

Chapter 4--Pediatric Dentistry

Overview

Introduction

Treating a pediatric patient requires special attention to the following:

- early childhood caries (ECC) and baby bottle tooth decay
- behavior management principles
- child abuse and neglect
- restorative procedures
- pulp therapy and trauma
- managing the developing occlusion and space maintenance

This chapter will cover the following topics:

Section	Topic	Page
A	Etiology of Dental Caries in Children	4-3
	Baby Bottle Tooth Decay (BBTD) and Nursing Caries	4-3
	Rampant Decay	4-4
	Other Sources of Decay	4-5
	Prevention	4-5
	B	Behavior Management
Communicative Management		4-10
Nitrous Oxide--Oxygen Inhalation Sedation		4-11
Physical Restraint		4-12
Hand-Over-Mouth Technique		4-13
Conscious Sedation		4-13
General Anesthesia		4-15
Practical Tips in the Behavior Management of Children		4-15
C	Pediatric Diagnosis and Treatment Planning	4-17
	Examining the Infant	4-17
	Dental Radiographs	4-18
	Pediatric Treatment Planning	4-20
	Individual Prevention	4-20
	Treating Early Childhood Caries	4-22
	Child Abuse and Neglect (CAN)	4-23

D	Local Anesthesia in Pediatric Dentistry	4-25
E	Restorative Dentistry	4-27
	Rubber Dam Technique	4-27
	Restoring Primary Incisors and Cuspids	4-28
	Restoring Primary Molars	4-28
	Using Stainless Steel Crowns	4-29
F	Pulp Therapy and Trauma in the Primary Dentition	4-33
	Diagnosis and Treatment Planning for Pulp Disease	4-33
Pulp Cap	4-34	
	Performing a Vital Pulpotomy	4-35
	Performing a Pulpectomy	4-36
	Guidelines for Treatment of Trauma to Primary Dentition	4-38
G	Management of Developing Dentition	4-41
	Maintaining Space in the Developing Dentition	4-41
Teeth	4-47	
	Supernumerary Teeth	4-47
	Infraoccluded Primary Teeth	4-48
Decayed First Permanent Molars	4-49	

Section A--Etiology of Dental Caries in Children

Overview

Introduction

Early childhood caries (ECC) is defined as any dental caries in children less than 3 years of age. It can be caused by several factors. These factors include--

- inappropriate bottle feeding (baby bottle tooth decay)
- *ad libitum* breast feeding (nursing caries)
- a highly cariogenic diet (rampant caries)
- absent or insufficient preventive measures
- high maternal *s. mutans* levels

Note: The importance of ECC and baby bottle tooth decay (BBTD) to the IHS cannot be overemphasized. Research has shown that most children who develop ECC continue to have higher decay rates into adult life. Children with ECC should be considered at higher risk for the development further of dental caries and have access to additional preventive programs and services.

Baby Bottle Tooth Decay (BBTD)

Introduction

BBTD is a common problem in the child population at IHS facilities. It is a condition that is most often recognized in the very young (age 1 to 3 years). Due to the devastation of the dentition and patient management considerations, treating BBTD/ECC can be a difficult and frustrating experience.

Causes

Prolonged cariogenic bottle feeding at night is a major risk factor. The contents of the bottle may include substances such as milk, formula, juice, or sweetened drinks.

Decay is thought to occur due to the distinctive swallowing process which infants display:

- The child lies in bed with a bottle in its mouth; the nipple resting against the palate while the tongue contacts the lower lip, covering the mandibular incisors.

- As the child falls asleep, the flow of saliva decreases, and the liquid in the mouth pools and remains in the oral cavity. This permits carbohydrates to remain in contact with microorganisms on the teeth for an extended period of time.

Pattern of Decay

The causative behaviors produce a distinctive pattern of decay in the primary dentition. The age of the child when the teeth erupt also plays a role. Typically, BBTD involves the facial and lingual surfaces of the maxillary incisors. Also, the occlusal surfaces of the maxillary and mandibular first molars are decayed. In advanced stages, the second molars might also display occlusal decay. Mandibular incisors rarely have decay due to the protective position of the tongue.

Nursing Caries

A decay pattern similar to BBTD may be predicted when children sleep with the mother and are allowed to nurse at will throughout the night. This is not a common problem with breastfeeding, but it should be a part of breastfeeding promotion and education. Although breast milk alone is not thought to be cariogenic, other dietary carbohydrates, along with the breast milk, contribute to this pattern.

Rampant Decay

Introduction

Rampant decay is also a common problem in young children at IHS facilities. The caries pattern is generalized, rather than affecting mostly the maxillary teeth.

Definition

Rampant decay is the widespread, rapidly advancing type of caries resulting in early involvement of the pulp and affecting surfaces of teeth usually regarded as immune from decay.

Causes

The factors most frequently present in cases of rampant decay are

- a diet high in refined carbohydrates
- virulent microorganisms
- poor oral hygiene

Pattern of Decay

The pattern of rampant decay in a young child is distinct from BBTDD. Smooth surfaces of all primary teeth are susceptible in rampant decay; however, it is the interproximal surface decay that predominates. Interproximal decay on the maxillary and mandibular incisors is indicative of rampant decay. Maxillary and mandibular molars may also have large occlusal and interproximal lesions.

Other Sources of Decay

Introduction

There are many other etiologies of decay present in the child population. It is not uncommon to see ECC in a child who has never used the bottle. The causes and variations of ECC are not well understood or quantified.

Risk Factors

ECC is a multifactorial process involving many potential risk factors. These may include the following:

- frequency of feeding
- contents of the diet
- quality and quantity of saliva
- virulence and makeup of the oral flora
- maturity of the enamel
- inappropriate feeding practices
- maternal transmission of pathogenic organisms
- exposure to fluoride

Prevention

Introduction

Dental caries in the very young child is a preventable condition. There are programs available to assist in prevention efforts, and many steps can be taken on an individualized basis.

Community Preventive Measures

Some examples of community preventive measures are--

- IHS or CDC ECC prevention programs
- breast feeding promotion including dental education
- posters and pamphlets for patient education
- media coverage of preventive practices
- water fluoridation
- in-service training to other health care providers

Clinical Preventive Measures

Some examples of clinical preventive measures are--

- increasing access to children between 1 and 2 years of age
- developing a High-Risk-for-Caries Prevention Program
- early screening and identification of children with ECC/BBTD
- appropriate topical fluoride therapy (i.e., varnish)
- conservative preventive restorations (i.e., ART)
- prevention programs designed to slow progression of caries until patient maturity and cooperation allow treatment
- supplying infants and toddlers with "tippy" cups
- prenatal WIC counseling
- oral hygiene instructions

Section B--Behavior Management

Overview

Introduction

Behavior management techniques are a continuum of care directed toward communication and education of the pediatric dental patient. The goals of these techniques are to--

- maintain communication
- reduce fear and anxiety
- extinguish inappropriate behavior
- elicit behavior consistent with the need for successful completion of dental treatment

Behavior Management Techniques

Behavior management techniques include the following examples:

- communicative management
- nitrous oxide—oxygen inhalation sedation
- physical restraint
- hand-over-mouth
- conscious sedation
- general anesthesia

Decision Making

The choice of behavior management techniques must be based on an evaluation that weighs risks versus benefits to the child. The following considerations enter into the decision making:

- urgency of care
- need for cooperation
- skill of the practitioner

- options available at each clinic
- parental considerations

Decision Making Factors

Prior to choosing a technique you should consider the following factors:

- alternative methods, including referral
- dental needs
- expectations of the parents or caregiver
- emotional development of the child
- past medical history
- ability of caregiver or person accompanying child to give consent

Consent

Decisions involving behavior management techniques **must** involve the parents and, if appropriate, the assent of the patient. Successful completion of dental services must be viewed as a partnership of dentist, parent, and child. When consent is required for any technique it must be informed consent prior to treatment. Documentation of consent may be by the use of specific forms or progress note entries.

