DEVELOPMENT OF OCCLUSION

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Dpt of pedodontics

CONTENTS

- Introduction
- The mouth of neonate
- The deciduous dentition
- The mixed dentition
- The permanent dentition
- Andrew's 6 keys of occlusion

CONCEPT OF OCCLUSION

- occ = upward clusion = closure
- The act or process of closure or of being closed or shut off.
- The static relationship between the incising or masticating surfaces of the Mx & Mb teeth

GPT-7

OCCLUSION includes a integrated system of functional units involving teeth, joints and muscles of head & neck

-WHEELERS

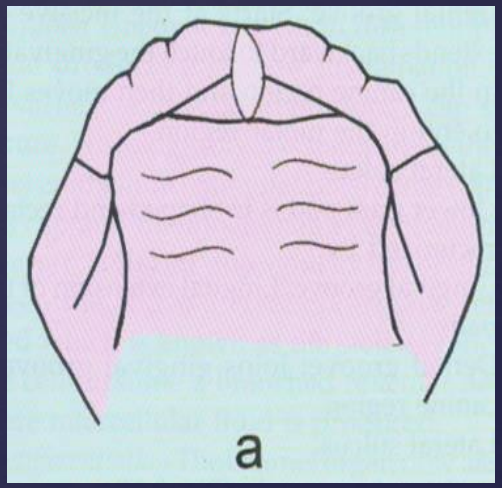
Normal relation of occlusal inclined planes of teeth when the jaws are closed

-ANGLE

MOUTH OF THE NEONATE

&GUM PADS:

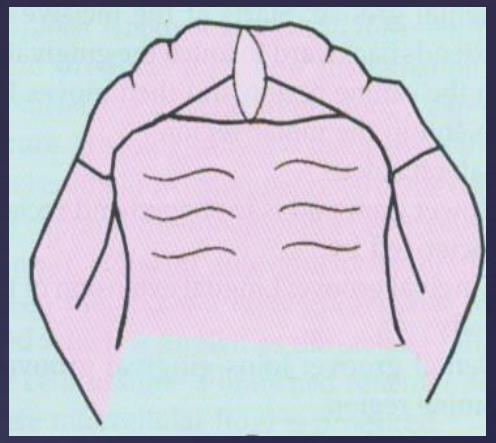
- thickening of omm
- pink & firm



PARTS→ labio- buccal , lingual

- transverse groove[labial]
- lateral sulcus[BUCCAL]

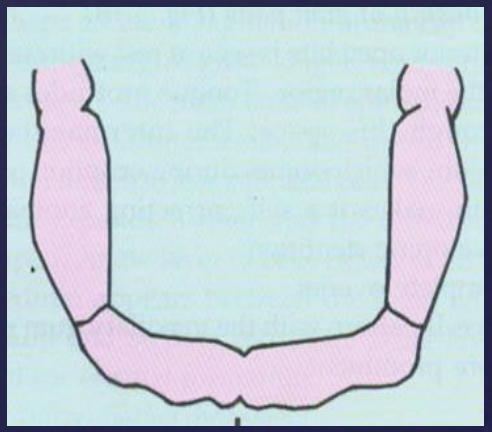
LINGUAL PORTION



- Differentiates later, remains entirely smooth.
- Separated by DENTAL GROOVE, which is the site of origin of dental lamina.
- GINGIVAL GROOVE separates the gumpad from palate.
- DENTAL GROOVE

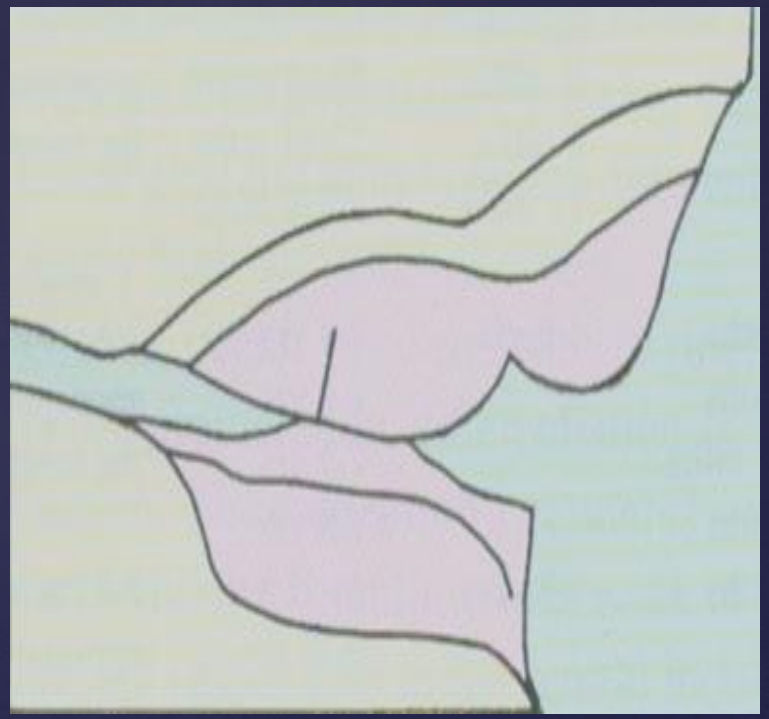
LOWER GUMPAD

- Anterior gumpad slightly everted labially.
- Transverse grooves, not clear as upper.
- Lateral sulci is usually posterior to upper



RELATIONSHIP OF GUM PADS

- Mx → More ant. In relation to mb
- Contact at molar region
- Tongue protrude at ant. Region.
- Antero-posterior movements of gumpads is usually small with no lateral movement



INFANTILE SWALLOWING

- With the eruption of incisors at about 6 months of age the tongue positions starts to retract.
- Over a period of 12 to 18 months as proprioception develops causes postural and functional changes in tongue.
- Between 2 to 4 years of age the **functionally balanced or mature swallow** is termed as **somatic swallow.**
- This swallow is seen in normal developmental patterns.

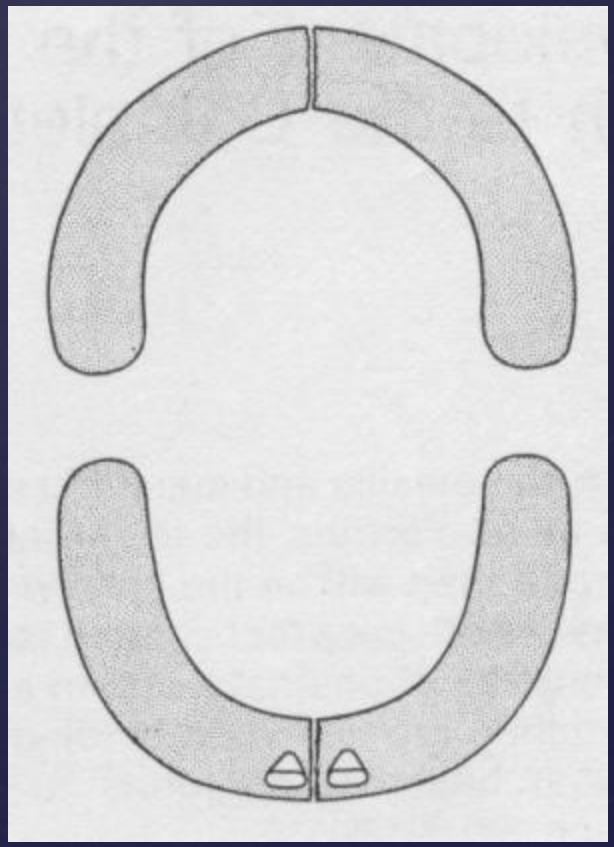
DECIDUOUS OR PRIMARY DENTITION

@ BIRTH

- Dental arches – small, subsequent crowding of tooth germs.
- During the 1st yr of life the pads grow rapidly , growth is most marked in lateral direction.

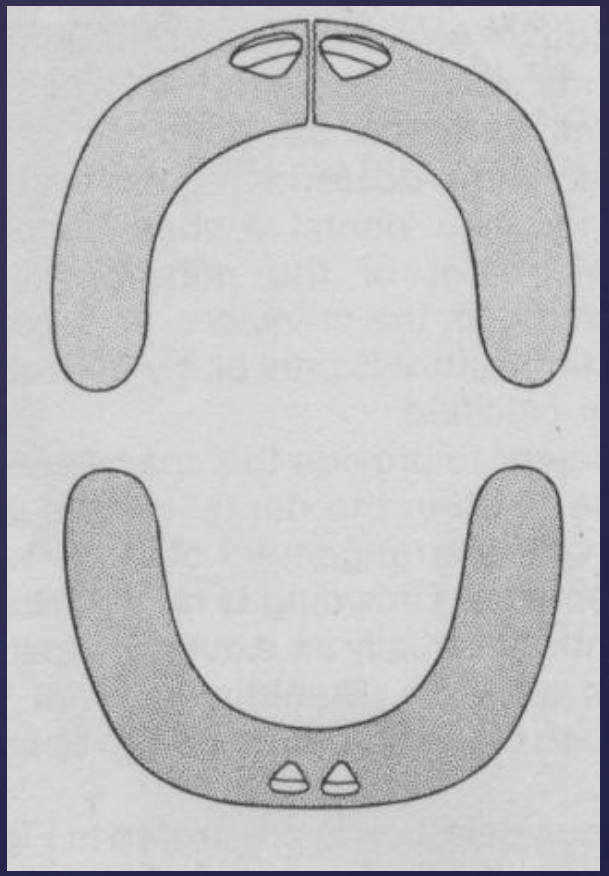
6-8 MONTHS

- Marked ventral dev → More antr. Position of lower jaw in relation to upper
- Relatively dorsal position of Mb initially present has changed by the time incisor erupt



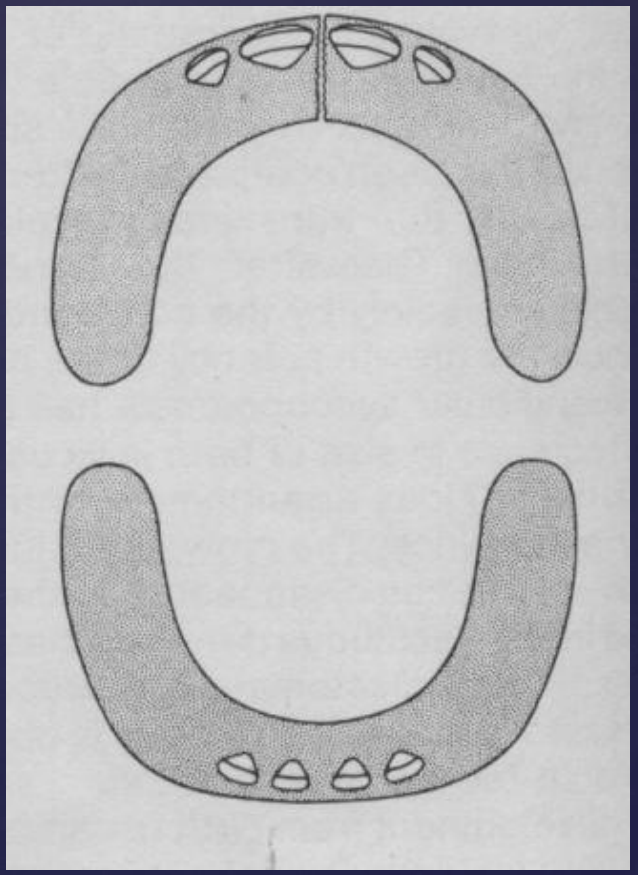
9-10 MONTHS

- Max. Central incisors emerge few months after the mandibular ones



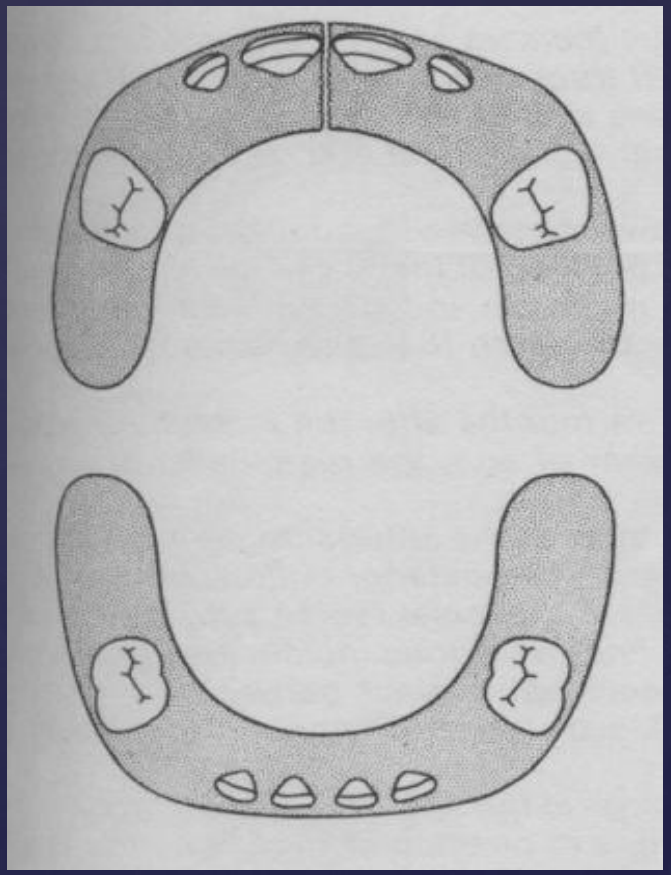
10-14 MONTHS

- Decid. lateral incisors emerge at about 1yr
- Mb ones are usually precede the Mx ones



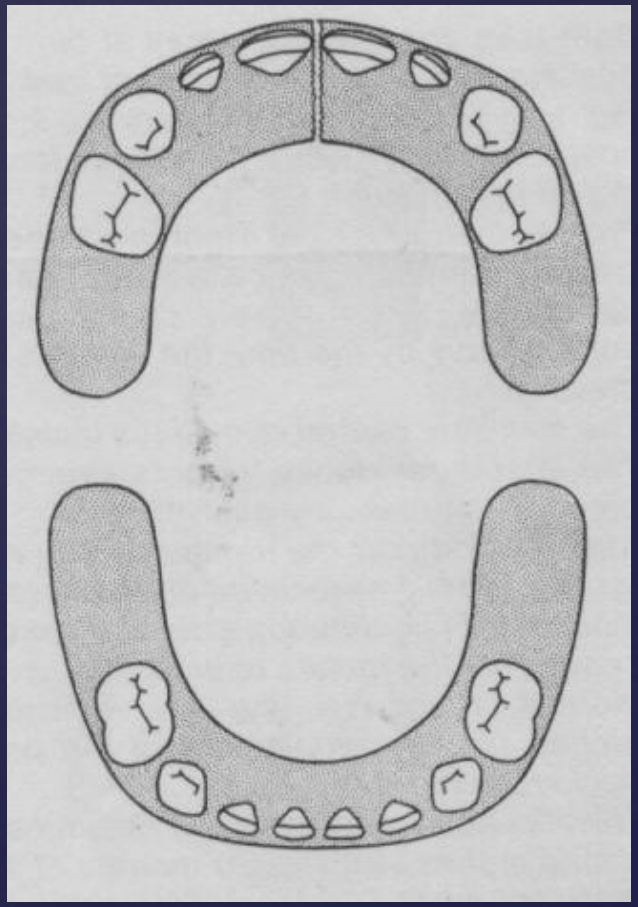
14 -18 MONTHS

- Transverse and ventral dev of both arches is limited
- Postr. Region keeps on growing and provide space for molar emergence



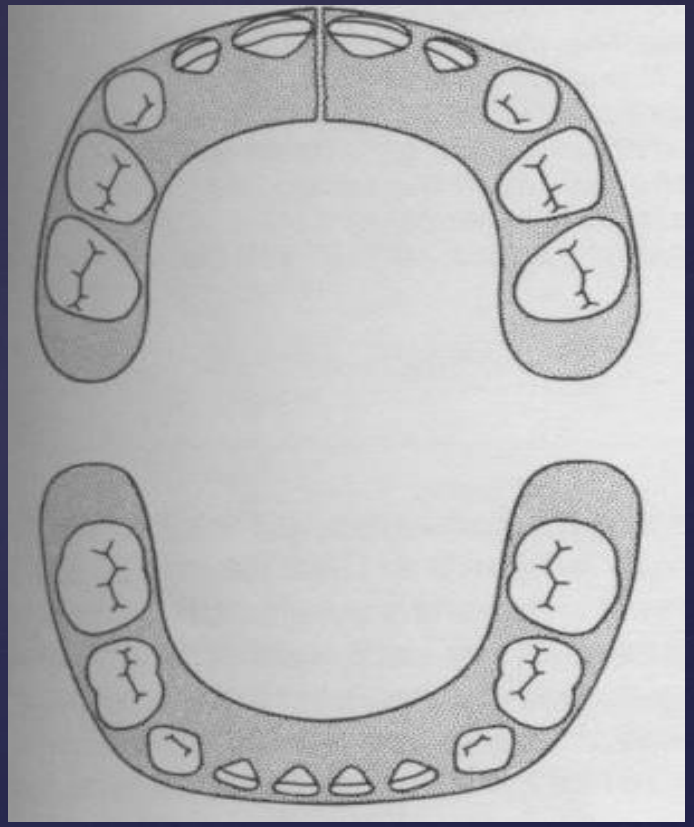
18-24 MONTHS

- Emergence of canine



24-30 MONTHS

- Eruption of 2nd decid molar



COMPLETE PRIMARY DENTITION

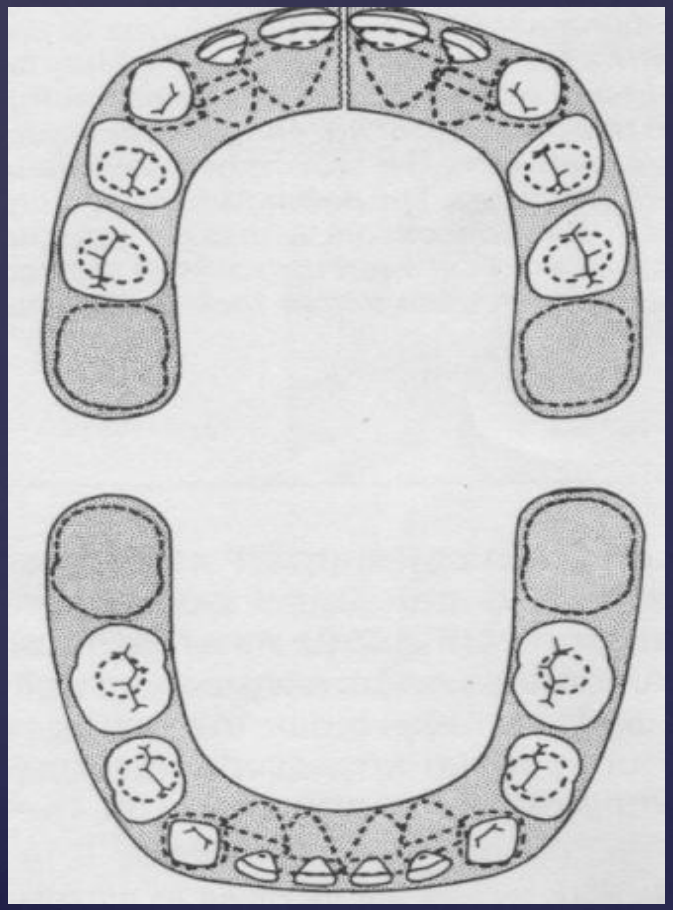
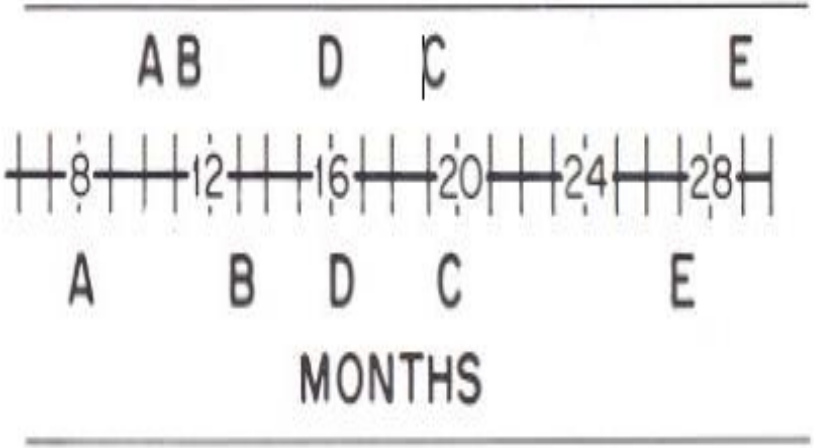


TABLE 6–2.

