37,39] A mesiodens can be suspected if there is an asymmetric eruption pattern of the maxillary incisors, delayed eruption of the maxillary incisors with or without any over-retained primary incisors, or ectopic eruption of a maxillary incisor.[37,41] The diagnosis of a mesiodens can be confirmed with radiographs, including occlusal, periapical, or panoramic films,[42] or computed tomography.[7,8] Three-dimensional information needed to determine the location of the mesiodens or impacted tooth can be obtained by taking two periapical radiographs using either two projections taken at right angles to one another or the tube shift technique (buccal object rule or Clark's rule)[42] or by cone beam computed tomography.[8]

Complications of supernumerary teeth can include delayed and/or lack of eruption of the permanent tooth, crowding, resorption of adjacent teeth, dentigerous cyst formation, pericoronal space ossification, and crown resorption.[43,44] Early diagnosis and appropriately timed treatment are important in the prevention and avoidance of these complications. Because only 25 percent of all mesiodens erupt spontaneously, surgical management often is necessary.[41,45] A mesiodens that is conical in shape and is not inverted has a better chance for eruption than a mesiodens that is tubular in shape and is inverted.[43] The treatment objective for a non-erupting permanent mesiodens is to minimize eruption problems for the permanent incisors.[43] Surgical management will vary depending on the size, shape, and number of supernumeraries and the patient's dental development.[43] The treatment objective for a nonerupting primary mesiodens differs in that the removal of these teeth usually is not recommended, as the surgical intervention may disrupt or damage the underlying developing permanent teeth.[44] Erupted primary tooth mesiodens typically are left to shed normally upon the eruption of the permanent dentition.[44]

Extraction of an unerupted primary or permanent mesiodens is recommended during the mixed dentition to allow the normal eruptive force of the permanent incisor to bring itself into the oral cavity.[38] Waiting until the adjacent incisors have at least two-thirds root development will present less risk to the developing teeth but still allow spontaneous eruption of the incisors.[1] In 75 percent of the cases, extraction of the mesiodens during the mixed dentition results in spontaneous eruption and alignment of the adjacent teeth.[44,46] If the adjacent teeth do not erupt within six to 12 months, surgical exposure and orthodontic treatment may be necessary to aid their eruption.[45,47]

Pediatric oral pathology

Lesions of the newborn

Epstein's pearls, dental lamina cysts, and Bohn's nodules. Epstein's pearls are common, found in about 75 to 80 percent of newborns.[48-57] They occur in the median palatal raphe area[48-52] as a result of trapped epithelial remnants along the line of fusion of the palatal halves.[44,46] Dental lamina cysts, found on the crests of the dental ridges, most commonly are seen bilaterally in the region of the first primary molars.[50] They result from remnants of the dental lamina. Bohn's nodules are remnants of salivary gland epithelium and usually are found on the buccal and lingual aspects of the ridge, away from the midline.[48,49,51] Epstein's pearls, Bohn's nodules, and dental lamina cysts typically present as asymptomatic one to three millimeter nodules or papules. They are smooth, whitish in appearance, and filled with keratin.[49,50] No treatment is required, as these cysts usually disappear during the first three months of life.[49,52]

Congenital epulis of the newborn. Congenital epulis of the newborn, also known as granular cell tumor or Neumann's tumor, is a rare benign tumor seen only in newborns. This lesion is typically a protuberant mass arising from the gingival mucosa. It is most often found on the anterior maxillary ridge.[53,54] Patients typically present with feeding and/or respiratory problems.[54] Congenital epulis has a marked predilection for females at 8:1 to 10:1.[53-55] Treatment normally consists of surgical excision.[53-55] The newborn usually heals well, and no future complications or treatment should be expected.

Eruption cyst (eruption hematoma)

The eruption cyst is a soft tissue cyst that results from a separation of the dental follicle from the crown of an erupting tooth.[49,60] Fluid accumulation occurs within this created follicular space.[48,51,56,59] Eruption cysts most commonly are found in the mandibular molar region.[55] Color of these lesions can range from normal to blue-black or brown, depending on the amount of blood in the cystic fluid.[7,51,56,59] The blood is secondary to trauma. If trauma is intense, these blood-filled lesions sometimes are referred to as eruption hematomas.[48,51,56,59] Because the tooth erupts through the lesion, no treatment is necessary.[48,51,56,59] If the cyst does not rupture spontaneously or the lesion becomes infected, the roof of the cyst may be opened surgically.[7,51,56]

