

Orthodontic Diagnosis and Treatment Planning

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Questionnaire/ Interview

- Chief complaint: find out what is important to the patient
- Medical and dental history
- Physical growth evaluation
 - Growth charts
 - Signs of sexual maturation
 - Clothes size changes
 - Hand and wrist radiographs

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Questionnaire/ Interview

- Social and behavioral evaluation
 - Motivation: external and internal
 - Patients' expectations
 - Cooperation
 - Benefit vs. requirement
 - Parental control

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Interview

- Why is this patient seeking treatment, and why now?
 - Chief complaint, motivation
- What does he or she expect to happen as a result of treatment?
 - Internal/ external motivation, expectation

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Interview

- How did things get to be the way they are
 - Medical and/ or dental history, etiology
- What if anything is likely to change in the near future?
 - Medical condition, growth status

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Clinical evaluation

- Evaluation of oral health
- Evaluation of jaw and occlusal function
 - Mastication
 - Speech
 - TMJ

TABLE 6-1 Speech Difficulties Related to Malocclusion

Speech sound	Problem	Related malocclusion
/s, z/ (sibilants)	Lisp	Anterior open bite, large gap between incisors
/n, ð/ (lingual/velar stops)	Difficulty in production	Irregular incisors, especially lingual position of maxillary incisors
/f, v/ (labiodental fricatives)	Distortion	Skeletal Class II
th, sh, ch (linguodental fricatives) (voiced or voiceless)	Distortion	Anterior open bite

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BOX 6-1

SCREENING EXAM FOR JAW FUNCTION (TMJ)

Jaw function/TMJ joint complaint now: No Yes
 If yes, specify: _____

History of pain: No Yes _____ duration

History of sounds: No Yes _____ duration

TMJ joint tenderness to palpation: No Yes Right Left

Muscle tenderness to palpation: No Yes
 If yes, where? _____

Range of Motion: Maximum opening _____ mm
 Right excursion _____ mm
 Left excursion _____ mm
 Protrusion _____ mm

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Clinical evaluation

- Evaluation of facial proportion
 - Assessment of developmental age
 - Chronologic vs. maturational age: 12-year-old looks 15 or 15-year-old looks 12
 - Facial esthetics vs. Facial proportions
 - Frontal examinations

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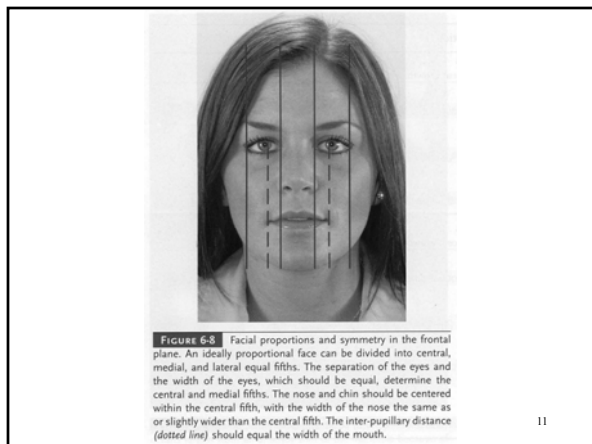
TABLE 6-2 Adolescent Growth Stages vs. Secondary Sexual Characteristics

Girls	
Total duration of adolescent growth: 3½ years	
Stage 1 Beginning of adolescent growth	Appearance of breast buds, initial pubic hair
Stage 2 (about 12 months later) Peak velocity in height	Noticeable breast development, axillary hair, darker/more abundant pubic hair
Stage 3 (12-18 months later) <u>Growth spurt ending</u>	<u>Menses</u> broadening of hips with adult fat distribution, breasts completed