Sequence of Emergence of Primary Teeth



CLINICAL FEATURES

- Spaced anterior
- Primate spaces
- Shallow overjet & overbite
- Straight terminal plane
- Almost vertical inclination of anterior teeth
- Ovoid arch form

GENERAL FEATURES

SPACING IN DECIDUOUS DENTITION

PRIMATE SPACES
[*Boyko 1968*]

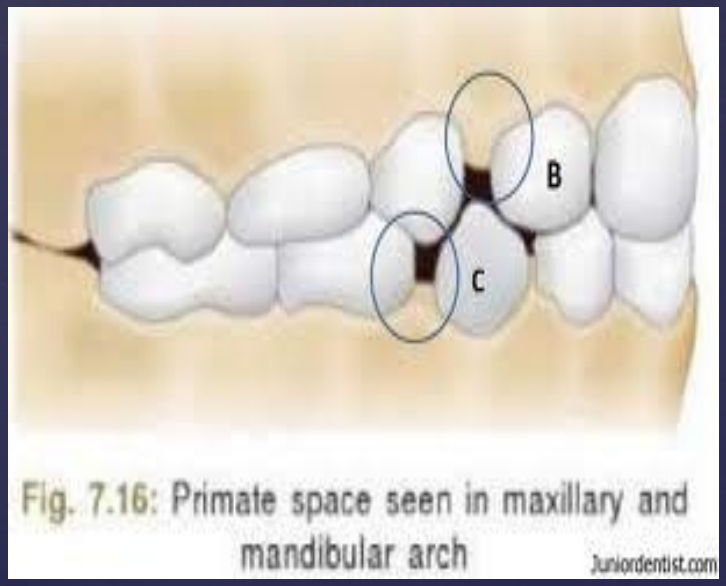


Fig. 7.16: Primate space seen in maxillary and mandibular arch

PHYSIOLOGIC SPACES
[*Korkhous & Neumann*]

0-8 mm – maxillary arch
1-7 mm – mandibular arch

ANTHROPOID/ SIMIAN SPACES
Foster & Hamilton-1969 [*Baume-1940]*

SIGNIFICANCE OF PRIMATE SPACES

- Spaced primary arches- favourable alignment of incisors.
- 40% of the arches without anterior spacing- crowded incisors.
- Mand primate spaces is conductive of proper molar occlusion by means of early mesial shift
- Mean increase in intercanine width brought abt by lateral and frontal alveolar growth is lesser in spaced arch
- Width of perm successors > dec predecessors so primate spaces help to accommodate these permanent teeth

PRIMARY DENTITION

TYPE OF SPACING	MAXILLARY %	MANDIBULAR %
Primate space	15.3%	10.3%
Developmental spaces	8.3%	11.4%
Primate & developmental spaces	69.4%	53.6%
Closed spaces	7%	24.7%

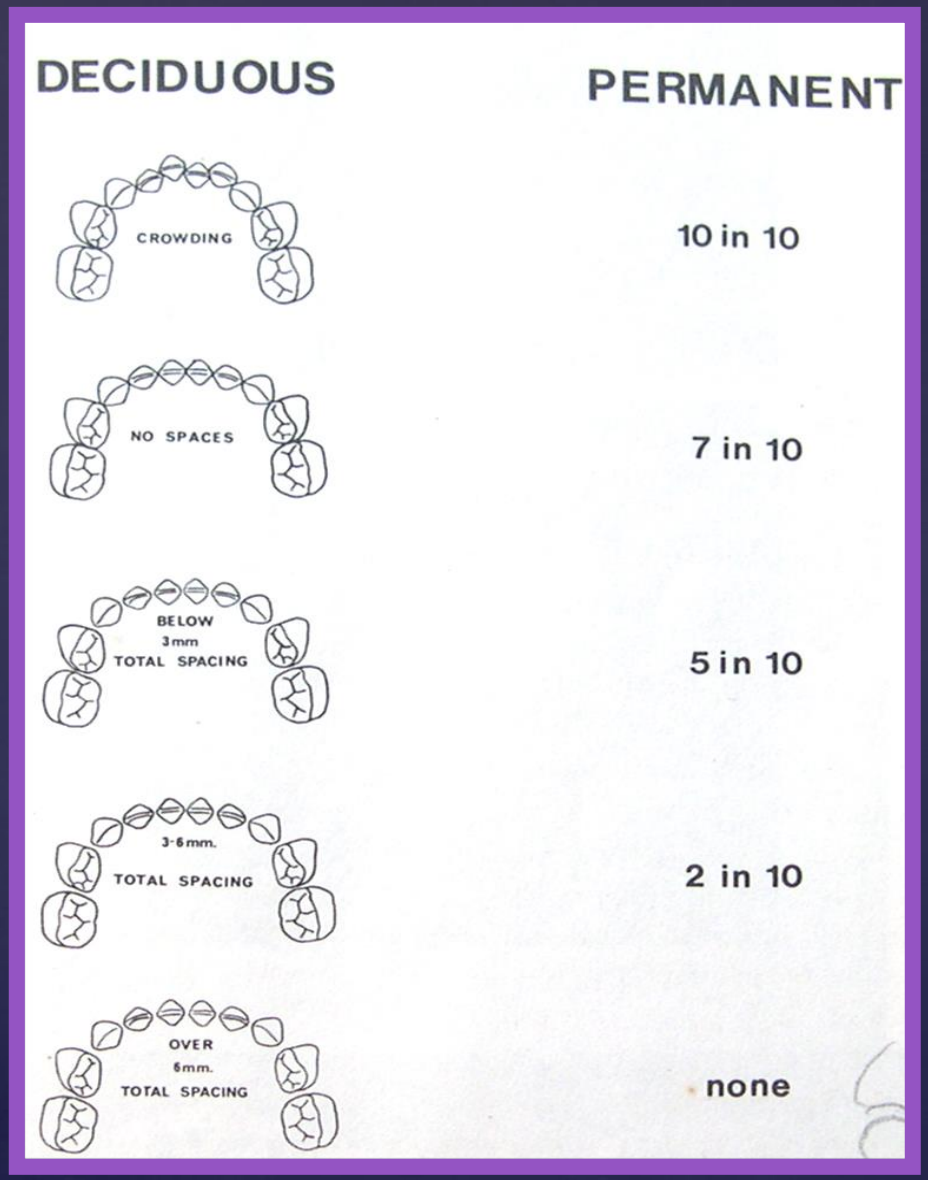
The prevalence of spacing in primary dental arch [ONO 1960]

NON SPACING IN DECIDUOUS DENTITION

Fig. 1 Unspaced primary dentition.

- Gap toothed smile - normal
- *Hollywood smile* with teeth in contact - not normal

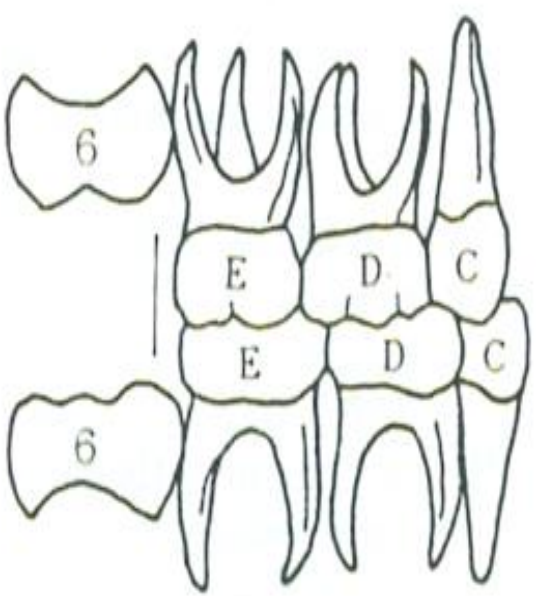
CROWDING



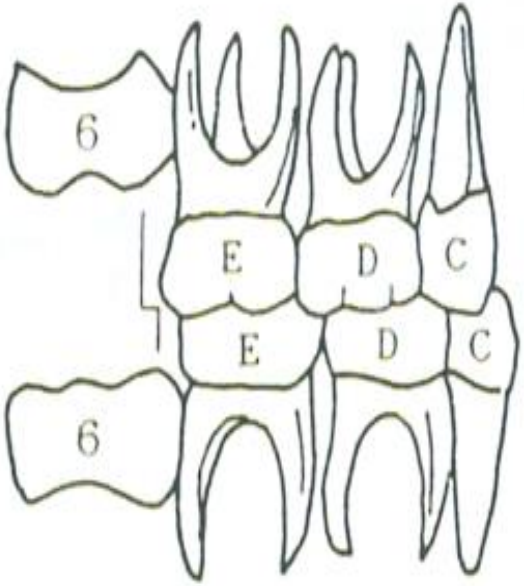
It is possible to predict degree of crowding in permanent teeth based on the amount of space present in lower arch

OCCLUSAL RELATIONSHIP

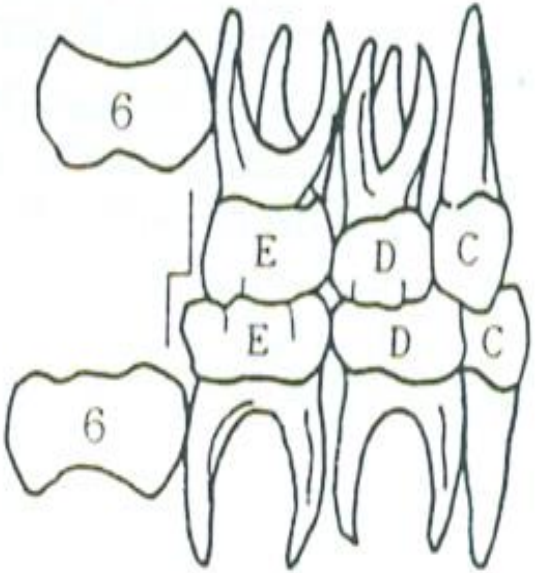
- 3 types of terminal planes –



Flush plane type



Mesial step type

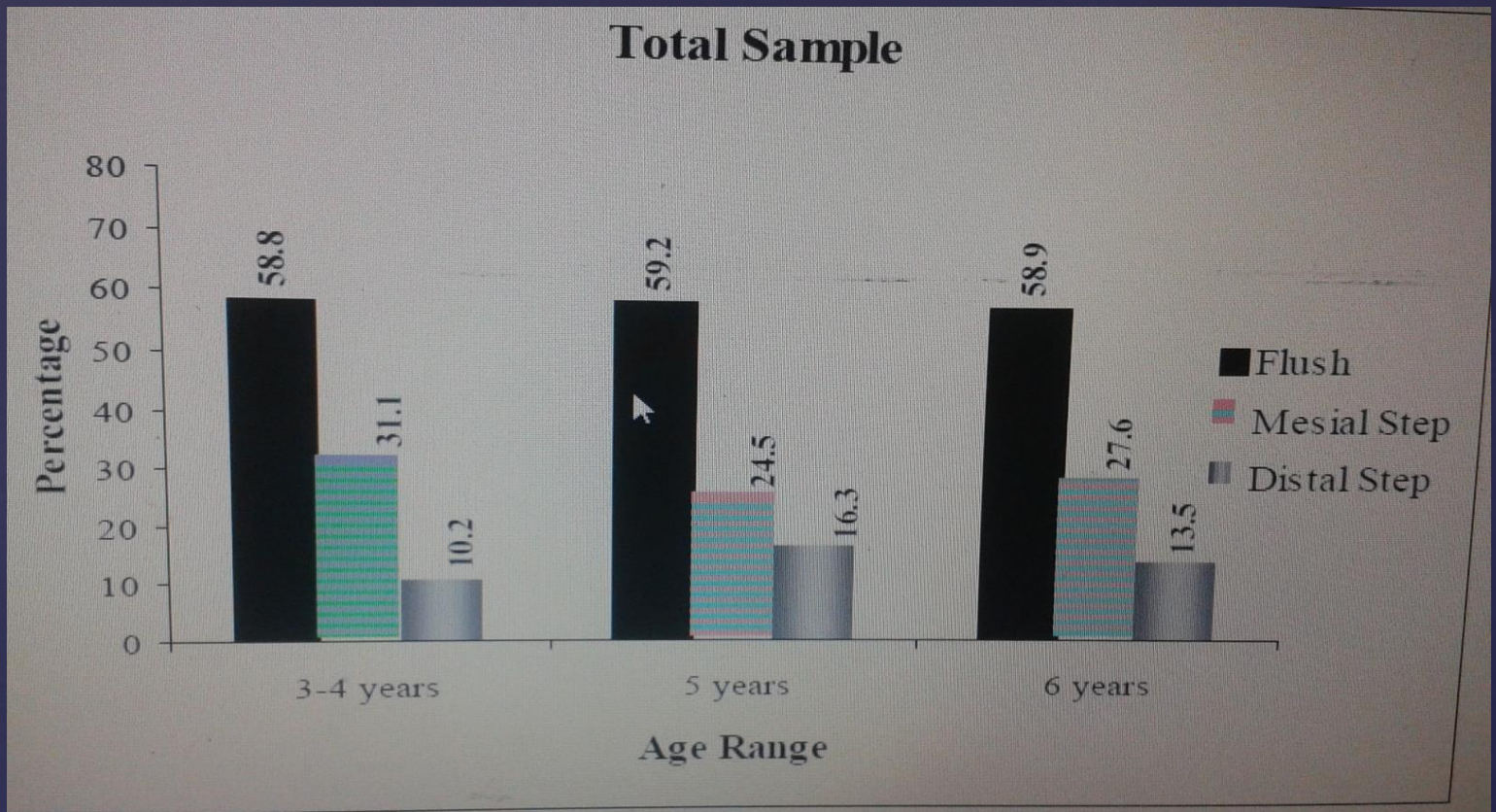


Distal step type

DISTRIBUTION	TYPE	PRESENT %
BILATERAL	FLUSH TERMINAL	59.1%
	MESIAL STEP	19.1%
	DISTAL STEP	4.6%
UNILATERAL [MIXED]	FLUSH TERMINAL & MESIAL STEP	9.1%
	FLUSH TERMINAL & DISTAL STEP	8.1%

THE PREVALENCE OF VARIOUS TYPES OF TERMINAL PLANES [ONO 1960]

PREVALENCE OF FLUSH TERMINAL PLANES



igure 1 – Prevalence of terminal relationships of the deciduous second molars according to the age range

Study of terminal relationships of the second molars in the deciduous dentition. Revista de Odontologia da Universidade Cidade de São Paulo 2007 jan-apr; 19(1):6-12

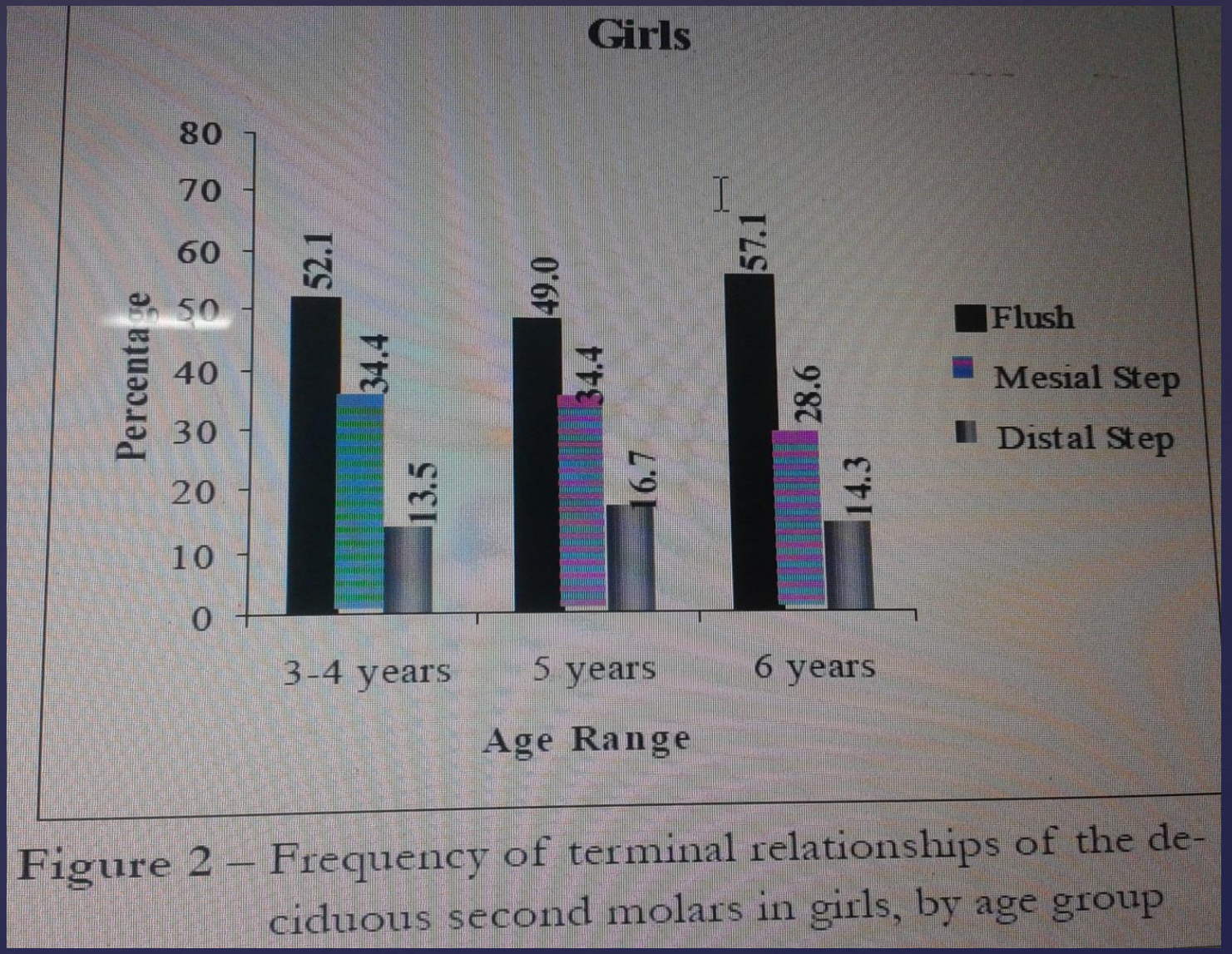


Figure 2 – Frequency of terminal relationships of the deciduous second molars in girls, by age group

Study of terminal relationships of the second molars in the deciduous dentition. Revista de Odontologia da Universidade Cidade de São Paulo 2007 jan-apr; 19(1):6-12

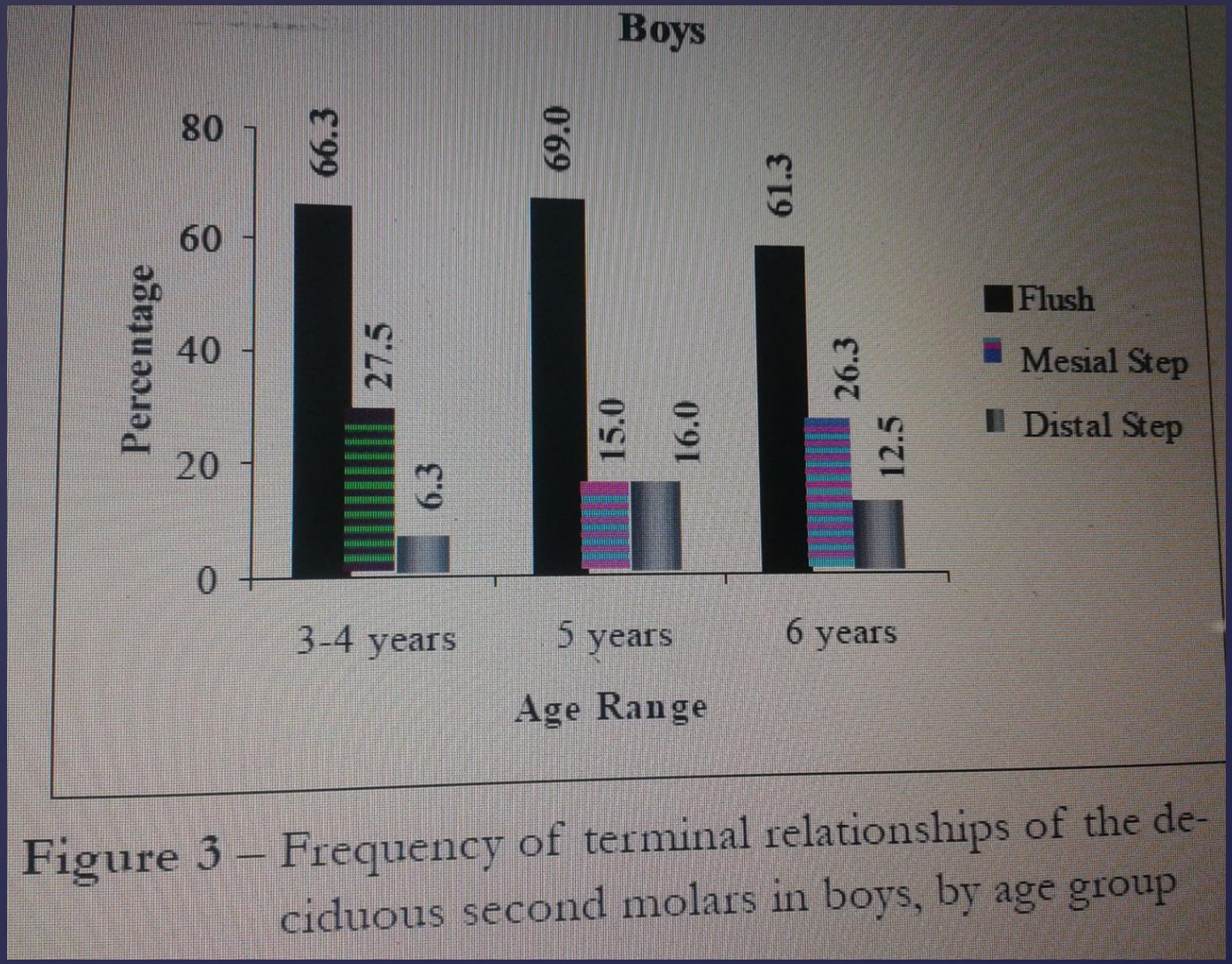


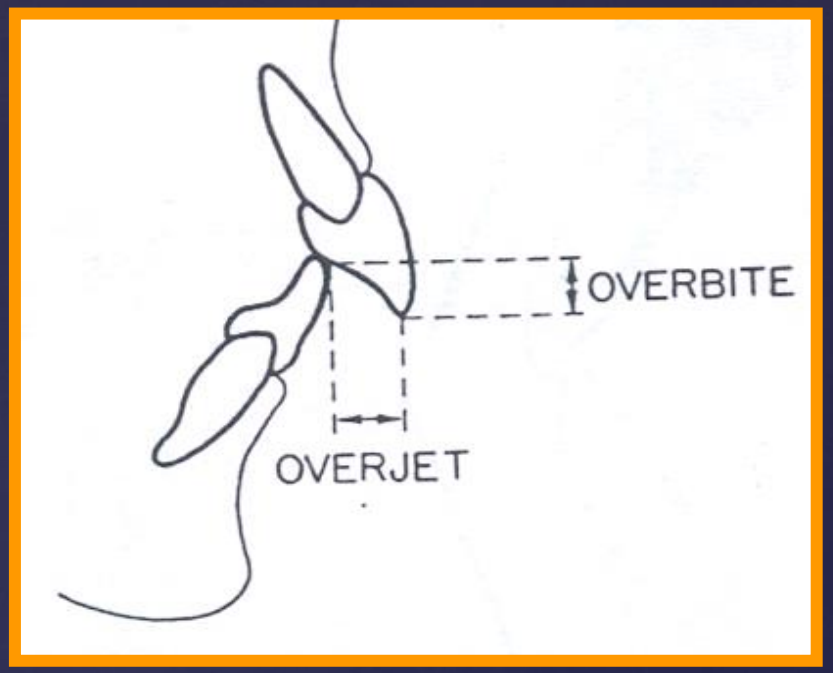
Figure 3 – Frequency of terminal relationships of the deciduous second molars in boys, by age group

Study of terminal relationships of the second molars in the deciduous dentition. Revista de Odontologia da Universidade Cidade de São Paulo 2007 jan-apr; 19(1):6-12

ANTERIOR TEETH RELATIONSHIP-

OVER BITE-

- 2mm



OVER JET

- 2- 4 mm

CANINE RELATIONSHIP

- Class 1-mand ‘c’ occludes in embrasure max ‘li & c’
- Class 2- mand ‘c’ occludes distal to embrasure

ARCH DIMENSION

- **ARCH LENGTH-**

- **ARCH CIRCUMFERENCE-**

- **ARCH WIDTH**

  both max & mand arches grow posteriorly to accommodate perm molars

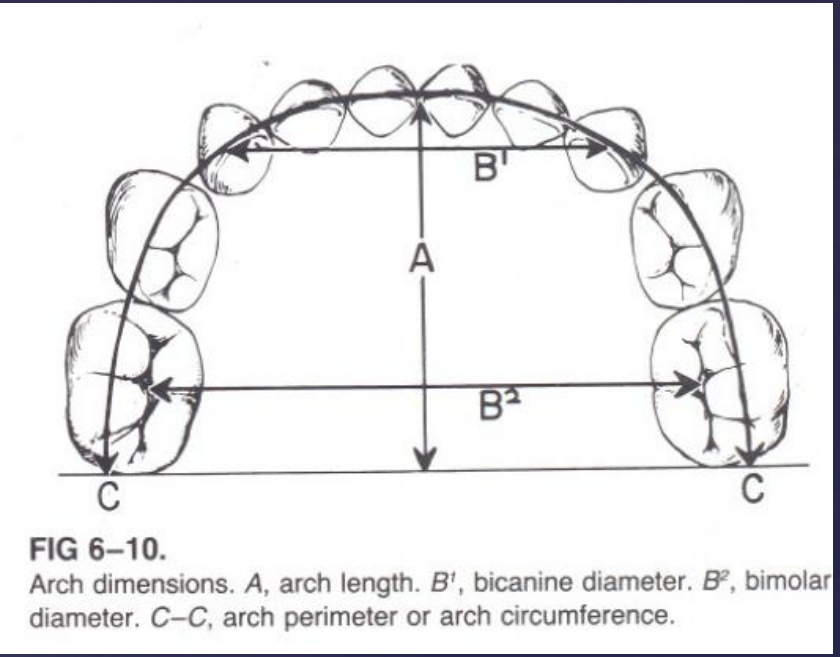
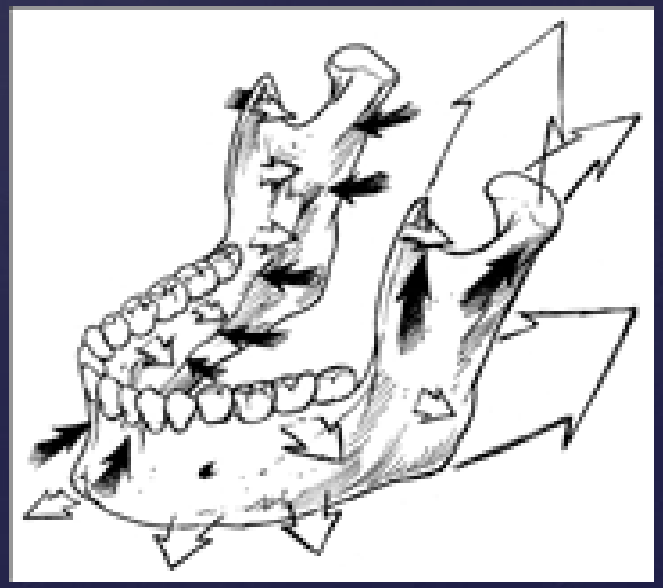


FIG 6–10.
Arch dimensions. *A*, arch length. B^1, bicanine diameter. B^2, bimolar diameter. *C–C*, arch perimeter or arch circumference.