Mucocele

The mucocele is a common lesion in children and adolescents resulting from the rupture of a minor salivary gland excretory duct, with subsequent leakage of mucin into the adjacent connective tissues that later may be surrounded in a fibrous capsule.[49,51,58-60] Most mucoceles are well-circumscribed bluish translucent fluctuant swellings that are firm to palpation, although deeper and long-standing lesions may range from normal in color to having a whitish keratinized surface.[51,58-60] Mucoceles most frequently are observed on the lower lip, usually lateral to the midline.[58] Mucoceles also can be found on the buccal mucosa, ventral surface of the tongue, retromolar region, and floor of the mouth (ranula).[58-60] Superficial mucoceles and some other mucoceles are short-lived lesions that burst spontaneously, leaving shallow ulcers that heal within a few days.[51,58-60] Local mechanical trauma to the minor salivary gland is often the cause of rupture.[45,52-54] Many lesions, however, require treatment to minimize the risk of recurrence.[51,58-60]

Pediatric oral pathology management considerations

Primary and reconstructive management of tumors in children is affected by anatomical and physiological differences from those of adult patients. Tumors generally grow faster in pediatric patients and are less predictable in behavior. The same physiological factors that affect tumor growth, however, can play a favorable role in healing following primary reconstructive surgery. Pediatric patients are more resilient and heal more rapidly than their adult counterparts.[2]

A wide spectrum of oral lesions occurs in children and adolescents, including soft and hard tissue lesions of the oral maxillofacial region. There is limited information on the prevalence of oral lesions in the pediatric population. The largest epidemiologic studies in the US place the prevalence rate in children at four to 10 percent with the exclusion of infants.[61,62] Although the vast majority of these lesions represent mucosal conditions, developmental anomalies, and reactive or inflammatory lesions, it is imperative to be vigilant for neoplastic diseases.

Regardless of the age of the child, it is important to establish a working diagnosis for every lesion. This is based on obtaining a thorough history, assessing the risk factors and documenting the clinical signs and symptoms of the lesion. Based on these facts, a list of lesions with similar characteristics is rank ordered from most likely to least likely diagnosis. The entity that is judged to be the most likely disease becomes the working diagnosis and determines the initial management approach.

For most oral lesions, a definitive diagnosis is best made by performing a biopsy of the diseased tissue. By definition, a biopsy is the removal of a piece of tissue from a living body for diagnostic study and is considered the gold standard of diagnostic tests.[63] The two most common biopsies are the incisional and excisional types. Excisional biopsies usually are performed on small lesions, less than one centimeter in size, for the total removal of the affected tissue. An incisional biopsy is performed when a malignancy is suspected, the lesion is large in size or diffuse in nature, or a multifocal distribution is present. Multiple incisional biopsies may be indicated for diffuse lesions, in order to obtain a representative tissue sample. Fine needle aspiration, the cytobrush technique, and exfoliative cytology may assist in making a diagnosis, but they are considered adjunctive tests because they do not establish a definitive diagnosis.[64,65]

It is considered the standard of care that any abnormal tissue removed from the oral and maxillofacial region be submitted for histopathologic examination. Exceptions to this rule include carious teeth that do not have soft tissue attached, extirpated pulpal tissue, and clinically normal tissue, such as tissue from gingival recontouring.[66] Gross description of all tissue that is removed should be entered into the patient record. In general, a soft tissue biopsy should be performed when a lesion persists for greater than two weeks despite removal of the suspected causative factor or empirical drug treatment. It is also imperative to submit hard or soft tissue for evaluation to a pathologist if the differential diagnosis includes at least one significant disease or neoplasm. Histopathologic examination not only furnishes a definitive diagnosis, but it provides information about the clinical behavior and prognosis and determines the need for additional treatment or follow-up. Another valuable outcome is that it allows the clinician to deliver evidence-based medical/dental care and increases the likelihood for a positive result. Furthermore, it presents important documentation about the lesion for the patient record, including the procedures taken for establishing a diagnosis.[63]

Many oral biopsies are within the scope of practice for a pediatric dentist to perform. However, if the tissue is excised, the following steps should be taken for optimum results:[63,66]

1. Select the most representative lesion site and not the area that is the most accessible.
2. Remove an adequate amount of tissue. If the biopsy is too small or too superficial, a diagnosis may be compromised.
3. Avoid crushing or distorting the tissue. Damage is most often observed from the forces of the tissue forceps, tearing the tissues or overheating the tissue from the use of electrosurgery or laser removal.
4. Immediately place the tissue in a fixative, which for most samples is 10 percent formalin. It is critical not to dilute the fixative with water or other liquids because tissue autolysis will render the sample nondiagnositic.
5. Proper identification of the specimen is essential. The formalin container should be labelled with the name of the patient and the location. Multiple tissue samples from different locations should not be placed in the same container, unless they are uniquely identified, such as tagged with a suture.
6. Complete the surgical pathology form including patient demographics, the submitting dentist's name and address, and a brief but accurate history. It is important to have legible records so that the diagnosis is not delayed. Clinical photographs and radiographs often are very useful for correlating the microscopic findings.