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Boys	
Total duration of adolescent growth: 5 years	
Stage 1 Beginning of adolescent growth	<u>"Fat spurt"</u> weight gain, feminine fat distribution
Stage 2 (about 12 months later) Height spurt beginning	Redistribution/reduction in fat, pubic hair, growth of penis
Stage 3 (8-12 months later) Peak velocity in height	Facial hair appears on upper lip only, axillary hair, muscular growth with harder/more angular body form
Stage 4 (15-24 months later) Growth spurt ending	Facial hair on chin and lip, adult distribution/color of pubic and axillary hair, adult body form

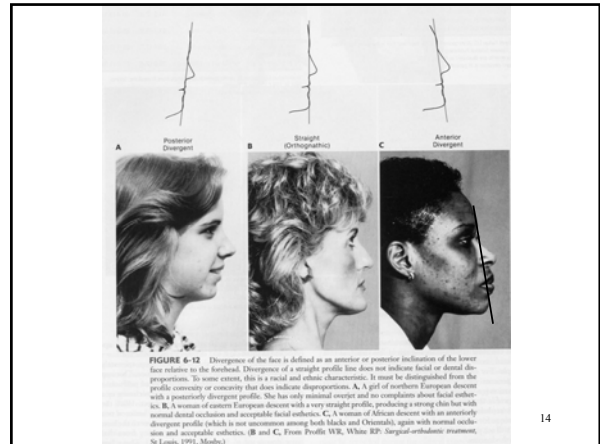
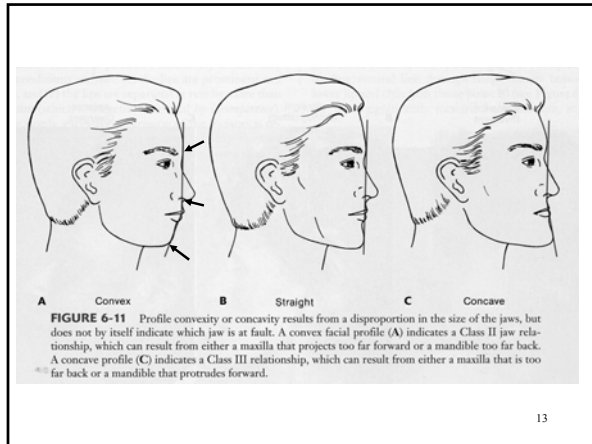
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Clinical evaluation

- Profile analysis
 - Jaw proportionately positioned in the A-P plane of space
 - Lip posture and incisor prominence
 - Vertical facial proportions and mandibular plane angle

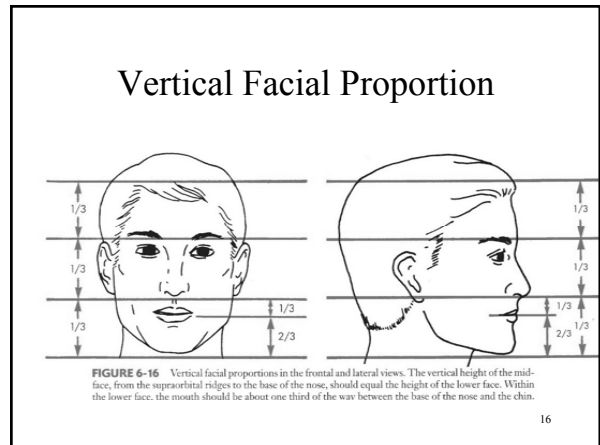
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Clinical Evaluation

- Profile Analysis
 - Evaluation of lip posture and incisor prominence
 - Bimaxillary dentoalveolar protrusion
 - Lip incompetence

FIGURE 6-14 Lip prominence is evaluated by observing the distance that each lip projects forward from a true vertical line through the depth of the concavity at its base (soft tissue points A and B) (i.e., a different reference line is used for each lip, as shown here). Lip prominence of more than 2 to 3 mm in the presence of lip incompetence (excessive separation of the lips at rest), as in this girl, indicates dentoalveolar protrusion.



