

MANAGEMENT OF SPACE PROBLEMS

DEVELOPMENT OF OCCLUSION

Occlusion develops from the primary dentition through the transitional (or mixed) dentition to the permanent dentition, a sequence of events occurs in an orderly and timely fashion. These events result in a functional, esthetic, and stable occlusion. When this sequence is disrupted, however, problems arise that may affect the ultimate occlusal status of the permanent dentition. When such disruptions do occur, appropriate corrective measures are needed to restore the normal process of occlusal development. Such corrective procedures may involve some type of passive space maintenance, active tooth guidance, or a combination of both. Usually, the tooth is maintained in its correct relationship in the dental arch as a result of the action of a series of forces. If one of these forces is altered or removed, changes in the relationship of adjacent teeth will occur.

Early loss of primary teeth may develop problems such as:

- 1-It may affect the alignment of the permanent dentition.
- 2- Opposing teeth can supra erupt.
- 3- More distal teeth can drift and tip mesially.
- 4- More forward teeth can drift and tip distally.
- 5-Altered tooth positions may include:
 - a. "Symptomatic" space deficiency with loss of arch length and circumference.
 - b. Blocked or deflected eruption of permanent teeth.
 - c. Unattractive appearance.
 - d. Food impaction areas.
 - e. Increased caries and periodontal disease, and other negative aspects of malocclusion.

The altered occlusal relationships may evidence traumatic interference and untoward jaw relationships. When early primary tooth loss occurs, corrective measures such as passive space maintenance, active tooth guidance with space regained, or a combination of both may be needed to optimize the normal process of occlusal development.

Space Maintenance

It is defined as the process of maintaining a space in a given arch previously occupied by a tooth or a group of teeth.

Space Maintainer

It is a fixed or removable appliance designed to preserve the space created by the premature loss of a primary tooth or a group of teeth.

Objectives of space maintenance

1. Preservation of primate space.
2. Preservation of the integrity of the dental arches.
3. Preservation of normal occlusal planes.
4. In case of anterior space maintenance, it should aid in esthetics and phonetics.

Requirement of a space maintainer

1. Should maintain the desired proximal dimensions of the space created by the loss of tooth.
2. Preferred to be functional.
3. Should not interfere with eruption of occluding teeth.
4. Should not interfere with the eruption of the replacing permanent teeth.
5. Should not interfere with speech, mastication or functional movement of mandible.
6. Should be simple and strong.
7. Should not impose excessive stress on adjacent tooth, that means it's passive in not imposing pressures on remaining teeth that might affect orthodontic movements
8. Easily cleansable without enhancing dental caries or soft-tissue pathology.
9. Should not restrict the normal growth and function.

Factors affecting planning for space maintainers

1. Time Elapsed Since Tooth Loss

If space closure is going to occur, it will usually take place within six months after the loss of tooth. Therefore, the appliance must be placed as soon as possible, following the extraction of tooth.

2. Amount of Space Loss

- a. Loss of maxillary second primary molars results in the greatest amount of closure, up to 8 mm of space loss in a quadrant.
- b. Loss of mandibular second primary molars shows the next greatest amount, up to 4 mm in a quadrant.
- c. Loss of upper or lower first primary molars shows almost equal amounts of space closure when compared with one another; the amount is most affected by timing of the first primary molar loss.

- d. Space loss potential is particularly high if the primary molar loss occurs in approximation to first permanent molar eruption, irrespective of which primary molar is lost and in which arch the loss occurs.
- e. After first permanent molars have erupted into occlusion, loss of second primary molars may still result in significant space closure.
- f. Loss of a first primary molar with retention of the second primary molar shows minimal amounts of space closure because the second primary molar serves to buttress first permanent molar positions after occlusion is established.

3. Rate of Space Closure

- a. The younger the patient, more is the space loss.
- b. Maximum space is lost during first 6 months of extraction and most immediate loss is within 76 hours.

4. Direction of Space Closure

Maxillary posterior spaces close predominantly by mesial bodily movement and mesiolingual rotation around the palatal root of the first permanent molars. Only minimal mesial crown tipping of the first molar is usually noted. In contrast, mandibular spaces close primarily by mesial tipping of the first permanent molars, along with distal movement and retroclination of teeth anterior to the space. Bodily movement of first molars is not typically notable in the lower arch as seen in the upper arch. Lower molars also tend to roll lingually in conjunction with their mesial crown-tipping during space loss movements.

5. Eruption Status of the Adjacent Teeth

It helps us ascertain mesial shift for molars and distal tipping for canines. For example, if the first primary molar is lost during the time of active eruption of the first permanent molar, a strong forward force will be exerted on the second primary molar, causing it to tip into the space required for the eruption of the first premolar. In addition, if the loss of the second primary molar occurs after the first permanent molars have fully erupted and normal cuspal interdigitation has been established, the degree of space loss should be less dramatic than earlier during molar transition

6. Amount of Bone Coverage Over the Tooth

Predictions of tooth emergence based on root development and the influence of the time of the primary tooth loss are not reliable if the bone covering the developing permanent tooth has been destroyed by infection. In such a situation the emergence of the permanent tooth is usually accelerated. If there is bone covering the crowns, it can be readily predicted

that eruption will not occur for many months; insertion of a space-maintaining appliance is indicated. A guideline for predicting emergence is that erupting premolars usually require 4 to 5 months to move through 1 mm of bone as measured on a bite-wing radiograph.

7. Eruption Status of the Succedaneous Tooth

It is estimated by the amount of root completion (tooth erupts in oral cavity after 2/3rd root formation). Teeth normally erupt when three fourths of the root is developed, regardless of the child's chronologic age. However, the eruption timing of a permanent successor may be delayed or accelerated after premature loss of a primary tooth, depending on the developmental status, bone density of the area, and nature of the primary tooth loss. Very early loss before significant root formation of the permanent successor usually results in delayed eruption timing.

8. Dental Age of Patient

It is the age calculated according to the last tooth erupted in oral cavity in normal eruption sequence. This involves recognizing the teeth clinically present in the oral cavity in comparison to dental eruption charts.

The chronologic age of the patient is not as important as the developmental age. Delayed eruption timing may alter normal transitional adjustments in arch length, arch width, and arch circumference.

9. Sequence of Eruption

Knowledge of usual eruption sequence is important. For example, if the mandibular primary 2nd molar is prematurely lost and mandibular 2nd permanent molar is erupting before the 2nd premolar, arch length loss secondary to mesial forces generated on 1st permanent molar as the 2nd permanent molar erupts can occur with subsequent space loss.

10. Delayed Eruption of Permanent Teeth

Over-retained or anklosed primary teeth, or impacted permanent teeth, can result in a delay of the eruption process. With the removal of these types of primary teeth an appliance may be needed to hold the space until the permanent tooth erupts into a normal position.

11. Available Space

An evaluation of the available space should be performed to determine whether the deficiency is developmental or a result of the pre-existing condition. A space analysis conducted in the mixed dentition, will aid the practitioner in a prediction of the amount of available space for the unerupted permanent teeth. A decision may be made at this point on the type of appliance (space maintainer or space regainer) that is appropriate.

12. Congenital absence of the permanent tooth.

Before space maintenance, the presence of a normal successor must be ensured through radiographic evaluation. If permanent teeth are congenitally absent, the dentist must decide whether to hold the space for many years until a fixed replacement can be provided or to allow the space to close.

13. Abnormal oral musculature (Abnormal Oral Habits)

They will exert abnormal pressure on dental arches and so may influence the type and planning of space maintainer. Strong mentalis muscle patterns may have a pronounced negative effect after loss of mandibular primary molars or canines, with collapse of the arch and the distal drifting of the anterior segment that is often exhibited. Thumb or finger habits may similarly produce abnormal forces in initiating collapse of the dental arches after untimely loss of primary teeth.

14. Arch Length Adequacy

This will be estimated by position of incisors, Leeway space and incisor liability:

- a. If analysis indicates a positive arch length or deficiency of less than 1 to 2 mm per quadrant, a space maintainer may be beneficial in holding tooth position. If the space is not held, the total arch length may be further decreased and lead to possible premolar extraction requirements. Holding the space may allow the permanent premolars and canines to erupt and utilize leeway space to alleviate anterior crowding.
- b. If the arch length deficiency is 2 to 3 mm or more per quadrant, a significant discrepancy exists where space regaining, serial extraction, and/or comprehensive orthodontic treatment may be indicated.
- c. If there is no question that permanent teeth will have to be removed to obtain a favorable occlusion, space maintenance may not be desirable because the space would need to be closed during orthodontic treatment anyway. In less obvious extraction cases, holding the space to allow teeth to erupt and prevent impactions can be a valuable service.

15. Miscellaneous Factors

These factors influence planning because they may be associated with either space gain or space loss. Some of these factors are growth of jaws, proximal caries, wear and attrition.

TYPES OF SPACE MAINTAINERS

1. Removable Space Maintainers

They are space maintainers that can be removed and reinserted into the oral cavity by the patient. It can be functional or nonfunctional, and are bilateral most of the time. Types of removable space maintainers



- a. Acrylic partial denture.
- b. Complete denture; given when there is loss of all the teeth as in rampant caries or ectodermal dysplasias.
- c. Removable distal shoe space maintainer; acts as acrylic immediate partial denture with distal shoe extension into the alveolus. It is used when fixed distal shoe cannot be placed due to many missing teeth.

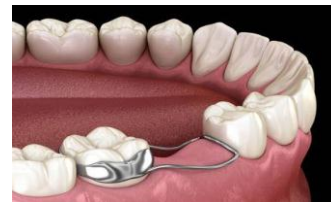
2.

They can be unilateral or bilateral, functional or nonfunctional, active or passive space maintainers that are designed to be cemented on to the tooth and thus cannot be removed by the patient. Types of fixed space maintainers are:

- a. Band and loop, crown and loop space maintainer
- b. Passive lingual arch space maintainer
- c. Transpalatal-bar space maintainer
- d. Nance palatal arch space maintainer
- e. Distal shoe space maintainers

Band and Loop Space Maintainers

They are unilateral, fixed, nonfunctional and passive space maintainers.



Indications of band and loop space maintainer:

- 1) Used when single tooth is missing in the posterior segment.
- 2) It can also be given in bilateral posterior tooth loss, before the eruption of permanent anterior incisors in the mandible, where two band and loop space maintainer can be given instead of passive lingual arch space maintainer.

Contraindications of band and loop space maintainer

- 1) High caries activity

- 2) Marked space loss
- 3) More than one adjoining teeth missing.

Disadvantages of band and loop space maintainer

- 1) Nonfunctional
- 2) Does not prevent continued supraeruption of opposing tooth
- 3) Caries check is difficult
- 4) Oral hygiene maintenance is difficult
- 5) The loop may slip from the position and impinge on the gingiva.
Occlusal rests given to the loop that rests on the occlusal surface of the mesial abutment tooth prevents this disadvantage.

Technique:

1. A stainless steel band is fitted on the tooth.
2. Impression of dentition and band, the band is removed from the tooth and seated in the impression.
3. On the stone model of the impression, a piece of 0.036-inch steel wire is used to prepare the loop and soldered to the band.
4. Band and loop appliance is cemented intraorally

The stainless steel crown and loop maintainer is a modification of the band and loop space maintainer. It may be used

- 1) if the posterior abutment tooth has extensive caries and requires a crown restoration or
- 2) if the abutment tooth has had vital pulp therapy, in which case it is desirable to protect the crown with full coverage.



The technique:

- 1) The steel crown should be prepared
 - 2) Before cementation, a compound impression is made
 - 3) The crown is removed from the tooth and seated in the impression ,
 - 4) The stone model is prepared from the impression.
 - 5) A piece of 0.036-inch steel wire is used to prepare the loop.
- Because it is difficult to remove the crown to make adjustments in the loop, some dentists prefer to adapt a band over a cemented appliance.

Passive Lingual Arch Space Maintainer

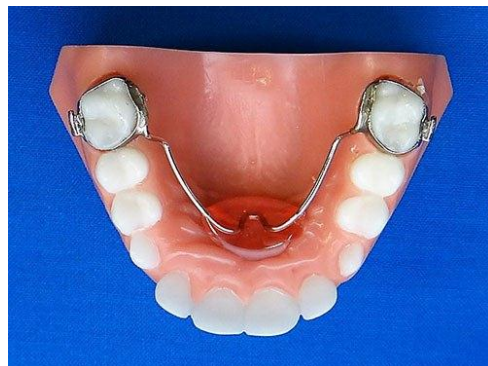
It is a bilateral, fixed or semi-fixed, nonfunctional, passive space maintainer for the mandibular arch.



- Indicated when there is bilateral loss of molars after the eruption of the permanent incisors in the lower arch.
- If the lingual arch is given before the eruption of the permanent lower incisors it may interfere with the eruption of the permanent incisors.
- The right and left first permanent molars are banded in the lower segment.
- A 'U' shaped arch wire extends from the lingual surface of the molar bands to the lingual surface of the anterior teeth. They are placed above the cingulum of the lower incisors.
- It prevents the mesial movement of the posterior teeth and collapse of the anterior segment.

Nance appliance

It is a bilateral, fixed, passive and nonfunctional space maintainer for the maxillary arch.



- The first permanent molars are banded
- The arched wire extends from the palatal surface of one molar band to the other. Anteriorly it extends up to the rugae area and is embedded in an acrylic button. The acrylic button that is firmly placed on the rugae provides good anchorage
- Indicated when there is bilateral missing deciduous molars in the upper arch.
- It can be made active by incorporating 'U' loop to the wire. Opening the loop causes distalization of the first permanent molar.
- The acrylic button may irritate the soft tissues and this appliance may not be suitable for patients allergic to acrylic.

Transpalatal-bar Space Maintainer

It is indicated for the maxillary teeth when one side of the arch is intact

and several primary teeth are missing on the other side.



In this case, the rigid attachment to the intact side usually provides enough stability for space maintenance. However, when primary molars have been lost bilaterally, both permanent molars may tip mesially with a transpalatal-bar arch. A Nance appliance is preferred in this situation

Distal Shoe Space Maintainers

It is a unilateral, fixed, nonfunctional and passive space maintainer. It is an intra-alveolar appliance, in which a portion of the appliance is extending into the alveolus

Indications of distal shoe space maintainer:

- 1) It is indicated when there is premature loss of second deciduous molar before the eruption of the first permanent molar.
- 2) Used only when one tooth is lost on one quadrant as the strength of the appliance is limited. So when both the first and second deciduous molars are missing in the same quadrant, removable distal shoe is preferred.

Contraindication of distal shoe space maintainer

- 1) Inadequate abutments due to multiple loss of teeth
- 2) Poor oral hygiene
- 3) Missing permanent first molar
- 4) Lack of patient and parent cooperation
- 5) Presence of medical conditions such as blood dyscrasias, congenital cardiac defect predisposing to subacute bacterial endocarditis, history of rheumatic fever, diabetes, general debilitation.

DISTAL SHOE

Should be evaluated with radiograph prior to cementation

Length
Position

Will be replaced with another space maintainer when permanent teeth erupt.

FAULTY POSITIONING IS THE MOST COMMON PROBLEM WITH THIS APPLIANCE

PREMATURE LOSS OF DECIDUOUS TEETH

LOSS OF PRIMARY INCISORS

The main concern is based on esthetics speech and function.

1. Loss of mandibular primary incisors

Early loss of lower primary incisors is generally due to ectopic eruption of the permanent incisors in reflecting excessive incisor liability. The loss of lower incisors in other circumstances, such as trauma, advanced caries, or extraction of a neonatal tooth, may result in anterior space loss if it occurs before primary canine stabilization is realized.

2. Loss of maxillary primary incisors

Premature loss of maxillary primary incisors does not generally result in decreased upper intracanine dimensions if the incisor loss occurs after the primary canines have erupted into occlusion at approximately 2 years of age.