ANTERIOR DEEP BITE

- Incisors are upright
- Later reduced by

1. Eruption of deciduous molars
2. Attrition of incisors
3. Forward movement of mandible



THE MIXED DENTITION PERIOD

- The first transitional period
- Intertransitional period
- The second transitional period

THE FIRST TRANSITION PERIOD

- The emergence of 1st permanent molar (A B C D E 6)
- Transition of the incisors
- Establishment of occlusion

DEVELOPMENTAL PROCESSES DURING ERUPTION OF SUCCEDANEOUS TEETH

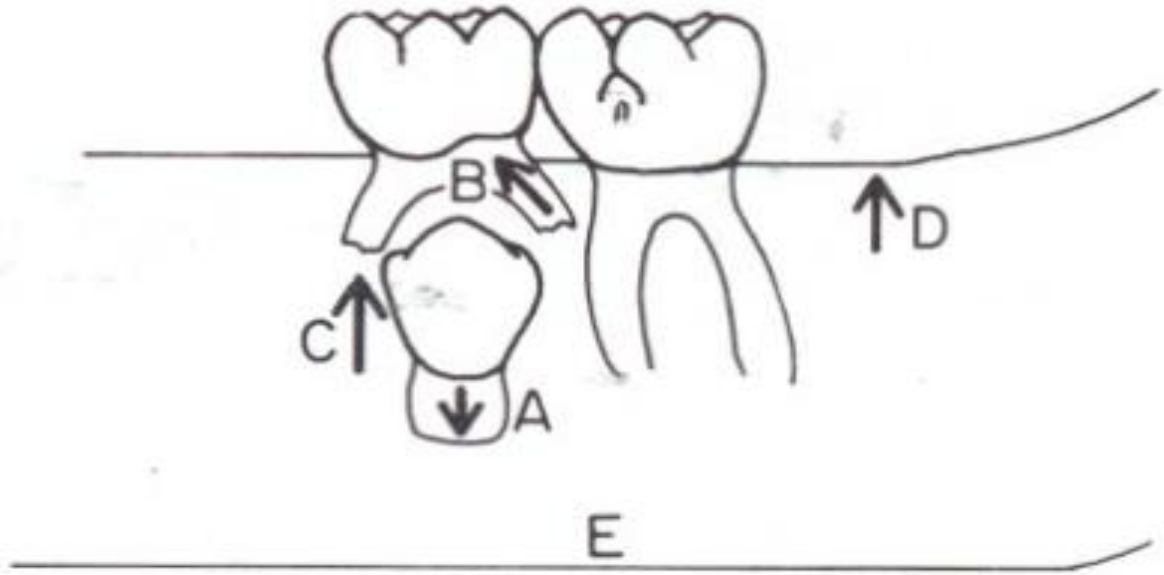


FIG 6–15.
Developmental processes during eruption of succedaneous teeth. *A*, elongation of the permanent root. *B*, resorption of the primary predecessor. *C*, movement of the permanent tooth occlusally. *D*, growth of the alveolar process. *E*, the inferior border of the mandible, which shows much less growth activity than the other four processes.

STAGES OF ERUPTION

- During eruption, the tooth passes through 4 distinct stages of development .
- At the onset, the position of the tooth germ is thought to be dependent on heritable traits. **[PRE-ERUPTIVE]**

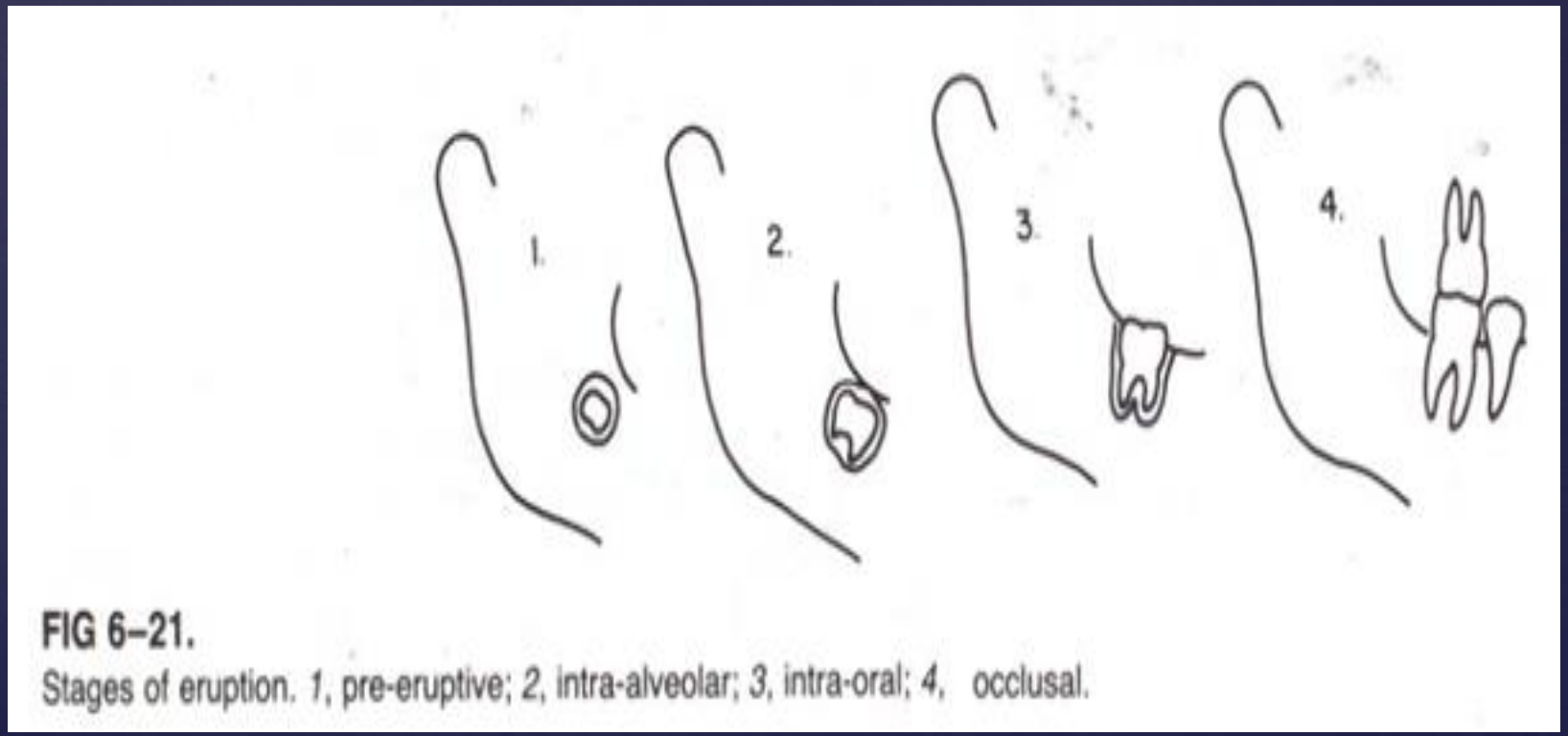


FIG 6–21.
Stages of eruption. *1*, pre-eruptive; *2*, intra-alveolar; *3*, intra-oral; *4*, occlusal.

- During INTRA-ALVEOLAR ERUPTION, the tooth's position is affected also by the presence or absence of adjacent teeth, rate of resorption of the primary teeth, early loss of primary teeth, localized pathologic conditions and any factors that alter the growth or conformation of the alveolar process.

- There is a strong tendency of the teeth to drift mesially even before they appear in the oral cavity. ----MESIAL DRIFTING TENDENCY.

- Once the oral cavity has been entered (INTRA-ORAL OR PREOCCLUSION STAGE OF ERUPTION), the tooth can be moved by the lip, cheek, and tongue muscles, or by extraneous objects brought into the mouth[thumbs, fingers, pencils] and drift into spaces created by caries or extractions.

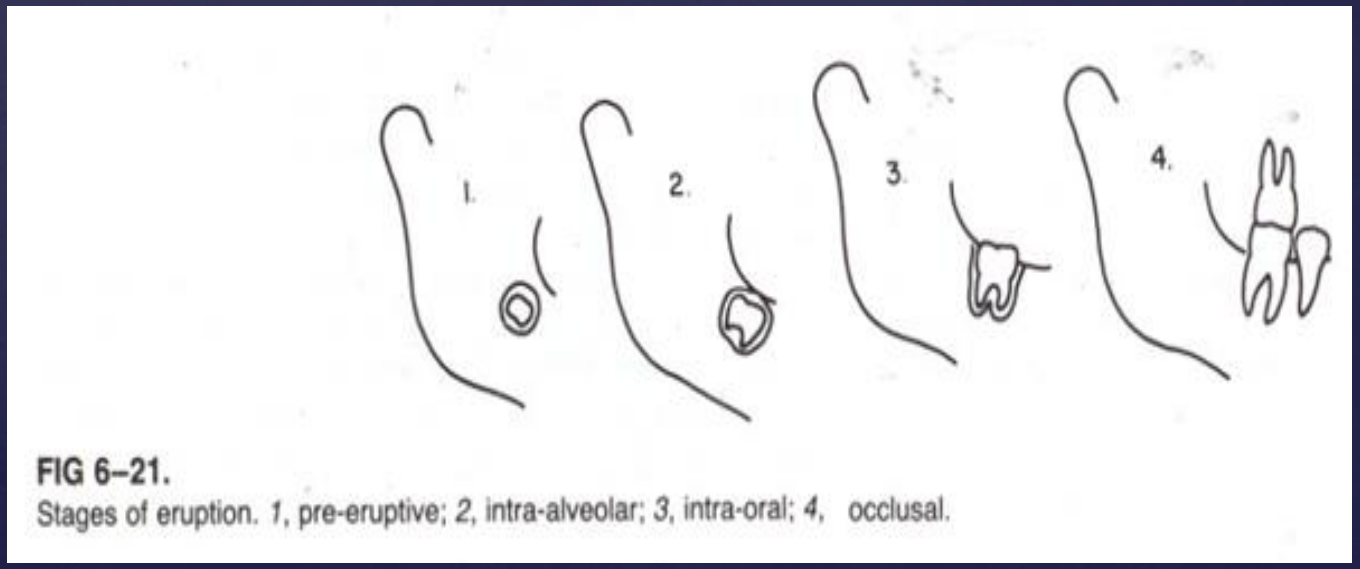


FIG 6–21.
Stages of eruption. *1*, pre-eruptive; *2*, intra-alveolar; *3*, intra-oral; *4*, occlusal.

- When the teeth occlude with those of the opposite dental arch (OCCLUSAL STAGE OF ERUPTION), a most complicated system of forces determines the position of the tooth.
- The muscles of mastication exert an influence through the interdigitation of the cusps.
- The upward forces of eruption and alveolar growth are countered by the opposition of the apically directed force of occlusion.
- The periodontal ligament disseminates the strong forces of chewing to the alveolar bone

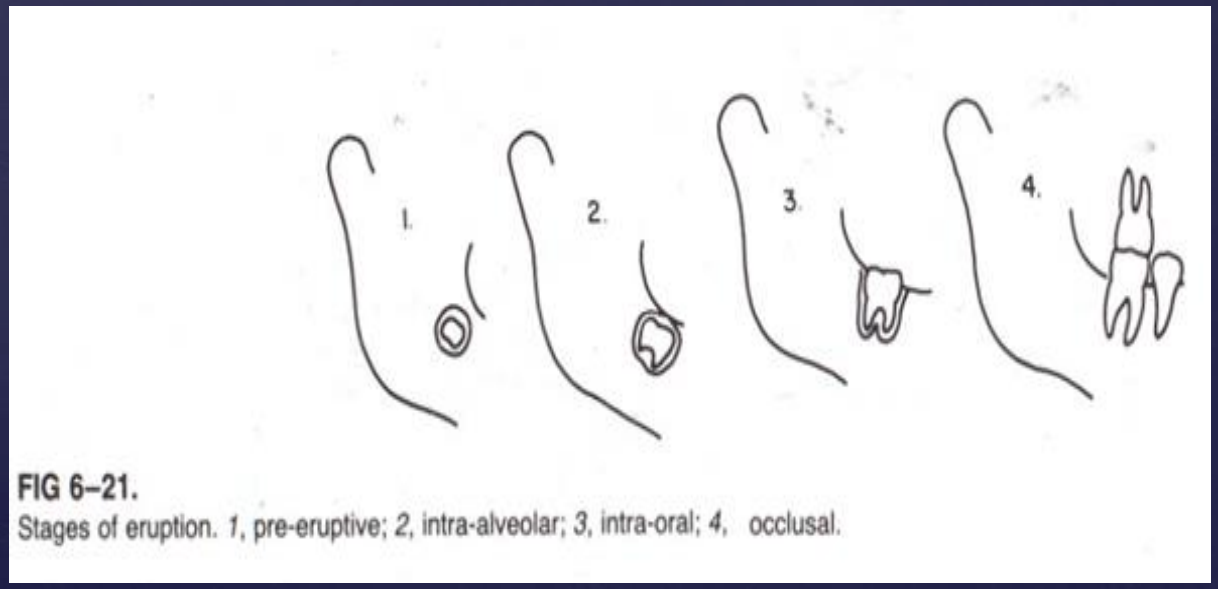
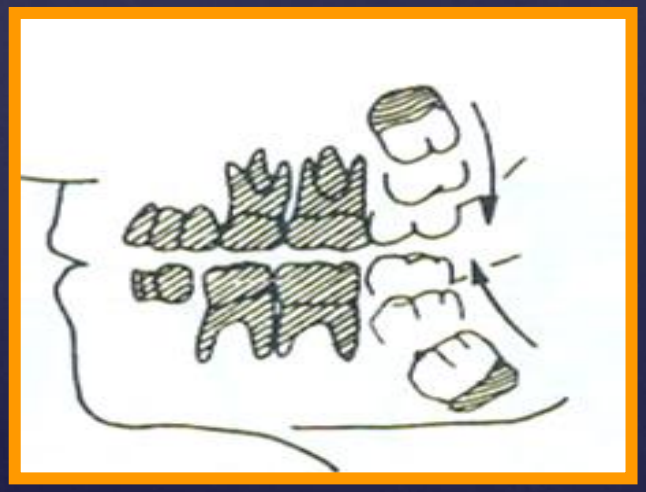
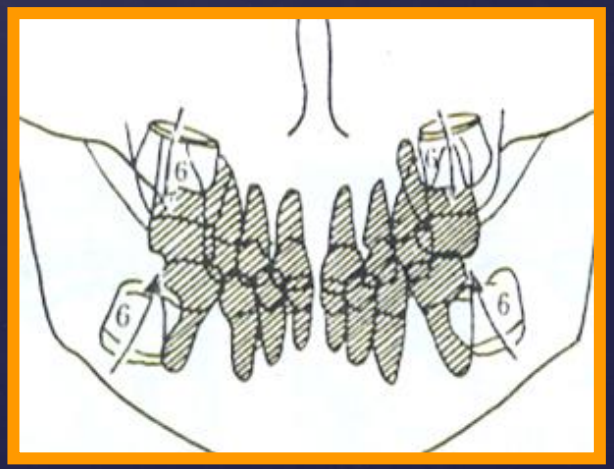


FIG 6–21.
Stages of eruption. *1*, pre-eruptive; *2*, intra-alveolar; *3*, intra-oral; *4*, occlusal.

THE EMERGENCE OF 1ST PERMANENT MOLAR

- 1st teeth to emerge in permanent dentition.
- The A-P relation b/w two opposing permanent molars depend upon –
  - Their previous position within the jaw
  - Sagittal relation b/w maxilla and mandible
  - Terminal planes of 2nd decid molars.



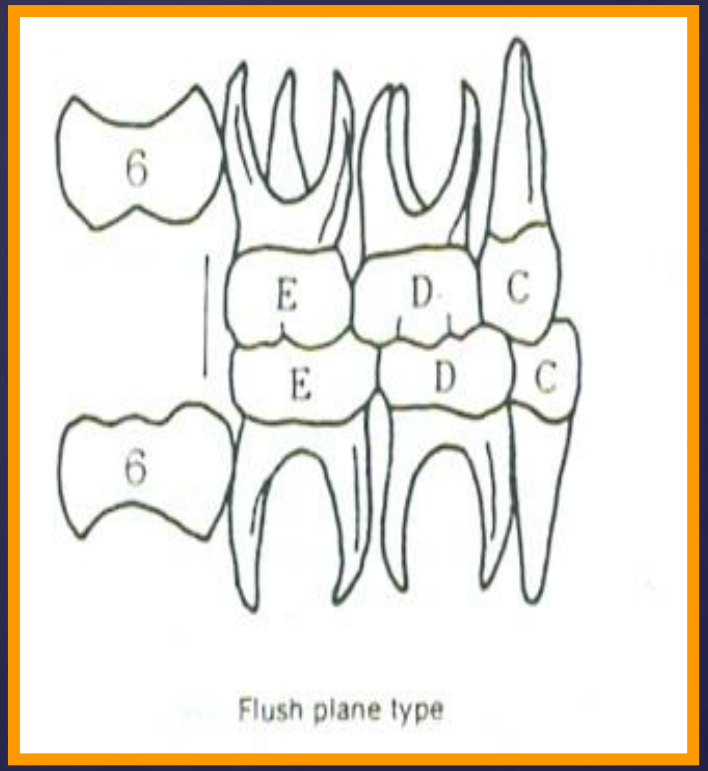


PATHWAY OF ERUPTION OF 1ST PERMANENT MOLAR

- Tooth germ of maxillary 1st permanent molar develops in maxillary tuberosity , & its occlusal surface directed downwards & backwards
- Tooth germ of mandibular 1st molar at corner of mandibular gonion with its occlusal surface facing upwards & forwards
- So there is obvious difference in pathway of eruption of maxillary & mandibular 1st permanent molar.
- As soon as 1st permanent molar erupts into the oral cavity , it comes in contact with distal surface of 2nd primary molar.
- Its location is not stable until final intercuspation of maxillary and mandibular 1st molar has been achieved.

FLUSH TERMINAL PLANE

- Distal surface of upper & lower 2nd molar are in one vertical plane
- So erupting 1st p molar→ flush or end on relationship
- To achieve class I molar relation lower molar have to move 3-5 mm forward in relation to upper molar



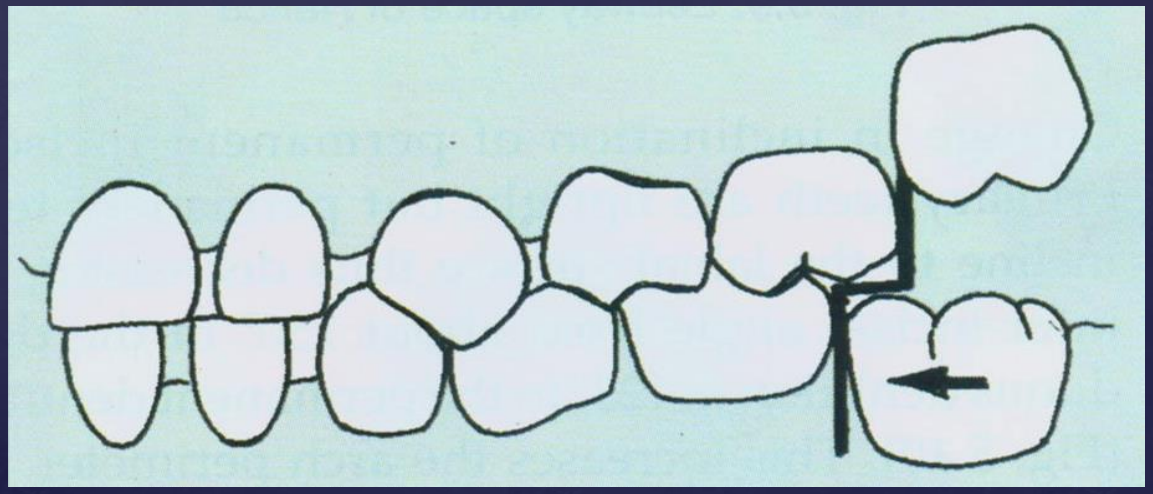
Flush plane type

BAUME 1950

- Utilization of physiologic spaces and leeway space in lower arch
- By differential forward growth of mandible

EARLY MESIAL SHIFT

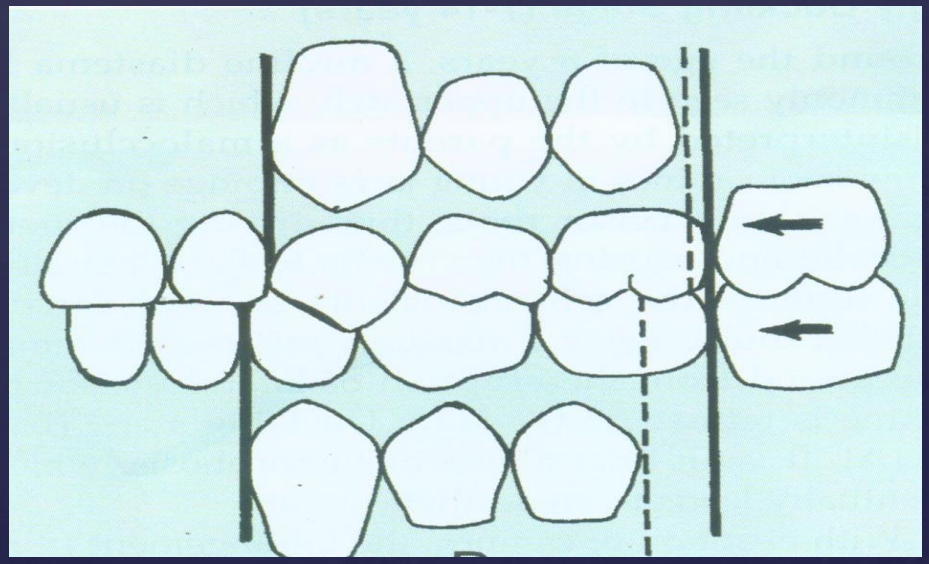
- Dec dent is spaced with flush terminal plane.
- Utilize primate space
- Decrease arch length



LATE MESIAL SHIFT

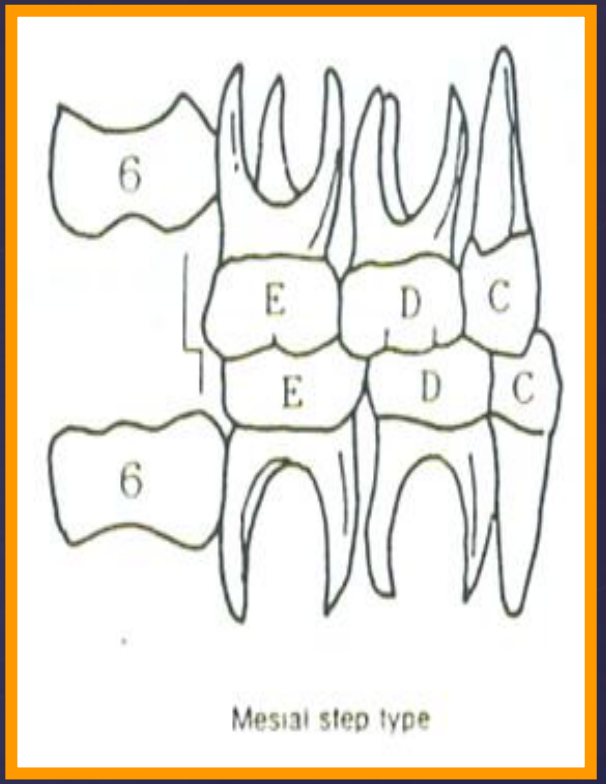
- Closed dentition, the erupting 1st molar is not able to close spaces.