Clinical Evaluation

- Profile analysis
 - Evaluation of vertical facial proportions and mandibular plane angle
 - Steep: long anterior facial height/ open bites
 - Flat: short anterior facial height/ deep bites

FIGURE 6-17 The mandibular plane angle can be visualized clinically by placing a mirror handle or other instrument along the border of the mandible. For this patient the mandibular plane angle is normal, neither too steep nor too flat.

Diagnostic records

- Purpose:
 - Document a starting point for treatment
 - Add information gathered clinical examination

Diagnostic Records

- Three major categories:
 - Records for evaluation of the teeth and oral structures
 - Records for occlusal evaluation
 - Records for evaluation of facial and jaw proportions

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Diagnostic Records

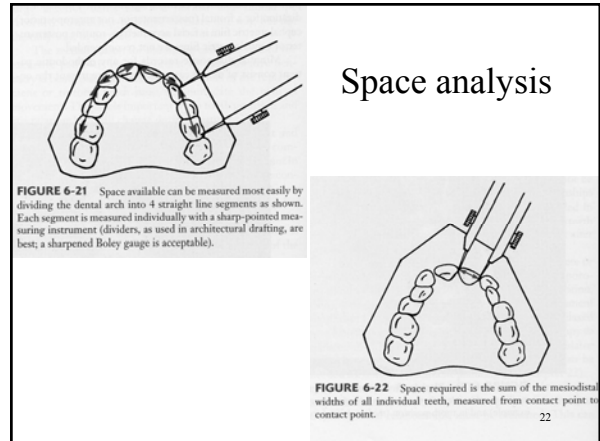
- Records for evaluation of the teeth and oral structures
 - Intraoral photographs
 - Panoramic radiographs
 - Periapical and bitewing radiographs

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Diagnostic Records

- Records for occlusal evaluation
 - Symmetry
 - Space analysis
 - Tooth size discrepancy

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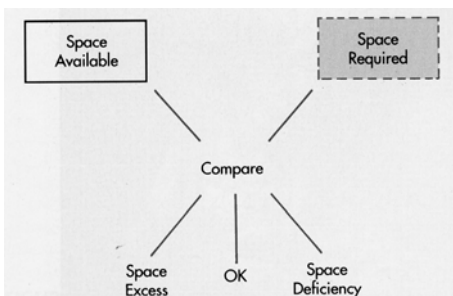


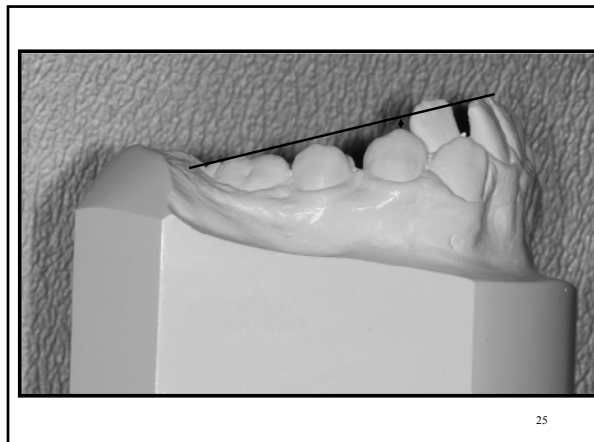
FIGURE 6-20 A comparison of space available versus space required establishes whether a deficiency of space within the arch will ultimately lead to crowding, whether the correct amount of room is available to accommodate the teeth, or whether excess space will result in gaps between the teeth.

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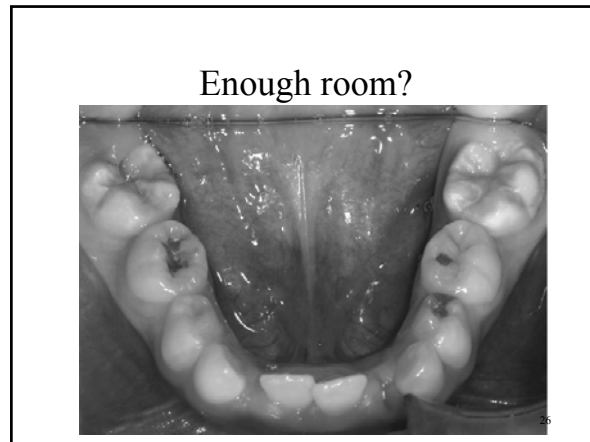
Curve of Spee