The major consequence of early loss of maxillary primary incisors is:

1. Delayed eruption timing of the permanent successors as reparative bone and dense connective tissue cover the site.
2. Unattractive appearance
3. Potential development of deleterious habits (e.g., tongue-thrust swallow, forward resting posture of the tongue)
4. Improper pronunciation of fricative sounds such as “s” and “f” may be of concern following premature loss of primary maxillary incisors.

Management:

a. Removable appliance

An anterior appliance incorporating artificial primary teeth may be considered to satisfy aesthetic and functional needs. Acrylic partial dentures have been successful in the replacement of single and multiple maxillary primary incisors.

b. Fixed appliance

A fixed option may be considered using primary incisor denture teeth secured from a rigid stainless steel wire (0.036- or 0.040-inch) extended to bands or stainless steel crowns on the primary molars, a so-called “Hollywood” bridge.

PREMATURE LOSS OF PRIMARY CANINES

1. Mandibular primary canine

Most often due to ectopic eruption of permanent lateral incisors, early loss of a mandibular primary canine is a significant indicator of a tooth size—arch size discrepancy.

The consequences of early loss of lower primary canines are:

- a. Unilateral loss of a lower primary canine:

This is frequently followed by:

- 1) A shift in the dental midline toward the side of loss
- 2) Lingual collapse of the incisor segment
- 3) Possibly deepening of the bite

The asymmetric disruption in arch integrity complicates normal eruption of the permanent canines and premolars toward the affected side.

b. If ectopic eruption involves bilateral loss of both lower primary canines, this is followed by:

- 1) Pronounced lingual inclination and distal drifting of the permanent incisors.
- 2) Deepening of the overbite
- 3) Increased overjet
- 4) Significant loss of arch perimeter

2. Maxillary primary canine

The ectopic loss of maxillary primary canines occurs less frequently than does mandibular loss. When it occurs, ectopic loss of a maxillary primary canine typically reflects a very distal eruptive displacement of the permanent lateral incisor and not necessarily a significant tooth mass problem. The following may occur:

- a. Atypical upper anterior alignment
- b. Resultant crowding and blockage of the permanent canine because it erupts so late in normal transition.

Early loss of maxillary primary canines is an indicator for early orthodontic treatment with an understanding that the child is a definite candidate for comprehensive orthodontic intervention.

Management:

- a. If one primary canine is lost during incisor eruption, it may be desirable to extract the contralateral primary canine to help maintain arch symmetry. Although extraction of the contralateral primary canine may improve the appearance of incisor alignment and midline integrity, crowding problems requiring such intervention strongly indicate a significant arch length deficiency that will likely become grossly evident upon permanent canine and premolar eruption.
- b. A lingual holding arch may be used with spur attachments to control incisor positioning and prevent encroachment on permanent canine eruption positions when primary canines are lost prematurely.

PREMATURE LOSS OF FIRST PRIMARY MOLAR

The effect of premature loss of first primary molars in both arches is mostly dependent on the **state of eruption of the first permanent molars.**

- 1) If the primary first molar is lost during the primary dentition from ages 3 to 5 years, there should be little or no space loss associated with mesial movement of the second primary molar.
- 2) If the primary first molar is lost as the first permanent molars erupt at ages 5 to 7 years, this will cause:
 - a. A strong force is exerted that pushes the second primary molar forward into the first primary molar space.
 - b. A loss of posterior arch length within the quadrant that can lead to crowding as the canines and premolars erupt in later stages.
 - c. Mandibular arch length may be further compromised by distal and lingual shifting of anterior teeth toward the side of first primary molar tooth loss.

Therefore the loss of a first primary molar in either arch, approximating eruption of first permanent molars, indicates that the use of a space maintainer is generally desirable to stabilize second primary molar and canine positioning.

- 3) If the first primary molar is lost after first permanent molars have erupted into occlusion and the second primary molar is still in position, minimal space loss should be evidenced in either arch.

Management:

- a. For unilateral loss of primary first molar a unilateral band or crown and loop is usually the appliance of choice. The appliance incorporates a band or crown on the second primary molar with a soldered wire-loop extension extending forward to come into contact with the distal-cervical surface of the primary canine in the quadrant.
- b. If first primary molars are lost bilaterally within a lower arch and the second primary molars are retained, two separate unilateral loop appliances are generally indicated until first permanent molar and incisor eruption is complete. Lingual holding arch designs should not be placed before eruption of the permanent incisors because the lingual wire may interfere with incisor positioning during eruption. Additionally, primary incisors as anterior stops do not offer sufficient anchorage to prevent loss of arch length in most cases.

PREMATURE LOSS OF SECOND PRIMARY MOLAR

The effect of the loss of the second primary molars also depends on the **state of eruption of the first permanent molars.**

- 1) If a second primary molar is lost in a child 2 to 5 years of age, no space loss should occur while the first permanent molar is in basal bone. The options for managing such early loss are very limited due

to lack of retention elements for fixed appliances and difficulties with patient cooperation in the use of appliances at this age.

- 2) If the first permanent molars erupt considerable loss in arch length can occur if no second primary molar is present as an eruptive guide. The upper first permanent molar displaces forward through bodily crown-root movement and mesiolingual rotation around the palatal root. While the lower first permanent molars move forward by pronounced mesial tipping of the crown in addition to the distal movement and retroclination of teeth anterior to the space.
- 3) If the loss of the second primary molar occurs after the first permanent molars have fully erupted and normal cuspal interdigitation has been established, the degree of space loss should be less dramatic than earlier during molar transition, regardless of the arch involved.

Management:

- a. If the loss occurs just before eruption of the first permanent molar, that is, when the first molar crown is still covered with oral mucosa and a thin partial covering of bone, a space maintainer to guide the positioning of the first permanent molar into normal occlusion is desirable. The appliance of choice is a distal shoe for both the maxillary and mandibular arches.
- b. If the first permanent molars are erupting the classic bilateral mixed-dentition space maintainer in the mandibular arch is the passive lingual arch with bands fitted to the first permanent molars, a 0.036- or 0.040-inch stainless steel wire is contoured to the arch and extended forward to make contact with the cingulum area of the incisors.
 - As stated earlier, lower lingual arches should not be placed before the eruption of the permanent incisors because of their frequent lingual eruption path. The lingual wire may interfere with normal incisor positioning if the appliance is in position before lateral incisor eruption. Additionally, abutting against primary incisors as anterior stops does not offer sufficient anchorage to prevent significant loss of arch length.
- c. While in the maxillary arch the bilateral mixed dentition space maintainer, to stabilize molar positions bilaterally, is Nance appliance. The Nance appliance uses a contoured rigid wire with an acrylic "button" in contact with the palatal shelf as an anterior stop for bilateral molar stabilization in the maxillary arch. Providing the same molar rotation and bodily movement control as transpalatal bars, the added bracing of the acrylic button against the anterior palatal vault offers some additional resistance against forward tipping movements of the molars.

Pedodontic

Management of Trauma to the Teeth and Supporting Tissues

Dental trauma often occurs in children, as well as adolescents and adults. The traumatic injury to the permanent teeth is severe particularly when there is damage to the periodontium tissue. Damage to teeth that cause loss, displacement or fracture teeth results in a negative impact on the child in terms of functional, psychological and aesthetic. There are several reasons to tooth fracture, including falls, running, bicycles and sports.

The incidence of tooth trauma varies widely between different ages of children. More frequently occur in children between the ages of 2-4 years and 7-10 years in both gender boys and girls. For permanent teeth, boys are more susceptible to traumatic injuries than girls according to Iraq study in 2011. and the frequency of the trauma increase during the autumn and winter (time of school beginning). dental injury involve one or two teeth, and more tooth affected is upper maxillary central incisor. An important predisposing factor reported for dental trauma was a large maxillary overjet and incomplete lip closure



HISTORY OF THE INJURY

1-medical history

Congenital heart disease, a history of rheumatic fever or immunosuppression? these may be contraindication to any procedure that is likely to require prolonged endodontic treatment with persistent necrotic/infected focus. Bleeding disorder, allergies

Tetanus immunization status? referral for tetanus toxoid injection is necessary if there is soil contamination of the wound and the child has not had a booster injection within last 5 years

2- dental history

Three important questions are asked in gathering the dental history. when, where, and how did the accident occur.

The time of the injury should first be established. Unfortunately, many patients do not seek professional advice and treatment immediately after an injury. The patient should be assessed for

nausea, vomiting, drowsiness, or possible cerebral spinal fluid leakage from the nose and ears, which would be indicative of a skull fracture. In addition, the patient should be evaluated for lacerations and facial bone fractures. Obtaining a baseline temperature, pulse, blood pressure, and respiratory rate should be considered as information to be gathered before addressing the dental Trauma to the supporting tissues may cause sufficient inflammation to initiate external root resorption. In instances of severe injury, teeth can be lost as a result of pathologic root resorption and pulpal degeneration.

CLINICAL EXAMINATION

The clinical examination should be conducted after the teeth in the area of injury have been carefully cleaned of debris. When the injury has resulted in a fracture of the crown, the dentist should observe the amount of tooth structure that has been lost and should look for evidence of a pulp exposure. With the aid of a good light, the clinical crown should be examined carefully for cracks and craze lines

A vitality test of the injured tooth should be performed, and the teeth in the immediate area, as well as those in the opposing arch, should be tested.

The best prediction of continued vitality of the pulp of a damaged or traumatized tooth is the vital response to electric pulp testing at the time of the initial examination. A negative response, however, is not reliable evidence of pulp death because some teeth that give such a response soon after the injury may recover vitality after a time.

RADIOGRAPHIC EXAMINATION

The examination of traumatized teeth cannot be considered complete without a radiograph of the injured tooth, the adjacent teeth, and sometimes the teeth in the opposing arch. It may even be necessary to obtain a radiograph of the soft tissue surrounding the injury site in search of a fractured tooth fragment .The relative size of the pulp chamber and canal should be carefully examined.

In young patients, the stage of apical development often indicates the type of treatment, just as the size of the coronal pulp and its proximity to the area of fracture influence the type of restoration that can be used. A root fracture as a result of the injury or one previously sustained can be detected by a careful examination of the radiograph. However, the presence of a root fracture may not influence the course of treatment ,When more complex facial injuries have occurred or jaw fractures are suspected, extra oral films may also be necessary to identify the extent and location of all injury sequelae.

Oblique lateral jaw radiographs and panoramic films are often useful adjuncts to this diagnostic process.

Emergency treatment of soft tissue injury.Injury to the teeth of children is often accompanied by open wounds of the oral tissues, abrasion of the facial tissues, or even puncture wounds. The dentist must recognize the possibility of the development of tetanus

Ellis and Davey classification of crown fracture is useful in recording extent of damage to crown

1 -Enamel fractured(Class 1)

The emergency treatment of minor injuries in which only the enamel is fractured may consist of no more than smoothing the rough and no restoration may be necessary, The patient should be reexamined at 2 weeks and again at 1 month after the injury.

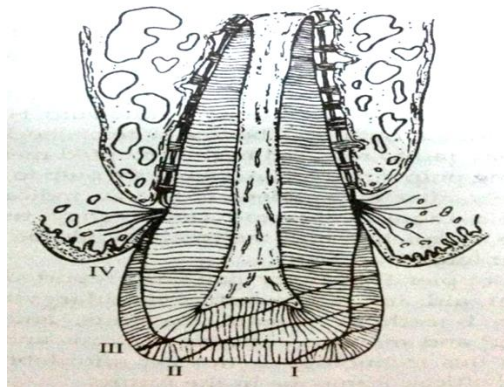
2-Enamel fractured and dentine (Class11)

Sudden injuries with a resultant extensive loss of tooth structure and exposed dentin require an immediate temporary restoration or protective covering, in addition to the complete diagnostic procedure.

In this type of injury, initial pulpal hyperemia and the possibility of further trauma to the pulp by pressure or by thermal or chemical irritants must be reduced. In addition, if normal contact with adjacent or opposing teeth has been lost, the temporary restoration or protective covering can be designed to maintain the integrity of the arch. occasionally the dentist may have the opportunity to reattach the fragment of a fractured tooth using resin and bonding techniques.

3-fractured involving the pulp (Class111)

4-loss of entire crown(Class IV)



Treatment of fractured teeth usually divided in 3 stage

1-emergency tratement

2- inter mediate or semi-permanent treatment

Types of semi permanent restoration

A-celloid crown

B-chrome- steal crown with window labeling

C pin with filling

D-Temporary crown (cold cure acrylic ,keep it for 4-6 weeks)

3- permanent restoration

Permanent filling in young children should not be done from beginning because

- 1- Irritation of the pulp because the dentinal tubules are widely open
- 2- The full length of clinical crown is not yet established
- 3- The pulp chamber is wide and high
- 4- The root continuous to develop 3-4 years after eruption

TRATEMENT OF VITAL PULP EXPOSURE

1-Direct Pulp Capping

If the patient is seen within an hour or 2 after the injury ,if the vital exposure is small, and if sufficient crown remains to retain a temporary restoration to support the capping material and prevent the ingress of oral fluids,

If the final restoration of the tooth will require the use of the pulp chamber or the pulp canal for retention, a pulpotomy or a pulpectomy is the treatment of choice.

Even though the pulp at the exposure site has been exposed to oral fluids for a period of time, the tooth should be isolated with a rubber dam, and the treatment procedure should be completed in a surgically clean environment.

The healthy pulp may survive and repair small injuries even in the presence of a few bacteria, the same as any other connective tissue. The crown and the area of the actual exposure should be washed free of debris, and the pulp should be kept moist before the placement of the pulp-capping material.

2-PULPOTOMY

If the pulp exposure in a traumatized, immature permanent (open apex) tooth is large, if even a small pulp exposure exists and the patient did not seek treatment until several hours or days after the injury, or if there is insufficient crown remaining to hold a temporary restoration,

the immediate treatment of choice is a shallow vital pulpotomy or a conventional pulpotomy

The exposure site should be conservatively enlarged, and 1 to 2 mm of coronal pulp tissue should be removed for the shallow pulpotomy or all pulp tissue in the pulp chamber removed for the conventional pulpotomy. pulp in the root canal to maintain its vitality and also Continued root end development

3- PULPECTOMY OR ENDODONTIC TRATEMENT

One of the most challenging endodontic procedures is the treatment and subsequent filling of the root canal of a tooth with an open apex. The lumen of the root canal of such an immature tooth is largest at the apex and smallest in the cervical area and is often referred to as a *blunderbuss canal*. Hermetic sealing of the apex with conventional endodontic techniques is usually impossible without apical surgery. This surgical procedure is traumatic for the young child and should be avoided if possible.

In instances of class III or class IV fractures of young permanent teeth with incomplete root growth and a vital pulp, the pulpotomy technique (as just described) is the procedure of choice. The successful pulpotomy allows the pulp in the root canal to maintain its vitality and also allows the apical portion to continue to develop (apexogenesis). For class IV fractures, the eventual restoration may require a post in the root canal. Before this type of restoration is completed, the dentinal bridge that has formed after the pulpotomy can be perforated and routine endodontic procedures can be undertaken in a now completely developed root canal. Occasionally a patient has an acute periapical abscess associated with a traumatized tooth. The trauma may have caused a very small pulp exposure that was overlooked, or the pulp may have been devitalized as a result of injury or actual severing of the apical vessels. A loss of pulp vitality may have caused interrupted growth of the root canal, and the dentist is faced with the task of treating a canal with an open apex. If an abscess is present, it must be treated first. If there is acute pain and evidence of swelling of the soft tissues drainage through the pulp canal will give the child almost immediate relief. A conventional endodontic access opening should be made into the pulp chamber. If pain is caused by the pressure required to make the opening into the pulp, the tooth should be supported by the dentist's fingers. Antibiotic therapy is also generally indicated

TRATEMENT OF PULP NECROSIES (STIMULATED APICAL GROWTH IN IMMATURE PERMENENT TEETH)

APEXIFICATION

The conventional treatment of pulpless anterior teeth usually requires apical surgery if the teeth have open apices.