Although the following list is not inclusive, examples of common oral lesions that may be biopsied include:

1. Gingival hyperplasia that is nonresponsive to oral hygiene measures.
2. Pyogenic granuloma and other reactive gingival lesions.
3. Mucocele.
4. Squamous papilloma or oral wart.
5. Irritation fibroma.
6. Inflamed operculum.
7. Periapical cyst or granuloma which may or may not be attached to an extracted tooth.
8. Hyperkeratosis of uncertain cause.
9. Smokeless tobacco keratosis.
10. Benign migratory glossitis with an atypical or stationary pattern.
11. Persistent oral ulcers.
12. Mucocutaneous diseases.
13. Dental follicle cyst or dentigerous cyst.
14. Odontoma.

Structural anomalies

Frenum attachments and their impact on oral motor function and development have become a topic of emerging interest among the community as well as various specialties of healthcare providers. Studies have shown differences in treatment recommendations among pediatricians, otolaryngologists, lactation consultants, speech pathologists, surgeons, and dental specialists.[67-75] Clear indications and timing of surgical treatment remain controversial due to lack of consensus regarding accepted anatomical and diagnostic criteria for degree of restriction and relative impact on growth, development, feeding, or oral motor function.[67-75] Although, the etiology of this condition remains unknown, there appears to be a higher predilection in males towards anomalies of frenum attachments, whether it is ankyloglossia or hypertrophic/restrictive maxillary labial frenum.[68,74,76]

Ankyloglossia/restrictive mandibular lingual frenum

Ankyloglossia is a developmental anomaly of the tongue characterized by a short, thick lingual frenum resulting in limitation of tongue movement (partial ankyloglossia) or by the tongue appearing to be fused to the floor of the mouth (total ankyloglossia).[70,77] Studies with different diagnostic criteria report prevalence of ankyloglossia between four and 10.7 percent of the population.[67,68] Several diagnostic classifications have been proposed based on anatomical and functional criteria, but none has been universally accepted.[67]

Ankyloglossia has been associated with breastfeeding difficulties among neonates, limited tongue mobility and speech difficulties, malocclusion, and gingival recession.[67-75,78] A short frenum can inhibit tongue movement and create deglutition problems.[67,79,80] During breastfeeding, a restrictive frenum can cause ineffective latch, inadequate milk transfer and intake, and persistent maternal nipple pain, all of which can affect feeding adversely.[67-82] Systematic literature review articles acknowledge the role of frenectomy procedure in improved breastfeeding and reduction in maternal nipple pain when provided in conjunction with support of other allied healthcare professionals.[67-70,73]

Limitations in tongue mobility and speech pathology have been associated with ankyloglossia.[67,83,84] Speech articulation is largely perceptual in nature, and differences in pronunciation are often evaluated subjectively. There is very high variability in the speech assessment outcomes among individuals and specialists from different medical backgrounds.[68] The difficulties in articulation are evident for consonants and sounds like /s/, /z/, /t/, /d/, /l/, /j/, /zh/, /ch/, /th/, /dg/, and it is especially difficult to roll an r.[68,83] Speech therapy in conjunction with frenuloplasty or frenectomy can be a treatment option to improve tongue mobility and speech.[83,84] There has been varied opinion among health care professionals regarding the correlation between ankyloglossia and speech disorders.[59,64] Further evidence is needed to determine the benefit of surgical correction of ankyloglossia and its relation to speech pathology as there are many children and individuals with ankyloglossia who do not suffer from speech difficulty.[67,73,85]

There is limited evidence to show that ankyloglossia and abnormal tongue position may affect skeletal development and be associated with Class III malocclusion.[61,80,86] A complete orthodontic evaluation, diagnosis, and treatment plan are necessary prior to any surgical intervention.[86]

Localized gingival recession on the lingual aspect of the mandibular incisors has been associated with ankyloglossia in some cases where frenal attachment causes gingival retraction.[67,70] As with most periodontal conditions, elimination of plaque-induced gingival inflammation can minimize gingival recession without any surgical intervention.[67] When recession continues even after oral hygiene management, surgical intervention may be indicated.[67,70]

Maxillary frenum

A prominent maxillary frenum in infants, children, and adolescents, although a common finding, is often a concern. The maxillary labial frenal attachment can be classified with respect to its anatomical insertion level.

1. Mucosal (frenal fibers are attached up to the mucogingival junction).
2. Gingival (fibers are inserted within the attached gingiva).
3. Papillary (fibers are extending into the interdental papilla).
4. Papilla penetrating (fibers cross the alveolar process and extend up to the palatine papilla).[74,88]

The most commonly observed types are mucosal and gingival.[74] However, it is also reported that a maxillary frenum is a dynamic structure that presents changes in position of insertion, structure, and shape during growth and development.[74] Infants have the highest prevalence of papillary penetrating phenotype.[74,88] In severe instances, maxillary frenum attachment has been associated with breastfeeding difficulties among newborns.[52,71,89] Hyperplastic labial frenum that inserts into free or marginal gingiva has been suggested to interfere with proper oral hygiene measures and potentially lead to facial-cervical caries as well as initiation and progression of gingival/periodontal disease due to interference with adequate oral hygiene.[89-91] However, further research is required to substantiate the cause-and-effect relationship.