Parental Presence

- The presence of parents in the dental operatory during treatment has been a concern historically. There may be limitations based on infection control, patient flow, or confidentiality. Some studies have shown children less than three years of age respond better if their parents are present. At a minimum, parents should be encouraged to participate in examination appointments if possible.
- Parental presence should be addressed in the clinic policy and procedure manual, and possibly in the infection control manual.
- Parental presence is inappropriate for conscious sedation and general anesthesia.

Responsibilities

The IHS Technical Quality Assurance document calls for documentation in the patient record for children less than 6 years of age on

- the behavior of the child for each visit
- the behavior management techniques used and the child's response

Documentation of Behavior

The Frankl Scale is recommended as a way to meet this criterion without having to make extensive notes in the chart.

A system of pluses and minus can be used to approximate the Frankl Scale.

Frankl Scale	Behavior	
Category #1 (- -)	Definitely negative. Child refuses treatment, cries forcefully, fearfully, or displays any agitated, overt evidence of extreme negativism.	Combative, thrashing, verbal, unable to be restrained, need to terminate procedure.
Category #2 (-)	Negative. Reluctant to accept treatment and some evidence of negative attitude (not pronounced).	Slightly combative, verbal, slightly agitated, able to be restrained and procedure safely completed
Category #3 (+)	Positive. The child accepts treatment but may be cautious. The child is willing to comply with the dentist, but may have some reservations.	Quiet, not combative, cooperative, nonverbal.
Category #4 (+ +)	Definitely positive. This child has a good rapport with the dentist and is interested in the dental procedures.	Happy, helpful

Documentation

Documentation in the clinical progress notes provides the practitioner with a record of success or failure with behavior management techniques. An entry such as "2 --> 3; VC,TSD" indicates that the patient went from a Frankl category 2 to a Frankl category 3 with voice control and tell-show-do techniques. This notation will facilitate treatment in successive appointments, and is important in multi-practitioner facilities.

Facility Guidelines

Facility policy and procedure guidelines may restrict behavior management options. It is the responsibility of the dental practitioner to participate in the development of local policy, and to be aware of their content. Specific privileging for some procedures (e.g., nitrous oxide-oxygen sedation, conscious sedation, or general anesthesia) may be required.

Communicative Management

Introduction

Communicative management is an ongoing process used to--

- gain attention and compliance
- avert negative behavior

Techniques

The following are specific communicative management techniques:

- voice control
- tell-show-do
- positive reinforcement
- distraction
- nonverbal communication

Indications

Communicative management is indicated for any child with minimal management demands.

Contraindications

Communicative management may be contraindicated in children noncommunicative due to--

- age
- disability
- immaturity
- medication

Concerns

No specific consent is required.

Nitrous Oxide/Oxygen Inhalation Sedation**Introduction**

Nitrous oxide/oxygen inhalation sedation is a safe and effective behavior management technique.

Indications

Use of nitrous oxide/oxygen is indicated in the following situations:

- you are able to obtain written informed consent
- the fearful or anxious patient
- as an adjunct to local anesthesia
- in a patient whose gag reflexes interfere with dental care

Contraindications

Use of nitrous oxide/oxygen may be contraindicated in children who have medical conditions such as

- upper respiratory infection, respiratory diseases, or asthma
- severe emotional disturbances

Concerns

You should consider the following factors prior to using nitrous oxide/oxygen inhalation sedation:

- Precautions to reduce environmental exposure to the staff are required.
- IHS guidelines require specific training and privileging.
- Indications, consent, flow rates, and duration must be documented
- Facility requirements most often supercede IHS guidelines

Physical Restraint

Introduction

Physical restraint includes partial or complete immobilization with staff, parent, or devices to protect the patient and staff from injury during dental treatment. The use of restraints may be offensive to uninformed parents.

Indications

Use of restraint may be indicated in the following situations:

- a patient who requires diagnosis/treatment and cannot cooperate due to a lack of maturity or a handicapping condition
- when the safety of the patient or staff would be at risk without restraint
- as a part of treatment during conscious sedation procedures

Contraindications

Use of restraint may be contraindicated in the following circumstances:

- you are unable to receive written, informed parental consent
- the child is cooperative
- the child has a complicating physical or mental condition

Concerns

You must document the following information pertaining to the use of restraint:

- indications for use
- technique or device used
- duration

Hand-Over-Mouth Technique

Introduction

The hand-over-mouth technique is a behavior management technique that is controversial and may be offensive to parents. A hand is placed over the child's mouth and behavioral

expectations are explained. The hand is removed, or reapplied, depending on the behavior of the patient. Because this technique involves potential legal liabilities, its use is discouraged for other than senior clinicians and pediatric dental consultants.

Indications

Use of the hand-over-mouth technique is indicated for a healthy child who is able to understand and cooperate but who exhibits defiant or hysterical avoidance behavior.

Contraindications

Use of the hand-over-mouth technique is contraindicated in children if--

- the technique causes occlusion of the nasal passages and restricts breathing
- you are unable to obtain written informed parental consent.
- the child is unable to understand and cooperate due to age, disability, or medication

Concerns

You should consider the following factors prior to using the hand-over-mouth technique:

- Informed consent and indications for use must be documented.
- Specific training in the hand-over-mouth technique--either at dental school or an IHS approved Continuing Dental Education (CDE) course--should be obtained before using this technique.

Conscious Sedation**Introduction**

Conscious sedation is a minimally-depressed level of consciousness that retains the patient's ability to

- maintain an airway independently
- respond to physical or verbal stimulation

Indications

Use of the conscious sedation technique is indicated for--

- ASA I or II patients who are healthy at the time of the appointment

- patients who cannot cooperate due to disability or immaturity
- patients whose need for care is consistent with the risks of sedation and whose care can be completed in one or two appointments

Contraindications

Use of the conscious sedation technique is contraindicated if--

- there are medical contraindications (ASA III to IV patients)
- you cannot obtain written informed parental consent
- the patient is cooperative with minimal needs
- the staff/facility is inappropriate for sedation

Concerns

You should consider the following factors prior to using the conscious sedation technique:

- Indications, consent, duration, drugs used, and monitoring must be documented.
- IHS guidelines require specific training (40 hours minimum) and local clinical privileging. Please review guidelines.
- Local facility guidelines supercede IHS policy.

General Anesthesia

Introduction

General anesthesia is a controlled state of unconsciousness accompanied by a loss of protective reflexes. The need for care must take into account the risks associated with general anesthesia.

Indications

Use of general anesthesia is indicated for--

- patients with compromising physical or mental conditions

- the extremely uncooperative child with dental needs that cannot be deferred
- patients with dental needs who otherwise would not obtain care

Contraindications

Use of general anesthesia is contraindicated if--

- the patient is healthy and cooperative with minimal dental needs
- you cannot obtain written, informed consent
- there are medical contraindications to general anesthesia

Concerns

You should consider the following factors prior to using general anesthesia:

- Clinical privileging is required (usually involving postgraduate training with anesthesia rotation).
- The indications for and informed consent for the use of general anesthesia must be documented.
- General anesthesia should not be attempted without medical consultation, in an inadequate facility, or without provision for recovery.

Practical Tips in the Behavior Management of Children

The following tips may be helpful when working with children:

- Spend time with the parents to address their concerns and gain their trust.

You may need to define the parent's role for treatment done in their presence.

- Use appropriate vocabulary with the child to explain the instrumentation, what you will be doing, and why he needs to help.
- Give the child a few simple, clear, non-threatening expectations so the child understands his/her role in the appointment.
- Do not ask a question if it is possible that you will not like the answer. Instead of asking "Will you help me?" say "I need your help!"