Many young teeth have been saved in this manner. However, a less traumatic endodontic therapy called *apexification* has been found to be effective in the management of immature, necrotic permanent teeth.

The allows the apical portion to continue to develop (apexogenesis).

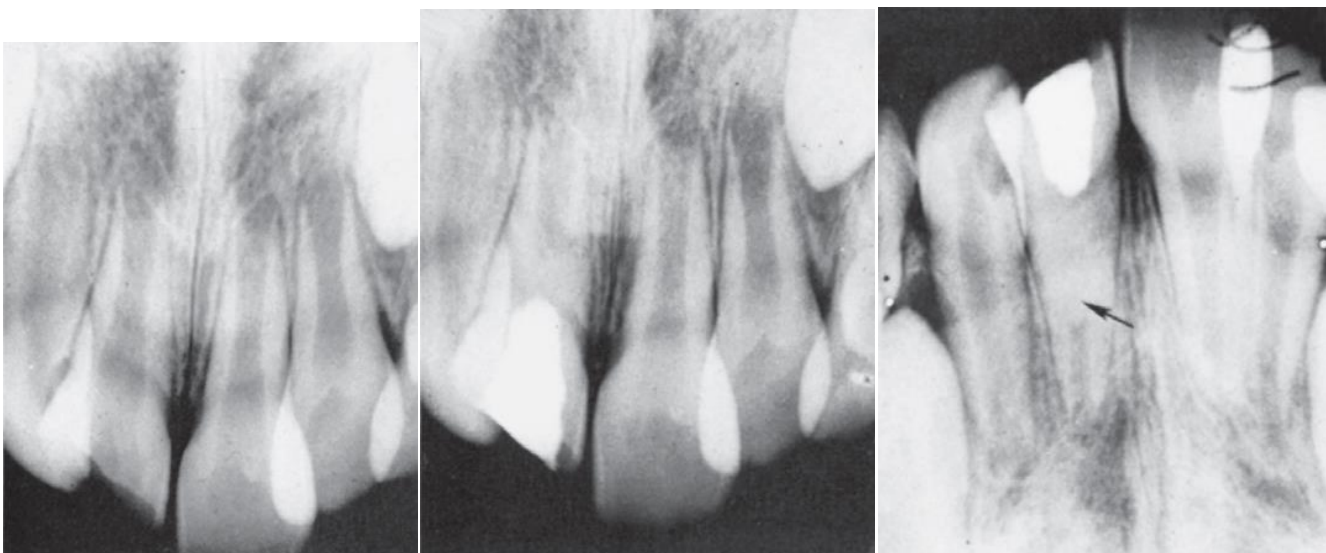
For class IV fractures, the eventual restoration may require a post in the root canal. Before this type of restoration is completed, the dentinal bridge that has formed after the pulpotomy can be perforated and routine endodontic procedures can be undertaken in a now completely developed root canal.

If apical closure has not occurred in 6 months, the root canal is retreated with the calcium hydroxide paste. If weeping in the canal was not controlled before filling, retreatment is recommended 2 or 3 months after the first treatment.

apexification procedure should precede conventional root canal therapy in the management of teeth with irreversibly diseased pulps and open apices.

The following steps are included in the technique:

1. The affected tooth is carefully isolated with a rubber dam, and an access opening is made into the pulp chamber.
2. A file is placed in the root canal, and a radiograph is made to establish the root length accurately. It is important to avoid placing the instrument through the apex, which might injure the epithelial diaphragm.
3. After the remnants of the pulp are removed using barbed broaches and files, the canal is flooded with hydrogen peroxide to aid in the removal of debris. The canal is then irrigated with sodium hypochlorite and saline.
4. The canal is dried with large paper points and loose cotton.
5. A thick paste of calcium hydroxide and camphorated mono-parachlorophenol (CMCP) or calcium hydroxide in a methylcellulose paste (Pulpdent Corp., Watertown, Mass) is transferred to the canal with the aid of an amalgam carrier. An endodontic plugger may be used to push the material to the apical end, but an excess of material should not be forced beyond the apex of the tooth.
6. A cotton pledget is placed over the calcium hydroxide, and the seal is completed with a layer of reinforced zinc oxide–eugenol cement.



Regenerative endodontic procedures can be defined as biologically based procedures designed to replace damaged structures, including dentin and root structures, as well as cells of the pulp-dentin complex.

The objectives of regenerative endodontic procedure, are to

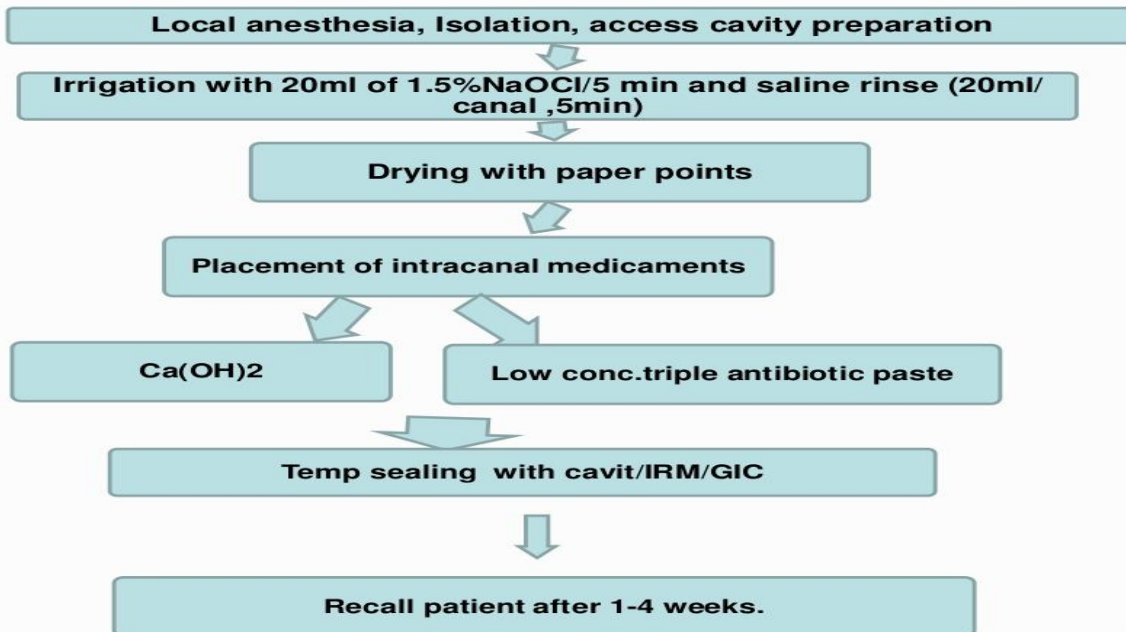
- 1-Regenerate pulp like tissue, ideally. The pulp -dentin complex
- 2-Regenerate damaged coronal dentin, such as following a caries exposure
- 3-Regenerate resorbed root, cervical or apical dentin

Components of regenerative endodontics

• The three key elements of tissue regeneration are:

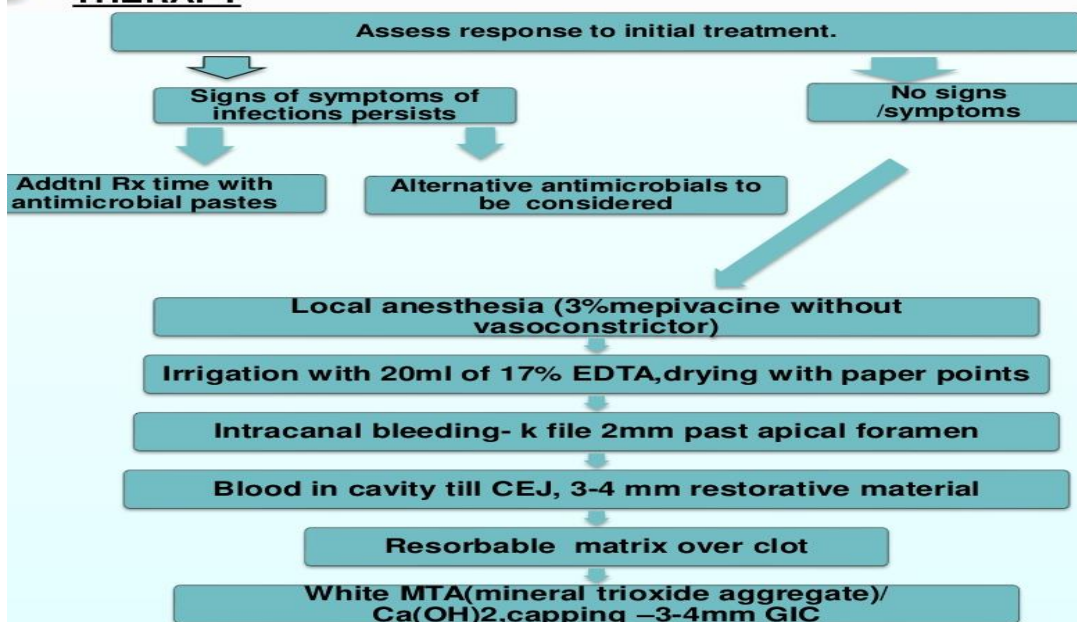
- 1-Stem cells
- 2-Growth factors
- 3- Scaffold

FIRST APPOINTMENT REGENERATIVE ENDODONTICS THERAPY



fppt.com

SECOND APPOINTMENT –REGENERATIVE ENDODONTIC THERAPY



om

Reaction of permanent Tooth buds to injury

The dentist who provides emergency care for a child after an injury to the anterior primary teeth must be aware of the possibility of damage to the underlying developing permanent teeth.

1-Reparative dentin production

In cases in which the injury to the developing permanent tooth is severe enough to remove the thin covering of developing enamel or cause destruction of the ameloblasts, the subjacent odontoblasts have been observed to of the tooth progresses. Cases have been observed in which the crown of a permanent tooth or a portion of it develops at an acute angle to the remainder to the tooth

2-Hypocalcification and hypoplasia

Gross malformed crown ,small pigment hypoplastic areas referred as (tuner tooth).small hypoplastic defect may be restored by resin bonding technique

Disturbance in enamel matrix formation produces enamel hypoplasia which is characterizes by irregular thickness of enamel and presence of pits and grove in the enamel surfaced .any defect in mineralization process the enamel thickness is normal but poorly mineralize.it can be found in the primary and permanent teeth .

3-Dilaceration

The condition referred to as dilacerations occasionally occurs after the intrusion or displacement of an anterior primary tooth. The developed portion of the tooth is twisted or bent on itself, and in this new position growth

AVULSION AND REPLANTATION

Replantation is the technique in which a tooth, usually one in the anterior region, is reinserted into the alveolus after its loss or displacement by accidental means. There . If the tooth has been out of the mouth for less than 30 minutes, the prognosis is therefore more favorable. Also, if the apical end of the tooth is incompletely developed at the time of the injury, there is a greater chance of regaining pulp vitality after replantation. If the apex is closed, the dentist should proceed with a pulpectomy a few days after the replantation, even if the extra oral time for the tooth was brief.

If a parent calls to report that a tooth has been avulsed and it can be determined that the injury is without other oral, neurologic, or higher-priority physical complications, the dentist may instruct the parent to replace it in the socket immediately and to hold it in place with light finger pressure while the patient is brought to the dental office. If the avulsion occurred in a clean environment, nothing should be done to the tooth before the parent replants it. If the tooth is dirty, an attempt should be made to clean the root surface, but it is very important to preserve any remnants of the periodontal ligament that are still attached to the root. Therefore the parent would then be instructed to keep the tooth immersed in a suitable storage medium and bring the child and the tooth for immediate care. Milk has been shown to be a suitable storage medium

that is also often readily available (skim or low-fat milk, if available, is preferred). Isotonic saline is another excellent solution to use for this purpose if it is available.

Trauma to supporting structure

-**Concussion** Injury to supporting tissues of tooth, without displacement.

-**Luxation** Displacement of tooth (laterally, labially, or palatally).

-**Subluxation** Actually means partial displacement, but commonly used to describe loosening of a tooth without displacement.

-**Intrusion** Displacement of tooth into its socket. Often accompanied by fracture of alveolar bone.

-**Extrusion** Partial displacement of tooth from its socket.

treatment

1-**Concussion** Reassurance and soft diet.

2-**Luxation** Need to reposition tooth as soon as possible. Give LA and use fingers to push back into place. Then tooth should be splinted flexibly 2-3 weeks. If there has been a delay of more than 24 h since the injury, manual reduction is unlikely to be successful. In these cases the tooth can be repositioned orthodontically. If the displaced tooth is interfering with the occlusion an URA, with buccal capping, should be fitted as soon as possible. If root development is complete loss of vitality is a common sequelae following luxation, leading to inflammatory resorption.

-Teeth with immature apices have a much better chance of pulp survival, External or internal resorption and pulp canal obliteration may also occur, therefore keep under review.

3-**Subluxation** If minor, no Rx other than advising a soft diet is necessary. If mobile, splint for 1-2 weeks and watch vitality.

4-**Intrusion**.

The intrusion of primary anterior teeth is potentially one of the most dangerous teeth with immature roots are likely to erupt and therefore no immediate Rx is required although consideration should be given to surgical repositioning if displacement is severe (i.e. > 6 mm intrusion). However, teeth with closed apices have a limited potential for re-eruption and will need orthodontic extrusion. This should be started as soon as possible to facilitate access for RCT. Again, surgical repositioning may be indicated when intrusion is severe. Surgically repositioned teeth require flexible splinting for 1-2 weeks. Pulp death and/or root resorption can ensue rapidly after injury and early pulp extirpation, and placement of the calcium hydroxide dressing is advisable. In immature teeth the blood supply means that loss of vitality is less likely, but not impossible.

Assist prof. lamia ibrahem

Disabled child

The American Academy of Pediatric Dentistry defines persons with special health care needs as individuals who: “have a physical, developmental, mental, sensory, behavioral, cognitive, or emotional impairment or limiting condition that requires medical management, health care intervention, and/or use of specialized services or programs.

First Visit

The initial dental examination for a disabled child is like the initial examination described for normal children. Special attention should be given to obtaining a thorough medical and dental history. The names and addresses of medical or dental personnel who have previously treated the patient are necessary for consultation purposes. Consultation with these specialists is common; this helps provide insight in case management and planning ,

The first dental appointment is very important and can set the stage for subsequent appointments. As previously noted, parental anxiety about a child’s dental treatment may be a significant factor. In many situations, parents or guardians do not realize the importance of this visit and desire treatment immediately. By scheduling the patient at a designated time (early in the day) and allowing sufficient time to talk with the parents (or the guardian) and the patient before initiating any dental care, a practitioner can establish an excellent relationship with them. This initial demonstration of sincere interest in the child often proves advantageous and saves time throughout the entire treatment process. Obtaining an informed consent is imperative.

Radiographic Examination

Adequate radiographic records are often necessary in planning dental treatment. Through appropriate behavior management of the child, a dentist can usually perform a complete radiographic examination of the teeth when indicated. Occasionally, assistance from the parent and dental auxiliaries and the use of immobilization devices may be necessary to obtain the films. Better cooperation may be elicited from some children by delaying radiographs until the second visit, when they are familiar with the dental office and have found it a friendly place. For patients with limited ability to control film position, intraoral films with bitewing tabs are used for all bitewing and periapical radiographs. An 18-inch (46cm) length of floss is attached through a hole made in the tab to facilitate retrieval of the film if it falls toward the pharynx. Regardless of the types of radiographs to be made, the patient should wear a lead apron with a thyroid shield, and anyone who helps hold the patient and the film or sensor steady should wear a lead-lined apron and gloves.

Preventive Dentistry

Preventing oral disease before it starts is the most desirable way of ensuring good dental health for any dental patient. An effective preventive dental program is important for a disabled child because of the predisposing factors that make restorative dental care harder to obtain when it is necessary, and those who make preventive dental visits will have fewer unmet needs.