- when prim molar exfoliates permanent molar migrates mesially to utilize leeway space



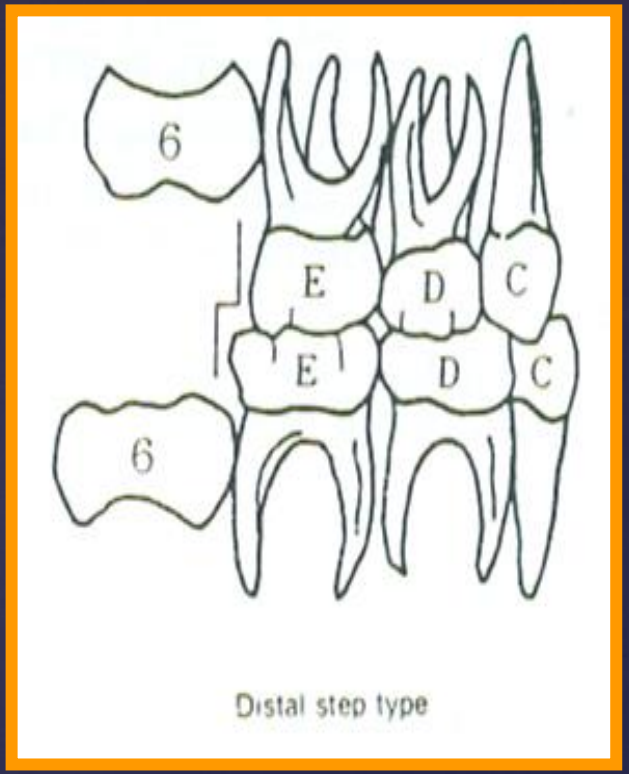
MESIAL STEP

- Distal surface of lower molar is more mesial to upper
- Occur due to early forward growth of mb
- If growth persist in forward direction → angle class III
- If growth minimal → angle class I



Mesial step type

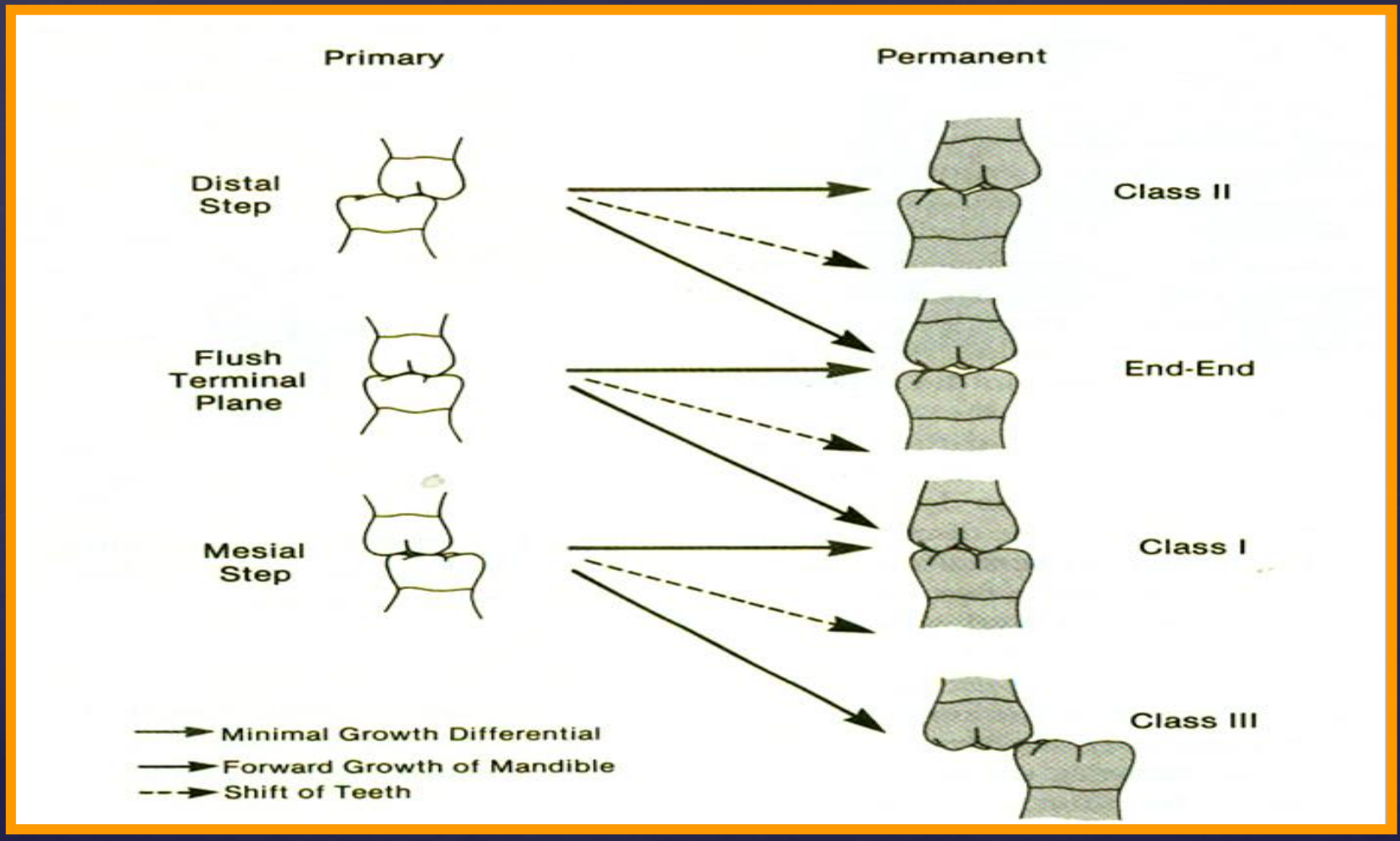
DISTAL STEP



Distal step type

- Distal surface of lower 2nd decid molar is more distal to upper
- Erupting permanent 1st molar is in class II or end on

Influence of terminal plane on the position of 1st permanent molar



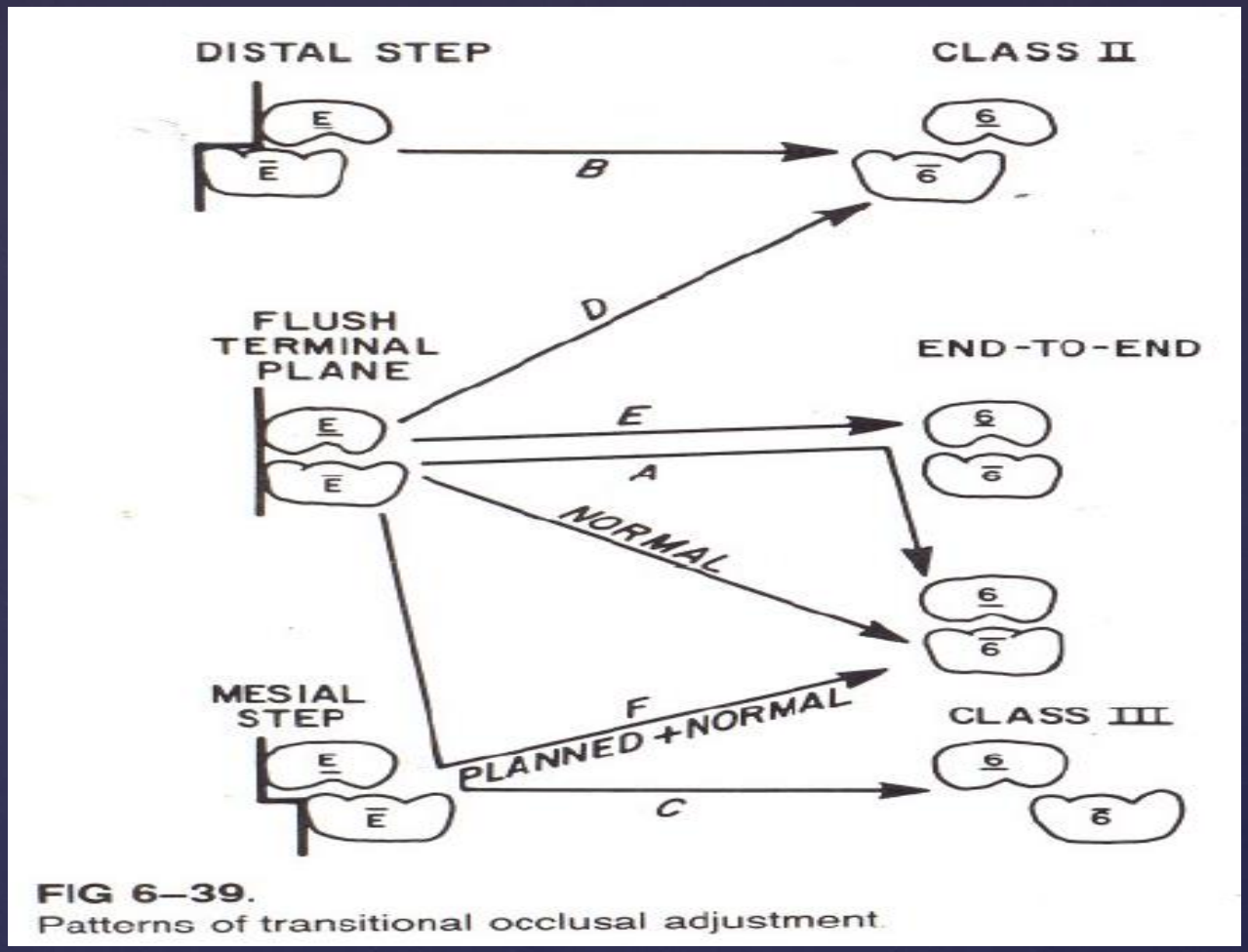


FIG 6–39.
Patterns of transitional occlusal adjustment.

Flush terminal plane of the primary dentition typically provides an end-to-end relationship of the 1ST permanent molars.

The first permanent molar normally then achieves a Class I relationship by
(1) a late mesial shift after the loss of the second primary molar (E and F);
(2) greater forward growth of the mandible than the maxilla.
(3) a combination of (1) and (2) (A).

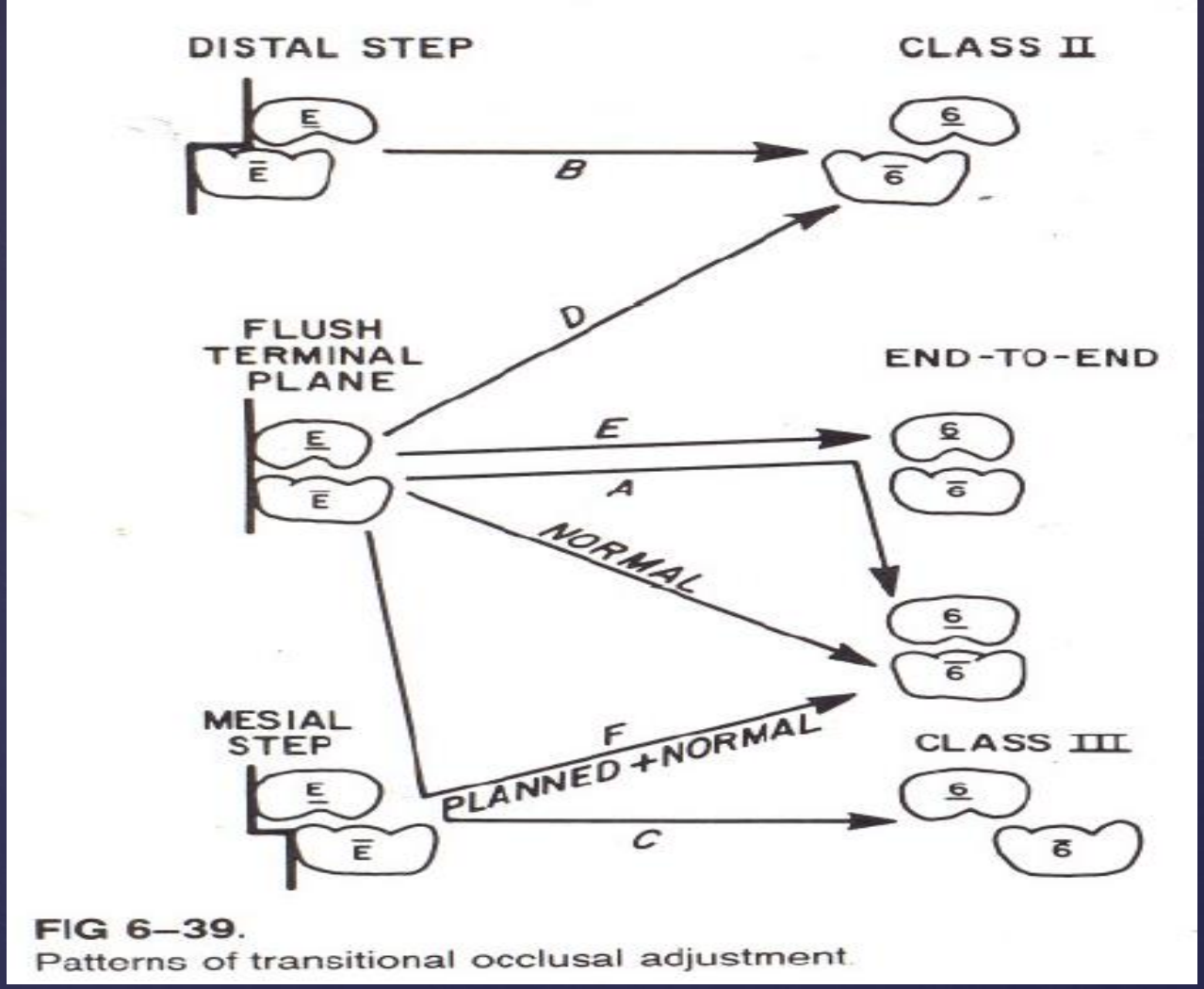


FIG 6–39.
Patterns of transitional occlusal adjustment.

- A distal step in the primary dentition reflects a likely skeletal imbalance and it will result in a Class II occlusion in the permanent dentition **(B).**

A Class II skeletal pattern may worsen the occlusal relations with time

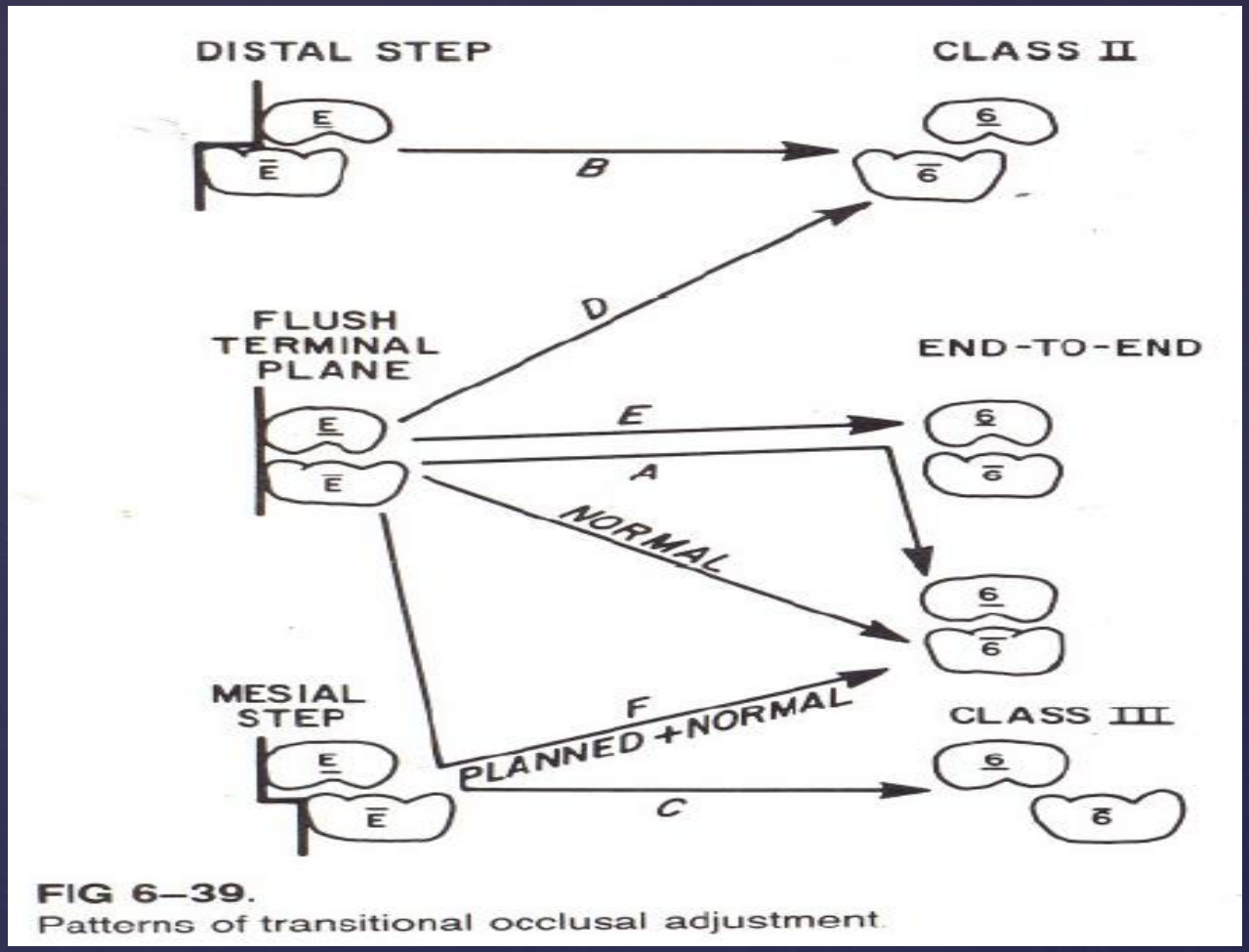


FIG 6–39.
Patterns of transitional occlusal adjustment.

- The two most common paths and hence the "normal" routes are from a flush terminal plane to Class I and from a mesial step to Class I occlusions

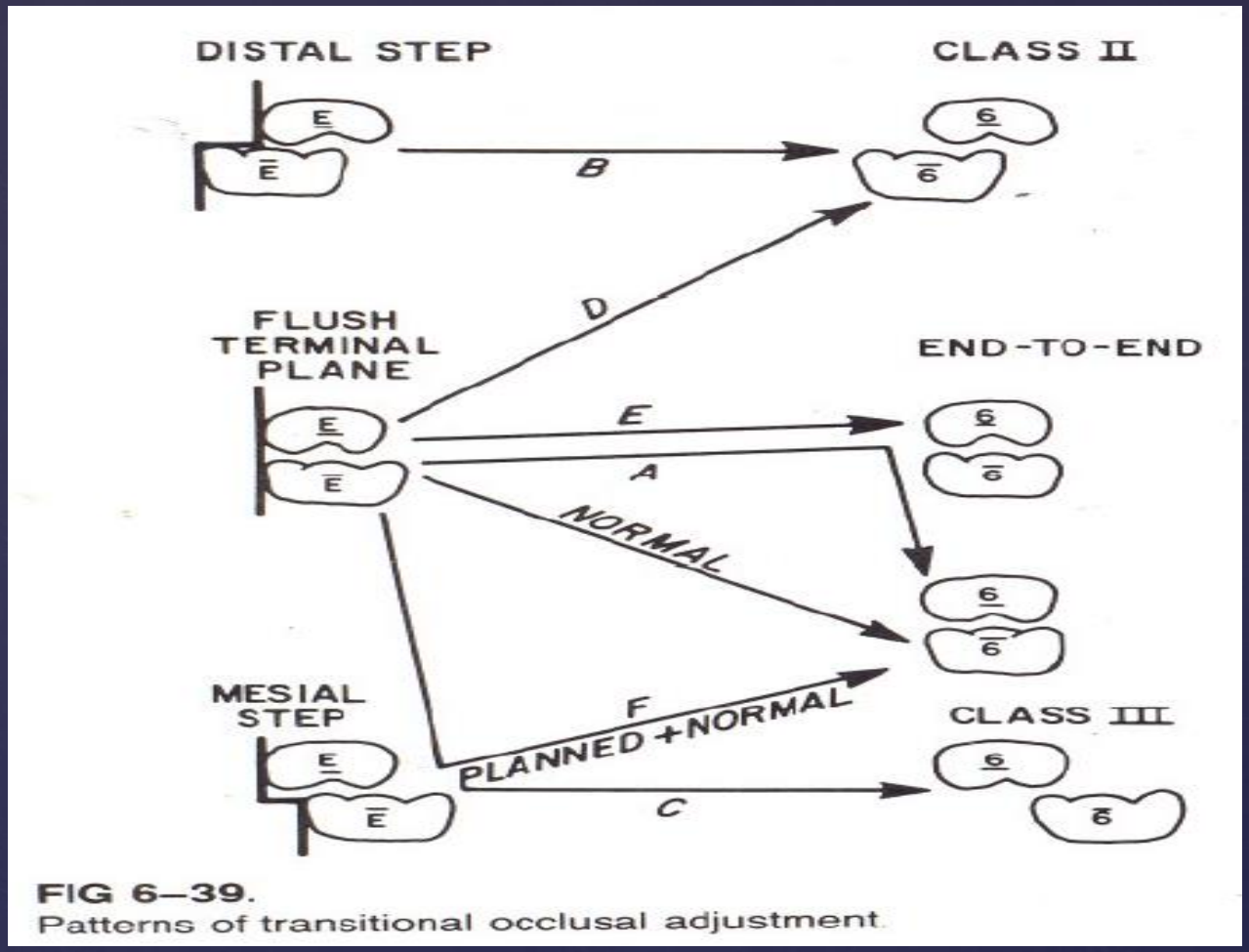


FIG 6–39.
Patterns of transitional occlusal adjustment.

A child has a flush terminal plane in the primary dentition, a mild Class II facial skeleton, and insufficient arch perimeter space to permit a late mesial shift of the first permanent molars, the occlusion likely will become Class II by the end of the mixed dentition period (D)or an end-to-end molar relationship may obtain by the time of the eruption of the premolars (E) depending on the severity of the Class II skeletal growth pattern.

- Hence **BAUME'S** study was based on examination of dental casts only and did not take into account the skeletal growth pattern of each child.

- The possibility that the changing molar relationship was due to differential growth in maxillary & mandibular jaw growth

- **CLINCH in 1951-**

C & C1- length of upper & lower deciduous arches from mesial of canine to distal of 2nd molar

F- length from distal of upper to mesial of lower canine .