- Use distraction frequently. Children's active imagination will allow you to distract them with stories about animals, cartoons, or current movies. When you stop talking, the child will focus on what you are doing in the mouth.
- Dental Assistants may need additional training to treat children well.
- Units should be fully stocked. The child should never be left alone in the unit. Delays should be minimized.
- Praise good behavior and reward if possible. Praise in front of parents works well. Give the child expectations for the next visit.
- Never belittle a child or compare his/her negative behavior to another child's good behavior.
- Know when to try another approach, including referral.
- Learn to work quickly; children often have limits to their cooperative ability.

Section C--Pediatric Diagnosis and Treatment Planning

Overview

Introduction

There should not be a minimum age requirement to gain access to a dental clinic. Prevention and treatment should begin as early as possible with the first oral examination at 12 to 18 months of age. Dental staff are encouraged to consider Well Child Dental Programs to ensure this.

Responsibilities

It is usually the responsibility of the general dentist to diagnose conditions and plan for their treatment in children. Treating a child requires special attention to some unique factors. This attention should begin at the child's first visit and be a major part of the treatment and prevention plan you develop for this child.

As with adults, you must begin by obtaining a history of the patient. You then perform physical and radiographic examinations. From this data you can develop a treatment or prevention plan.

Another responsibility of all health care providers is to report child abuse and neglect (CAN). Oral examinations often provide the first signs of physical abuse.

Examining the Infant

Introduction

The American Academy of Pediatric Dentistry (AAPD) recommends that all children receive an oral evaluation visit within 6 months of the eruption of the first primary tooth and no later than twelve months of age. The time required to perform an examination on an infant is minimal and the benefits can be enormous. Early intervention and prevention relies on early examination.

Stages

As with adults, the examination consists of the physical examination (both intraoral and extraoral) and the radiographic examination. If insufficient cooperation exists for radiographs this should be documented.

Natal Teeth

One of the most common consultation requests pediatric dentists receive concerns natal teeth. Less than 10 percent of natal teeth are supernumerary teeth, so the best treatment is no treatment.

Fear of exfoliation and aspiration have been exaggerated since there have been no reports of this

malformed natal teeth, or those that lack the support to maintain an upright position, may need to be extracted. Occasionally, natal teeth interfere with breastfeeding and removal is considered. Usually, when the mother is informed that these are primary teeth she will attempt to continue breastfeeding and will be successful.

Preventive Services

The major purpose of examining infants and very young children is to intercept destructive habits and practices and prevent the early formation of dental caries. Recommendations on diet, bottle use, nighttime breast feeding, and preventive measures can help in the development of a healthy dentition. Preventive measures and the use of frequent recalls for observation or treatment may be indicated. Fluoride varnish application may be done at any age.

Positioning

Children less than 3 years old are often frightened by the dental chair. The knee-to-knee position provides a less threatening option. Have the parent sit in a chair at the same height as yours, face the parent, and put your knees together. Have the child lay down on this platform with his or her legs around the parent's waist and the hands held by the parent.

Dental Radiographs

Introduction

The IHS adheres to the Food and Drug Administration (FDA) and the American Dental Association (ADA) guidelines for the use of radiographs.

Who Needs Radiographs?

Generally, all children need bite-wing radiographs at each examination appointment, unless the child is without caries and has interproximal contacts open to exploration and visualization.

Determining Which Radiographs to Take

To determine which radiographs should be taken, you must address each of the following factors:

- **Age/Maturity Factor.** How old and cooperative is the child?
- **Nature.** What is the nature of the pathology?
- **Approach.** How should children be approached for radiographs?

Age/Maturity Factor

In very young children (less than 4 years of age) you should take--

- two bite-wing radiographs
- an occlusal radiograph taken with a #0 (Pedo) or #2 (adult) film (in high risk patients). The Academy of Pediatric Dentistry recommends the occlusal film at this age only if caries is suspected.

These films are excellent in demonstrating small interproximal caries and for evaluating the child for supernumerary teeth commonly found in the maxillary anterior region.

Caution: These films generally do not adequately show you the apices of the primary teeth. A #2 bite-wing (adult) should be used as soon as the child is able to tolerate it, since it will demonstrate interproximal surfaces, the root furcations, and the developing tooth buds.

Nature of the Decay

In children demonstrating large carious lesions throughout the mouth, making pulpal therapy almost a certainty, it is more appropriate to take four periapical radiographs making more diagnostic information available.

Approach

Many children who are labeled as uncooperative or frightened have had a poor introduction to the process. The use of the tell-show-do method is extremely important.

Using the Tell-Show-Do Method

Follow these steps to obtain radiographs using the tell-show-do method:

Step	Action
1	Introduce the tube-head as a camera, the lead shield as a superman cape, etc
2	Attempt to take the easier maxillary occlusals first using a #2 film turned sideways, or a #0 (Pedo) film, if necessary.
3	Attempt to take the two bite-wings. Use encouragement and patience.

Growth and Development

Periodic growth and development concerns dictate the use of a panoramic radiograph if possible. Films taken at age 9 for examination of the developing permanent dentition and at age 15 to view the developing third molars are recommended.

Radiographs With the Uncooperative Child

Many times dental radiographs are not possible due to age, maturity, or fear. Films can be exposed during a sedation visit or during general anesthesia. In an emergency situation, extraoral techniques or restraint may be required.

Pediatric Treatment Planning

Introduction

Planning treatment for children should take age and maturity into consideration. A treatment plan for preschoolers may vary significantly from that for older children. Appointment length and time of day may vary with age.

Preschoolers

Try to limit treatment for the preschooler to 30 minutes or less. You should work hard at developing clinical speed. This will help prevent misbehavior and should still allow quadrant dentistry. More appointments are often helpful. Do not plan appointments during nap time. If emesis is a problem, meals may be delayed.

Older Children

When planning treatment for the older child, give consideration to the root development of permanent teeth and the stage of root resorption of the primary teeth. Do not ignore caries because "they're only baby teeth." Plan to restore, extract, or attempt to arrest the progress of decay with fluorides or other preventive measures.

The oral environment and decay progression of the dentition is affected by the presence of active carious lesions. The outdated idea of ignoring maxillary anterior caries until exfoliation is not acceptable. These teeth should be restored, extracted, or addressed through a preventive regimen.

Individual Prevention

Introduction

Having a recall program is crucial if dentistry for children is to be a pleasant experience instead of an anxiety-filled experience driven by emergency encounters. Preventive treatments often provide the children with these more pleasant experiences.

Planning Factors

Use of fluorides and sealants needs to be individualized for the pediatric patient based on the following factors:

- age
- motor skills
- behavior
- disease status

Examples of Individualized Prevention Planning

The following are examples of individualized treatment planning designed to address the above planning factors:

- **Example 1.** A young child with incipient lesions in the maxillary incisor region might benefit from a twice daily application by an adult a pea sized portion of fluoridated toothpaste with a toothbrush, and periodic fluoride varnish applications.
- **Example 2.** An anxious patient might not be able to tolerate an operative procedure for an incipient lesion but could tolerate a sealant.
- **Example 3.** *Caries in an anxious child could be treated with the Alternative Restorative Technique (ART).* Using appropriate behavior management techniques and hand instrumentation only, as much decay is removed as cooperation allows. The teeth are restored with a light cured glass ionomer material. These teeth can be considered temporized or filled depending on decay removal success. N₂O-O₂ may be helpful with this technique.

Fluoride Varnish

Fluoride varnish is an invaluable aid in caries prevention, particularly in young children. Traditional topical fluorides for children less than six years of age may contribute to fluorosis or acute toxic episodes. Fluoride varnish offers fluoride uptake with reduced risk to toxicity. It is appropriate for ECC prevention programs. Application frequency should be based on caries risk assessment protocols.

Fluoride Schedule

The following dietary fluoride supplement dosage schedule has recently been adopted by the ADA and AAPD. Increased levels of fluoride in processed foods and concerns about fluorosis led to these changes.