Dental diagnosis and treatment planning will necessitate an accurate, up-to-date medical history at each visit. After the diagnosis, the dentist should determine the patient's needs, assume the responsibility for formulating an individual program for the child, and adequately communicate to the parents and patient how such a program can be affected.

Home Dental Care

Dental education of parents/guardians/caregivers are responsible for establish good oral hygiene in the home. Reinforcement of good home dental care is provided through mass media (e.g., newspapers, radio, television, and Internet), communication with other people, and school activities (e.g., health classes, parent-teacher association meetings, and observation of National Dental Health Month).. Regular follow-up supervision at home and in the dental office is essential for effective implementation of the preventive dental treatment plan. Home dental care should begin in infancy; the dentist should teach the parents to gently cleanse the incisors daily with a soft cloth or an infant toothbrush. For older children who are unwilling or physically unable to cooperate, the dentist should teach the parent or guardian to clean teeth twice a day using correct tooth brushing techniques, safely immobilizing the child when necessary. Several positions for tooth brushing that permit firm control and support of the child, adequate visibility, and convenient positioning of the adult, with reasonable comfort for both adult and. Positions most commonly used for children requiring oral care assistance are as follows:

- The standing or sitting child is placed in front of the adult so that the adult can cradle the child's head with one hand while using the other hand to brush the teeth.
- The child reclines on a sofa or bed with the head angled backward on the parent's lap. Again, the child's head is stabilized with one hand while the teeth are brushed with the other hand.
- The parents face each other with their knees touching. The child's buttocks are placed on one parent's lap, with the child facing that parent while the child's head and shoulders lie on the other parent's knees; this allows the first parent to brush the teeth.
- The extremely difficult patient is isolated in an open area and reclined in the brusher's lap. The patient is then immobilized by an extra attendant while the brusher institutes proper oral care. If a child cannot be adequately immobilized by one person, then both parents and perhaps siblings may be needed to complete the home dental care procedures.
- The standing and resistive child is placed in front of the caregiver so that the adult can wrap his or her legs around the child to support the torso while using the hands to support the head and brush the teeth.

If a child with SHCN is institutionalized, the staff should be instructed in the proper dental care regimen for the child. Wrapped tongue blades may be of benefit in helping to keep a child's mouth open while plaque is being removed. Stabilization of the child's head prevents unnecessary trauma from sudden movements.

Diet And Nutrition

Diet and nutrition influence dental caries by affecting the type and virulence of the microorganisms in dental plaque, the resistance of teeth and supporting structures, and the properties of saliva in the oral cavity.

A proper noncariogenic diet is essential to a good preventive program for a disabled child. One should assess the diet by reviewing answers on a diet survey with the parent, realizing that allowances must be made for certain conditions for which dietary modifications are required. For example, conditions associated with difficulty in swallowing, such as severe cerebral palsy, may require that the patient be on a pureed diet. Patients with certain metabolic disturbances or syndromes, such as phenylketonuria, diabetes, or Prader-Willi syndrome, have diets that restrict specific foods or total caloric consumption. Whatever the special circumstances, any dietary recommendations should be made individually after proper consultation with the patient's primary physician or dietitian, along with early intervention and aggressive preventive care based on the child's caries risk. The oral side effects of the child's medications should be reviewed with the parents or guardians at each visit to identify specific concerns, for example, of increased caries or gingival overgrowth, to prevent or minimize these problems. Particular emphasis should be placed on discontinuation of the nursing bottle by 12 months of age and cessation of at-will breast-feeding after teeth begin to erupt, to decrease the likelihood of early childhood caries.

FLUORIDE EXPOSURE

Special emphasis should be placed on ensuring adequate systemic fluoride for patients with disabilities. The dentist should first determine the concentration of fluoride in the patient's daily water supply. If the level of fluoride is between 0.7 and 1 ppm, no supplementation is normally required. If the dentist is not sure of the fluoride level of the patient's drinking water or fluoride acquired from other sources, an analysis is indicated. Once the level has been documented, a determination of the need for fluoride supplementation can be made. The amount of systemic fluoride supplementation necessary, along with the various forms available (i.e., drops, tablets, and rinses).

Whether the patient lives in an area with a fluoridated or nonfluoridated water supply, a topical fluoride should be applied after a regularly scheduled professional prophylaxis. Also, 5% neutral sodium fluoride varnishes have been shown to be beneficial.

Some clinicians treating patients who have chronically poor oral hygiene and high decay rates suggest a daily regimen of rinsing with 0.05% sodium fluoride solution. Nightly application of a 0.4% stannous fluoride or 1.1% sodium fluoride brush-on gel has also been successfully used to decrease caries in children.

PREVENTIVE RESTORATIONS

Pit-and-fissure sealants have been shown to reduce occlusal caries effectively. For a patient who requires dental work under general anesthesia, deep occlusal pits and fissures should be restored with amalgam or long-wearing composites to prevent further breakdown and decay. Patients with severe bruxism and interproximal decay may need their teeth restored with stainless steel crowns to increase the longevity of the restorations.

Regular Professional Supervision

Close observation of caries-susceptible patients and regular dental examinations are important in the treatment of patients with SHCN. Although most patients are seen semiannually for professional prophylaxis, examination, and topical fluoride application, certain patients can benefit from recall examinations every 2, 3, or 4 months. This is particularly true of patients who are confined to institutions in which dental health programs are inadequate.

Management Of A Child With Special Health Care Needs During Dental Treatment

The principles of behavior management are even more important in the treatment of a disabled child. Because hospital visits or previous appointments with a physician frequently result in the development of apprehension in the patient, additional time must be spent with the parent and the child to establish rapport and dispel the child's anxiety. If patient cooperation cannot be obtained, the dentist must consider alternatives such as **protective stabilization, conscious sedation, or general anesthesia** to allow the necessary dental procedures to be performed.

Protective Stabilization

Partial or complete protective stabilization of the patient is sometimes a necessary and effective way to diagnose and deliver dental care to patients who need help controlling their extremities, such as infants or patients with certain neuromuscular disorders. Protective stabilization is also useful for managing combative, resistant patients so that the patient, practitioner, and/or dental staff may be protected from injury while care is being provided. This can be performed by the dentist, staff, or parent, with or without the aid of a stabilization device.

The parents, guardian, or patient (if an adult) must be informed and must give consent, and the consent must be documented before protective stabilization is used. These individuals should have a clear understanding of the type of stabilization to be used, the rationale, and the duration of use. In many cases this information should be included in the explanation of the overall management approach for the child during the initial examination and conference with the parents.

The use of protective stabilization is indicated in the following situations:

1. A patient requires immediate diagnosis and/or limited treatment and cannot cooperate because of lack of maturity or mental or physical disability.
2. A patient requires diagnosis or treatment and does not cooperate after other behavior management techniques have failed.
3. The safety of the patient, staff, parent, or practitioner would be at risk without the use of protective stabilization.

The use of stabilization is contraindicated in the following situations:

- A cooperative nonsedated patient.
 - Patients who cannot be safely stabilized due to medical or physical conditions.
 - Patients who have experienced previous physical or psychological trauma from protective stabilization (unless no other alternatives are available).
 - Non sedated patients with none emergent treatment requiring lengthy appointments.

Protective stabilization should not be used as punishment and should not be used solely for the convenience of the staff. The patient's record should display an informed consent, the indications for use, the type of stabilization used, and the duration of application. The tightness and duration of stabilization must be monitored and reassessed at regular intervals; stabilization around the extremities or chest must not actively restrict circulation or respiration. Stabilization should be terminated as soon as possible in a patient who is experiencing severe stress or hysterics to prevent possible physical or psychological trauma.

Common mechanical aids for maintaining the mouth in an open position are:

1. **Padded and wrapped tongue blades.**
2. **Open wide disposable mouth props** to aid with home dental care.
3. **Molt Mouth Prop** can be very helpful to manage a difficult patient for a prolonged period. It is made in both adult and child sizes, allows access to the opposite side of the mouth, and operates by a "reverse scissors" action. Its disadvantages include the possibility of lip and palatal lacerations and luxation of teeth if not used correctly. Caution must be exercised to prevent injury to the patient, and the prop should not be allowed to rest on anterior teeth. The patient's mouth should not be forced beyond its natural limits because patient discomfort and panic will result, which will cause further resistance and perhaps airway compromise.
4. **Rubber bite blocks** can be purchased in various sizes to fit on the occlusal surfaces of the teeth and stabilize the mouth in an open position. The bite blocks should have floss attached for easy retrieval if they become dislodged in the mouth.

Body control is gained through a variety of methods and techniques. For children who have a severe intellectual disability or are very young, parents and dental assistants can help control movements during dental procedures, however, for a child who has a severe intellectual disability, better working conditions and a more predictable patient response are

obtained through the combined use of psychological management techniques, parental assistance, pharmacologic aids, and stabilization

- ❖ The Papoose Board has several advantages. It is simple to store and use, reusable, and available in sizes to hold both large and small children and has attached head stabilizers. An extremely resistant patient may develop hyperthermia if immobilized too long, and, of course, any restrained patient requires constant attendance and supervision.

Intellectual Disability

Intellectual disability is a general term used when an individual's intellectual development is significantly lower than average and his or her ability to adapt to the environment is consequently limited. The condition varies in severity and cause.

Dental Treatment Of A Person With Intellectual Disability

Children with intellectual disability may have a higher incidence of poor oral hygiene, gingivitis, malocclusion, and untreated caries. As the severity of intellectual disability increases, typical oral signs of clenching, bruxing, drooling, pica, trauma, missing teeth, and self-injurious behaviors increase. Providing dental treatment for a person with intellectual disability requires adjusting to social, intellectual, and emotional delays.

The following procedures have proved beneficial in establishing dentist-patient-parent-staff rapport and reducing the patient's anxiety about dental care:

1. Give the family a brief tour of the office before attempting treatment. Introduce the patient and family (parent/caretaker/guardian) to the office staff. This will familiarize the patient with the personnel and facility and reduce the patient's fear of the unknown. Allow the patient to bring a favorite item (stuffed animal, blanket, or toy) to hold for the visit.
2. Be repetitive; speak slowly and in simple terms. Make sure explanations are understood by asking the patient if there are any questions. If the individual has an alternative communication system, such as a picture board or electronic device, be sure it is available to assist with dental explanations and instructions.
3. Give only one instruction at a time. Reward the patient with compliments after the successful completion of each procedure.
4. Actively listen to the patient. People with intellectual disability often have trouble with communication, and the dentist should be particularly sensitive to gestures and verbal requests.
5. Invite the parent/guardian into the operatory for assistance and to aid in communication with the patient when helpful.
6. Keep appointments short. Gradually progress to more difficult procedures (e.g., anesthesia and restorative dentistry) after the patient has become accustomed to the dental environment.
7. Schedule the patient's visit early in the day, on a lightly scheduled day, when the dentist, the staff, and the patient will be less fatigued.

Down Syndrome (Trisomy 21 Syndrome)

Down syndrome is the best-known chromosomal disorder and is caused by the presence of an extra copy of chromosome 21 (trisomy 21). Medical conditions that occur more frequently in infants and children with Down syndrome and increase the mortality of these individuals include cardiac defects, leukemia, and upper respiratory infections. The incidence of congenital cardiac defects is about 40%, and because of these patients' high susceptibility to periodontal disease, knowledge of a heart condition is essential for dental treatment.

Skeletal findings are an underdeveloped midface, creating a prognathic occlusal relationship. Oral findings include mouth breathing, open bite, appearance of macroglossia, fissured lips and tongue, angular cheilitis, delayed eruption times, missing and malformed teeth, oligodontia, small roots, microdontia, crowding, and a low level of caries. Children with Down syndrome experience a high incidence of rapid, destructive periodontal disease, which may be related to local factors such as tooth morphology, bruxism, malocclusion, and poor oral hygiene. Many children with Down syndrome are affectionate and cooperative.

Dental Management

- Medical History (heart disease, ALL)
- Emphasize oral hygiene due to high incidence of rapid periodontal dz
 - Poor vascularized gingival tissue
 - T-cell maturation defect or PMN chemotactic defect
 - May benefit from daily antimicrobial agents e.g. Chlorhexidine
- Many children with Down syndrome are affectionate and cooperative
- Some may require light sedation, immobilization or general anesthesia

Autism

Its severely incapacitating disturbance of mental and emotion development that causes problems in learning, communication and relating to other

Prevalence: Earlier studies: 4 per 10,000....Recent studies: 10-15 per 10,000

Oral Manifestations

- Drooling, Poor muscle tone, Poor tongue coordination, Pouch food instead of swallowing, Increases caries rate due to sweet and soft diet

Dental Management

- Repeated visits may desensitize
- Use slow approach and quiet voice
- T-S-D
- Modeling by parents and siblings
- Home rehearsals
- Positive reinforcement with immediate reward
- Minimize movements as easily distracted
- Short visits, time out
- Physical restriction
- Sedation, N2O, GA

Mental retardation.

term used when an individual's intellectual development is significantly lower than average and whose ability to adapt to their environment is consequently limited.

The WHO recommends the division of the mentally subnormal into three broad categories:

- 1-Mild Subnormal_ with IQ of 50 to 69 and a mental age in the adult of 8 to 12 years.
- 2-Moderate Subnormal_ with IQ of 20 to 49 and a mental age in adult of 3 to 7 years.
- 3-Sever Subnormal_ with IQ of 0 to 19 and a mental age in the adult of 0 to 2 years

Dental Problems

- 1-Anomalies in the dento facial morphology and in the dental eruptive pattern.
- 2-Enamel hypoplasia.
- 3-Delayed eruption.
- 4-High palatal vault with a hypoplastic maxilla.
- 5-Tendency for Class II malocclusion with an open bite.
- 6- Over retained primary dentition

Dental treatment of a child with mental retardation

- 1- Behavior management techniques can be used for patients with mild or moderate retardation
- 2- Dental procedures must be explained slowly, simply and repetitively.
- 3- Give only one instruction at a time. Reward the patient with compliments after each procedure.
- 4 - Actively listen to the patient. People with mental retardation often have trouble with communication.
- 5- The visits should be short. Minimal new procedures should be introduced at each appointment.
- 6- Gradually progress to more difficult procedures.
- 7- We must learn from the parents or guardians about the patient's habits, comprehensive words or gestures to facilitate our work
- 8- Before using physical restriction on patients, suitability must be considered for each case and with parental or guardian consent.
- 9- We must consider the patient's behavior, his age and the type of dental treatment needed.
- 10- We may utilize elements of partial or total restriction, or the collaboration of 2 or 3 helpers.
- 11- Sedation techniques can also be used such as oral premeditation.
- 12- General anesthesia should be used only in cases where physical restriction, behavior management and conscious sedation have all failed or were ineffective in providing the most efficient care.

Cerebral Palsy

Not a specific disease entity is a collection of disabling disorders caused by insult and permanent damage to the brain in the prenatal and perinatal periods, during which time the central nervous system is still maturing. This disability might involve muscle tone with disruption of movement and posture, dysfunction and paralysis.

Three most common types of neoromuscular dysfunctions:

Spasticity.

Athetosis.

Ataxic.

Classification according to affected area by this disorder:

Monoplegia ,Hemiplegia ,Paraplegia and Diplegia

Oral manifestations of CP

- 1• Periodontal disease due to poor oral hygiene and soft diet
- 2• Gingival hyperplasia due to seizure meds
- 3 • Dental caries-conflicting data
- 4• Malocclusion-twice as common
- 5• Protrusion of max ant teeth, increase overbite/overjet, openbite
- 6• Bruxism
- 7• Trauma

Dental Management

- 1-Thorough medical and dental history
- 2- Consider treating in wheelchair
- 3- Use 2 person lift if moving to dental chair
- 4- Do not force limbs into unnatural positions
- 5- Use rubber dam - protection from aspiration
- 6- Consider physical restraints for protection
- 7- Consider recommending mouthguard
- 8- Patience
- 9- Goal of treatment-comprehensive care
- 10- Prevention- frequent visits, parental involvement in home care, modifications to toothbrush, diet, fluoride
- 11- Restorative care with rubber dam, bite block tied with floss
- 12- Short appointments.