When treatment is considered due to higher caries risk, anticipatory guidance and other preventive measures should be emphasized. Surgical removal of maxillary midline frenum is also related to presence or prevention of midline diastema formation, prevention of post orthodontic relapse, esthetics, and psychological considerations.[71-74,92] Treatment options and sequence of care vary with patient age and can include orthodontics, restorative dentistry, surgery, or a combination of these.[92] Treatment is suggested when the attachment exerts a traumatic force on the gingiva causing the papilla to blanch when the upper lip is pulled or if it causes a diastema wider than two millimeters, which is known to rarely close spontaneously during further development.[74,78,92] When a diastema is present, the objectives for treatment involve involve managing both the diastema of permanent teeth and its etiology.[92] If orthodontic treatment is indicated, the need for frenectomy should be assessed and coordinated with orthodontic closure of the diastema to achieve stable results.[7,78,92]

Mandibular labial frenum

A high frenum sometimes can present on the labial aspect of the mandibular ridge. This is most often seen in the permanent central incisor area and frequently occurs in individuals where the vestibule is shallow.[70] The mandibular anterior frenum, as it is known, occasionally inserts into the free or marginal gingival tissue.[70] Movements of the lower lip cause the frenum to pull on the fibers inserting into the free marginal tissue, which in turn, can lead to food and plaque accumulation.[70] Early treatment can be considered to prevent subsequent inflammation, recession, pocket formation, and possible loss of the alveolar bone and/or tooth.[70] However, if factors causing gingival/periodontal inflammation are controlled, the degree of recession and need for treatment decreases.[67,70]

Frenectomy procedure

Although there is limited evidence in the literature to promote the timing, indication, and type of surgical intervention, frenectomy for functional limitations should be considered on an individual basis.[67,68,80,82,84,93] When indicated, frenuloplasty/frenotomy (various methods to release the frenum and correct the anatomic situation) or frenectomy (simple cutting of the frenulum may be a successful approach to alleviate the problem.[67,68,74,94] Each of these procedures involves surgical incision, establishing hemostasis, and wound management.[95] Dressing placement or the use of antibiotics is not necessary.[95] Recommendations include maintaining a soft diet, regular oral hygiene, and analgesics as needed.[96] The use of electrosurgery or laser technology for frenectomies has demonstrated a shorter operative working time, a better ability to control bleeding, reduced intra- and post-operative pain and discomfort, fewer postoperative complications (e.g., swelling, infection), no need for suture removal, and increased patient acceptance[71,96,97] These procedures require extensive training as well as skillful technique and patient management.[67,68,74,84,94,98-101]

Natal and neonatal teeth

Natal and neonatal teeth can present a challenge when deciding on appropriate treatment. Natal teeth have been defined as those teeth present at birth, and neonatal teeth are those that erupt during the first 30 days of life.[102,103] The occurrence of natal and neonatal teeth is rare; the incidence varies from 1:1,000 to 1:30,000.[102,103] The teeth most often affected are the mandibular primary incisors.[104] In most cases, anterior natal and neonatal teeth are part of the normal complement of the dentition.[102,103] Natal or neonatal molars have been identified in the posterior region and may be associated with systemic conditions or syndromes (e.g., Pfieffer syndrome, histiocytosis X).[104-106] Although many theories exist as to why the teeth erupt prematurely, currently no studies confirm a causal relationship with any of the proposed theories. The superficial position of the tooth germ associated with a hereditary factor seems to be the most accepted possibility.[103]

If the tooth is not excessively mobile or causing feeding problems, it should be preserved and maintained in a healthy condition if possible.[103-106] Close monitoring is indicated to ensure that the tooth remains stable.

Riga-Fede disease is a condition caused by the natal or neonatal tooth rubbing the ventral surface of the tongue during feeding, leading to ulceration.[101,102] Failure to diagnose and properly treat this lesion can result in dehydration and inadequate nutritional intake for the infant.[106] Treatment should be conservative and focus on creating round, smooth incisal edges.[103-107] If conservative treatment does not correct the condition, extraction is the treatment of choice.[103-107]

An important consideration when deciding to extract a natal or neonatal tooth is the potential for hemorrhage. Extraction is contraindicated in newborns due to risk of hemorrhage.[108] Unless the child is at least 10 days old, consultation with the pediatrician regarding adequate hemostasis may be indicated prior to extraction of the tooth.

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