Supplemental Fluoride Dosage Schedule			
Age	Fluoride in Drinking Water (ppm)		
	Less than 0.3	Between 0.3 to 0.6	More than 0.6
Birth to 6 mo	0*	0	0
6 mo to 3 yrs	0.25	0	0
3 yrs to 6 yrs	0.50	0.25	0
6 yrs to 16 yrs	1.0	0.50	0

*milligrams of fluoride per day

Treating Early Childhood Caries/Baby Bottle Tooth Decay (ECC/BBTD)

Introduction

Increasing community awareness and the awareness of other health professionals may lead to more children being treated during the early stages of caries. Prevention efforts can focus on preventing further destruction, pain, or infection.

Ignoring the caries and waiting for a toothache should not be an option. Failing to prevent the progression of caries is likely to lead to the development of symptoms and an emergency dental encounter.

Recommended Treatment

The dentist's skill and program demands and resources will dictate what services can be provided for young children with decayed incisors. The preferred way to arrest the progression of these lesions is to restore the teeth with the ART and the use of topical fluorides.

If more invasive treatment is necessary, restraint or sedation may be required. Under these conditions a full coverage restoration is the best choice.

Extracting Primary Incisors

When primary incisors need to be extracted, the dentist should show compassion and do everything possible to make this unpleasant experience more easily tolerated. Often in the cases of ECC/BBTD this may be the patient's first visit. The following tips may help:

- Do not extract one carious incisor and leave three carious incisors unless you plan to restore them soon. Usually, it is better to subject the child to this experience only once; therefore, treat all carious incisors at the same time.
- During any childhood extraction procedure, use a gauze drape to prevent inadvertent aspiration of the tooth.

- After curettage of the extraction socket, a hemostatic dressing (e.g., Gelfoam) may help make the postoperative management less messy.
- Consider dispensing analgesics, especially with multiple extractions

Child Abuse and Neglect

Introduction

Although we often view the childhood years as a period of love and caring, for many children reality is more stark. Child abuse and neglect (CAN) is a growing concern with more than 2,000,000 incidents reported yearly in the United States. Although CAN may be found in any socioeconomic group, family stress (e.g., unemployment, marital discord, or substance abuse) may be contributory.

Definitions

The following definitions are used in describing CAN:

- **Child abuse** is the harm or threatened harm occurring through non-accidental physical or emotional injury, suffered by a child through acts or omissions of a responsible caretaker.
- **Child neglect** is the failure of a responsible caretaker to adequately provide food, shelter, clothing, or other care necessary for the child's health and welfare when able to do so financially.
- **Dental neglect** is the willful failure of a parent or guardian to seek and follow through with treatment necessary to ensure a level of oral health essential for adequate function and freedom from pain and infection.

Reporting Responsibility

Health professionals in all 50 states are required by law to report CAN or suspicion of CAN (SCAN). Proof is not required on the part of the reporter but is to be determined by child protective agencies. Failure to report CAN may result in civil or criminal penalties.

Suspicion, not proof, mandates all health care professionals to report CAN. If reports are made in good faith, the reporter is protected from prosecution. Policies in service units differ, but reports are usually made to the Social Services Department or the Child Protection Team. Check with your service unit administrative staff or clinical director for the reporting procedures at your facility.

Federal programs are covered under federal reporting guidelines in addition to state requirements.

Behavioral Signs in Diagnosing CAN

Child abuse results in physical damage as well as emotional scars. Behavioral signs may include--

- inappropriate anxiety due to parental presence or absence
- withdrawn behavior
- avoidance of eye contact
- overly vigilant behavior by the parents or guardians

Physical Signs in Diagnosing CAN

Physical signs of CAN may include--

- burns
- unexplained hair loss
- lacerations
- bruises that are shaped like a hand or object
- bruising in different stages of healing

Clothing that is inappropriate for the season may be used to cover physical signs.

Oral Signs in Diagnosing CAN

Dental staff often are the first providers to observe CAN with 65 percent of all physical abuse involving orofacial injuries. Oral signs of abuse may include--

- torn frenum(s)
- intraoral lacerations
- fractured, displaced, or missing teeth

Section D--Local Anesthesia in Pediatric Dentistry

Overview

Introduction

Improper anesthetic technique probably creates more inappropriate behavior than any other single factor in pediatric dentistry. Many studies have demonstrated that a child's worst behavior occurs during the injection phase of restorative dentistry. Therefore, your primary goals should be to deliver the anesthetic with minimal discomfort and to achieve profound anesthesia.

Tips for Successful Local Anesthesia in Children

The following are suggestions to use when delivering anesthesia to children:

- Use behavior management techniques (e.g., distraction, encouragement, or nitrous oxide).
- Always use topical anesthetic; wait at least 60 seconds.
- Use a short, 30-gauge needle.
- Deliver the anesthetic slowly; rapid injection causes pain.
- For most treatment, lidocaine 2 percent with epinephrine 1:100,000 or mepivacaine 2 percent with levonordefrin 1:20,000 are recommended.

Common Errors in Using Local Anesthesia

The most common mistakes made by dentists are--

- failure to ascertain success of the injection before beginning treatment
- overdosage
- failure to deliver enough anesthetic to achieve anesthesia

Overdoses

Local anesthesia achieves toxic levels much more rapidly in children. To avoid local anesthetic complications, know your patient's weight and the maximum dose allowable for the drug you are using. Develop the habit of using only 1/2 carpule for each quadrant to avoid reaching the toxic level and still provide good anesthesia. The safe dosage for lidocaine and mepivacaine in children is 2 mg/lb. During conscious sedation procedures, dosages should be reduced by 50 percent.

Maximum Dosages

The following table provides dosages of 2 percent lidocaine with 1:100,000 epinephrine (or 2 percent mepivacaine with 1:20,000 levonordefrin*) for pediatric dental patients:

Maximum Dosages of 2% lidocaine with 1:100,000 epinephrine and 2% mepivacaine with 1:20,000 levonordefrin		
Patient Weight (lbs.)	Maximum Dosage mg	No. of carpules
20	40	1.0
30	60	1.5
40	80	2.25
50	100	2.75
60	120	3.25
70	140	3.75

* 3 percent mepivacaine contains 50 percent more drug per volume.

Section E--Restorative Dentistry for Children

Overview

Introduction

Restorative dentistry in children may require the use of alternative techniques and materials. Since success may be limited by behavior, speed and efficiency are important.

Rubber Dam Technique

Introduction

The use of the rubber dam in pediatric dentistry is considered to be the standard of care. A rubber dam should be used for operative procedures, whenever possible.

Advantages

The rubber dam offers the following advantages:

- improves child management; enhances the delivery of nitrous oxide sedation
- decreases gag response from water spray
- prevents aspiration of small objects
- protects soft tissues from abrasive and chemical trauma

Tips for Using The Rubber Dam Technique

The following are some tips for using the rubber dam technique:

- Keep the rubber dam clamp ligated at all times with dental floss.
- Use age appropriate vocabulary; i.e., the clamp is a "tooth button" and the rubber dam is a "raincoat." Explain why you are using it. (The raincoat keeps the sugar bugs from going in your tummy)
- The W8A, 14, and 26N are the most commonly used clamps. The 26N is helpful for clamping maxillary molars without palatal anesthesia. Weak or old clamps may fracture during use and become swallowed or aspirated. Discard suspect clamps.
- Sequential placement of first, the clamp, and secondly, the dam, decreases fear. Allow the child to see and feel the dam.