Deafness

Deafness is a disability that is often over looked because it is not obvious .total deafness affects 1.8 million people,

1 in 600 neonates has a congenital hearing loss

• Hearing impairment = problem with or damage to one or more parts of the ear.

Conductive: problem with the outer or middle ear, including the ear canal, eardrum, or ossicles.

- Usu. can be corrected with medications or surgery.

Sensorineural: damage to the inner ear (cochlea) or the auditory nerve.
trouble hearing clearly, understanding speech, & interpreting sounds.

- Hearing loss is permanent.
- Treated with hearing aids or, in severe cases, a cochlear implant.

Mixed both conductive and sensorineural hearing problems.

- **Etiology:** Prenatal Factors:

1. Viral infections
2. ototoxic drugs (aspirin, streptomycin, neomycin, kanamycin)
3. Congenital syphilis
4. Hereditary disorders

Perinatal Factors:

1. Toxemia late in pregnancy
2. Prematurity
3. Birth injury
4. Anoxia
5. Erythroblastosis fetalis

Postnatal Factors:

1. Viral infections (mumps, measles, chickenpox, flu, &/or meningitis)
2. Injuries
3. Ototoxic drugs (aspirin, streptomycin, neomycin, kanamycin)

- **Management**

1-Prepare the patient & parent before the first visit with a welcome letter

2-Let the patient & parent determine how the patient desires to communicate

(i.e inter preter ,lip-reading, sign language)

3- enhance visibility for communication. watch the patient expression

4-Make sure the patient understands what the dental equipment going to happen, and how it will feel

5- employ the tell-show- feel-do approach

6-Reassure the patient with physical contact. hold the patients hand initially

7-Allow extra time for all appointments

8-Avoid blocking the patient's visual field

9-Adjust the hearing aid before the hand piece is in operation (hearing aid amplifies all sounds

10- make sure the parent or patient understands explanations of diagnosis ,treatment and payment

Visual impairment

- Total visual impairment affects over 15 million people
- A person is considered to be affected by blindness

If visual acuity doesn't exceed 20/200 in the better eye w/ corrective lenses OR

If acuity greater than 20/200 but w/ a visual field of no greater than 20 degrees

• Etiology

Prenatal Factors:

Optic atrophy, microphthalmos, cataracts, colobomas, dermoid and other tumors, toxoplasmosis, syphilis, rubella, tuberculous meningitis, developmental abnormalities of the orbit

Postnatal causes:

Trauma, retrolental fibroplasias, hypertension, premature birth, polycythemia vera, hemorrhagic disorders, leukemia, diabetes mellitus, glaucoma

- The capabilities of a child with blindness are difficult to assess, therefore an affected child could be misdiagnosed as developmentally delayed
- Children with blindness may exhibit self-stimulating activities, such as eye pressing, finger flicking, rocking or head banging

- Listening, touching, tasting, and smelling are extremely important for the affected children in helping to learn coping behavior
- **Dental management:**
 - 1-Determine the degree of visual impairment
 - 2-Establish rapport
 - 3-Do not grab, move or stop the patient without verbal warning, encourage the parent to accompany the child
 - 4-Paint a picture in the mind of the visually impaired child by describing the office setting and treatment
 - 5-Introduce the office personal
 - 6-When making physical contact, do so reassuring
 - 7-Allow the patient to ask questions
 - 8-Protect the patient's eyes with eyeglasses
 - 9-Use the **touch, taste, or smell approach**
 - 10-A patient may reject strong tastes, use small quantities of dental materials
 - 11- Use audio & Braille dental pamphlets explaining specific dental procedures
 - 12-Ideally, limit providers of the patient's dental care to one dentist
 - 13-Maintain a relaxed atmosphere

pedodontic

Disabled child

The American Academy of Pediatric Dentistry defines persons with special health care needs as individuals who: “have a physical, developmental, mental, sensory, behavioral, cognitive, or emotional impairment or limiting condition that requires medical management, health care intervention, and/or use of specialized services or programs.

Classification Of Handicapped Child:

1-physical of handicapped

2- congenital handicapped condition such as cleft lip and palate

3- mental Handicapped condition such as cerebral palsy

4- convulsion (epilepsy)

5- communication

6- systemic or medical Handicapped (cardiac ,hemophilia)

7- metabolic (juvenile disease)

8- malignant (leukemia)

9-osseous(rickets)

New classification

1-Developmentally disable

2- medical compromised

FIRST VISIT

The initial dental examination for a disabled child is like the initial examination described for normal children. Special attention should be given to obtaining a thorough medical and dental history. The names and addresses of medical or dental personnel who have previously treated the patient are necessary for consultation purposes. Consultation with these specialists is common; this helps provide insight in case management and planning ,

The first dental appointment is very important and can set the stage for subsequent appointments. As previously noted, parental anxiety about a child's dental treatment may be a significant factor. In many situations, parents or guardians do not realize the importance of this visit and desire treatment immediately. By scheduling the patient at a designated time (early in the day) and allowing sufficient time to talk with the parents (or the guardian) and the patient before initiating any dental care, a practitioner can establish an excellent relationship with them. This initial demonstration of sincere interest in the child often proves advantageous and saves time throughout the entire treatment process. Obtaining an informed consent is imperative.

RADIOGRAPHIC EXAMINATION

Adequate radiographic records are often necessary in planning dental treatment. Through appropriate behavior management of the child, a dentist can usually perform a complete radiographic examination of the teeth when indicated. Occasionally, assistance from the parent and dental auxiliaries and the use of immobilization devices may be necessary to obtain the films. Better cooperation may be elicited from some children by delaying radiographs until the second visit, when they are familiar with the dental office and have found it a friendly place. For patients with limited ability to control film position, intraoral films with bitewing tabs are used for all bitewing and periapical radiographs. An 18-inch (46cm) length of floss is attached through a hole made in the tab to facilitate retrieval of the film if it falls toward the pharynx. Regardless of the types of radiographs to be made, the patient should wear a lead apron with a thyroid shield, and anyone who helps hold the patient and the film or sensor steady should wear a lead-lined apron and gloves.

PREVENTIVE DENTISTRY

Preventing oral disease before it starts is the most desirable way of ensuring good dental health for any dental patient. An effective preventive dental program is important for a disabled child because of the predisposing factors that make restorative dental care harder to obtain when it is necessary, and those who make preventive dental visits will have fewer unmet needs.

Dental diagnosis and treatment planning will necessitate an accurate, up-to-date medical history at each visit. After the diagnosis, the dentist should determine the patient's needs, assume the responsibility for formulating an individual program for the child, and adequately communicate to the parents and patient how such a program can be affected.

HOME DENTAL CARE

Dental education of parents/guardians/caregivers are responsible for establish good oral hygiene in the home. Reinforcement of good home dental care is provided through mass media (e.g., newspapers, radio, television, and Internet), communication with other people, and school activities (e.g., health classes, parent-teacher association meetings, and observation of National Dental Health Month).. Regular follow-up supervision at home and in the dental office is essential for effective implementation of the preventive dental treatment plan. Home dental care should begin in infancy; the dentist should teach the parents to gently cleanse the incisors daily with a soft cloth or an infant toothbrush. For older children who are unwilling or physically unable to cooperate, the dentist should teach the parent or guardian to clean teeth twice a day using correct tooth brushing techniques, safely immobilizing the child when necessary. Several positions for tooth brushing that permit firm control and support of the child, adequate visibility, and convenient positioning of the adult, with reasonable comfort for both adult and. Positions most commonly used for children requiring oral care assistance are as follows:

- The standing or sitting child is placed in front of the adult so that the adult can cradle the child's head with one hand while using the other hand to brush the teeth.

- The child reclines on a sofa or bed with the head angled backward on the parent's lap. Again, the child's head is stabilized with one hand while the teeth are brushed with the other hand.

- The parents face each other with their knees touching. The child's buttocks are placed on one parent's lap, with the child facing that parent while the child's head and shoulders lie on the other parent's knees; this allows the first parent to brush the teeth.

- The extremely difficult patient is isolated in an open area and reclined in the brusher's lap. The patient is then immobilized by an extra attendant while the brusher institutes proper oral care. If a child cannot be adequately immobilized by

one person, then both parents and perhaps siblings may be needed to complete the home dental care procedures.

- The standing and resistive child is placed in front of the caregiver so that the adult can wrap his or her legs around the child to support the torso while using the hands to support the head and brush the teeth.

If a child with SHCN is institutionalized, the staff should be instructed in the proper dental care regimen for the child. Wrapped tongue blades may be of benefit in helping to keep a child's mouth open while plaque is being removed. Stabilization of the child's head prevents unnecessary trauma from sudden movements.

DIET AND NUTRITION

Diet and nutrition influence dental caries by affecting the type and virulence of the microorganisms in dental plaque, the resistance of teeth and supporting structures, and the properties of saliva in the oral cavity.

A proper noncariogenic diet is essential to a good preventive program for a disabled child. One should assess the diet by reviewing answers on a diet survey with the parent, realizing that allowances must be made for certain conditions for which dietary modifications are required. For example, conditions associated with difficulty in swallowing, such as severe cerebral palsy, may require that the patient be on a pureed diet. Patients with certain metabolic disturbances or syndromes, such as phenylketonuria, diabetes, or Prader-Willi syndrome, have diets that restrict specific foods or total caloric consumption. Whatever the special circumstances, any dietary recommendations should be made individually after proper consultation with the patient's primary physician or dietitian, along with early intervention and aggressive preventive care based on the child's caries risk. The oral side effects of the child's medications should be reviewed with the parents or guardians at each visit to identify specific concerns, for example, of increased caries or gingival overgrowth, to prevent or minimize these problems. Particular emphasis should be placed on discontinuation of the nursing bottle by 12 months of age and cessation of at-will breast-feeding after teeth begin to erupt, to decrease the likelihood of early childhood caries.

FLUORIDE EXPOSURE

Special emphasis should be placed on ensuring adequate systemic fluoride for patients with disabilities. The dentist should first determine the concentration of fluoride in the patient's daily water supply. If the level of fluoride is between 0.7

and 1 ppm, no supplementation is normally required. If the dentist is not sure of the fluoride level of the patient's drinking water or fluoride acquired from other sources, an analysis is indicated. Once the level has been documented, a determination of the need for fluoride supplementation can be made. The amount of systemic fluoride supplementation necessary, along with the various forms available (i.e., drops, tablets, and rinses).

Whether the patient lives in an area with a fluoridated or nonfluoridated water supply, a topical fluoride should be applied after a regularly scheduled professional prophylaxis. Also, 5% neutral sodium fluoride varnishes have been shown to be beneficial.

. Some clinicians treating patients who have chronically poor oral hygiene and high decay rates suggest a daily regimen of rinsing with 0.05% sodium fluoride solution. Nightly application of a 0.4% stannous fluoride or 1.1% sodium fluoride brush-on gel has also been successfully used to decrease caries in children.

PREVENTIVE RESTORATIONS

Pit-and-fissure sealants have been shown to reduce occlusal caries effectively. For a patient who requires dental work under general anesthesia, deep occlusal pits and fissures should be restored with amalgam or long-wearing composites to prevent further breakdown and decay. Patients with severe bruxism and interproximal decay may need their teeth restored with stainless steel crowns to increase the longevity of the restorations.

REGULAR PROFESSIONAL SUPERVISION

Close observation of caries-susceptible patients and regular dental examinations are important in the treatment of patients with SHCN. Although most patients are seen semiannually for professional prophylaxis, examination, and topical fluoride application, certain patients can benefit from recall examinations every 2, 3, or 4 months. This is particularly true of patients who are confined to institutions in which dental health programs are inadequate.

MANAGEMENT OF A CHILD WITH SPECIAL HEALTH CARE NEEDS DURING DENTAL TREATMENT

The principles of behavior management are even more important in the treatment of a disable child. Because hospital visits or previous appointments with a physician frequently result in the development of apprehension in the patient, additional time must be spent with the parent and the child to establish rapport and dispel the child's anxiety. If patient cooperation cannot be obtained, the dentist

must consider alternatives such as **protective stabilization, conscious sedation, or general anesthesia** to allow the necessary dental procedures to be performed.

PROTECTIVE STABILIZATION

Partial or complete protective stabilization of the patient is sometimes a necessary and effective way to diagnose and deliver dental care to patients who need help controlling their extremities, such as infants or patients with certain neuromuscular disorders. Protective stabilization is also useful for managing combative, resistant patients so that the patient, practitioner, and/or dental staff may be protected from injury while care is being provided. This can be performed by the dentist, staff, or parent, with or without the aid of a stabilization device.

The parents, guardian, or patient (if an adult) must be informed and must give consent, and the consent must be documented before protective stabilization is used. These individuals should have a clear understanding of the type of stabilization to be used, the rationale, and the duration of use. In many cases this information should be included in the explanation of the overall management approach for the child during the initial examination and conference with the parents.

The use of protective stabilization is indicated in the following situations:

1. A patient requires immediate diagnosis and/or limited treatment and cannot cooperate because of lack of maturity or mental or physical disability.
2. A patient requires diagnosis or treatment and does not cooperate after other behavior management techniques have failed.
3. The safety of the patient, staff, parent, or practitioner would be at risk without the use of protective stabilization.

The use of stabilization is contraindicated in the following situations:

- A cooperative nonsedated patient.
- Patients who cannot be safely stabilized due to medical or physical conditions.
- Patients who have experienced previous physical or psychological trauma from protective stabilization (unless no other alternatives are available).
- Non sedated patients with none emergent treatment requiring lengthy appointments.

Protective stabilization should not be used as punishment and should not be used solely for the convenience of the staff. The patient's record should display an informed consent, the indications for use, the type of stabilization used, and the duration of application. The tightness and duration of stabilization must be monitored and reassessed at regular intervals; stabilization around the extremities or chest must not actively restrict circulation or respiration. Stabilization should be terminated as soon as possible in a patient who is experiencing severe stress or hysterics to prevent possible physical or psychological trauma.

Common mechanical aids for maintaining the mouth in an open position are:

1. **Padded and wrapped tongue blades.**
2. **Open wide disposable mouth props** to aid with home dental care.
3. **Molt Mouth Prop can be** very helpful to manage a difficult patient for a prolonged period. It is made in both adult and child sizes, allows access to the opposite side of the mouth, and operates by a “reverse scissors” action. Its disadvantages include the possibility of lip and palatal lacerations and luxation of teeth if not used correctly. Caution must be exercised to prevent injury to the patient, and the prop should not be allowed to rest on anterior teeth. The patient’s mouth should not be forced beyond its natural limits because patient discomfort and panic will result, which will cause further resistance and perhaps airway compromise.
4. **Rubber bite blocks** can be purchased in various sizes to fit on the occlusal surfaces of the teeth and stabilize the mouth in an open position. The bite blocks should have floss attached for easy retrieval if they become dislodged in the mouth.

Body control is gained through a variety of methods and techniques. For children who have a severe intellectual disability or are very young, parents and dental assistants can help control movements during dental procedures, however, for a child who has a severe intellectual disability, better working conditions and a more predictable patient response are obtained through the combined use of psychological management techniques, parental assistance, pharmacologic aids, and stabilization

- ❖ The Papoose Board has several advantages. It is simple to store and use, reusable, and available in sizes to hold both large and small children and has attached head stabilizers.

An extremely resistant patient may develop hyperthermia if immobilized too long, and, of course, any restrained patient requires constant attendance and supervision.

INTELLECTUAL DISABILITY

Intellectual disability is a general term used when an individual’s intellectual development is significantly lower than average and his or her ability to adapt to the environment is consequently limited. The condition varies in severity and cause.