G - length of distal of upper molar to mesial of lower canine

H- distance between distal molar surfaces

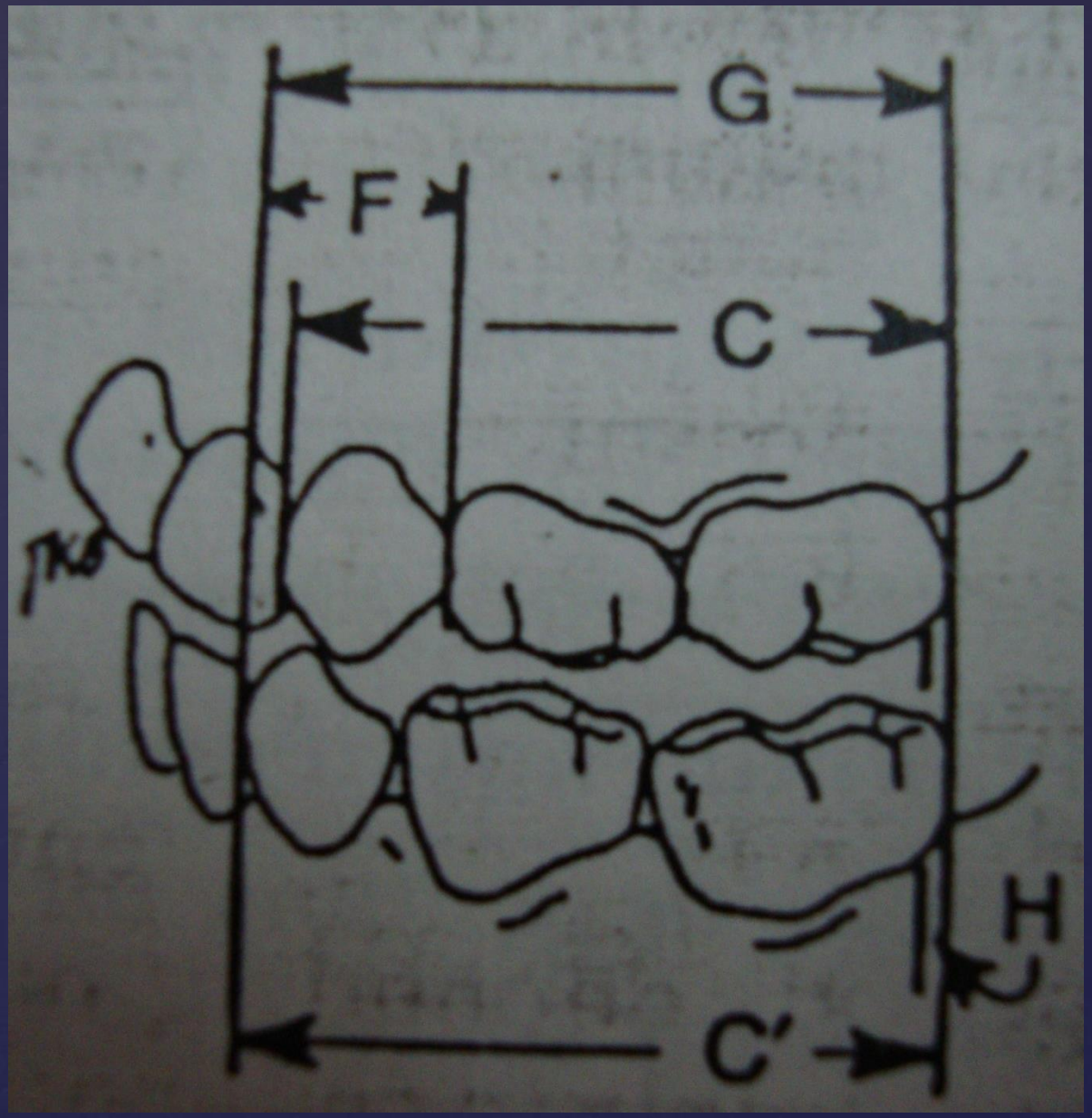
- **CLINCH in 1951-**

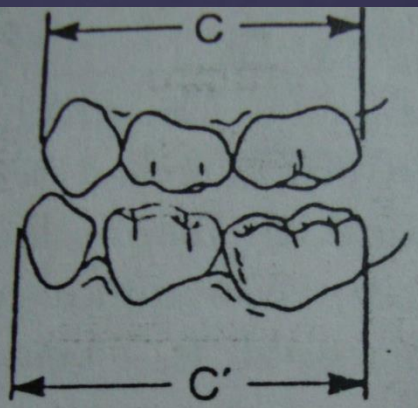
C & C1- length of upper & lower deciduous arches from mesial of canine to distal of 2nd molar

F- length from distal of upper to mesial of lower canine .

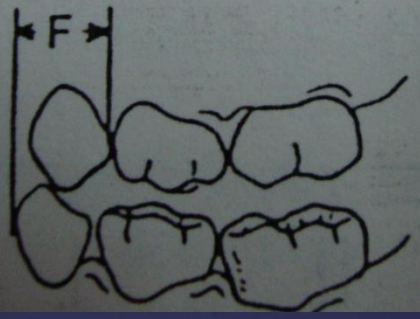
G - length of distal of upper molar to mesial of lower canine

H- distance between distal molar surfaces

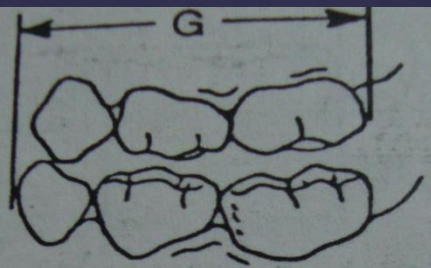




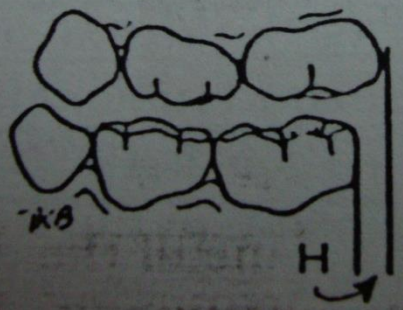
C + C′ decreased
0.5-1.0 mm
(eruption of anteriors
+
(primate space)



F increased
0.4-0.6 mm



G decreased
0.6-0.7 mm



H increased
4.5-4.8 mm

- Molars are pushed forward by erupting 1st molar or the canines moves distally or combination of both.

- Hence she concluded that change in relation in upper & lower molars is due to downward & forward growth of mandible & also arch length decreases because the canines moves distally to close the primate space or to utilize the leeway space

EXCHANGE OF INCISORS

- Normally mb incisor erupt first, usually present lingual

- INCISOR LIABILITY/ EARLY INCISOR CROWDING
  -incisors are somewhat crowded & thus some space is needed to properly align them is occupied by deciduous canines

- In mx – 7.6 mm & in mb – 6 mm

THE EXCHANGE OF INCISORS

JAWS	SPACING IN PRIMARY DENTITION	NO OF CASES	ALIGNMENT OF ANTERIOR TEETH	NO OF CASES
MAXILLA	SPACED	9	Normal Spaced Crowded	4 1 4
	CLOSED	8	Normal Spaced Closed	1 0 7
MANDIBLE	SPACED	9	Normal Spaced Crowded	3 4 3
	CLOSED	7	Normal Spaced Closed	2 0 5

Relationship of spacing in the primary dental arch to alignment of anterior teeth in permanent dental arch [MOTCHIZUKI 1965]

JAWS	AMT OF SPACING IN PRIMARY DENTITION	CASES WITH GOOD ALIGNMENT OF INCISOR TEETH IN PERMANENT DENTITION [%]
MAXILLA	>6mm 3-6mm <3mm	86 67 37
MANDIBLE	>4.5mm 2-4.5mm <2mm	100 68 40

Relationship of the amount of spacing in the primary dentition to the alignment of incisor teeth in the permanent dentition

[NAMBA 1981]

INCISOR LIABILITY CAN BE CORRECTED BY

I. utilization of interdental spaces

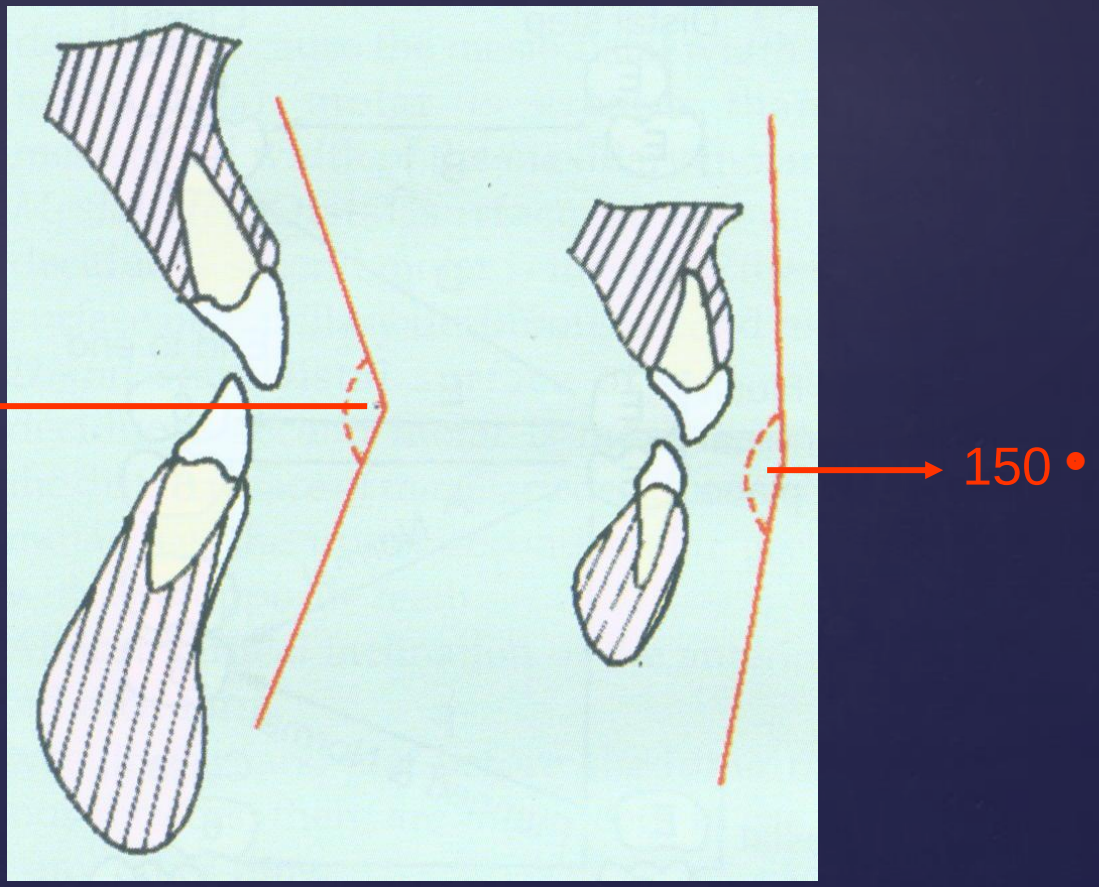
II. increase in anterior arch length

III. increase in inter-canine arch width

IV. Favourable ratio in the size ratio between the primary & permanent teeth

INTERCANINE ARCH LENGTH INCREASE

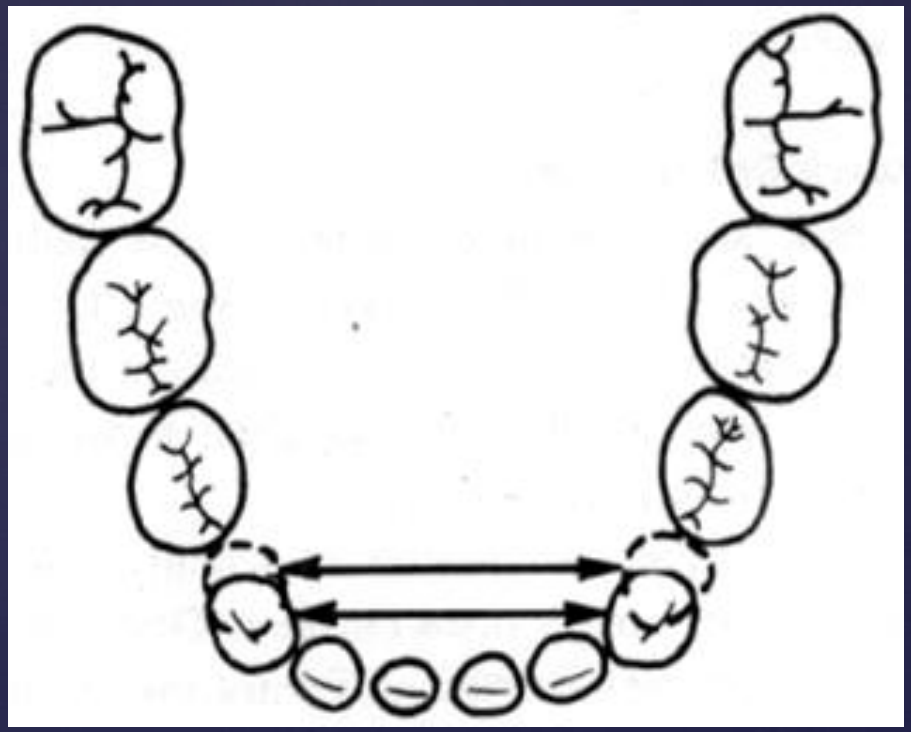
- More anterior inclination of perm incisors



HUMAN OCCLUSAL DEV , UNIV OF MICHIGAN 1976

Inter canine arch width

- Increase in both jaws at the time of eruption → 3mm
- Increase at the time of canine eruption → 1.5 mm



HUMAN OCCLUSAL DEV , UNIV OF MICHIGAN 1976

ARCH CIRCUMFERENCE/ PERIMETER

a. Reduction in mand circumference during mixed & early adolescent dentition is due to late mesial shift, mesial drifting of post teeth throughout life, interproximal wear of teeth, lingual positioning of incisors, original tipped position of incisors & molars.

b. Arch perimeter loss is more females.

c. Maxillary arch in contrast will increase.[angulation of incisors]

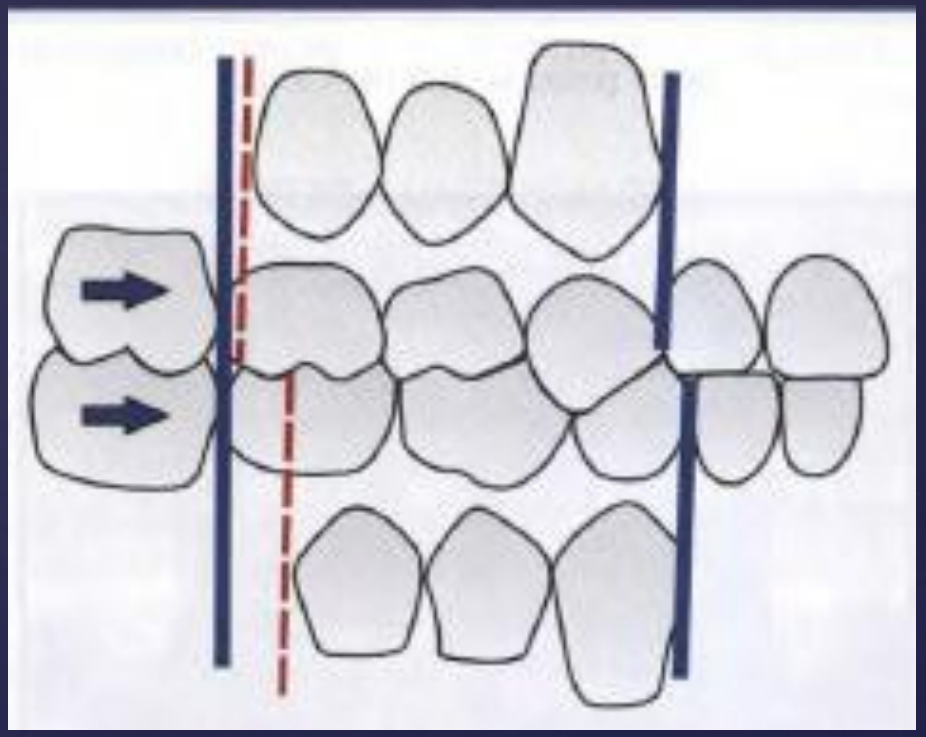
HUMAN OCCLUSAL DEV , UNIV OF MICHIGAN 1976

Favourable ratio in the size ratio between the primary & permanent teeth

LEEWAY SPACE OF NANCE

Sum of M-D dimension of 3,4,5 < C DE

Space available
0.8(U)
3.4 (L)



CONTROVERSIES REGARDING LEEWAY SPACE OF NANCE

MOORREES [1965]

- In his longitudinal study of dental cast.....

	BOYS	GIRLS
MAXILLA	5.22mm	3.59mm
MANDIBLE	0.77mm	0.17mm

- So he conclude that the arch must increase in size by alveolar bone growth so larger tooth mass will have sufficient room for proper alignment.

- Nance did not consider the large diff in M-D size between dec. incisor & their permanent successor, & this is done since arch needs to be looked at its totality

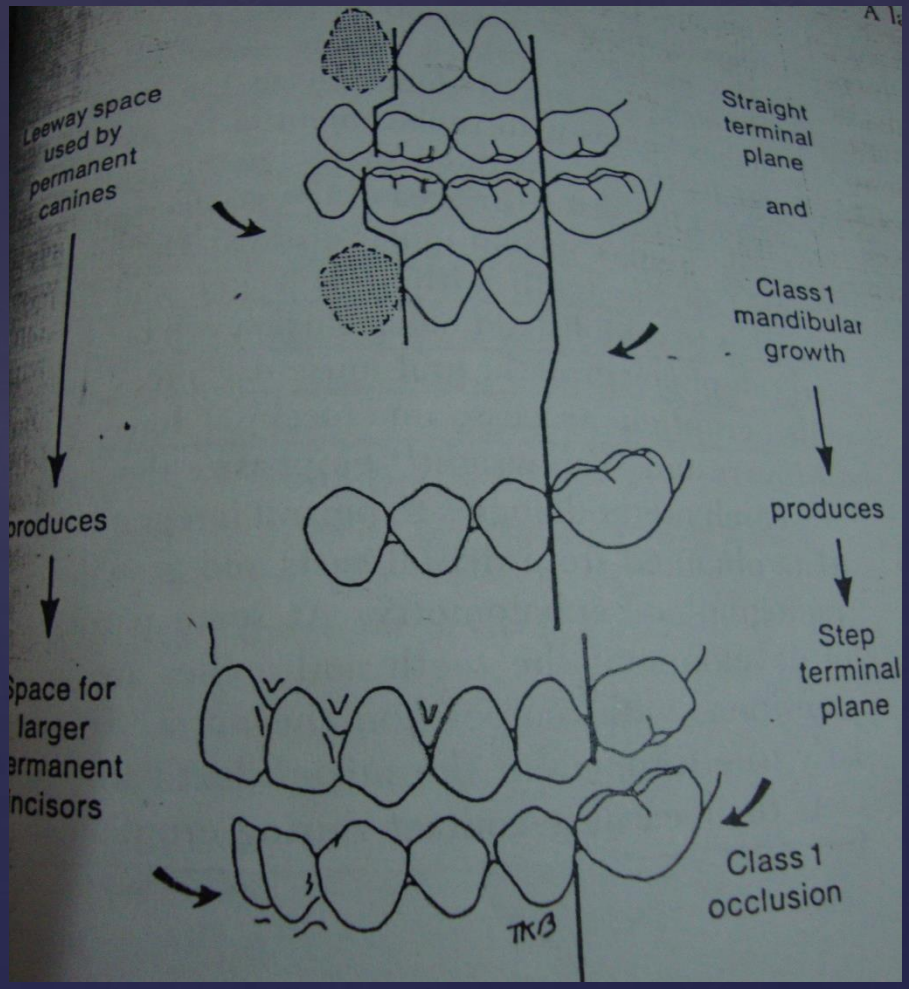
- This represents 1 segment of total arch.

- The max incisors as group in 1 quadrant is 3.2-3.5mm larger than dec predecessors , mand incisors as a group in 1 quadrant is 2.5mm larger than dec predecessors.

- Hence a child requires 1mm & 6mm more in max & mand respectively.

- It is evident that 1.7mm of leeway space is taken up by larger permanent incisor, in turn, will require distal eruption of perm canine , & this will allow for reduction of incisor crowding in mandibular arch

Leeway space , provided by large posterior teeth is utilized to provide arch space for larger anterior teeth



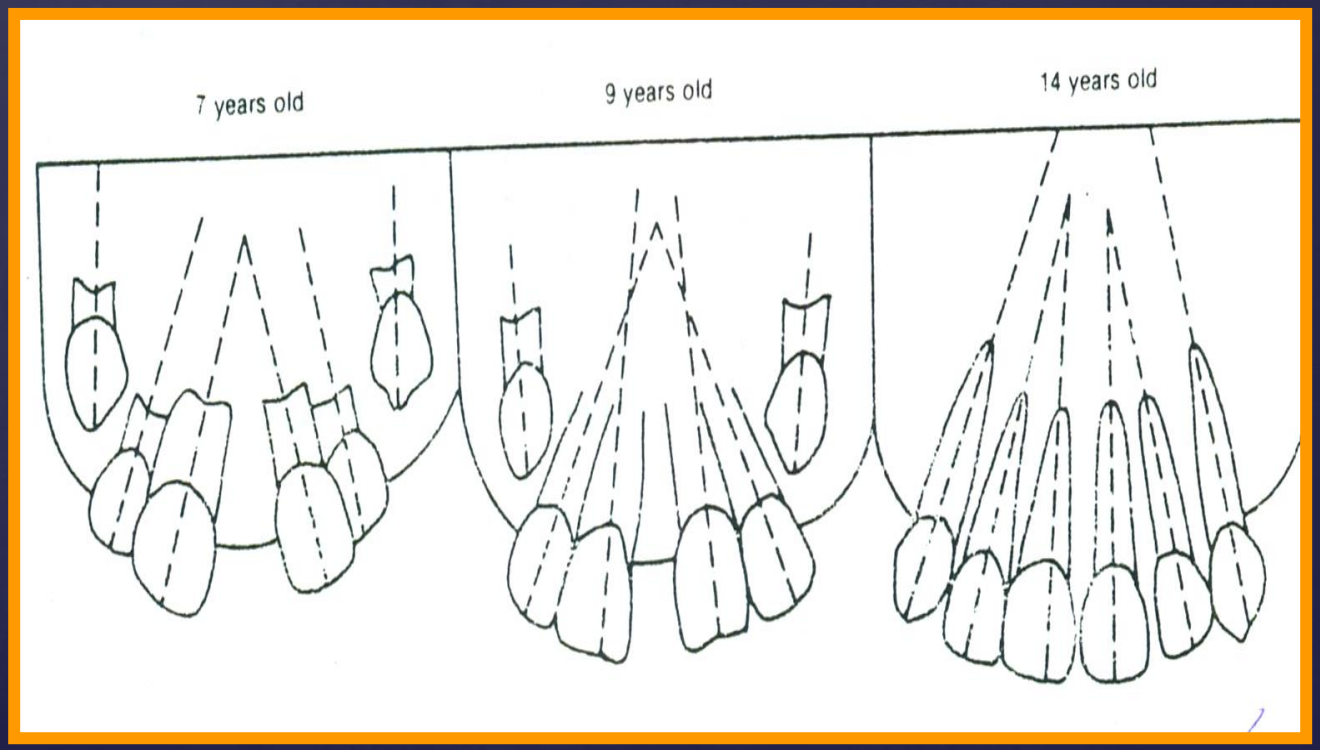
E SPACE

- **The difference between the mesio-distal (m-d) diameter of the second primary molar and the second premolar** because the combined m-d diameter of the primary canine and first molar (13.64 mm) is approximately equal to the combined m-d diameter (13.85 mm) of the permanent canine and first premolar.