Restoring Primary Incisors and Cuspids

Introduction

Carious primary anterior teeth are to be thought of as reservoirs of cariogenic bacteria. They should not be ignored because the patient risks the following:

- additional caries
- pain and infection
- damage to the developing tooth
- deflection of the permanent teeth

Materials

The following materials are recommended for restoring primary anterior teeth:

- **Glass ionomers.** Small lesions can be restored with visible, light-cured glass ionomer restorative material (resin modified glass ionomers, not compomers).
- **Composites.** Hybrid composites work well, look good, and have adequate durability. Composites are very technique sensitive so patient cooperation is required. Strip crowns work well for the larger composite fillings. Composites are not indicated with large lesions involving many surfaces, or when decay extends subgingivally.
- **Stainless steel crowns (SSCs).** SSCs can be placed on incisors with large lesions on patients whose lack of cooperation could compromise the quality of a composite restoration. The main advantage of a SSC is durability. Because they are not esthetic, it is imperative that the parent be fully informed prior to placing the SSCs. Esthetics can be improved by cutting a window in the labial surface of the crown; and filling with a composite.
- **Prefabricated aesthetic crowns.** Ceramic or veneered stainless steel crowns are available from several different vendors. Before planning to use any of these, a pediatric dentist should be consulted. Currently, all available veneered crowns demonstrate veneer failures. Repairs are difficult.

Restoring Primary Molars

Introduction

Posterior teeth in the primary dentition can be restored using the same materials as the posterior teeth of the permanent dentition except that the stainless steel crown is used instead of cast restorations.

Materials

Sealant, composites, glass ionomer, amalgam, and SSCs can all be indicated for carious primary molars.

- **Sealant.** Sealants, including invasive sealants, are often used in children with deep pits and fissures, or incipient decay. Sealant material can also be used in developmental pits in incisors and cuspids.
- **Glass ionomer.** Visible, light-cured glass ionomer is actually a glass ionomer-composite hybrid. It bonds to teeth and releases fluoride. It is suitable for use in caries control, in all restorations, and as a base replacing composite in preventive resin restorations. Glass ionomer restorations leech fluoride, and inhibit recurrent decay.
- **Composite.** Composite restorations may be indicated in the individual with a low caries rate and minimal pit and fissure caries. The preventive resin restoration technique (PRR) is an acceptable clinical restorative procedure. Class II composites are usually contraindicated.
- **Amalgam.** Amalgam is used often in occlusal restoration. Class II restorations before the full eruption of the first permanent molars have a high failure rate.
- **Stainless steel crowns.** When Class II carious lesions in molars need to be restored, the SSC is the restoration of choice. Full coverage is also required following any pulp therapy.

Using Stainless Steel Crowns (SSCs)

Introduction

Stainless steel crowns (SSCs) can be used in restoring any primary tooth. They are used extensively in the IHS because of the high caries rate of the population, the durability of the SSC, and the lack of adequate recall programs.

Advantages

SSCs offer the following advantages:

- excellent durability
- the least frequently replaced restoration
- full coverage assists in controlling caries progression

- can be done quickly assuming good patient behavior and operator skill.

Disadvantages

SSCs pose the following disadvantages:

- parents may object to appearance
- preformed crowns may be challenging to adapt to tooth
- transient damage to periodontium
- may contribute to ectopic eruption of first permanent molars

Indications

The use of SSCs is indicated in the following situations:

- interproximal caries or caries on more than two surfaces
- badly broken-down teeth
- rampant caries
- congenitally malformed teeth
- restoration following pulp therapy
- support for space maintainers

Contraindications

The use of SSCs is contraindicated in the following situations:

- sensitivity to nickel or crown luting cements
- lack of acceptance by parent or guardian, i.e., no consent

Armamentarium

1. Rubber dam isolation materials
2. Crown crimping pliers
3. Howe pliers
4. Appropriate burs. Tapered diamond burs are kind to soft tissue and help prevent ledging
5. Cement, spatula, mixing pad

6. Band seater (a Tooth Slooth can also be used)
7. Routine operative set-up

Molar

Perform the following steps to place SSCs on primary molars:

Step	Action
1.	Obtain anesthesia; place rubber dam.
2.	Reduce the occlusal surfaces of the teeth to be crowned.
3.	Complete caries removal. Perform pulp therapy if indicated.
4.	Reduce the distal aspect of the tooth with a tapered diamond. Displace dam if necessary.
5.	Open and round contacts and line angles including occlusal table.
6.	Select size and adapt crown. It should snap into place and fit snugly.
7.	Cement with an appropriate material with the rubber dam in place.
8.	Wipe excess cement with gauze with rubber dam still in place.
9.	Remove the rubber dam and have the patient bite into the occlusion.
10.	Rinse with air-water syringe. Remove excess cement with floss and explorer.

Troubleshooting SSCs

The following table provides possible solutions to problems associated with SSCs:

Problem	Possible Solutions
SSC that fits buccal-lingual is too wide mesial-distal	Squeeze the next smallest size SSC with the Howe pliers in the mesial-distal direction to lengthen it in the buccal-lingual direction.
SSC that fits mesial-distal is too short buccal-lingual	The next largest size SSC can be squeezed as described above. Re-prepare the tooth buccally and lingually.
SSC with good mesial-distal and buccal-lingual coverage will not seat fully	Try either of the following methods: <ul style="list-style-type: none"> • Refine preparation. Visualization of the inside of the crown will often reveal a sharp bend indicating further reduction in that area. Check for ledges. • Have the patient bite on a stick or a band seater
Contact points of SSCs are off, contact is open	The SSC can be rotated by gently grasping it with the Howe pliers and twisting. Avoid denting the SSC. Use a larger SSC and exaggerate the crimp.
Tooth prep is half way between sizes	Use the crown and bridge scissors and cut off 1 mm of the crimp on smaller sizes. You now have a 1/2 size larger SSC.

length of SSC is inadequate	<p>Try any of the following methods:</p> <ul style="list-style-type: none"> • Further reduce the tooth if necessary. • Round the edge of the occlusal table. • Try an un-crimped Unitek SSC. It is longer than the Ion SSC. It will need contouring and crimping.
Size 7 pedo crown is too small	<p>Try any of the following methods:</p> <ul style="list-style-type: none"> • Further reduce the tooth. • Trim the margin of the 7 to make the SSC big enough. • Use the Ion SSC for another tooth. You may need to use permanent molar crowns.
the SSC is tipped	<ul style="list-style-type: none"> • Have the patient bite on a stick or band seater. • Refine the prep. There is probably a ledge or the contact is unopened.

Notes

The 3M Ion[®] Ni-CHO primary molar crowns are the most widely used in the IHS. They are pre-crimped, although additional crimping to achieve a better fit is often indicated. If possible, make minor adjustments in your prep rather than the crown preferred.

Crimping SSCs is best performed with a 800417 or 800421 crimping pliers from 3M. After crimping, the margins should be smooth and well adapted to the tooth. The 800421 is most useful when crimping anterior crowns.

Anterior crowns are often challenging. Minimum tooth preparation is required. Select the smallest crown possible that fully seats and crimp to fit.

The patient usually tolerates a slight opening of the occlusion. Rarely do you need to retreat because of traumatic occlusion.

Matching your crown prep to the internal contours of the SSC increases efficiency. Sharp line angles and ledges hinder placement.

Section F--Pulp Therapy and Trauma in the Primary Dentition

Overview

Introduction

Just as in the permanent dentition, primary teeth are subject to the insults of trauma and dental caries. In the primary and mixed dentition, premature loss of primary teeth can lead to--

- loss of function
- compromised esthetics
- space loss with subsequent orthodontic complications

For these reasons pulp therapy in the primary dentition is often a consideration.

Diagnosis and Treatment Planning for Pulp Disease

Introduction

Before a primary tooth with a compromised pulp is treated, an evaluation of the pulpal health must be done. A thorough clinical and radiographic evaluation should be completed to search for any sign of necrosis or breakdown of the supporting structure. Symptoms associated with the tooth should be evaluated for clues to vitality. Thermal and electric testing are unreliable in the primary dentition.