DENTAL TREATMENT OF A PERSON WITH INTELLECTUAL DISABILITY

Children with intellectual disability may have a higher incidence of poor oral hygiene, gingivitis, malocclusion, and untreated caries. As the severity of intellectual disability increases, typical oral signs of clenching, bruxing, drooling, pica, trauma, missing teeth, and self-injurious behaviors increase. Providing dental treatment for a person with intellectual disability requires adjusting to social, intellectual, and emotional delays.

The following procedures have proved beneficial in establishing dentist-patient-parent-staff rapport and reducing the patient's anxiety about dental care:

1. Give the family a brief tour of the office before attempting treatment. Introduce the patient and family (parent/caretaker/guardian) to the office staff. This will familiarize the patient with the personnel and facility and reduce the patient's fear of the unknown. Allow the patient to bring a favorite item (stuffed animal, blanket, or toy) to hold for the visit.

2. Be repetitive; speak slowly and in simple terms. Make sure explanations are understood by asking the patient if there are any questions. If the individual has an alternative communication system, such as a picture board or electronic device, be sure it is available to assist with dental explanations and instructions.

3. Give only one instruction at a time. Reward the patient with compliments after the successful completion of each procedure.

4. Actively listen to the patient. People with intellectual disability often have trouble with communication, and the dentist should be particularly sensitive to gestures and verbal requests.

5. Invite the parent/guardian into the operatory for assistance and to aid in communication with the patient when helpful.

6. Keep appointments short. Gradually progress to more difficult procedures (e.g., anesthesia and restorative dentistry) after the patient has become accustomed to the dental environment.

7. Schedule the patient's visit early in the day, on a lightly scheduled day, when the dentist, the staff, and the patient will be less fatigued.

DOWN SYNDROME (TRISOMY 21 SYNDROME)

Down syndrome is the best-known chromosomal disorder and is caused by the presence of an extra copy of chromosome 21 (trisomy 21). Medical conditions that occur more frequently in infants and children with Down syndrome and increase the mortality of these individuals include cardiac defects, leukemia, and upper respiratory infections. The incidence of congenital cardiac defects is about

40%, and because of these patients' high susceptibility to periodontal disease, knowledge of a heart condition is essential for dental treatment.

Skeletal findings are an underdeveloped midface, creating a prognathic occlusal relationship. Oral findings include mouth breathing, open bite, appearance of macroglossia, fissured lips and tongue, angular cheilitis, delayed eruption times, missing and malformed teeth, oligodontia, small roots, microdontia, crowding, and a low level of caries. Children with Down syndrome experience a high incidence of rapid, destructive periodontal disease, which may be related to local factors such as tooth morphology, bruxism, malocclusion, and poor oral hygiene. Many children with Down syndrome are affectionate and cooperative.

Dental Management

- Medical History (heart disease, ALL)
- Emphasize oral hygiene due to high incidence of rapid periodontal dz
 - Poor vascularized gingival tissue
 - T-cell maturation defect or PMN chemotactic defect
 - May benefit from daily antimicrobial agents e.g. Chlorhexidine
- Many children with Down syndrome are affectionate and cooperative
- Some may require light sedation, immobilization or general anesthesia

1-McDonald and Avery Dentistry for the Child and Adolescent
9th Edition

Authors: Jeffrey Dean Ralph McDonald David Avery Ralph McDonald David Avery Jeffrey Dean David Avery Ralph McDonald

Published Date: 8th April 2010

2- Pediatric Dentistry: A Clinical Approach, 2nd Edition

Goran Koch (Editor), Sven Poulsen (Editor)

ISBN: 978-1-118-68719-2

May 2013, Wiley-Blackwell

Pedodontic

Diagnosis and treatment plan

Paediatric dentists are committed to the oral health of children from infancy through the teen years. They have the experience and qualifications to care for a child's teeth, gums, and mouth throughout the various stages of childhood. They are also serving as educational resources for parents. - It is recommended that a dental visit should occur within six months after the presence of the first tooth or by a child's first birthday, Diagnosis simply defined as identification of disease. In pedodontic the diagnosis for child differs from that for adult, because the childhood is the period of life's greatest physical, psychological and emotional growth, so the dentist must not only examine the pediatric patient and arrive at diagnosis but also must prepare a treatment plan to solve today's problem and prevent those of tomorrow. The diagnostic-process includes the traditional sequence of chief complaint, history, examination, diagnosis and treatment planning which remains the best approach to patient evaluation and treatment.

A- The chief complaint

It defined as a symptom or symptoms described by the patient's own words related to the presence of an abnormal condition. In pedodontic for younger children, the parents are the best historian because younger children have difficulty in characterizing the pain or even localizing it to a single quadrant, while for older children or even teenager they have a sense of that permit adequate characterization of problems, however the decision to choose either parent or child or both must the dentist depend on patient's age, intelligence and emotional state at the time of visit.



B- History

It traditionally served to identify known diseases or signs and symptoms of unknown diseases, this is very important in case of congenital heart disease, orthopedic problems and hematological disorders that may affect the dental care and treatment. History classified into medical and dental history.

The medical history includes:

- 1- Past history: includes operations, hospitalizations, infectious diseases, allergies accidents...
- 2- Family history: includes the pattern of health and diseases within the patient's family like occurrence of genetic diseases, tendency toward allergies in siblings...
- 3- Social history: the importance of social history is that it concern for developmental and emotional status of the child, because behavior management is a major aspect of pediatric dentistry and determination of developmental delays or emotional liability is an important function of the history. The social includes the family situations, current medications, child's school status, personality traits and developmental status and the child's interpersonal relationships.
- 4- Review of systems: includes head, respiration, cardiovascular, gastrointestinal tract, musculature skeletal and hematological systems. It is through questions about specific signs and symptoms.

The dental history



It must fulfill two functions:

- 1- It should be diagnostic, pointing to existing disease, symptoms of disease or problems that the child experienced.
- 2- It should be prognostic, providing the dentist with an impression of the success of the past professional intervention and parental involvement.

In addition the dental history of the child patient includes:

Eruption pattern and problems, feeding technique, use of pacifier, habits (thumb sucking, nursing bottle...), home hygiene care, diet history and fluoridation. For the parent includes, care of the child, instruction of oral hygiene, attitude toward primary teeth, previous dental cares satisfaction.

Oral Habits



C- Clinical examination

The dentist should observe the child patient as he walks in the dental clinic like patient gait, stature, size, gross deformities skin and hands.

GAIT: an unsteady walking indicates a central nervous system disorder or an orthopedic problem.

STATURE: small or large stature, wide variations in weight and gross deformity in the body may indicate a syndrome of handicap that requires a special attention and management.

Also the dentist should evaluate the psychological state of the child patient inside the dental clinic, talking with parent and the child and observing their interaction will provide an idea of general emotional and intellectual functioning. Also the dentist can ask questions while examining the child and make an assessment of the child's behavior.

Attention to the patient's hair, head, face, neck, and hands should be among the first observations made by the dentist after the patient is seated

in the chair.

The patient's hands may reveal information. The dentist may first detect an elevated temperature by holding the patient's hand. Cold, clammy hands or bitten fingernails may be the first indication of abnormal anxiety in the child. An unusually clean digit suggests a persistent sucking habit. Clubbing of the fingers or a bluish color in the nail beds suggests congenital heart disease that may require special precautions during dental treatment.

Extra oral examination

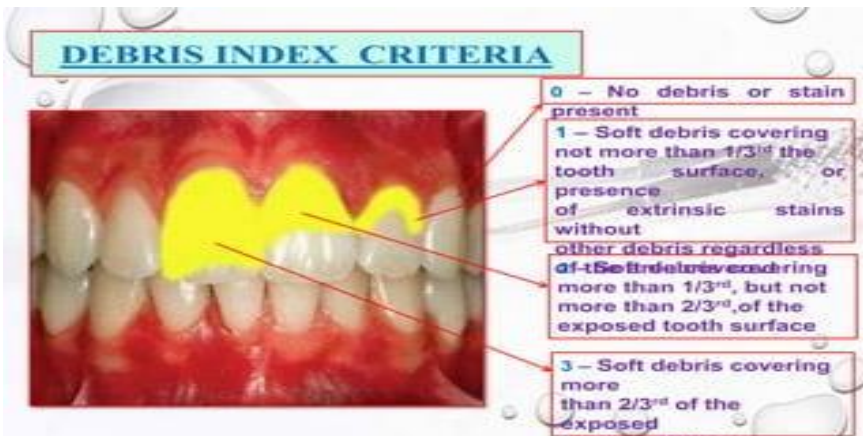
Inspection and palpation of the patient's head and neck are also indicated. Unusual characteristics of the hair or skin should be noted. The dentist may observe signs of head lice, ringworm, or impetigo during the examination. Proper referral is indicated immediately, since these conditions are contagious. If a contagious condition is identified but the child also has a dental emergency, the dentist and the staff must take appropriate precautions to prevent spread of the disease to others while the emergency is alleviated. Further treatment should be postponed until the contagious condition is controlled.

One should evaluate temporomandibular joint function by palpating the head of each mandibular condyle and observing the patient while the mouth is closed, at rest, and in various open positions. The extraoral examination continues with palpation of the patient's neck and submandibular area. Again, deviations from normal, such as unusual tenderness or enlargement, should be noted and follow-up tests performed or referrals made as indicated.

Intraoral examination:

Intraoral examination for pediatric patient should be comprehensive, the oral cavity should be examined starting from the lips, buccal vestibules, floor of the mouth, palate and tongue, gingiva, and oropharynx like for ex. enlarged tonsils with a purulent discharge may be the initial signs of streptococcal infection leading to a rheumatic fever which need an immediate referral to the child's physician.

- During inspection of the gingival issues, an assessment of oral cleanliness should also be made, and the presence of any plaque or calculus deposits noted. A number of simple oral hygiene indices have been developed to provide an objective record of oral cleanliness. 8 - One such index, the oral debris index (Green and Vermillion, 1964), requires disclosing prior to an evaluation of the amount of plaque on selected teeth (first permanent molars, and upper right and lower left central incisors).



Also the occlusion should be noted, any dental or skeletal irregularities, monitoring the patient's facial profile and symmetry, molar, canine and anterior segment relationships, dental dental midlines, then the teeth examined carefully and counted if any congenital missing teeth or supernumerary teeth, or any hereditary or acquired anomalies. Finally the teeth should inspected carefully for carious lesions. Identification of carious lesions in young patients is critical because the lesions may progress rapidly in children if not controlled. Eliminating the carious activity and restoring the teeth as needed prevent pain and spread of infection and also contribute to the stability of the developing occlusion. The dentist may always start in the upper right quadrant, work around the maxillary arch, move down to the lower left quadrant, and end the examination in the lower right quadrant.

The Radiographical Examination :-

- Radiograph should be taken before comprehensive oral health care plan can be developed and subsequent radiographs are required periodically to detect incipient caries or other developing anomalies.

- A child should be exposed to dental ionizing radiation only after the dentist has

determined that radiography is necessary to make an adequate diagnosis for the individual child at the time of the appointment.

- Sometimes, obtaining isolated occlusal, periapical or bitewing radiograph is indicated in

very young children (even infants) because of trauma, toothache, suspected developmental

disturbances, or proximal caries. Carious lesions appear smaller on radiographs than they

actually are. If the pediatric patient can be motivated to adopt a routine of good oral

hygiene supported by competent supervision, many of these initial lesions can be arrested.

- Radiographs may be indicated in order to facilitate :-

- Caries diagnosis.
- Trauma diagnosis.
- Orthodontic treatment planning.
- Identification of any abnormalities in dental development.
- Detection of any bony or dental pathology.

- The caries diagnosis :- Bitewing radiographs are invaluable for the detection of early interproximal carious lesions, or occult occlusal lesions. Indeed, bitewing radiography will increase the identification of interproximal lesions by a factor of between 2 and 8, compared to visual assessment alone.

- Bitewing radiographs are usually recommended for all new patients, especially high caries risk individuals, to provide a baseline caries assessment, but, we should keep in mind that the carious lesion always appears smaller on the radiograph than it actually is, likewise, microscopic observation of ground sections of teeth reveal that progress of the lesion through the enamel and dentin is more extensive than is evident on the radiograph.

- The bitewing radiograph is the view of choice for interproximal carious detection, but it does require a reasonable degree of patient co-operation. For patient unable to tolerate intraoral films, the lateral oblique radiograph provides a useful alternative. This view has the added advantage of including the developing permanent dentition.

- Following the initial radiographic investigation of caries, a decision

should be made regarding the frequency of any future assessment. The interval will depend on the patient's individual caries risk as follows :-

- High caries risk :- repeat bitewings in 12 months.

- Low caries risk :- repeat bitewings in 24-36 months.

- Thus, the radiographic examination is important for recognizing hidden incipient lesions in the practice of preventive dentistry.

- The trauma assessment :- The radiographs may be indicated for patients who have sustained facial or dental trauma.

- The orthodontic treatment planning :- A panoramic radiograph is usually mandatory prior to any orthodontic treatment. The need for other views, such as an upper standard occlusal or lateral cephalometric radiograph, is dependent on the individual clinical situation.

- The dental development :- The need for radiographic assessment of the developing dentition may be indicated by any of the following clinical features :-

- 1-Delayed / premature dental development.

- 2-Suspected missing / extra teeth.

- 3-Potential ectopic tooth position (especially upper maxillary canines).

- 4-First permanent molars of poor prognosis-in cases where first permanent molars are to be extracted it is mandatory to check for the radiographic presence of all other permanent teeth, including third molars, and to assess the stage of dental development of the lower second permanent molars in order to determine the optimum time for any first permanent molar

Extractions.

- The panoramic oral radiograph provides the optimum view for an overall assessment of normal or abnormal dental development. Furthermore, accurate determination of chronologic age can be achieved by calculating dental age, using a panoramic radiograph and a technique for dental aging.

- A panoramic oral radiograph may be supplemented with an intraoral radiograph, such as an upper standard occlusal, when an abnormality presents in the anterior maxilla. The combination of these two views provides the opportunity to confirm the exact position of any unerupted maxillary canines or supernumerary teeth, using the vertical parallax technique.

- The detection of pathology :- Selected radiographs may be required in cases of suspected pathology. The actual view is obviously dictated by the presenting complaint, but, a periapical radiographs is frequently indicated

for localized pathologies, such as :-

- Periapical or interradicular infection (primary molars) associated with non-vital teeth.
- Periodontal conditions.
- Trauma-related sequel, such as root resorption.

- A panoramic oral view is particularly valuable where the pathology involves more than one quadrant or has extensive bony involvement. A sectional panoramic oral radiograph may be prescribed in some situations since this approach helps to reduce ionizing exposure.

D- Treatment plan:

The diagnosis and treatment plan should be in the sequence of four phases:

- 1- Systemic phase: includes premedication for medical considerations such as rheumatic heart disease, medical consultation and treatment in cases of syndromes or handicapping conditions or cleft palate, also in this phase includes consideration of medication for behavior control.
- 2- Preparatory phase: includes preventive considerations, periodontal care, behavior control, gross caries excavation and temporary restoration, orthodontic consultation, prosthetic, endodontic therapy and oral surgery, in pedodontic, therapy should be carried out in quadrants.
- 3- Corrective phase: the aim of this phase is to restore the teeth and occlusion to their proper level of health, by restoring the tooth whether to choose amalgam or stainless steel crown or spacemaintainer construction.
- 4- Maintenance phase: recall scheduling and long-term preventive and orthodontic visits

pedodontic

GINGIVITIS AND PERIODONTAL DISEASES

THE GINGIVA

It is the part of the oral mucous membrane that covers the alveolar processes and the cervical portions of the teeth. It has been traditionally divided into free and attached gingiva.

The free gingiva — is the tissue coronal to the bottom of the gingival sulcus.