- Depth of Curve of Spee - Unilateral measurement of the deepest curve of Spee on the mandibular cast. This is defined as a vertical measurement (millimeters) from a horizontal plane resting on the most distal-buccal molar cusp tip and the ipsilateral central incisor edge to the most gingivally positioned premolar or deciduous molar buccal cusp tip.

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Mixed dentition space analysis

- Measurement of the teeth on radiographs
- Estimation from proportionality tables
 - Moyers; Tanaka and Johnston
- Combination of radiographic and prediction table methods

FIGURE 6-22 Space required is the sum of the mesiodistal widths of all individual teeth, measured from common point to common point.

True width of primary molar
Apparent width of primary molar =

True width of unerupted premolar
Apparent width of unerupted premolar

•Distorted image of canine on radiograph

FIGURE 6-23 To correct for magnification in films, the same object is measured on the cast and on the film, which will yield the percentage of magnification. This ratio is used to correct for magnification on unerupted teeth.

Moyer's prediction table

TABLE 6-6 Moyer Prediction Values (75% level)

Total Mandibular-Incisor Width	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0
Predicted width of canine and premolars	Maxilla	20.6	20.9	21.2	21.3	21.8	22.3	22.6
	Mandible	20.1	20.4	20.7	21.0	21.3	21.6	22.2

From Moyers RE: Handbook of orthodontics, ed 3, Chicago, 1973, Mosby.

23.5	24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0
22.9	23.1	23.4	23.7	24.0	24.2	24.5	24.8	25.0	25.3	25.6	25.9
22.5	22.8	23.1	23.4	23.7	24.0	24.3	24.6	24.8	25.1	25.4	25.7

- The M-D width of the lower incisors is measured and this number is used to predict the size of both the lower and upper unerupted canines and premolars.

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Tanaka and Johnston prediction values

BOX 6-2

TANAKA AND JOHNSTON PREDICTION VALUES

One half of the mesiodistal width of the four lower incisors + 10.5 mm = estimated width of mandibular canine and premolars in one quadrant

+ 11.0 mm = estimated width of maxillary canine and premolars in one quadrant

From Tanaka MM, Johnston LE: J Am Dent Assoc 88:798, 1974.

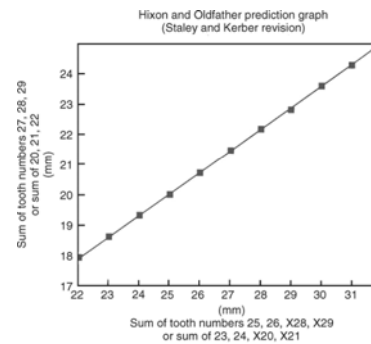
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Hixon and Oldfather prediction graph

- Combination of radiographic and prediction table methods
- Only for mandibular arch
- Measure the width of #25, 26 from the cast
- Measure the width of unerupted #28, 29 from the radiograph
- Sum of the above 2 and look up the graph for the total width of unerupted canines and premolars (#27,28,29)

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Hixon and Oldfather prediction graph



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Comparison

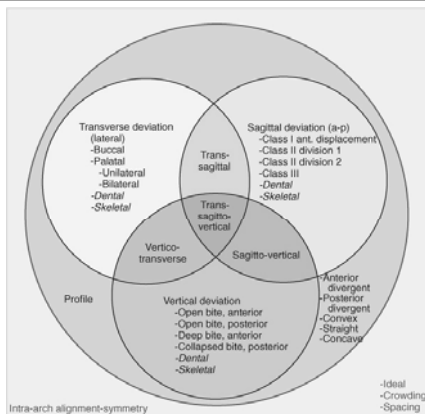
- Hixon and Oldfather: most accurate
- Tanaka and Johnston: most practical
- Radiographic method: for population other than Caucasians.