A young child may not be able to give an accurate description of the discomfort. All diagnostic information must be taken into consideration before making a final diagnosis.

Note: Profound anesthesia and rubber dam isolation are assumed. All primary teeth receiving pulp therapy should be restored with a full coverage restoration.

Reversible Pulp Disease

A history of provoked pain, either from mastication or from thermal insult, is more indicative of reversible pulp disease, which would indicate more conservative care i.e., indirect pulp cap or pulpotomy.

Irreversible Pulp Disease

A history of spontaneous pain in a primary tooth is indicative of irreversible pulp disease, and treatment could be either--

- extraction

- pulpectomy

Contraindications

Pulp therapy is not indicated in the following situations:

- teeth that are nonrestorable due to caries
- teeth with root resorption, although temporary maintenance for space concerns may be considered.
- severe space loss has occurred due to excessive interproximal caries (It may be preferable to extract a primary tooth and consider space maintenance.)
- immunocompromised patients

Pulp Cap

Introduction

Deep caries can provoke symptoms without a carious exposure. An indirect pulp cap can preserve the integrity of the pulp. Recent literature and clinical experience, attests to the success of this technique. However, failure of an indirect pulp cap is often seen on primary first molars.

Indications

The following are indications for an indirect pulp cap:

- a tooth with deep caries that is asymptomatic or only exhibits provoked pain
- a tooth with deep caries, no signs of pulp disease, and without pulp exposure.

Contraindications

The following are contraindications for indirect pulp cap:

- a tooth with deep caries and a history of spontaneous pain
- a tooth with frank carious or mechanical pulp exposure
- clinical or radiographic signs of infection, necrosis, or resorption

Pulp Therapy

The following procedure is used for performing indirect pulp therapy in the primary dentition

Step	Action
1	Rubber dam isolation
2	Remove decay down to a shallow layer of semi-hard, affected dentin overlaying the pulp.
3	Place a protective CaOH ₂ or ZOE base over the remaining carious dentin.
4	Restore the tooth sealing the dentin from the oral environment with a full coverage restoration.

Direct Pulp Therapy

Direct pulp capping in primary teeth is appropriate only in extremely limited conditions. Minute exposures due to trauma or non-carious mechanical exposures may respond to a direct pulp cap with a CaOH₂ material. Generally, a vital pulpotomy is preferred due to its higher rate of success.

Performing a Vital Pulpotomy

Introduction

In a vital pulpotomy, the coronal pulp is removed, the pulp stumps treated, and the chamber is filled with a sedative dressing. Use of this technique assumes the following:

- Only the coronal portion of the pulp is affected.
- The radicular pulp is preserved.
- The support structures remain unaffected.

Indications

A vital pulpotomy is indicated when there are small carious exposures with vital radicular pulp. The tooth exhibits reversible pulpitis symptoms.

Contraindications

A vital pulpotomy is contraindicated in the following situations:

- symptoms of irreversible or hyperemic pulp disease
- teeth close to exfoliation or that are non-restorable

- clinical or radiographic signs of infection, necrosis, or resorption

Procedures for Performing a Vital Pulpotomy

The following steps should be used to perform a vital pulpotomy in the primary dentition:

Step	Action
1	Isolate with rubber dam. Perform occlusal reduction. Remove caries.
2	Expose the coronal pulp by removing the roof of the pulp chamber with a high-speed handpiece
3	Amputate the pulp and remove any remaining pulp tissue from the floor of the chamber using a slow-speed handpiece with a round bur or a sharp spoon excavator.
4	Perform a ferric sulfate or formocresol pulpotomy.
5	Place a ZOE dressing in the chamber. Restore appropriately.

- Alternative pulpotomy techniques (e.g., electrocautery, or glutaraldehyde) have been advocated. Contact a pediatric dentistry consultant for more information.
- The formocresol pulpotomy techniques uses a 1:5 dilution of Buckley's formocresol on a dampened cotton pellet.

Performing a Pulpectomy

Introduction

Under certain conditions a vital pulpotomy will not be successful. If hemostasis is not accomplished, if the pulp is necrotic, or if the tooth has irreversible pulp disease, a pulpectomy must be performed, or else the tooth should be extracted.

Partial Pulpectomy

This procedure is actually a variation of the pulpotomy procedure. If hemostasis cannot be achieved, a slow-speed, round bur is advanced 2 to 3 mm down the canal to reach unaffected vital tissue. The procedure then proceeds to step #4 as described previously.

Complete Pulpectomy

When a vital pulpotomy or a partial pulpectomy will not be successful, the canals must then be thoroughly debrided and filled with a resorbable paste. This technique relies heavily on the bactericidal properties of the paste and the recuperative powers of the body. Due to primary molar canal anatomy, all pulp tissue cannot be removed.

Indications for a Complete Pulpectomy

A complete pulpectomy may be indicated in the following situations:

- a restorable primary tooth with hyperemic or necrotic pulp
- a history of spontaneous pain
- clinical or radiographic signs of an infection

Contraindications for a Complete Pulpectomy

A complete pulpectomy may be contraindicated in the following situations:

- medically compromised patients (i.e. patients requiring SBE prophylaxis, patients with shunts, or immunocompromised patients)
- pathologic root resorption
- excessive bone loss or mobility
- teeth with perforations

Procedures for Performing a Complete Pulpectomy

The following steps should be used to perform a complete pulpectomy on a pediatric patient:

Step	Action
1	Isolate the tooth and perform occlusal reduction.
2	Expose the pulp chamber by removing the roof of the pulp chamber with a high-speed handpiece.
3	Use the preoperative X-ray to determine a length 1 to 2 mm short of the radiographic apex. A precise working length does not need to be determined.
4	Debride the canals using standard endodontic k-files or Hedstrom files (up to at least the size 30 file). An apical stop is required.
5	Irrigate during instrumentation and dry the canals when debridement is complete.
6	If hemostasis cannot be achieved, temporize and reappoint for fill.
7	Fill the canals with ZOE resorbable paste using jiffy tubes, lentulo spiral drills, or the needle tube tips to the Centrix syringe. Iodoform (Vitapex) or ZOE paste are recommended.
8	Expose a postoperative X-ray to evaluate the fill.
9	Place the ZOE dressing in the chamber and restore appropriately.

Guidelines for Treatment of Trauma to Primary Dentition

Introduction

The highest incidence of pediatric dental trauma occurs at approximately 18 months of age, shortly after the child learns to walk. The treatment of dental trauma in the child begins with asking the what, why, where, when, and how of the injury. Additionally, it is important to assess if the child needs a medical consultation or should be considered a victim of child abuse.

Neurological Assessment

It is not the dentist's responsibility to diagnose neurological status, but to seek a medical opinion if CNS involvement is suspected. Consultation is of primary importance with a history of unconsciousness, seizure, vomiting, severe headache, or prolonged confusion or irritability associated with the trauma. A quick cranial nerve assessment would evaluate smell, hearing, balance, memory, speech, and reactivity of the pupils to light. The patient should have normal gait, be able to follow movement with the eyes, have equally sized pupils, be able to protrude tongue normally, and have symmetrically facial movement.