- This simplifies the usual leeway space calculation.

Seminars in Orthodontics, Vol 1, No 3 (September), 1995: pp 188-194

- **UGLY DUCKLING STAGE**
- **TERM → BROADBENT [1937]**
- **TRANSIENT OR SELF CORRECTING**



Children tend to look unusual during exchange of their incisors.

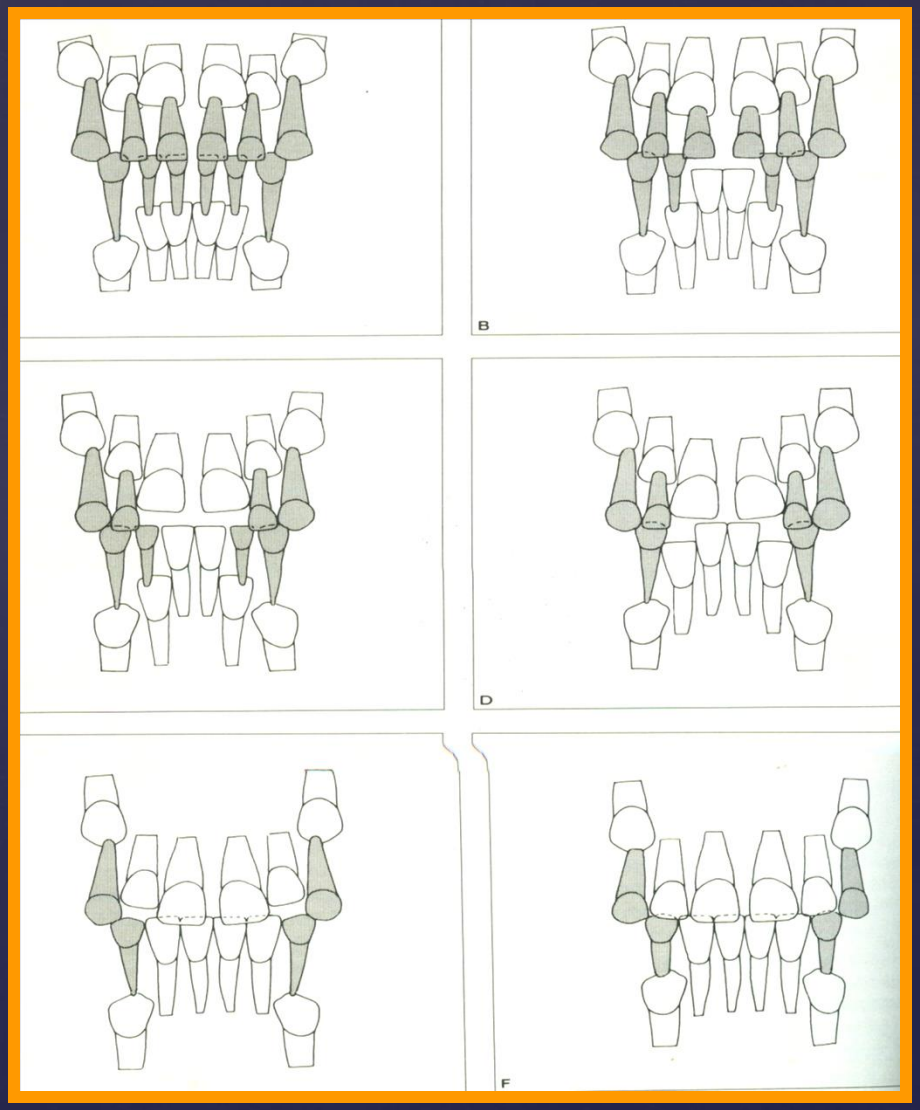
- Appear to be much larger than primary teeth
- Longitudinal axis is flared out, inverse V
- Teeth slighly more yellowish
- Because of pressure of erupting perm C in the developing roots of LI , the crowns of the incisors flare more laterally producing diastema

Sequence of normal transition of incisors

At 5 yr.

At 7 –8 yr.

At 8 – 9 yr

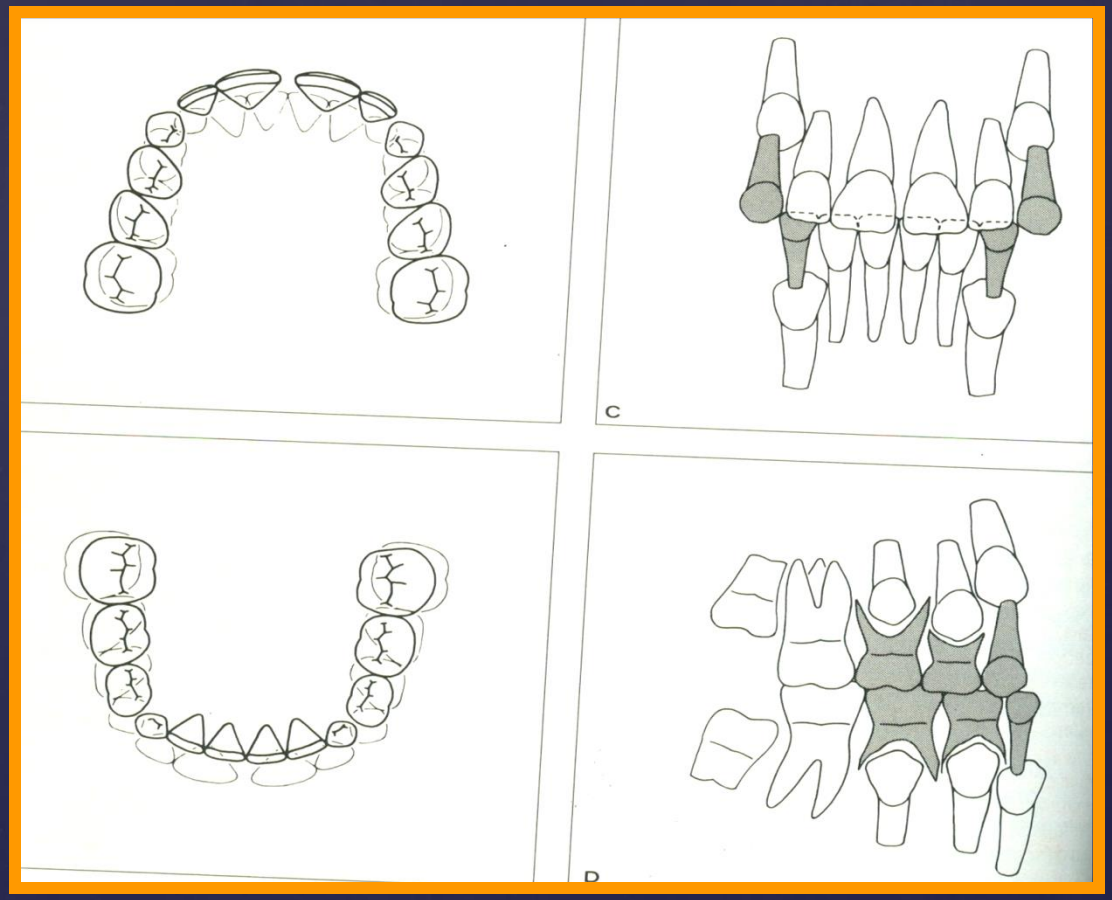


At 6 –7 yr

THE INTER TRANSITIONAL PERIOD

1 2 C D E 6

INTERTRANSITIONAL PERIOD



INTERTRANSITIONAL PERIOD

- consist of both decid & permanent dentition
- ugly duckling stage persist
- under influence of tongue mb incisors attain proper sites from their lingual position
- decid teeth present are worn out
- stable phase with little changes in dentition

THE SECOND TRANSITIONAL PERIOD

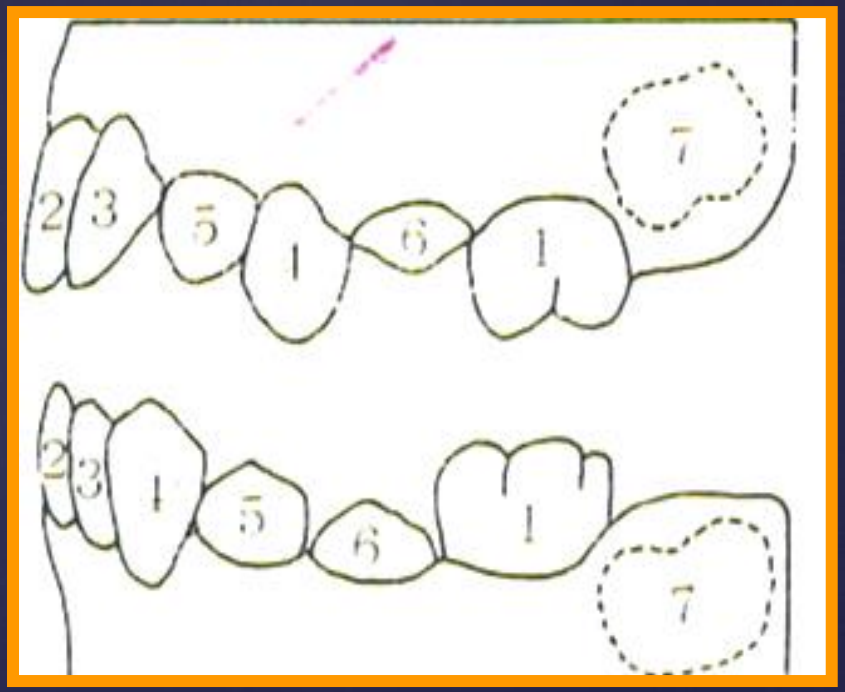
- Transition of Canine & premolar
- Eruption of Second permanent molar
- Establishment of occlusion.

TRANSITION OF CANINE& PREMOLAR

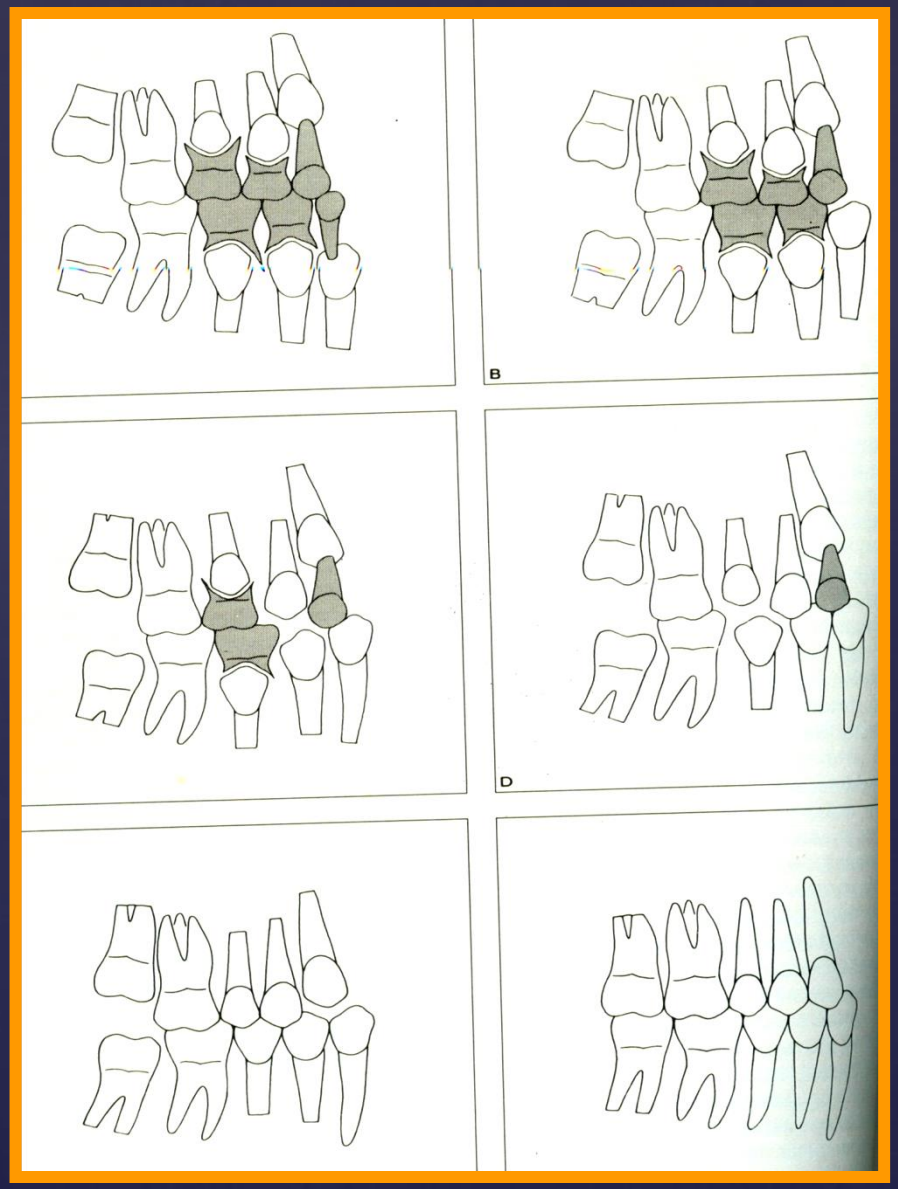
- Transition of C D E with 3 4 5 @ around 9- 10 yrs of age.
- After eruption of incisors, there follows a pause of 1-2 yrs & next lower canine erupts followed by 1st premolar at 11-12 yrs of age.
- Then max canine and 2nd bicuspid erupt at 12 yrs of age
- The period is terminated by appearance of 2nd molar 13-14yrs of age.
- Transition from ugly duckling to a mature stage of dentition, also called as prepubertal period

Order of exchange of decid canines and molars to permanent canines & pre-molars

- Takes 1.5 yrs to complete
- Sequence of eruption
- Mx → 4 5 3
- Mb → 3 4 5



TRANSITION OF CANINE,PMOLAR & ERUPN OF 2ND PERM MOLAR



At 9- 10 yrs

At 10 – 11 yrs.

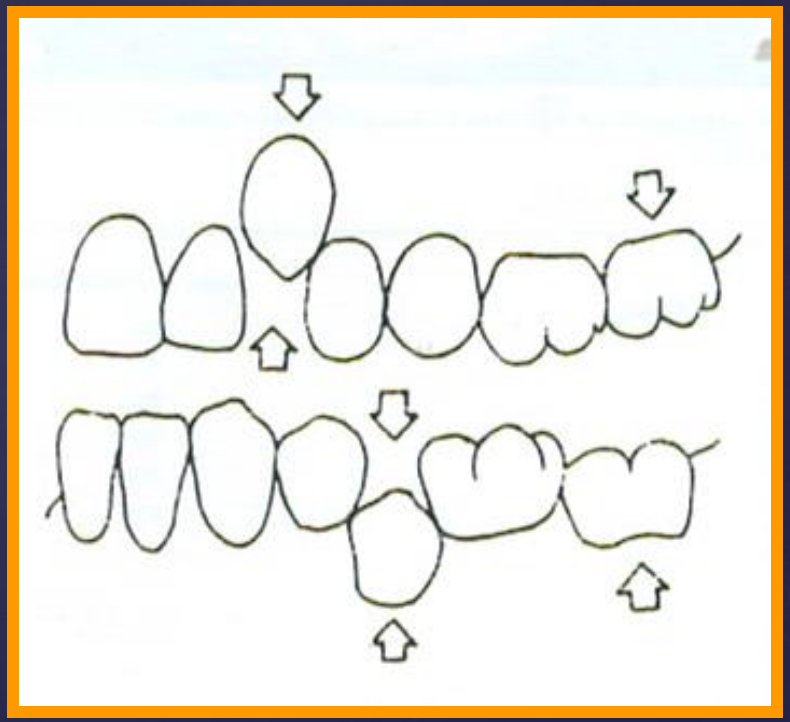
At 10 – 12 yrs.

At 11 – 12 yrs

At 12 – 13 yrs.

ERUPTION OF 2ND MOLAR

- After loss of all decid teeth
- Sometimes it erupts before E sheds→ crowding



TOTAL SAGITTAL ARCH LENGTH CHANGES

MOYERS ET AL , **UNIV OF MICHIGAN 1976**

	Complete primary dentition (3-5 yrs)	Permanent incisor eruption (6-8 yrs)	Permanent canine eruption (11-12 yrs)	Premolar eruption (10-12yrs)
Maxilla	↘ ↘	↑ ↗	– ↘	– ↘
mandible	↘ ↘	– ↗	– ↘	– ↘

CODE ↑ = rate of increase in dimension with slope >1

MOORREES 1959

↗ = rate of increase in dimension with slope 0<1

\- = no change

↓ = rate of decrease in dimension with slope 0< -1

↘ = rate of decrease in dimension with slope> -1

ARCH WIDTH CHANGES

	Complete primary dentition (3-5 yrs)		Permanent incisor eruption (6-8 yrs)		Permanent canine eruption (11-12 yrs)		Premolar eruption (10-12yrs)	
CANINE								
Maxilla	↗	–	↑	↗	↑	↑	↑	↑
mandible	↗	–	↑	↑	–	–	–	–
D or 4								
Maxilla	↗	↗	↗	↗	↑	↗	↑	↗
Mandible	–	↗	↗	↗	↑	↗	↑	↗
E or 5								
Maxilla	↑	↑	↗	↗	↗	↗	↗	↗
mandible	↗	↗	↗	↗	–	↑	↑	↑

MOYERS ET AL , UNIV OF MICHIGAN 1976

MOORREES 1959

THE PERMANENT DENTITION

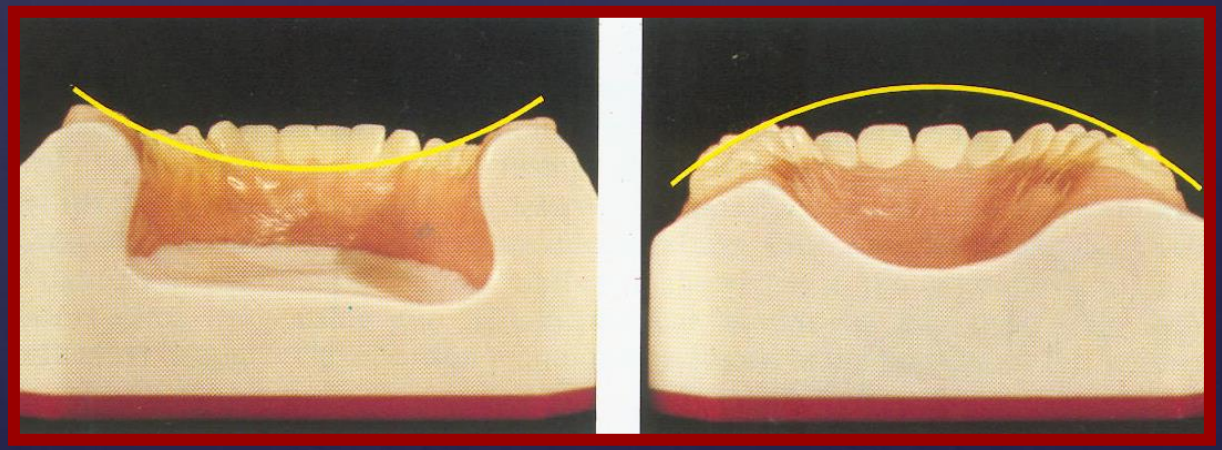
1 2 3 4 5 6 7
1 2 3 4 5 6 7

THE PERMANENT DENTITION

- At around 13 yr of age all permanent teeth (except 3rd molar) are erupted.

The curvatures of teeth and arches

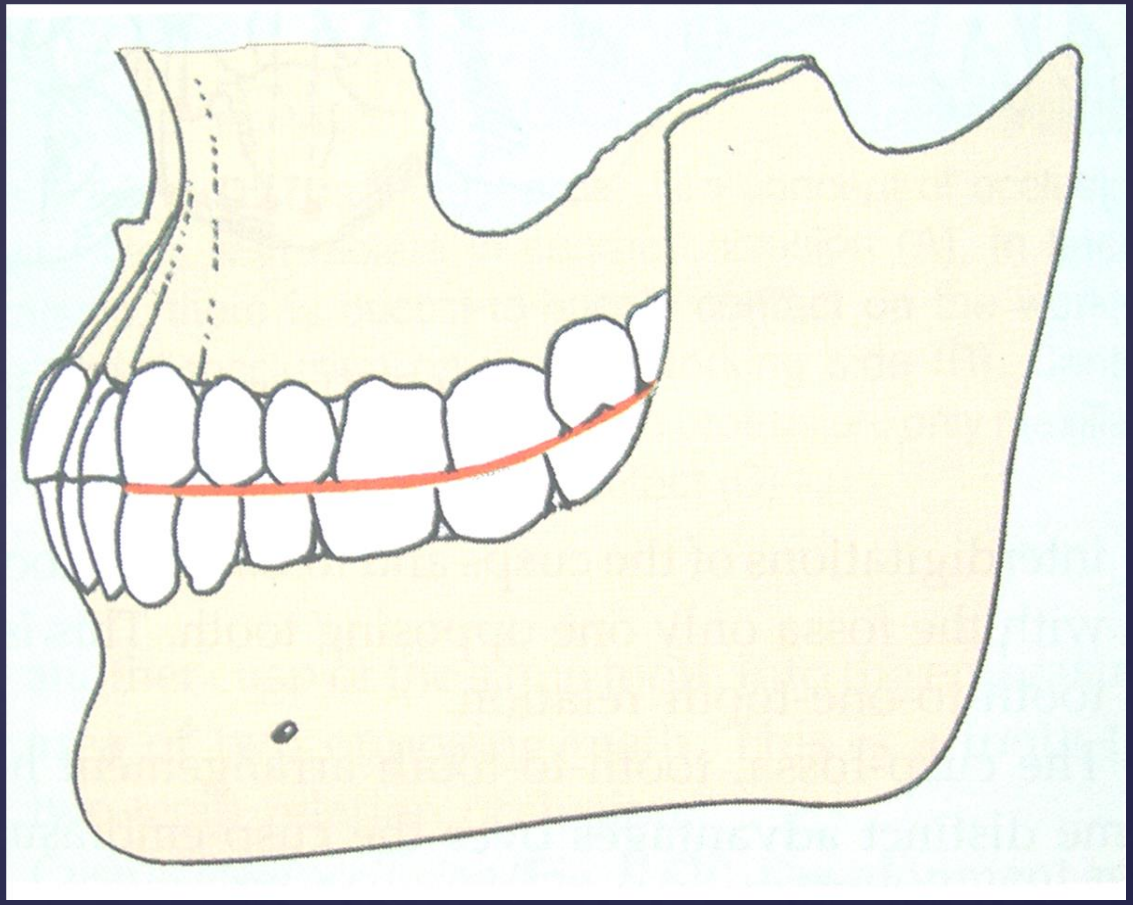
- *Curve of **Spee.***
- *Curve of **Wilson***
- *Curve of **Monson***