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Diagnostic Records

- Tooth size analysis
 - 5% of the population have some degree of disproportion among the sizes of individual teeth → tooth size discrepancy

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Treatment planning for the primary dentition

- Alignment problems
 - Malposed, crowded and irregular incisors: uncommon
 - Absence of spaces between primary incisors: crowding in permanent dentition
 - Space maintenance for missing primary molars but not anterior teeth

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Treatment planning for the primary dentition

- Posterior and anterior crossbites: treat early
- Skeletal A-P and vertical problems: treatment indicated only for the most severe discrepancies

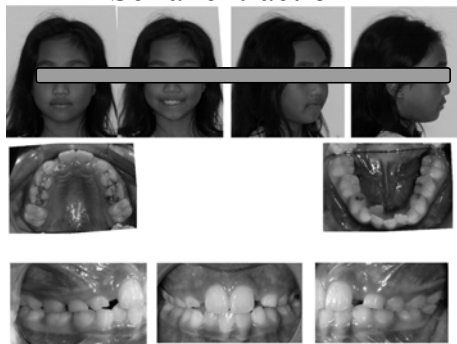
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Treatment planning for the early mixed dentition

- Space discrepancies
 - <4mm: non-extraction
 - 5-9 mm: non-extraction/ extraction
 - > 10 mm: extraction
- Serial extraction

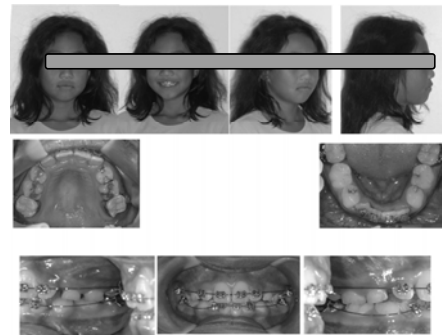
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Serial extraction



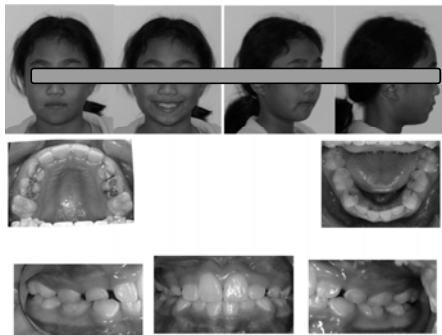
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Serial extraction



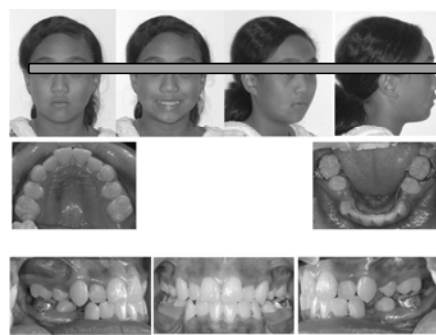
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Serial extraction



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Serial extraction



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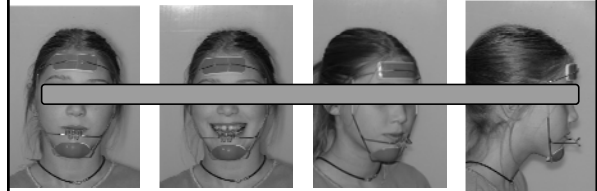
Treatment Planning for the Early Mixed Dentition

- Skeletal problems
 - Growth modification
- Dentofacial problems related to incisor protrusion:
 - Late mixed dentition or early permanent dentition

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Growth modification

- Facemask for Class III skeletal malocclusion



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Treatment planning for the early mixed dentition

- Space problems: missing primary teeth with adequate space: space maintenance
 - > 6 month delay before permanent premolar erupts with adequate space: space maintenance
 - Early loss of single primary canine space maintenance or extraction of contralateral tooth