Dentition

The following flow diagrams should be considered an aid in determining treatment for the following injuries to the primary dentition:

- crown fracture (Figure 4-1A)
- root fracture (Figure 4-1B)
- luxation or avulsion injury (Figure 4-1C)
- alveolar fracture (Figure 4-1D)

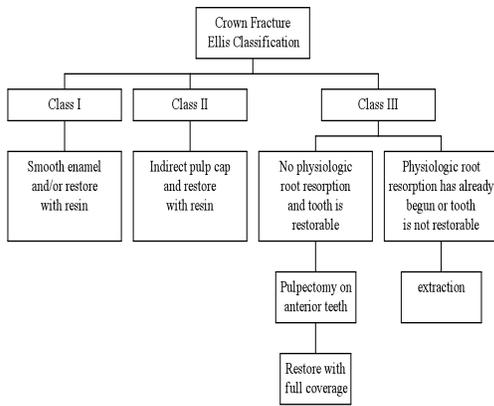


Figure 4-1A

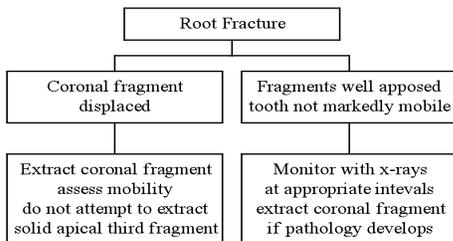


figure 4-1B

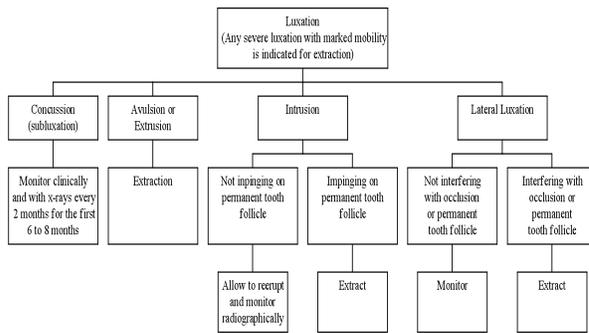


figure 4-1C

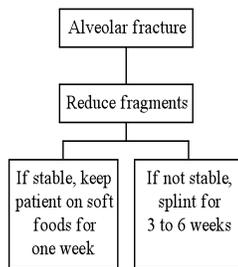


Figure 4-1D

Section G--Management of Developing Dentition

Overview

Introduction

The untimely loss of one or more deciduous molars or canines can result in crowding problems, loss of arch length, ectopic eruption, or impaction. Prevention with space maintenance appliances will help the patient avoid some of these difficulties. Please review Chapter 10, Orthodontics, regarding interceptive orthodontic treatment.

Maintaining Space in Developing Dentition

Introduction

Space management and space supervision represents one of the most critical aspects of orthodontic treatment for children. Space maintenance techniques may be employed from the early mixed dentition to the early permanent dentition. Maintenance of arch circumference will eliminate many developing crowding situations.

Indications for Space Maintenance

A space maintainer appliance may be indicated as follows

- when a deciduous first or second molar is lost prior to the eruption of the permanent first molar
- to preserve leeway space when all of the posterior primary teeth are present but the dentition is slightly crowded

Contraindications for Space Maintenance

A space maintainer may not be indicated under the following situations:

- The premolars are due to erupt within 6 months. The dental age of the patient should be evaluated. The following may serve as a guide:
 - Root length 3/4 formed indicates eruption in approximately 6 months.
 - With 1/2 root formation present, it takes 4 to 5 months for the succedaneous tooth to move through 1 mm of overlying bone (as measured on a bite-wing radiograph).
- There is poor compliance, poor oral hygiene, or uncontrolled rampant caries.

- Space has already been lost.
- Severe crowding already exists.
- There is no recall program available

Tips for Using Space Maintainers

When deciding to place a space maintainer it is important to address the following factors:

- Placement of an appliance should be done as soon as possible after the loss of a primary tooth. Do not wait until the final appointment to evaluate for space maintenance.
- The dental age of the patient should be evaluated to judge stability of the appliance through the mixed dentition.
- Cement all appliances with glass ionomer cement to resist enamel demineralization.
- All patients with space maintainers should be recalled at least every 6 months to evaluate for loose or distorted appliances, decalcification, soft tissue irritation, and eruption of permanent teeth.

Types of Space Maintainer Appliances

The following space maintainer appliances may be used to maintain space in mixed dentition:

- band and loop or crown and loop
- distal shoe
- Nance appliance
- transpalatal arch (TPA)
- lower lingual arch (LLA)

Indications for Specific Space Maintainers

Tooth Prematurely Lost	Type of space maintainer to use if loss occurred...	
	during eruption of 1st permanent molar	after eruption of 1st permanent molar
mandibular primary 1st molar	<ul style="list-style-type: none"> • unilateral loss: band & loop/crown & loop • bilateral loss: LLA or two unilateral appliances 	<ul style="list-style-type: none"> • unilateral loss: band & loop/crown & loop • bilateral loss: LLA or two unilateral appliances
maxillary primary 1st molar	<ul style="list-style-type: none"> • unilateral loss: band & loop/crown & loop • bilateral loss: Nance or two unilateral appliances 	<ul style="list-style-type: none"> • unilateral loss: band & loop/crown & loop • bilateral loss: Nance or two unilateral appliances
mandibular primary 2nd molar	Distal shoe	<ul style="list-style-type: none"> • unilateral loss: band & loop • bilateral loss: LLA
maxillary primary 2nd molar	Distal shoe	<ul style="list-style-type: none"> • unilateral loss: <ul style="list-style-type: none"> ○ band and loop ○ bilateral loss: ○ Nance
both 1st and 2nd mandibular primary molars	Nothing	LLA, if no space loss has occurred
both 1st and 2nd maxillary primary molars	Nothing	Nance, if no space loss has occurred
primary cuspids	Maintain arch symmetry, extract opposite primary cuspid, and place appropriate bilateral appliance.	Maintain arch symmetry, extract opposite primary cuspid, and place appropriate bilateral appliance.

Band and Loop

The band and loop appliance (Figure 4-2) is a unilateral space maintainer that is used in edentulous areas to prevent the drifting of adjacent teeth. It should be used in the primary dentition when a primary second molar is available for banding to hold space for the first premolar. A stainless steel crown may be substituted for the orthodontic band on primary molars. A .030 or .036 inch wire is soldered to the band or crown.

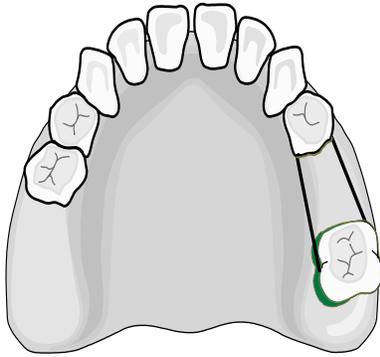


figure 4-2

Distal Shoe

The distal shoe (Figures 4-3A and 4-3B) is a variation of the band and loop. It is very important to use this appliance during the eruption of the first permanent molar, when a second primary molar is missing. The length of the distal arm can be determined by measuring a radiograph of the area. The distal extensions should contact the mesial of the erupting permanent molar and extend 1 mm gingival to the mesial marginal ridge. The distal shoe is maintained until the complete eruption of the permanent molar, at which time the distal shoe is removed and a lingual arch or a Nance appliance is placed.

Warning: The distal shoe is contraindicated in patients prone to bacterial endocarditis.



figure 4-3A

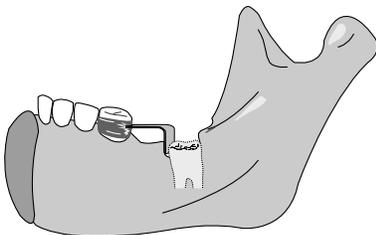


figure 4-3B

Nance Appliance

The Nance appliance (Figure 4-4) is an effective appliance when the patient is missing primary molars bilaterally. It prevents mesial drift and molar rotation. The appliance incorporates a passive palatal acrylic button connected to an .036 wire soldered to molar bands.