CURVE OF SPEE

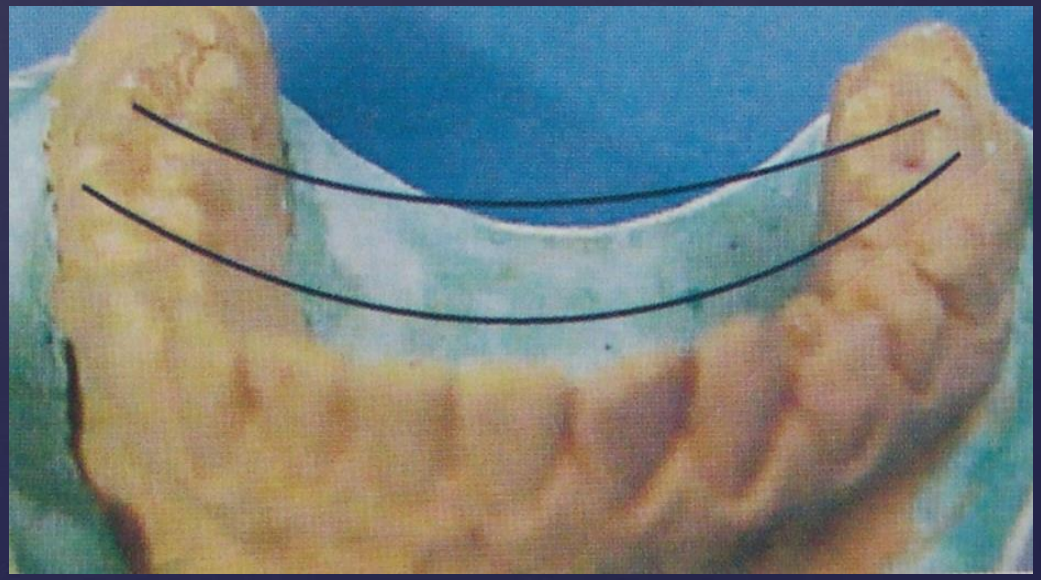
- Ferdinand graf spee (1890)
- "The anatomic curve established by the occlusal alignment of teeth, as projected onto the median plane beginning with the cusp tip of Mb canine and following the buccal cusp tips of PM & M teeth, continuing through the ant. border of ramus , ending in the condyle"

GPT-7



Curve of wilson

- George H. wilson
- Eponym for mediolateral curve



"In the theory that occlusion should be spherical, the curvature of the cusp as projected on the frontal plane expressed in both arches; the curve in the lower arch being concave and the one in the upper arch being convex. The curvature in the lower arch is affected by an equal lingual inclination of the right and left molars so that the tip points of the corresponding cross aligned cusps can be placed into the circumference of circle. The transverse cuspal curvature of the upper teeth is affected by the equal buccal inclination of their long axis"

CURVE OF MONSON

- Is obtained by extending the curve of spee & wilson to all cusps &incisal edges

- Dempster et al

ANDREWS SIX KEYS OF OCCLUSION

1. MOLAR RELATIONSHIP
2. CROWN ANGULATION
3. CROWN INCLINATION
4. ROTATIONS
5. TIGHT CONTACTS
6. OCCLUSAL PLANE

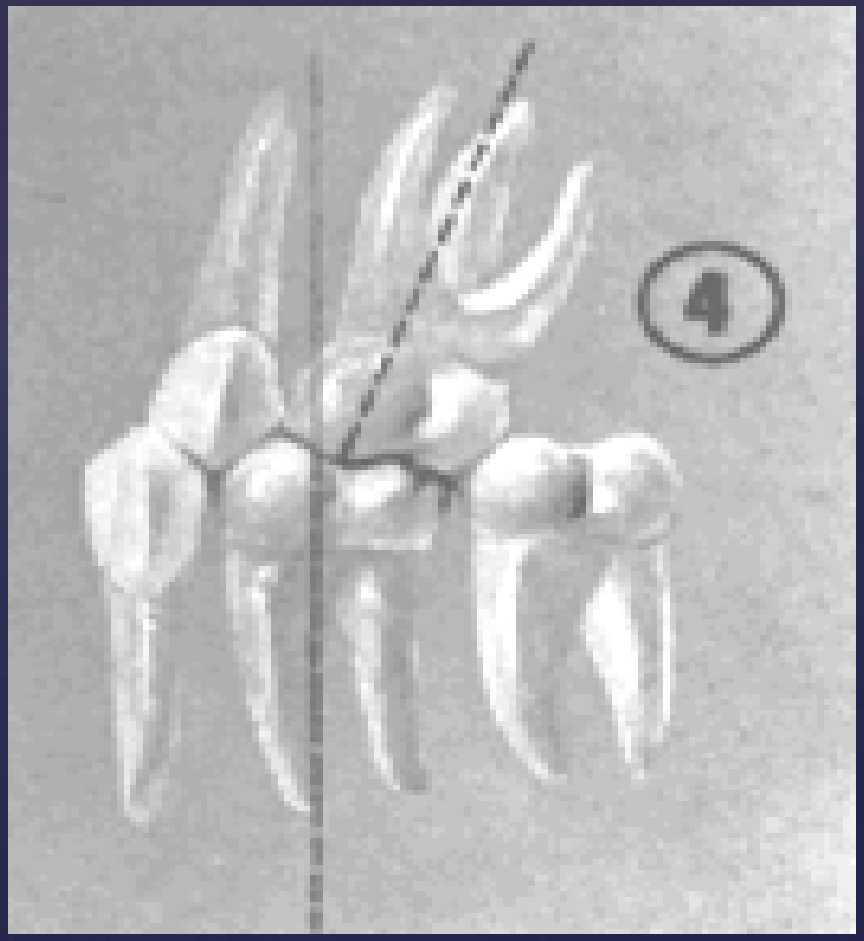
SIX KEYS TO NORMAL OCCLUSION

- LAWRENCE F.ANDREWS(1972)

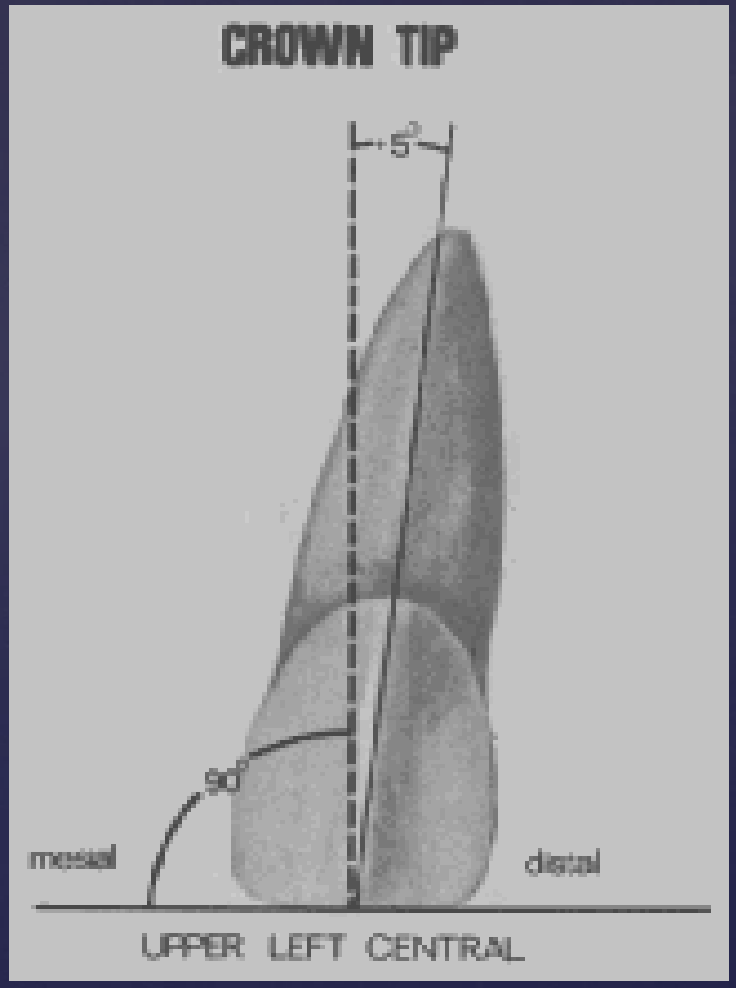
- **Criteria for selection**

1. Had never undergone ortho treatment
2. Were straight & pleasing in appearance
3. Had a bite which looked generally correct
4. In his judgement, would not benefit from ortho treatment

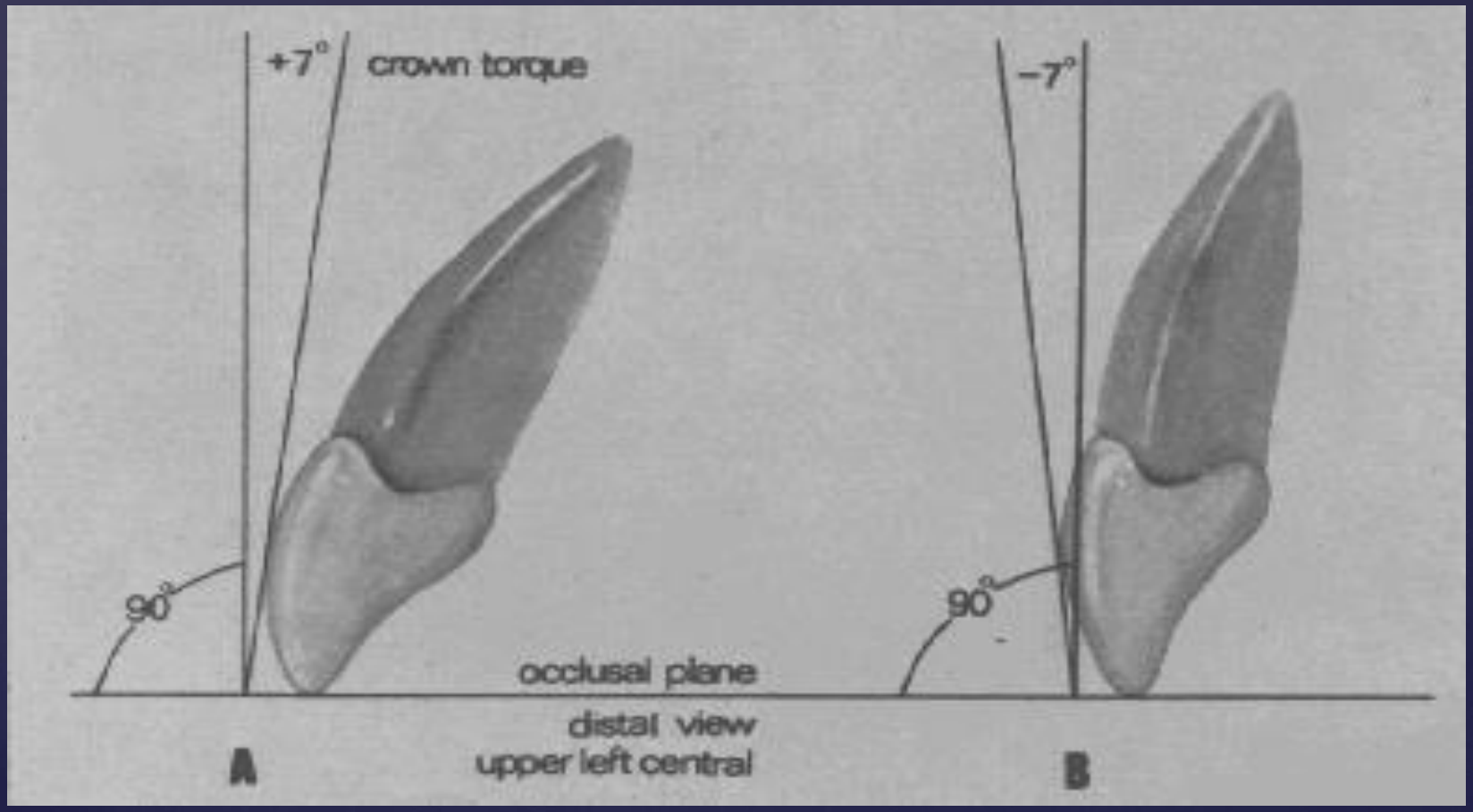
Molar relation



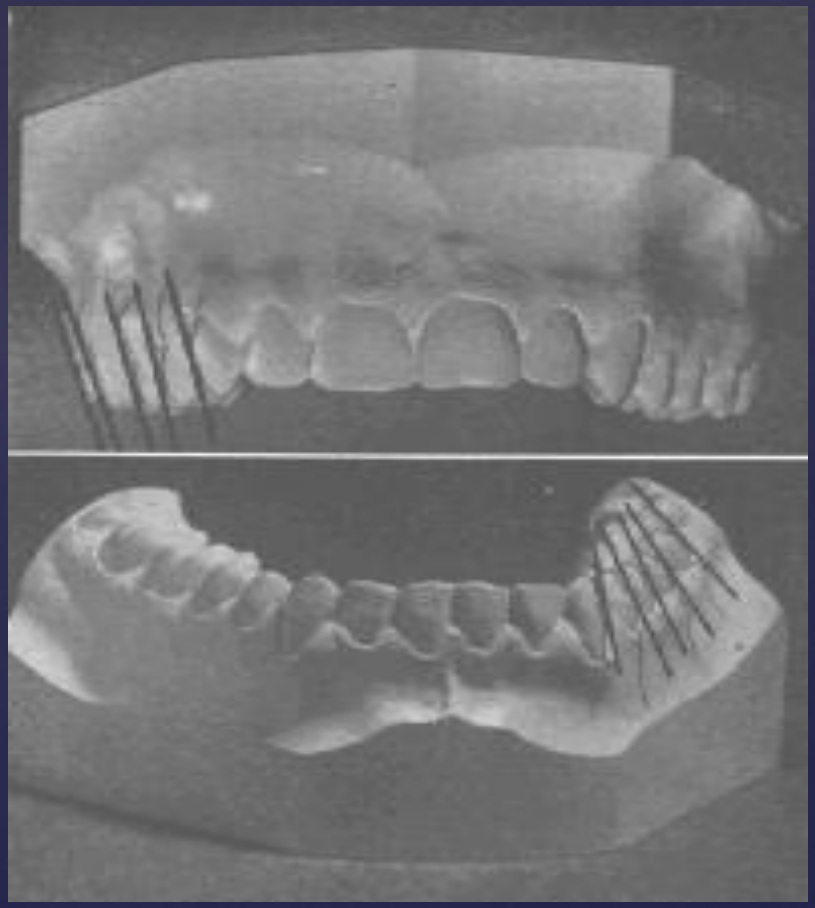
Crown angulation



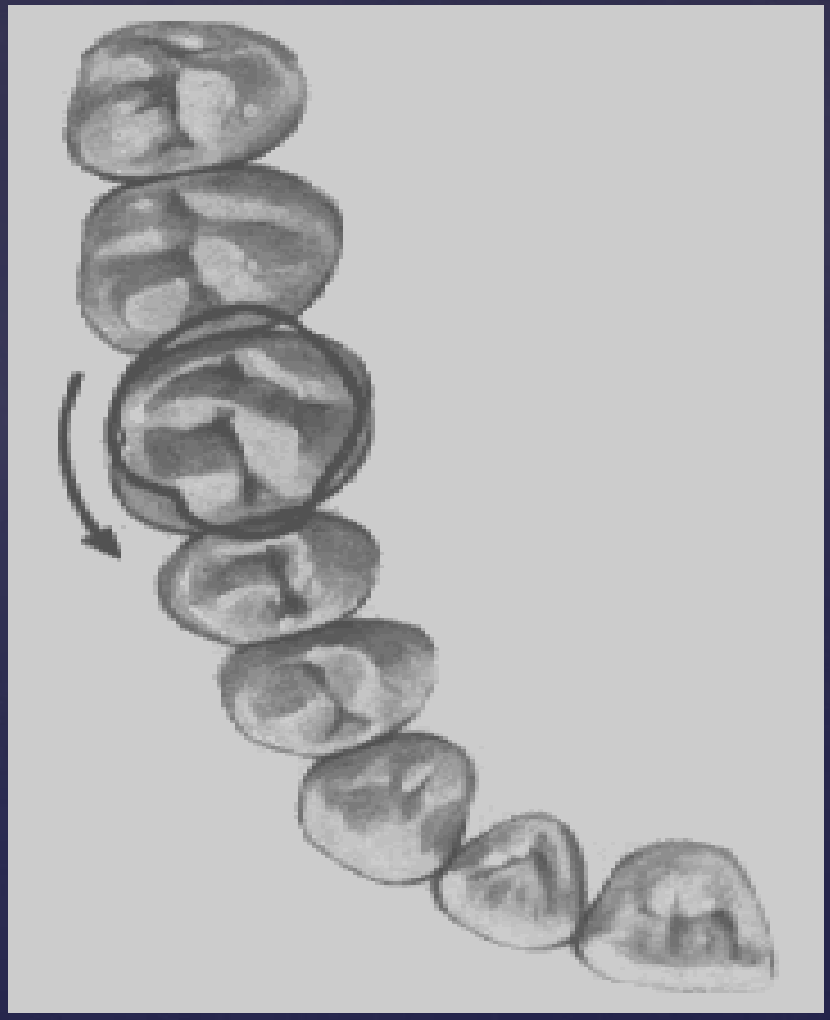
Crown inclination



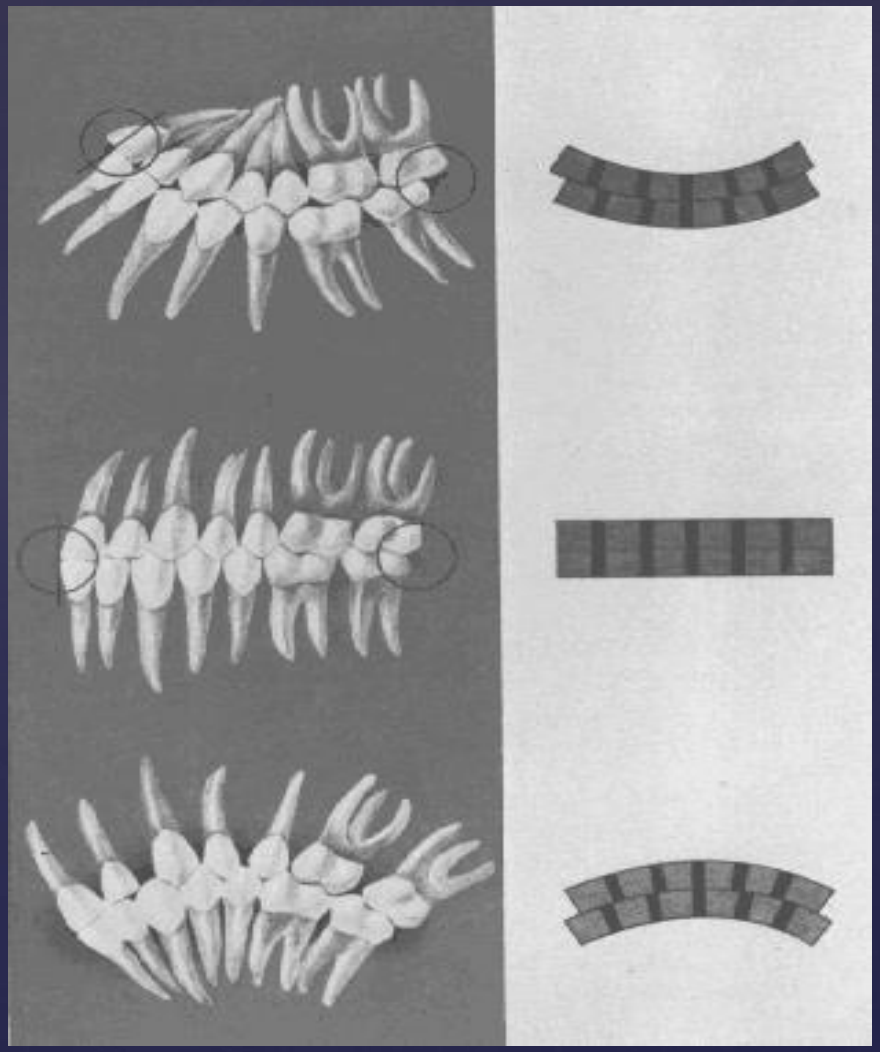
Crown inclination of posteriors



Absence of rotations



Occlusal plane




THANK YOU

CLASSIFICATION OF MALOCCLUSION

- FATHER OF MODERN ORTHODONTICS

- was the first to classify malocclusion. He based his classifications on the relative position of themaxillary first molar.

- According to Angle, the mesiobuccal cusp of the upper first molar should align with the buccal groove of the mandibular first molar.

Dr. Edward H. Angle (1855-1930)

CLASS I: NEUTROCCLUSION

Here the molar relationship of the occlusion is normal or as described for the maxillary first molar, but the other teeth have problems like spacing, crowding, over or under eruption, etc

CLASS II: DISTOCCLUSION (RETROGNATHISM, OVERJET) In this the mesiobuccal cusp rests in between the first mandibular molars and second premolars:

Class II Division 1: The molar relationships are like that of Class II and the anterior teeth are protruded.

Class II Division 2: The molar relationships are class II but the central are retroclined and the lateral teeth are seen overlapping the centrals.

CLASS III: MESIOCCLUSION (PROGNATHISM, NEGATIVE OVERJET)

The mesiobuccal cusp of the maxillary first molar lies posteriorly to the mesiobuccal groove of the mandibular first molar.

NATAL & NEONATAL TOOTH

SYNONYMS - Congenital teeth, fetal teeth, predeciduous teeth, and precocious dentition (Mayhall and Bodenhoff), dentitia praecox and dens connatalis

MASSLER & SAVARA

NATAL TEETH- more common

NEONATAL TEETH

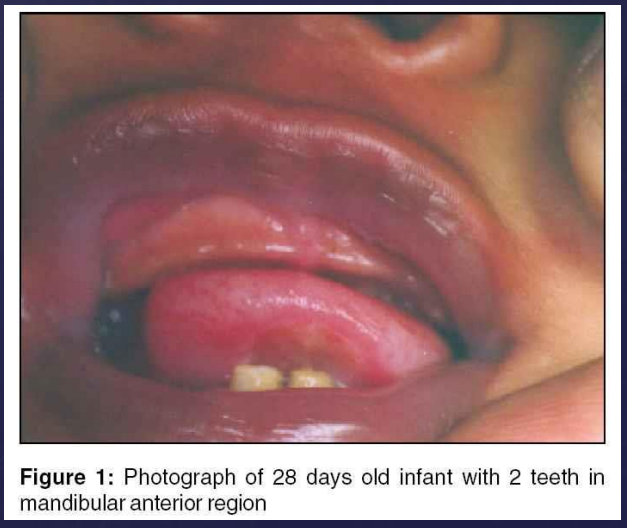


Figure 1: Photograph of 28 days old infant with 2 teeth in mandibular anterior region

Spoug and Feasby (1966)

A mature natal or neonatal tooth.

An immature natal or neonatal tooth

The appearance of each natal tooth into the oral cavity

- Shell-shaped crown poorly fixed to the alveolus by gingival tissue and absence of a root.
- Solid crown poorly fixed to the alveolus by gingival tissue and little or no root.
- Eruption of the incisal margin of the crown through the gingival tissues.
- Edema of gingival tissue with an unerupted but palpable tooth.