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Treatment planning for the early mixed dentition

- Space problems: localized space loss (< 3mm): space regaining
 - Premature loss of primary Mx or Md 2nd molar
 - Early loss of one Md primary canine
 - Unilateral space loss: regain up to 3mm
 - Bilateral space loss: regain up to 4mm for total arch/ 2mm per quadrant

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Treatment planning for the early mixed dentition

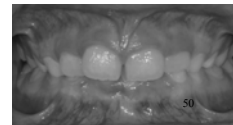
- Generalized moderate crowding
 - 2-4 mm of arch length discrepancy with no prematurely missing primary teeth → eventually has moderately crowded permanent incisors. → Expand the arches with either LLHA in lower arch or W-arch in upper arch

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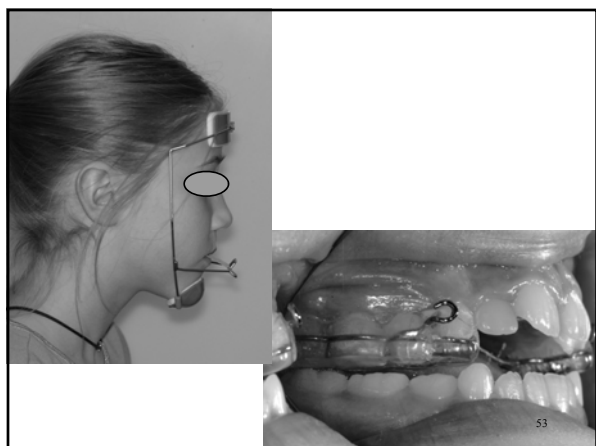
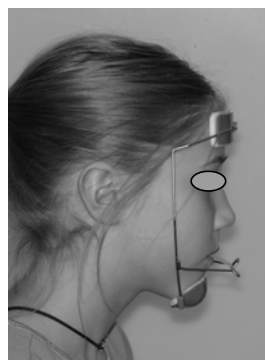
Treatment planning for the early Mixed dentition

- Irregular/ Malpositioned incisors
 - Spaced and flared maxillary incisors
 - Maxillary midline diastema: “ugly duckling stage”
 - Space > 2mm: spontaneous closure is unlikely (early frenectomy should be avoided)
 - Mesioden?
 - High frenum?



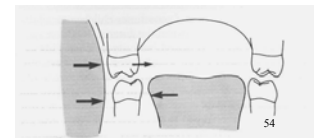
Treatment planning for the early mixed dentition

- Anterior crossbite
 - Skeletal class III jaw relationship
 - Maxillary laterals erupt lingually due to lack of space → extraction of adjacent primary canine prior to complete eruption of the lateral incisors → spontaneous correction

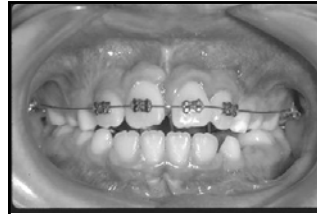


Treatment Planning for the Early Mixed Dentition

- Posterior Crossbite
 - Narrowing of the maxillary arch: children with prolonged sucking habits
 - Anterior open bite:
 - Prolonged thumb sucking
 - Tongue thrust



Blue grass appliance



Tongue crib



Treatment planning for the early mixed dentition

- Over-retained primary teeth and ectopic eruption
 - Delayed eruption of permanent teeth if primary predecessor retained too long
 - If a primary tooth still has considerable root remaining, when $\frac{3}{4}$ of the root of the permanent successor has formed, the primary tooth should be extracted.

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Treatment planning for the early mixed dentition

- Premature removal of primary tooth: layer of dense bone and soft tissue
- Extraction of Mx primary canine when permanent canines are overlapping the permanent lateral incisor roots → positive influence on the permanent tooth's eruption path.

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Summary

- Questionnaire/Interview
- Clinic evaluation
- Diagnostic records
- Treatment plan

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