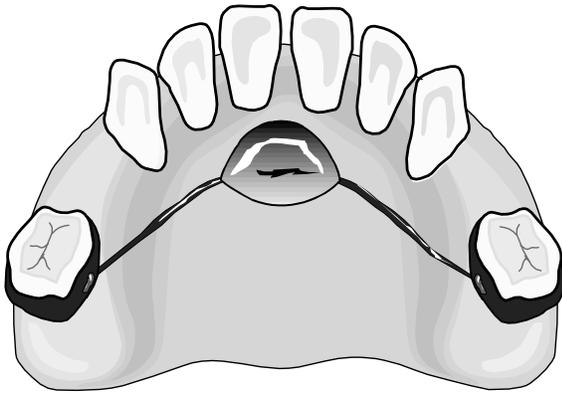


figure 4-4

Transpalatal Arch (TPA)

The transpalatal arch (Figure 4-5) can be used to maintain the position of the upper first molars in the case where there is unilateral primary molar loss. It consists of .036 wire, soldered to the molar bands, with an Omega loop in the midline. This wire should remain 1.5 mm off of the palate.

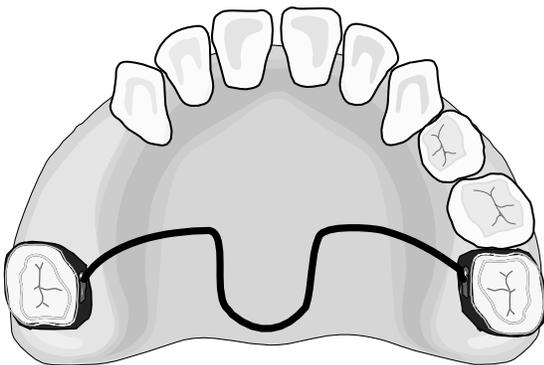


figure 4-5

Lower Lingual Arch (LLA)

The lower lingual arch (Figure 4-6) uses primary second molars or permanent first molars for anchorage. It is used when replacing a distal shoe or when bilateral loss of primary molars or canines has occurred and the permanent incisors have erupted. Omega loops directed gingivally just mesial to the molars are incorporated into the appliance which will allow for adjustments when inserting the appliance. A .036 wire soldered to the bands should be stepped in lingually 1 to 2 mm from the primary canines and molars to allow eruption of the permanent teeth. This wire should also contact the cingulum of the incisors and remain approximately 1.5 mm off of the soft tissue. A wire spur soldered to the LLA distal to the lateral incisor can prevent midline shift when a primary cuspid is prematurely lost.

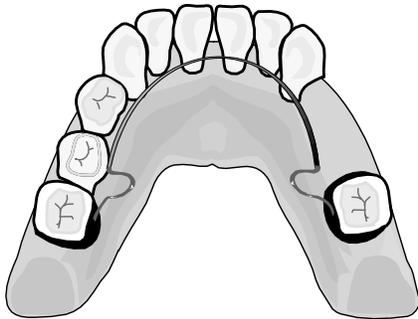


figure 4-6

Space Maintainer Construction Options

All of the previous appliances can be easily constructed with a minimum of materials and time. This is often done if funds are not available for lab fees. If funds are available, commercial orthodontic laboratories provide good services, with only plaster models being required. The direct construction technique for fixed unilateral space maintainers allows immediate construction and insertion minimizing delays and financial considerations.

Caring for Space Maintainers

Instructions for Parents: A space maintainer has been placed in your child's mouth. It is important to follow a few guidelines for care of the appliance.

- Avoid hard, sticky foods (especially taffy, gum, Jolly Ranchers, etc.).
- The appliance is held in place with a special dental cement. If the appliance should come out or come loose, please come into the office as soon as possible with the appliance and child.

- It is important to keep the appliance and the teeth clean, brushing twice a day should be adequate. Adult supervision of the brushing is highly recommended.
- A properly fitted space maintainer should not cause your child any pain. If your child complains of pain, have the dentist check the appliance as soon as conveniently possible.

Your child's space maintainer needs to be checked periodically for stability and for the eruption of the permanent teeth. Be sure to keep these check-up appointments.

Teeth

Introduction

The eruption of a permanent tooth can be delayed or displaced abnormally if its primary predecessor is retained too long. When this happens, the obvious treatment is to remove the primary tooth. As a general guideline a permanent tooth should erupt when approximately three fourths of its root is developed. If root formation of the permanent successor has reached this point while a primary tooth still has considerable root remaining, the primary tooth should be extracted. The problem is most likely to arise when the permanent tooth bud is displaced.

Treatment Options

molars may present with resorption of just one root. In some instances, the primary tooth might have minimal or no root structure remaining, yet still be relatively firm due to being locked between adjacent teeth. Intervention may reduce or prevent future orthodontic problems for the patient. If the erupting permanent tooth has been deflected, short term space maintenance may be required to allow eruption and self correction.

Minimal crowding during eruption and exfoliation in the mandibular incisor area is often observed but considered normal. Intercanine width is increased due to pressure from eruption as well as lip and tongue molding. The extraction of primary canines is rarely indicated and should be done only if the practitioner is able to manage the mixed dentition orthodontically.

Supernumerary Teeth

Introduction

The most common supernumerary tooth is the mesiodens located in the maxillary midline. Other less common extra teeth are lateral incisors, premolars, and fourth molars. Supernumerary teeth often interfere with the eruption of adjacent teeth resulting in displacement or impaction of them.

Diagnosis of Supernumerary Teeth

Diagnosis is made with a periapical, occlusal, or panoramic radiograph, which should routinely be taken when delayed eruption of a tooth is suspected.

Treatment

In most cases, extraction of the supernumerary is indicated. Removal should be performed as soon as possible without endangering the developing teeth. Care must be taken to avoid damaging the developing permanent teeth during the removal of the supernumerary tooth. At times it is preferable to wait until root development of the permanent teeth is complete before attempting surgery.

Infraoccluded Primary Teeth

Introduction

An ankylosed primary tooth is often termed "submerged tooth." This tooth is not submerging but is remaining in a stationary position while the adjacent teeth are erupting and the alveolar bone is growing. Further diagnosis can be derived from a break in the continuity of the PDL space seen on the radiograph.

Over-retention

Often, the ankylosed tooth may be maintained the same as any other primary tooth as it resorbs and exfoliates naturally. However, over-retention may lead to some problems:

- It may impede the eruption of its permanent successor or deflect it from its normal path of eruption.
- The infraocclusion of a primary second molar can cause excessive mesial tipping of the first permanent molars resulting in loss of arch length.
- Supereruption of opposing teeth may occur.

Treatment

Three treatment options are provided for three of the various situations associated with infraoccluded primary teeth:

- If the adjacent teeth have not tipped, a SSC or composite buildup can be placed to maintain space and minimize supereruption of the opposing tooth. The patient should be kept on a regular recall to evaluate further difficulties.
- If maintenance of the ankylosed primary tooth has caused an interference with eruption or significant drift of the adjacent teeth, then extraction and possible placement of a space maintainer is needed. Space-regaining procedures may also be required.

- If the ankylosed primary tooth has no successor, the primary tooth should be maintained as long as reasonably possible. A stainless steel crown may be placed to restore the vertical space loss due to infraocclusion. These cases must be followed closely. Extraction with prosthodontic replacement or comprehensive orthodontics may be required.

Decayed First Permanent Molars

Introduction

carious first permanent molars frequently pose a difficult treatment decision. Often these teeth are restored with or without pulp treatment only to require further treatment and eventual extraction.

Decision Making

Timing is critical to avoid poor results. The decision to restore or extract first permanent molars should be a proactive one. The "let's wait and see" approach will rarely yield a good clinical result. In most cases, the decision should be made before the age of 10 years. Delayed extraction of the teeth can result in mesially inclined second molars and a posterior bite collapse. Conversely, extraction of the permanent molar too early (before age 8) may lead to distal drifting of the unerupted second premolar, resulting in non-exfoliation of the primary second molar.

- When a lower molar is extracted, the upper molar may supererupt. A TPA cemented to the maxillary first molars will prevent this.
- An orthodontic consult should be considered if extractions are contemplated. Good records and informed consent are mandatory.
- Often more than one permanent molar is involved. In these cases, extracting all four first permanent molars should be an option.