ETIOLOGY

- Endocrine disturbances
- Jasmin et al reported that the eruption of natal and neonatal teeth could be dependent on osteoblastic activity within the area of the tooth germ.
- Infection
- Nutritional deficiency
- Febrile status
- Superficial position of the tooth germ.
- Environmental factors

NATAL TEETH:CASE REPORT & REVIEW OF LITERATURE. **Yr** : 2009 | **Vol** : 13 | **Issue** : 1 | **Pg** : 41-46

PREVALENCE

Magitot,1876	1:6000
Putch,1876	1:30000
Ballantyme 1897	1:6000
Massler & Savara 1950	1:2000
Allwright 1958	1:3408
Mayhall 1967	1:1125
Kates 1984	1:3667
Leing 1986	1:3392
Almeida and Gomide, 1996	1:21.6

No prevalence found after 1996

Journal of Academy of Advanced Dental Research, Vol 2; Issue 2: May 2011

SYNDROMES

CHONDROECTODERMAL DYSPLASIA

RIGA FEDE SYNDROME

PIERRE-ROBIN SYNDROME

CLEFT LIP & PALATE

Infants are generally brought to the dental clinic due to one of the following reasons:

- Potential risk of the infant inhaling the tooth into his/her airway and lungs if the tooth becomes dislodged during nursing, due to its great mobility.
- Ulceration to ventral surface of tongue
- Difficulty in feeding or refusal to feed due to pain.
- Ulceration to the nipple of the mother and interference with breast feeding
- Myth of bad omen or devil's incarnation.
- To know whether the tooth is part of the normal dentition or is supernumerary tooth

CLINICAL FEATURES

- F > M
- Natal teeth > neonatal teeth [3:1]
- Mandibular region CI(85%), maxillary incisors (11%), mandibular cuspids or molars (3%), and then maxillary cuspids or molars (1%).
- more frequently bilateral.
- Most commonly, these teeth are precociously erupted from the normal complement of primary teeth (90%-99%).
- Only 1% to 10% of natal and neonatal teeth are supernumerary

- Small/ normal size, conical/ normal shape.
- immature appearance with enamel hypoplasia and small root formation.
- a brown-yellowish/whitish opaque color..
- Attached to a pad of soft tissue above the alveolar ridge, occasionally covered by mucosa
- *Bigeard et al.* revealed that the dimensions of the crown of these teeth are smaller than those for the primary teeth under normal conditions.

NATAL TEETH – REVIEW OF LITERATURE
2009: 13(1): 41-46

DIAGNOSIS

- complete history,
- physical examination of the infant,
- clinical and radiographic findings to rule out them being part of normal dentition or supernumerary

TREATMENT

- Massler and Savara recommend "leaving them alone, unless they are causing difficulty to the infant and mother".

- However some recommend that they be removed as the tooth can cut or amputate the tip of the tongue.

Maury Massler; Bhim Sen Savara The Journal of pediatrics, 36 (3): 349-359

If extraction is carried out, it is necessary to ensure that the underlying dental papilla and Hertwigs epithelial root sheath are removed by gentle curettage as root development can continue if these structures are left.

Prophylactic administration of vitamin K (0.5-1.0mg, i.m.)

The ulcerations caused by the natal teeth could be managed by roundening of the incisal edges of the teeth.

NATAL TEETH – REVIEW OF LITERATURE
2009: 13(1): 41-46

CASE REPORT

A 20 old baby girl was referred for evaluation of an ulcerated area on the lip. The mother complained of child exhibiting pain during suckling and would not nurse.

O/E

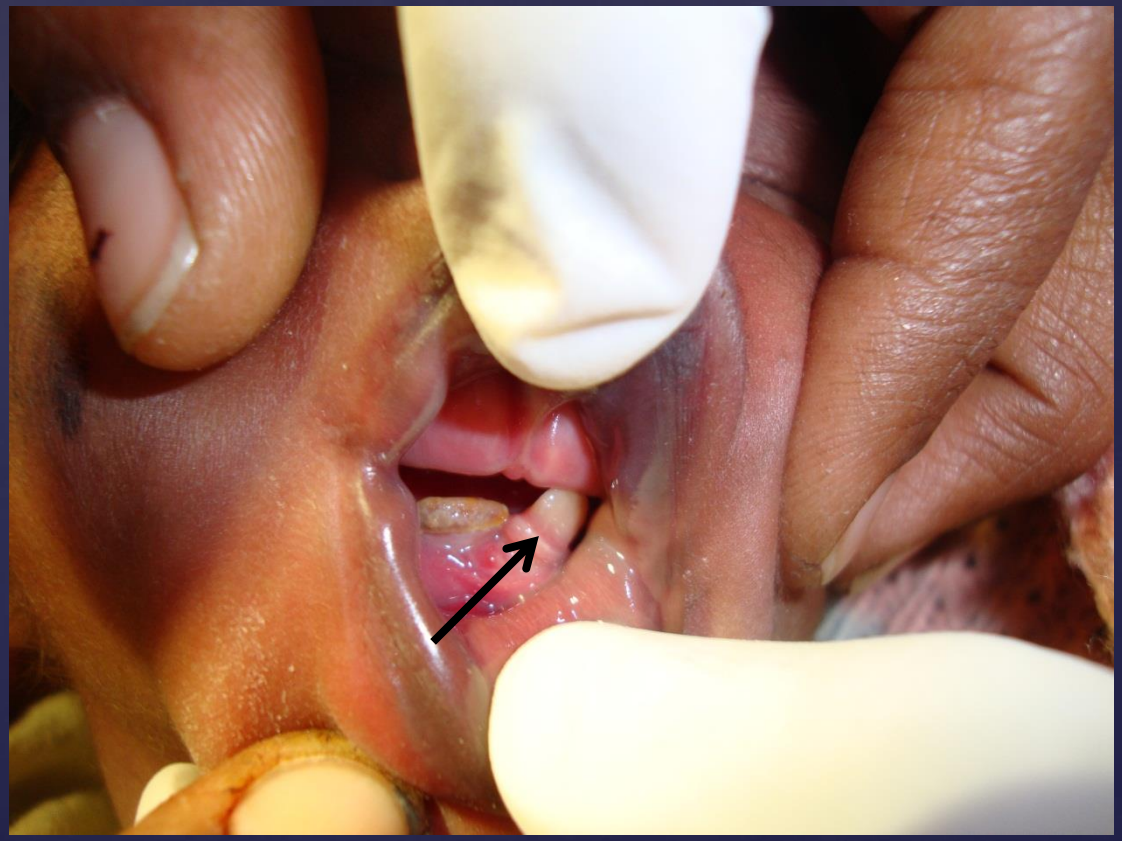
crown in the mandibular anterior region, whitish in color and exhibiting no mobility. The lip showed 5 mm x 5 mm ulceration. palpation, area elicited a pain response from the patient. neonatal tooth, probably, a primary incisor, with well formed.

Based on clinical findings diagnosis of "RigaFede" disease was made. In this case, extraction of teeth applied orabase..At the follow-up, we confirmed that the lesion was resolved and infant was feeding normally.

Journal of Academy of Advanced Dental Research, Vol 2; Issue 2: May 2011

CASE REPORT

A case was reported to the dept of pedodontics Krishnadevaraya College of Dental Science



RETAINED DECIDUOUS TEETH

- Abnormal erup path of perm teeth e.g. lingual erup of incisors on over retained decid incisors
- If persists too long → entire obstn of erup of successors
- If R/F confirm the presence of successors retained decid teeth may be extracted immediately

ECTOPIC ERUPTION OF MAXILLARY 1ST MOLAR

- It can be defined as an abnormal eruption of the permanent molar, which is placed too far mesial and also causing premature, atypical resorption of primary molar in an abnormal fashion.
- prevalence -2 to 6%.
- **cleft palate** patients, a higher prevalence of 25%.
- BOYS > GIRLS

PULVER –abnormal large size of the maxillary primary 1ST &2ND molars,
posterior position of the maxillae in relation to the cranial base,
abnormal angulation of the path of eruption of the PMFMs
smaller maxillae
delayed calcification
Heredity

2 types of PMFM ectopic eruption –

- reversible ("jump"type)
- irreversible ("hold" type).

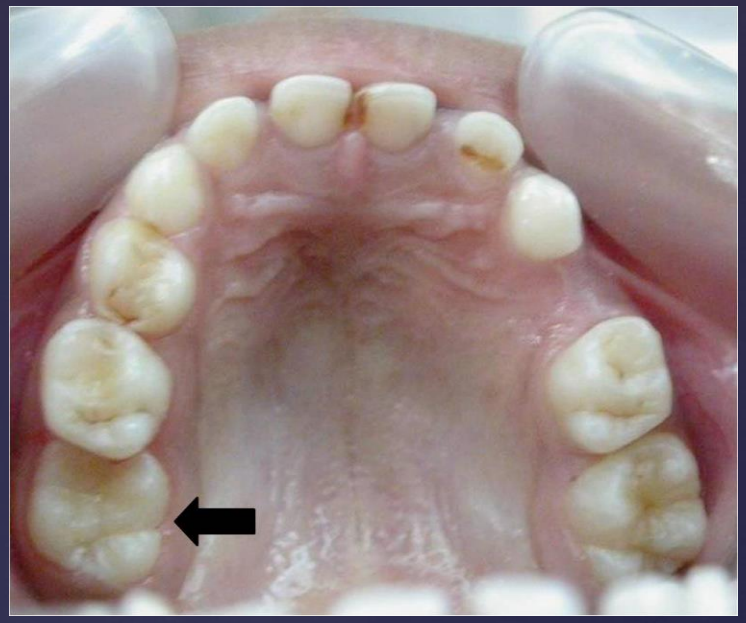
- If the permanent molar spontaneously corrects itself and erupts to occlusion, the reversible type is present.

- In the irreversible type, the permanent molar remains in the locked position until treatment is provided or premature exfoliation of the primary 2ND molar occurs spontaneously

Interceptive orthodontic correction of ectopically erupting permanent maxillary first molar. A case report. VIRTUAL J ORTHO 2010 1-13

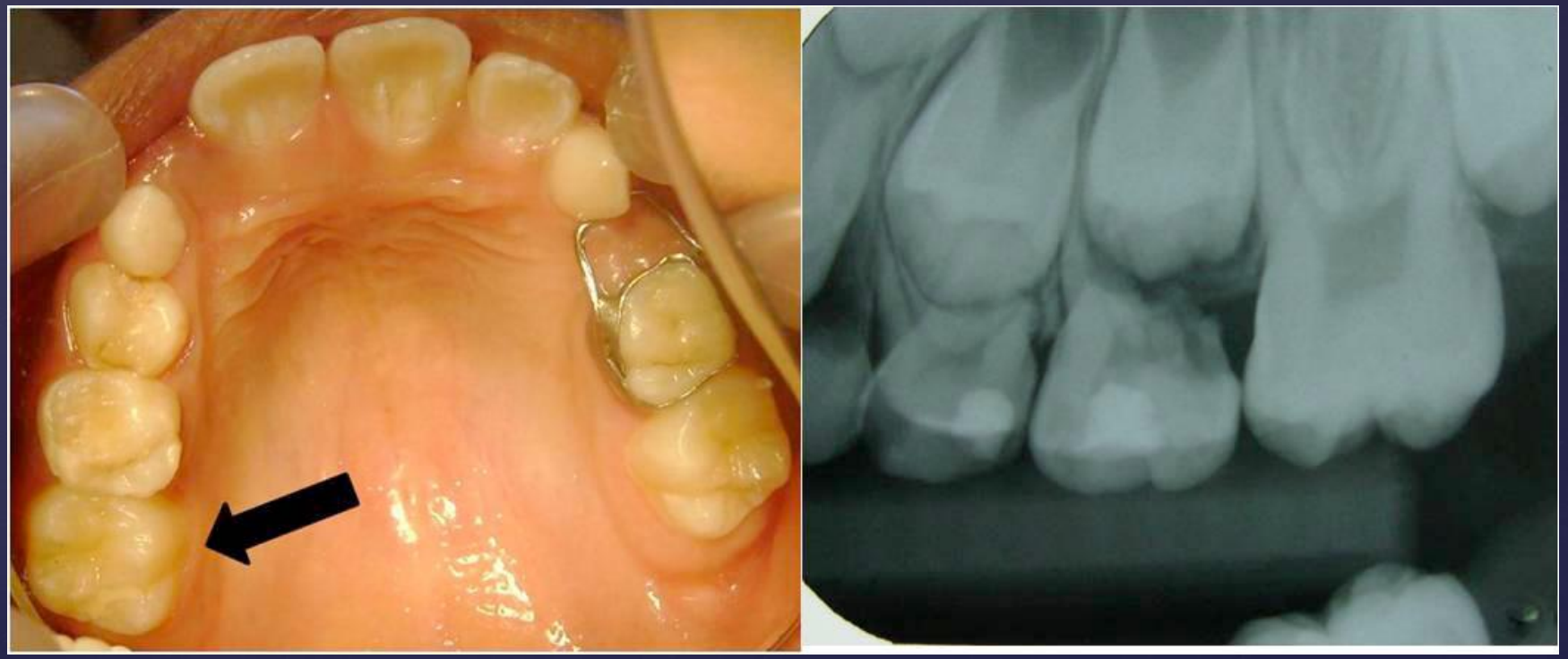
HUMPHREYS APPLIANCE

- 1962
- It is a fixed appliance consisting of band on second primary molar with soldered ‘S’ shaped wire and its free end engaging in occlusal pit of the first permanent molar.



Activation done every 2 weeks with bird beak plier by opening the S shape

After 3 months



Interceptive orthodontic correction of ectopically erupting permanent maxillary first molar. A case report. VIRTUAL J ORTHO 2010 1-13

HALTERMAN'S APPLIANCE

- Single band on the deciduous molar and a Halterman wire.
- The Halterman wire is soldered to the buccal of the band and ends with an elastic hook that is positioned posterior to the distal of the tipped molar.
- To use the appliance you will direct bond an orthodontic button to the occlusal of the tipped molar.
- The button should be positioned as mesial as possible.
- The chain elastic is then shortened gradually over a period of time to exert the force that is used to upright the molar

MANAGEMENT OF SPACE PROBLEMS IN PRIMARY & PERMANENT DENTITION

CROWDING

Simple crowding - "disharmony between the size of the teeth and the space available in the alveolus with no skeletal, muscular, or occlusal functional features.

-associated with a Class I malocclusion, Class II malocclusions with maxillary dental protrusion and a normal skeletal pattern.

Complex crowding "crowding caused by skeletal imbalance, abnormallip and tongue functioning, and/or occlusal dysfunction as well as disharmony between the sizes of the teeth and the available space.

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SIGNS OF A TRUE HEREDITARY TOOTH-SIZE/JAW-SIZE DISCREPANCY.

- Maxillary mandibular alveolodental protrusion without interproximal spacing
- Crowded mandibular incisor teeth
- A midline displacement of the permanent mandibular incisors, resulting in the premature exfoliation of the primary canine on the crowded side
- A midline displacement of the permanent mandibular incisors with the lateral incisors on the crowded side blocked out, usually lingually but occasionally labially
- Bilateral primary mandibular canine exfoliation, resulting in an uprighting of the permanent mandibular incisors; this, in turn, increases the overjet, the overbite or both
- Ectopic eruption of the permanent maxillary first molars, which indicates a lack of development in the tuberosity area and results in the premature exfoliation of the primary second molars

JADA, Vol. 130, September 1999 :1330-1339

ENVIRONMENTAL FACTORS CAUSING CROWDING.

- An aberration in the eruptive pattern and sequence of the permanent teeth
- Transposition of teeth
- Uneven resorption of primary teeth
- Premature loss of primary teeth, resulting in the reduction of arch length due to subsequent drifting of permanent teeth
- Reduction of arch length due to interproximal caries in the primary teeth
- Prolonged retention of primary teeth

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DIAGNOSIS OF CROWDING PROBLEMS

TANAKA AND JOHNSTON ANALYSIS.

- predictive technique because it has reasonable accuracy, does not require radiographs, requires no prediction tables and predicts the sizes of the unerupted permanent canines and premolars in maxillary and mandibular teeth.

- 1/2of the mesiodistal widths of the four lower incisors and adding 10.5 mm,
  =**estimated width of the mand canines and premolars in 1 quadrant.**

- 1/2mesiodistal width of the four lower incisors plus 11.0 mm=**estimated width of the maxillary canine and premolar in one quadrant.**

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GRADING

- mild crowding (space shortage of < 2 mm),
- moderate crowding(space shortage of 2 -4 mm),
- severe crowding (space shortage of 5 -9 mm)
- extremely severe crowding (>10 mm).

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MANAGEMENT OF MILD CROWDING

1] SPACE MAINTENANCE.

- Early loss of primary teeth is most commonly attributable to caries.
- Early loss of a primary incisor as a result of caries or trauma usually results in very little change in the dentition.

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2] PREMATURE LOSS OF PRIMARY CANINES.

- Premature loss of primary canines in the mandibular arch
- Is a result of large succedaneous permanent incisors and ectopic eruption.
- A lateral shift of the incisor teeth usually accompanies the loss of the primary canine, resulting in a midline discrepancy.
- A fixed lingual holding arch

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3] EARLY LOSS OF PRIMARY MOLARS.

- Distal drifting of the primary canine if the loss occurs during the active eruption of the permanent lateral incisors.
- Early loss of a primary second molar, especially in the maxillary arch, results in arch length reduction due to mesial migration of permanent molars.
- If the first permanent molar has fully erupted, then a band and loop can be placed on either the first permanent molar or on the primary first molar
- A distal shoe appliance should be used if the primary second molar is lost before the permanent first molar erupts

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MANAGEMENT OFMODERATE CROWDING

the result of an inherent lack of space or a loss of space.

In the maxillary arch, early space loss usually is manifested as mesial tipping or mesial-lingual rotation of the permanent first molars.

Space can be regained or expanded by distal tipping or bodily distalization of the permanent first molars.

Regaining space is easier in the maxillary arch because of the increased anchorage afforded by the palate.

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- Space can be regained or expanded in the mandibular arch using a **LIP BUMPER**
- This appliance functions by tipping the lower molars distally while at the same time removing lip pressure from the lower incisors.
- It provides forward movement of the lower incisors due to increased tongue pressure.
- Unilateral space loss may be corrected by using a removable lingual holding arch.

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MANAGEMENT OFSEVERE CROWDING

- expansion of maxillary and mandibular arches or extraction of primary and, ultimately, permanent teeth may be the only possible method of reducing the discrepancy between tooth mass and arch length.
- Maxillary expansion could be orthodontic or orthopedic in nature.
- every millimeter of transpalatal width increase inthe premolar region, created with the use of a rapid palatal expansion appliance, produces a 0.7-mm increase in available arch perimeter.
- possibility of expansion in the mandibular arch also is limited because of the lack of a midline suture and the need for surgical intervention.

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MANAGEMENT OF EXTREMELY SEVERE CROWDING

Serial extraction

The timing of extractions should be based on the stage of development of the erupting permanent tooth and should coincide with its phase of active eruption.

The ideal guidelines for serial extractions

- absence of skeletal discrepancies;
- large (greater than 10 mm) arch-length deficiency;
- normal overbite;
- Class I malocclusion;
- commitment on the practitioner's

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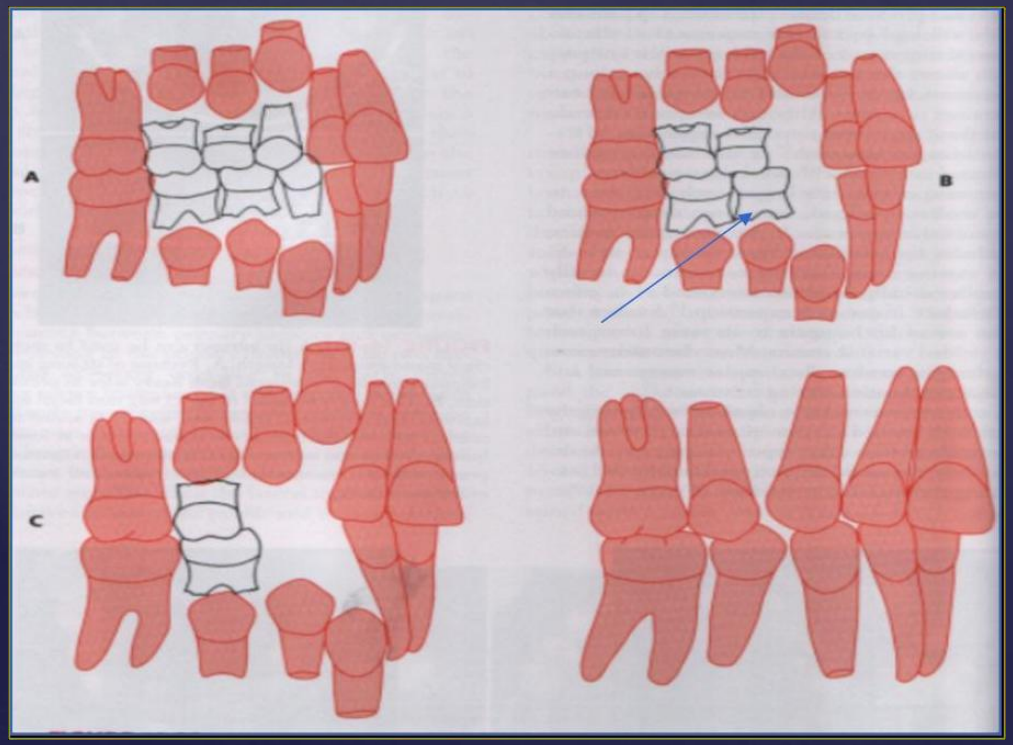
- removal of the primary canines as the permanent lateral incisors erupt.
- Then, the primary first molars are extracted to speed the eruption of the first premolars.
- Next, the permanent first premolars are removed to allow the permanent canines to erupt in the first premolar space.



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MANAGEMENT OF MANDIBULAR "LI & C" ECTOPIA

- Both clinical and radiographic interceptive orthodontic investigations should focus on the mandibular canine around the dental age of 9 years, as interceptive treatment options may be considered at this stage of development

- AETIOLOGY
  - malposition of the permanent lateral incisors;
  - spontaneous early loss of the primary canines;
  - abnormal or unfavourable sequence of eruption of the canines and premolars in the mandible;
  - anomalies associated with the eruption process.

SADJ VOL 66 NO 10 pg 462-467

MALPOSITION OF LATERAL INCISOR

- The permanent mandibular lateral incisor is the most frequently displaced mandibular tooth'.

- to assess the space needs of the patient.

- In cases with minor lower incisor crowding, a lower lingual "6 to 6" arch could be placed in order to maintain the leeway space, which could then be utilised to align the incisors and canine

- More severe cases of crowding should be referred for comprehensive orthodontic treatment.

SADJ VOL 66 NO 10 pg 462-467

SPONTANEOUS EARLY LOSS OF PRIMARY CANINE

- This occurs because the erupting mandibular permanent lateral incisors, crowded out of position, exert pressure on the roots of the primary canines, resulting in premature resorption.

- unilaterally or bilaterally in the mandible
- Unilateral spontaneous early loss of the primary canine, if left untreated, LEADS TO…

- If treatment is instituted shortly after the loss, the remaining lower primary canine may be removed, followed by the placement of a lower lingual arch.
- IF TREAMENT DONE AFTER A GAP- fixed utility arch

SADJ VOL 66 NO 10 pg 462-467

- Bilateral spontaneous early loss of the primary canines leads to a bilateral loss of arch perimeter and a deepening of the bite.

- In this situation, the incisor imbrication is often resolved by the action of the muscles of the lip and tongue which force the lateral incisors distally into the spaces of the primary canine as the incisors tip lingually

SADJ VOL 66 NO 10 pg 462-467

THE SEQUENCE OF ERUPTION OF THE CANINES AND PREMOLARS IN THE MANDIBLE

- Diagnosed radiographically.
- Generally, the tooth with the most root development will be the first to erupt.
- lingual arch
- This would allow the teeth to be aligned once they have erupted, irrespective of the sequence of eruption.

SADJ VOL 66 NO 10 pg 462-467

CONCLUSION

- *Occlusion , good or bad, is the result of an intricate and complicated synthesis of genetic and environmental relationships at work throughout the early developmental stages of childhood and young adulthood .*

- *Understanding the concepts has thus got far reaching implications in diagnosis, treatment planning and prognosis of malocclusion.*

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THANK YOU