The attached gingiva extends apically from the free gingival groove to the mucogingival junction.

Gingival tissue in adults	Gingival tissue in children
The gingival tissues are normally light pink, although the color may be related to the complexion of the person, the thickness of the tissue, and the degree of keratinization.	The gingival color of the young child may be more reddish due to increased vascularity and thinner epithelium.
The surface of the gingiva of an adult appears more stippled than that of a child.	The surface of the gingiva of a child appears less stippled or smoother than that of an adult.
In the healthy adult, the marginal gingiva has a sharp, knifelike edge.	During the period of tooth eruption in the child the gingivae are thicker and have rounded margins due to the migration and cervical constriction of the primary teeth.

GINGIVITIS

It is inflammation involving only the gingival tissues surrounding the tooth. Microscopically, it is characterized by the presence of an inflammatory exudate and edema, some destruction of collagenous gingival fibers, and ulceration and proliferation of the epithelium facing the tooth and attaching the gingiva to it. Clinically it includes erythema, bleeding on probing and edema. Marginal gingivitis is the most common form of periodontal disease and starts in early childhood. Severe gingivitis is relatively uncommon in children. Bacterial plaque is considered the major etiologic factor associated with gingivitis and more significant periodontal disease.

pedodontic

TYPES OF GINGIVITIS IN CHILDREN

Eruptive Gingivitis

It is gingival inflammation occurring around an erupting permanent tooth. During the eruptive phase, the epithelium displays degenerative changes at the site of fusion between dental and oral epithelia. These areas are vulnerable to plaque accumulation and sets up a bacterial reaction and since the child may be experiencing discomfort which will therefore make tooth brushing difficult. This will lead to plaque accumulation and inflammation. This gingivitis, often localized and associated with difficult eruption, subsides after the teeth emerge into the oral cavity.

This inflammation is most commonly associated with the eruption of the first and second permanent molars, and the condition can be painful and can develop into pericoronitis or a pericoronal abscess. Mild eruption gingivitis requires no treatment other than improved oral hygiene. Painful pericoronitis may be helped when the area is irrigated with a counterirritant, such as Peroxyl. Pericoronitis accompanied by swelling and lymph node involvement should be treated with antibiotic therapy.

Dental Plaque—Induced Gingivitis

The degree of dental cleanliness and the condition of the gingival tissues in children are related. Gingivitis associated with poor oral hygiene is usually classified as early (slight), moderate, or advanced. Early gingivitis is quickly reversible and can be treated with good oral prophylactic treatment and instruction in tooth brushing and flossing techniques to keep the teeth free of bacterial plaque. Favorable occlusion and the chewing of coarse, detergent-type foods, such as raw carrots, celery, and apples, have a beneficial effect on oral cleanliness. Gingivitis is generally less severe in children than in adults with similar plaque levels.

Allergy and Gingival Inflammation

An enhanced gingival inflammatory reaction was observed in the allergic children during the pollen seasons. Although the significance of gingival reaction during short allergy seasons is difficult to assess, patients with complex allergies who have symptoms for longer periods may be at higher risk for more significant adverse periodontal changes.

Herpetic Gingivostomatitis

Herpes virus causes one of the most widespread viral infections. The primary infection usually occurs in a child younger than 6 years of age who has had no contact with the type 1 herpes simplex virus (HSV-1) and who therefore has no neutralizing antibodies. It is believed that 99% of all primary infections are of the subclinical type. The infection may also occur in susceptible adults who have not had a primary infection.

pedodontic

Symptoms:

- 1) In some preschool children the primary infection may be characterized by only one or two mild sores on the oral mucous membranes, which may be of little concern to the child or may go unnoticed by the parents.
- 2) In other children the primary infection may be manifested by acute symptoms (acute herpetic gingivostomatitis).
- 3) The active symptoms of the acute disease can occur in children with clean mouths and healthy oral tissues.
- 4) The symptoms of the disease develop suddenly
- 5) Fiery red gingival tissues, malaise, irritability, headache
- 6) Pain associated with the intake of food and liquids of acidic content.

Characteristic oral findings:

Characteristic oral finding in the acute primary disease are:

- 1) The presence of yellow or white liquid-filled vesicles.
- 2) In a few days the vesicles rupture and form painful ulcers, 1 to 3 mm in diameter, which are covered with a whitish gray membrane and have a circumscribed area of inflammation.
- 3) The ulcers may be observed on any area of the mucous membrane, including buccal mucosa, tongue, lips, hard and soft palate, and the tonsillar areas.
- 4) Large ulcerated lesions may occasionally be observed on the palate or gingival tissues or in the region of the mucobuccal fold. This distribution makes the differential diagnosis more difficult.
- 5) An additional diagnostic criterion is a fourfold rise of serum antibodies to HSV-1. The lesion culture also shows positive results for HSV-1.

Treatment:

Treatment of acute herpetic gingivostomatitis in children, which runs a course of 10 to 14 days, should include specific antiviral medication and provision for the relief of the acute symptoms so that fluid and nutritional intake can be maintained.

- 1) The application of a mild topical anesthetic, such as dyclonine hydrochloride (0.5%) (Dyclone), before mealtime temporarily relieves the pain and allows the child to eat soft food. Another topical anesthetic, lidocaine (Xylocaine Viscous), can be prescribed for the child who can hold 1 teaspoon of the anesthetic in the mouth for 2 to 3 minutes and then expectorate the solution.
- 2) Because fruit juices are usually irritating to the ulcerated area, ingestion of a vitamin supplement during the course of the disease is indicated.

Although the treatments described may be useful, they are only palliative. **The mainstay of definitive therapy is regular doses of specific**

systemic antiviral medication (acyclovir, famciclovir and valacyclovir) combined with systemic analgesics (acetaminophen or ibuprofen) during the course of the disease. Systemic antiviral medications inhibit viral replication in cells infected with the virus.

After the initial primary attack during early childhood, the herpes simplex virus becomes inactive and resides in sensory nerve ganglia. The virus often reappears later as the familiar cold sore or fever blister, usually on the outside of the lips. Thus the disease has been commonly referred to as **recurrent herpes labialis @HL**). However, approximately 5% of recurrences are intraoral. With the recurring attacks, the sores develop in essentially the same area. The recurrence of the disease has often been related to conditions of:

- a) Emotional stress
- b) Lowered tissue resistance resulting from various types of trauma.
- c) Excessive exposure to sunlight may be responsible for the appearance of the recurrent herpetic lesions on the lip. Use of sunscreen can prevent sun-induced recurrences.
- d) Lesions on the lip may also appear after dental treatment and may be related to irritation from rubber dam material or even routine daily procedures.

Dentists and dental auxiliaries without a history of herpetic lesions might benefit from serologic testing. Considering the occupational disability that often accompanies HSV-1 infection of the finger or eye, effective barrier protection for health professionals is important. Primary herpetic infection has been observed on the dorsal surface of the thumb of a pediatric patient. The child was a thumb sucker, and the acute primary infection was present in the mouth.

Acute Necrotizing Ulcerative Gingivitis

The infectious disease commonly referred to as acute necrotizing ulcerative gingivitis (ANUG) is rare among preschool children. The condition occurs occasionally in children from 6 to 12 years old, and is more commonly seen in young adults. It is an acute multiple bacterial infection of the gingivae. ANUG can be easily diagnosed because of the involvement of the interproximal papillae and the presence of a pseudomembranous necrotic covering of the marginal tissue.

The clinical manifestations of the disease include:

- 1) Inflamed, painful, bleeding gingival tissue
- 2) Poor appetite
- 3) Temperature as high as 40°C (104°F)
- 4) General malaise
- 5) A fetid odor.

- 1) The disease responds dramatically within 24 to 48 hours to subgingival curettage, debridement, and the use of mild oxidizing solutions.
- 2) If the gingival tissues are acutely and extensively inflamed when the patient is first seen, antibiotic therapy is indicated.
- 3) Improved oral hygiene, the use of mild oxidizing mouth rinses after each meal, and twice-daily rinsing with CH will aid in overcoming the infection.

Recurrent Aphthous Ulcer (Canker Sore)

The recurrent aphthous ulcer (RAU) also referred to as recurrent aphthous stomatitis (RAS) is a painful ulceration on the unattached mucous membrane that occurs in school-aged children and adults. The peak age for RAU is between 10 and 19 years of age. It has been reported to be the most common mucosal disorder in people of all ages and races in the world. The description of RAU frequently includes the term **canker sores**

Characteristic oral findings:

- 1) Recurrent ulcerations on ie moist mucous membranes of the mouth, in which both discrete and confluent lesions form rapidly in certain sites and feature a round to oval crateriform base
- 2) Raised reddened margins, and pain.
- 3) They may appear as attacks of minor or single, major or multiple, or herpetiform lesions.
- 4) They may or may not be associated with ulcerative lesions elsewhere.
- 5) Lesions persist for 4 to 12 days

Causes of Recurrent Aphthous Ulcer:

The cause of RAU is unknown. Some factors associated with RAU are:

- 1) Local and systemic conditions along with a genetic predisposition and immunologic and infectious microbial factors.
- 2) It is also possible that the lesions are caused by an autoimmune reaction of the oral epithelium.
- 3) Local factors include trauma, Injuries caused by cheek biting and minor facial irritations are probably the most common precipitating factors.
- 4) Allergy to toothpaste constituents (sodium lauryl sulfate)
- 5) Salivary gland dysfunction.
- 6) Nutritional deficiencies including deficiencies of iron, vitamin B12, and folic acid.
- 7) Stress may prove to be an important precipitating factor, particularly in stress-prone groups, such as students in professional schools and military personnel.

Treatment

Numerous treatments have been recommended for RAU, but a completely successful therapy has not been found. Current treatment is focused on promoting ulcer healing, reducing ulcer duration and patient pain, maintaining the patient's nutritional intake, and preventing or reducing the frequency of recurrence of the disease.

- 1) Topical anti-inflammatory and analgesic medicines and/or systemic immunomodulatory and immunosuppressive agents have been used for RAU.
- 2) The primary line of treatment uses topical gels, creams, and ointments as anti-inflammatory agents. A topical corticosteroid is applied to the area with a mucosal adherent for example The application of triamcinolone acetonide (Kenalog in Orabase) to the surfaces of The lesions before meals and before sleeping may also be helpful.
- 3) Topical rinses have also been helpful for The relief of RAU. Chlorhexidine (CH) mouthwash has been known to alleviate the symptoms of RAU. Dexamethasone elixir when swished is useful to treat ulcerations in areas of the mouth that are difficult to access.
- 4) The topical application of tetracycline to the ulcers is often helpful in reducing the pain and in shortening the course of The disease.

Acute Candidiasis (Thrush, Candidosis, Moniliasis)

Candida (Monilia) albicans is a common inhabitant of the oral cavity but may multiply rapidly and cause a pathogenic state when host resistance is lowered. Young children sometimes develop thrush after local antibiotic therapy, which allows The fungus to proliferate. The lesions of oral candidiasis appear as raised, furry white patches, which can be removed easily to produce a bleeding underlying surface. Neonatal candidiasis, contracted during passage through The vagina and erupting clinically during The first 2 weeks of life, is a common occurrence. This infection is also common in immunosuppressed patients.

Treatment:

Antifungal antibiotics control thrush.

1. **For infants and very young children:** a suspension of 1 mL (100,000 units) of nystatin (Mycostatin) may be dropped into the mouth for local action 4 times a day. Nystatin is nonirritating and nontoxic. Clotrimazole suspension (10 mg/mL), 1 to 2 mL applied to affected areas 4 times daily, is an effective antifungal medication. Systemic fluconazole suspension(10 mg/mL) is safe to use in infants at a total dosage of up to 6 mg/kg/day.
2. **For children old enough to manage solid medications allowed to dissolve in the mouth:** clotrimazole troches or nystatin pastilles are recommended because the therapeutic agent remains in The saliva longer than with the liquid medication.

3. **For children old enough to swallow:** systemic fluconazole (100-mg tablets) in a 14 - day course may be prescribed when the infection has not responded to topical antifungal agents.

Acute Bacterial Infections

The prevalence of acute bacterial infection in the oral cavity is unknown. Acute streptococcal gingivitis is an example of this type of infection. It is characterized by enlarged papilla, gingival abscesses, and painful, erythematous gingiva that bleed easily. Cultures show a predominance of hemolytic streptococci. Acute infections of this type may be more common than was previously realized. The diagnosis is difficult to make, however, without extensive laboratory tests.

Treatment:

1. Broad spectrum antibiotics are recommended if the infection is believed to be bacterial in origin.
2. Improved oral hygiene is important in treating the infection.
3. As with any acute microbial oral infection, CH mouth rinses are also appropriate.

CHRONIC NONSPECIFIC GINGIVITIS

It is a type of gingivitis commonly seen during the preteenage and teenage years. The chronic gingival inflammation may be localized to the anterior region, or it may be more generalized. Although the condition is rarely painful, it may persist for long periods without much improvement.

It is observed as an unusual gingivitis in individuals between 12 and 18 years of age in which the fiery red gingival lesion was not accompanied by enlarged interdental labial papillae or closely associated with local irritants.

Causes of chronic nonspecific gingivitis

The cause of chronic gingivitis is complex and is considered to be based on a multitude of local and systemic factors.

1. Hormonal imbalance: The age of the patients involved and the prevalence of the disease in girls suggested it as a possible factor.
2. Inadequate oral hygiene, which allows for food impaction and the accumulation of material alba and bacterial plaque, is undoubtedly the major cause of this chronic type of gingivitis.
3. Insufficient quantities of fruits and vegetables in the diet, leading to a subclinical vitamin deficiency, may be an important predisposing factor.
4. Malocclusion, which prevents adequate function, and crowded teeth, which make oral hygiene and plaque removal more difficult, are also important predisposing factors in gingivitis.
5. Caries lesions, with irritating sharp margins and faulty restorations with overhanging margins (both of which cause food accumulation) also favor the development of the chronic type of gingivitis.
6. A wide variety of local irritants can produce a hyperplastic type of gingivitis in children and young adults.

7. The irritation to the gingival tissue produced by mouth breathing is often responsible for the development of the chronic hyperplastic form of gingivitis, particularly in the maxillary arch.

Treatment:

1. An improved dietary intake of vitamins and the use of multiple-vitamin supplements will improve the gingival condition in many children.
2. The placement of dental restorations to restore adequate function and contour of defective teeth after the reduction of acute symptoms is an equally important treatment consideration.
3. The importance of thorough daily oral hygiene must be emphasized repeatedly to the patients.

GINGIVAL DISEASES MODIFIED BY SYSTEMIC FACTORS
GINGIVAL DISEASES ASSOCIATED WITH THE ENDOCRINE SYSTEM

Puberty gingivitis is a distinctive type of gingivitis that occasionally develops in children in the pre-pubertal and pubertal period. The gingival enlargement is marginal in distribution and, in the presence of local irritants, is characterized by prominent bulbous interproximal papillae far greater than gingival enlargements associated with local factors.

Treatment:

Treatment of puberty gingivitis should be directed toward improved oral hygiene, removal of all local irritants, restoration of carious teeth, and dietary changes necessary to ensure an adequate nutritional status. Severe cases of hyperplastic gingivitis that do not respond to local or systemic therapy should be treated by gingivoplasty.

GINGIVAL LESIONS OF GENETIC ORIGIN

Hereditary gingival fibromatosis (HGF) is characterized by a slow, progressive, benign enlargement of the gingivae. Genetic and pharmacologically induced forms of gingival enlargement are known. The gingival tissues appear normal at birth but begin to enlarge with the eruption of the primary teeth. Although mild cases are observed, the gingival tissues usually continue to enlarge with the eruption of the permanent teeth until the tissues essentially cover the clinical crowns of the teeth. The dense fibrous tissue often causes displacement of the teeth and malocclusion. The condition is not painful until the tissue enlarges to the extent that it partially covers the occlusal surface of the molars and becomes traumatized during mastication.

Surgical removal of the hyperplastic tissue achieves a more favorable oral and facial appearance. However, hyperplasia can recur within a few months after the surgical procedure and can return to the original condition within a few years.

PHENYTOIN-INDUCED GINGIVAL OVERGROWTH (PIGO)

Phenytoin (Dilantin, or diphenylhydantoin), a major anticonvulsant agent used in the treatment of epilepsy. Varying degrees of gingival hyperplasia, one of the most common side effects of phenytoin therapy. Most

investigations agree on the existence of a close relationship between oral hygiene and PIGO. PIGO can be decreased or prevented by scrupulous oral hygiene and dental prophylaxis. The relationship between plaque, local irritants, and PIGO is also supported by the observation that patients without teeth almost never develop PIGO.

- ❖ PIGO, when it does develop, begins to appear as early as 2 to 3 weeks after initiation of the phenytoin therapy and peaks at 18 to 24 months.
- ❖ Painless enlargement of the interproximal gingiva
- ❖ The buccal and anterior segments are more often affected
- ❖ As the interdental lobulations grow, clefting becomes apparent at the midline of the tooth
- ❖ In some cases, the entire occlusal surface of the teeth becomes covered.

PIGO may impose problems of

- Esthetics,
- Difficulty in mastication,
- Speech impairment,
- Delay tooth eruption, tissue trauma, and secondary inflammation leading to periodontal disease.

Dental treatment based on clinical oral signs and symptoms

- Patients with mild PIGO (i.e., less than one third of the clinical crown is covered) require daily meticulous oral hygiene and more frequent dental care.
- For patients with moderate PIGO (i.e., one third of the clinical crown is covered)
 - ✓ Meticulous oral home care
 - ✓ the judicious use of an irrigating device may be needed
 - ✓ In addition, prophylaxes and topical stannous fluoride application is recommended
 - ✓ If there has been no change, consultation with the patients physician concerning the possibility concerning the possibility of using different anticonvulsant drug may be helpful
 - ✓ If no improvement occurs, surgical removal of the overgrowth may be recommended

☒ For patients with severe PIGO (i.e., more than two third of the tooth is observed) who do not respond to the previously mentioned therapeutic regiments, surgical removal is necessary.

- ☐ Gradual recurrences of the fibrous tissue usually follow the treatment.
- ☐ The success in controlling the gingival overgrowth with positive-pressure appliances.

Other drugs that have been reported to induce gingival overgrowth in some patients include cyclosporine, calcium channel blockers, valproic acid, and phenobarbital. As with all disorders affecting periodontal tissues, maintaining excellent oral hygiene is the primary key to successful therapy.

ASCORBIC ACID DEFICIENCY GINGIVITIS (SCORBUTIC GINGIVITIS)

Scorbutic gingivitis is associated with vitamin C deficiency and differs from the type of gingivitis related to poor oral hygiene.

- ❖ The involvement is usually limited to the marginal tissues and papillae.
- ❖ The child with scorbutic gingivitis will be evident.

Complete dental care, improved oral hygiene, and supplementation with vitamin C (the daily administration of 250 to 500 mg of ascorbic acid) and other water soluble vitamins will greatly improve the gingival condition.

PERIODONTAL DISEASES IN CHILDREN

Periodontitis, an inflammatory disease of the gingiva and deeper tissues of the periodontium, is characterized by pocket formation and destruction of the supporting alveolar bone. Bone loss in children can be detected in bite-wing radiographs by comparing the height of the alveolar bone to the cemento-enamel junction.

Distances between 2 and 3 mm can be defined as questionable bone loss and distances greater the 3 mm indicate definite bone loss.

AGGRESSIVE PERIODONTITIS (EARLY-ONSET PERIODONTITIS)

EOP is used as generic term to describe a heterogeneous group of periodontal disease occurring in young individuals who are otherwise healthy. EOP can be viewed as

- 1) A localized form (generalized juvenile periodontitis [LJP]),
- 2) A generalized form (generalized juvenile periodontitis [GJPI])

The prevalence of aggressive periodontitis in adolescent schoolchildren in the United States is more in African American than in whites and more in boys than in girls.

Aggressive periodontitis of the primary dentition can occur in localized form but is usually seen in the generalized form.

- ❖ LAP is localized attachment loss and alveolar bone loss only in the primary dentition in an otherwise healthy child

- ❖ The exact time of onset is unknown, but it appears to arise around or before 4 years of age, when the bone loss is usually seen on radiographs around the primary molars and/or incisors.
- ❖ Abnormal probing depth with minor gingival inflammation, rapid bone loss, and minimal to various amounts of plaque have been demonstrated at the affected sites of the child's dentition.
- ❖ Abnormalities in host defenses (e.g., leukocyte chemotaxis), extensive proximal caries facilitating plaque retention and bone loss, and a family history of periodontitis have been associated with LAP in children.
- ❖ As the disease progresses, the child's periodontium shows signs of gingival inflammation, with gingival clefts and localized ulceration of the gingival clefts and localized ulceration of the gingival margin.

GENERALIZED AGGRESSIVE PERIODONTITIS

- The onset of the GAP is during or soon after the eruption of the primary teeth.
- It results in severe gingival inflammation and generalized attachment loss, tooth mobility, and rapid alveolar bone loss with premature exfoliation of the teeth.
- The gingival tissue may initially demonstrate only minor inflammation with plaque accumulation at minimum.
- It often affects the entire dentition.
- Alveolar bone destruction proceeds rapidly, and the primary teeth may be lost by 3 years of age.
- Because of its wide distribution and rapid rate of alveolar bone destruction, the GAP was previously known as generalized juvenile periodontitis, severe periodontitis, and rapidly progressive periodontitis.
- Chronic cases display the presence of clefting and pronounced recession with associated acute inflammation.
- Affected teeth harbor more nonmotile, facultative, anaerobic, gram-negative rods (especially *Porphyromonas gingivalis*) in GAP than in LAP. Microorganisms predominating in the gingival pockets include *Aggregatibacter actinomycetemcomitans* (Aa), *Porphyromonas* (*Bacteroides melanogenicus*), *Prevotella intermedia*, *Capnocytophaga sputigena*, and *Fusobacterium nucleatum*,
- The major periodontal pathogens are transmitted among family members.
- The past medical history of the child often reveals a history of recurrent infections (e.g., otitis media, skin infections, upper respiratory tract infections).
- LAP and GAP are distinctly different radiographically and clinically. Neutrophils in GAP patients have suppressed.
- Individuals with GAP exhibit marked periodontal inflammation and have heavy accumulations of plaque and calculus. Testing may reveal a

high prevalence of leukocyte adherence abnormalities and an impaired host response to bacterial infections.

LOCALIZED AGGRESSIVE PERIODONTITIS (LOCALIZED JUVENILE PERIODONTITIS)

This condition presents a classic pattern and occurs in otherwise healthy children and adolescents without clinical evidence of systemic disease. It is characterized by the rapid and severe loss of alveolar bone around more than one permanent tooth, usually the first molars and incisors. It appears self-limiting and bone loss around the primary teeth can be an early finding in this disease.

Clinically:

1. Localized aggressive periodontitis patients have less tissue inflammation and very little supra-gingival dental plaque or calculus.
2. They present with evidence of Sub-gingival plaque accumulation, both tissue-associated and tooth-associated.
3. Progression of bone loss is three to four times faster than in chronic periodontitis.

TREATMENT OF AGGRESSIVE PERIODONTITIS

Successful treatment of aggressive periodontitis depends on early diagnosis:

1. The use of antibiotics against the infecting microorganisms
2. The provision of an infection free environment for healing.
3. Consultation with the patient's physician if necessary
4. Mechanical removal of supragingival and subgingival microbial agents via nonsurgical and/or surgical treatment modalities with adjunctive antimicrobial therapy.
5. Surgical removal of infected crevicular epithelium and debridement of root surfaces during surgery while the patient is on a 14 day course of doxycycline hyclate (1 g. per day) is considered the best effective treatment modality.

PERIODONTITIS AS A MANIFESTATION OF SYSTEMIC DISEASE

In 1999 the American Academy of Periodontology introduced a new classification, classifying periodontitis as a manifestation of systemic disease as a separate category. Several of these conditions are identified in the pediatric population:

A. Associated with hematological disorders

1. Acquired neutropenia
2. Leukemias

B. Associated with genetic disorders

1. Familial and cyclic neutropenia
2. Down syndrome
3. Leukocyte adhesion deficiency syndromes
4. Papillon-Lefèvre syndrome

5. Chédiak-Higashi syndrome
6. Histiocytosis syndromes
7. Glycogen storage disease
8. Infantile genetic agranulocytosis
9. Cohen syndrome
10. Ehlers-Danlos syndrome (types IV and VIII)
11. Hypophosphatasia
12. Other

PREMATURE BONE LOSS IN THE PRIMARY DENTITION

Advanced alveolar bone loss associated with systemic disease occurs in children and adolescents, as well as in adults. In the primary dentition, this is rare. Although most premature tooth loss from non-systemic disease results from trauma or caries, the cause of advanced alveolar bone loss is often not readily apparent.

Local factors (periodontitis, trauma, and infection secondary to caries) account for the majority of cases of premature bone loss. Bony destruction in the primary dentition in the absence of local factors is highly suggestive of systemic disease.

PAPILLON-LEFÈVRE SYNDROME

The syndrome is rare, and the cause is unknown. However, in the families of affected children in which a familial predisposition to the disorder is noted, an autosomal-recessive mode of inheritance has been identified.

Characteristics of the syndrome:

1. There is no racial or gender predominance.
2. The primary teeth erupted at the normal time.
3. As early as 2 years of age, the child rubbed the gingival tissues and acted as if they were painful.
4. There was a tendency toward gingival bleeding when the teeth were brushed.
5. Hyperkeratosis of the palms and soles was present. The first evidence was erythema and scaliness noted initially at 8 months of age.
6. Hyperkeratotic lesions of the elbows and knees may be observed
7. At 2½ years of age, all the primary teeth showed looseness, and full-mouth radiographs revealed severe horizontal bone resorption.
8. Because of gingival inflammation, patient discomfort, and the presence of infected periodontal pockets, all the primary teeth were removed by 3 years of age.
9. Complete dentures were constructed 3 months after the removal of the primary teeth. The child tolerated the dentures well, both functionally and psychologically
10. The first permanent molars and mandibular central incisors erupted at the expected time, and the denture base was adjusted to allow for the emergence of the teeth.

Although previous reports have indicated that the permanent dentition will also be affected, tetracycline therapy as an adjunct to meticulous subgingival debridement in the management of periodontal disease may have been responsible for eliminating pathogens and preventing the destructive process from being carried into the permanent dentition. However, attempts at conventional therapy have been unsuccessful in preventing tooth loss.

GINGIVAL RECESSION

Gingival recession is often observed in children. Several factors predispose patients to gingival recession. These factors include:

1. The presence of a narrow band of attached or keratinized gingiva
2. Alveolar bony dehiscence
3. Toothbrush trauma
4. Tooth prominence
5. Impinging frenum attachment
6. Soft tissue impingement by opposing occlusion
7. Orthodontic tooth movement
8. Use of impression techniques including subgingival tissue retraction
9. Oral habits
10. Periodontitis, pseudorecession (extrusion of teeth)
11. Intraoral piercings, such as tongue piercings.

Recession is dealt with conservatively by elimination of the etiology if possible, while excellent oral hygiene is maintained in the affected areas. If the recession of the affected area remains unchanged (non-progressive) or improves, continued periodic monitoring is recommended.

SELF-MUTILATION

Occasionally children purposely traumatize their oral structures. Self-mutilation probably occurs more frequently than is realized because relatively few children will admit to the act unless they are observed practicing it. Therefore the self-inflicted lesions may be incorrectly diagnosed. Dentists should be aware of the possibility of this condition and should approach the problem in the same manner as they do thumb sucking. An attempt should be made to determine the cause. If it is found to be the result of local dental factors, it can be corrected. However, in the majority of children an emotional problem is involved, and the family must be directed to competent counseling services.

ABNORMAL FRENUM ATTACHMENT

A frenum is a membranous fold that joins two parts and restricts the individual movement of each. It is a mucous membrane fold containing epithelium and connective tissue fibers but no muscle.

A normal frenum attaches apically to the free gingival margin so as not to exert a pull on the zone of the attached gingiva, usually terminating at the mucogingival junction.

An abnormal or high frenum is present when there is inadequate attached gingiva in the terminal insertion area.

□ A frenum attached too closely to the gingival margin (high frenum) may interfere with proper toothbrush placement, may cause opening of the gingival crevice during function, or may interfere with speech. High frenum attachments may also be associated with isolated gingival recessions and diastemas.

□ An abnormally short lingual frenum and the inability to extend the tongue constitute a congenital condition known as ankyloglossia (tongue-tie). Normal function can occur with this mild form, and the frenum may lengthen with normal growth and maturation of the child.

□ A mandibular anterior frenum occasionally inserts into the free or marginal gingival tissue and causes subsequent recession and pocket formation.

Indications for treating a high frenum include the following:

1. A high frenum attachment associated with an area of persistent gingival inflammation that has not responded to root planing and good oral hygiene
2. A frenum associated with an area of recession that is progressive.
3. A high maxillary frenum and an associated midline diastema that persist after complete eruption of the permanent canines
4. A mandibular lingual frenum that inhibits the tongue from touching the maxillary central incisors. This would interfere with the child's ability to make /t/, /d/, and /l/ sounds.

As long as the child has enough range of motion to raise the tongue to the roof of the mouth, no surgery would be indicated. Most children cannot normally make these sounds until after 6 or 7 years of age.

FRENOTOMY AND FRENECTOMY

A **frenotomy** involves an incision of the periosteal fiber attachment and possibly suturing of the frenum to the periosteum at the base of the vestibule. It is associated with less postoperative discomfort than a frenectomy and will usually suffice.

A **frenectomy** involves complete excision of the frenum and its periosteal attachment. The need for a frenectomy or frenotomy should be based on the individual's ability to maintain gingival health.

EXTRINSIC STAINS AND DEPOSITS ON TEETH

Staining is generally believed to be caused by extrinsic agents, which can be readily removed from tooth surfaces with an abrasive material. The agents responsible for staining are deposited in enamel defects or become attached to the enamel without bringing about a change in its surface.

Pigmentation, in contrast to extrinsic staining, is associated with an active chemical change in the tooth structure, and the resulting pigment cannot be removed without alteration of the tooth structure.

GREEN STAIN

The cause of green stain, which is most often seen on the teeth of children, is unknown, although it is believed to be the result of the action of chromogenic bacteria on the enamel cuticle. It tends to recur even after careful and complete removal. The enamel beneath the stain may be roughened or may have undergone initial demineralization.

ORANGE STAIN

The cause of orange stain is likewise unknown. Orange stain occurs less frequently and is more easily removed than green or brown stain. The stain is most often seen in the gingival third of the tooth and is associated with poor oral hygiene

BLACK STAIN

A black stain occasionally develops on the primary or permanent teeth of children, but it is much less common than the orange or green type.

- A thin black line of dots or band of stain may be seen following the gingival contour.
- It is difficult to remove, especially if it collects in pitted areas.
- Many children who have black stain are relatively free of dental caries and have excellent oral hygiene.

CALCULUS

Calculus is not often seen in preschool children, and even in children of grade-school age, it occurs with much lower frequency than in adult patients.

- A low caries incidence is related to high calculus incidence.
- Children with mental retardation often have accumulations of calculus on their teeth. This accumulation may be related to abnormal muscular function, a soft diet, poor oral hygiene, and stagnation of saliva.
- Supragingival deposits of calculus occur most frequently and in greater quantity on the buccal surfaces of the maxillary molars and the lingual surfaces of the mandibular anterior teeth. These areas are near the openings of the major salivary glands.
- A child that chews mostly on one side partially accounts for the greater cleanliness on that side and cause calculus accumulation.