DEVELOPMENT OF OCCLUSION

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TERM - DEFINITION

- Term of occlusion → both statistic and dynamic aspect
- Statistic refers to form, alignment and articulation of teeth within & between dental arches and relationship of teeth to their supporting structures
- Occlusion defined also as the contact relationship of the teeth in function or parafunction

- **Ideal Occlusion:**

  Pre-conceived theoretical concept of occlusal structural & fuctional relationship that include idealized principles and characteristics that an occlusion should be

- **Normal occlusion:**

  Class I relationship in centric occlusion of maxillary and manibular 1st molars

- **Physiologic Occlusion:**

  Occlusion that deviates in one or more ways from ideal yet it is well adapted to that particular environment is esthetic & shows no pathologic manifestations

- **Functional Occlusion:**

  An arrangement of teeth which will provide highest efficiency during excursive movements of mandible which is necessary during function

- **Balance Occlusion:**

  An occlusion which balance & equal contacs are maintained throughout entire arch during all excursions of mandible

PERIODS OF OCCLUSAL DEVELOPMENT

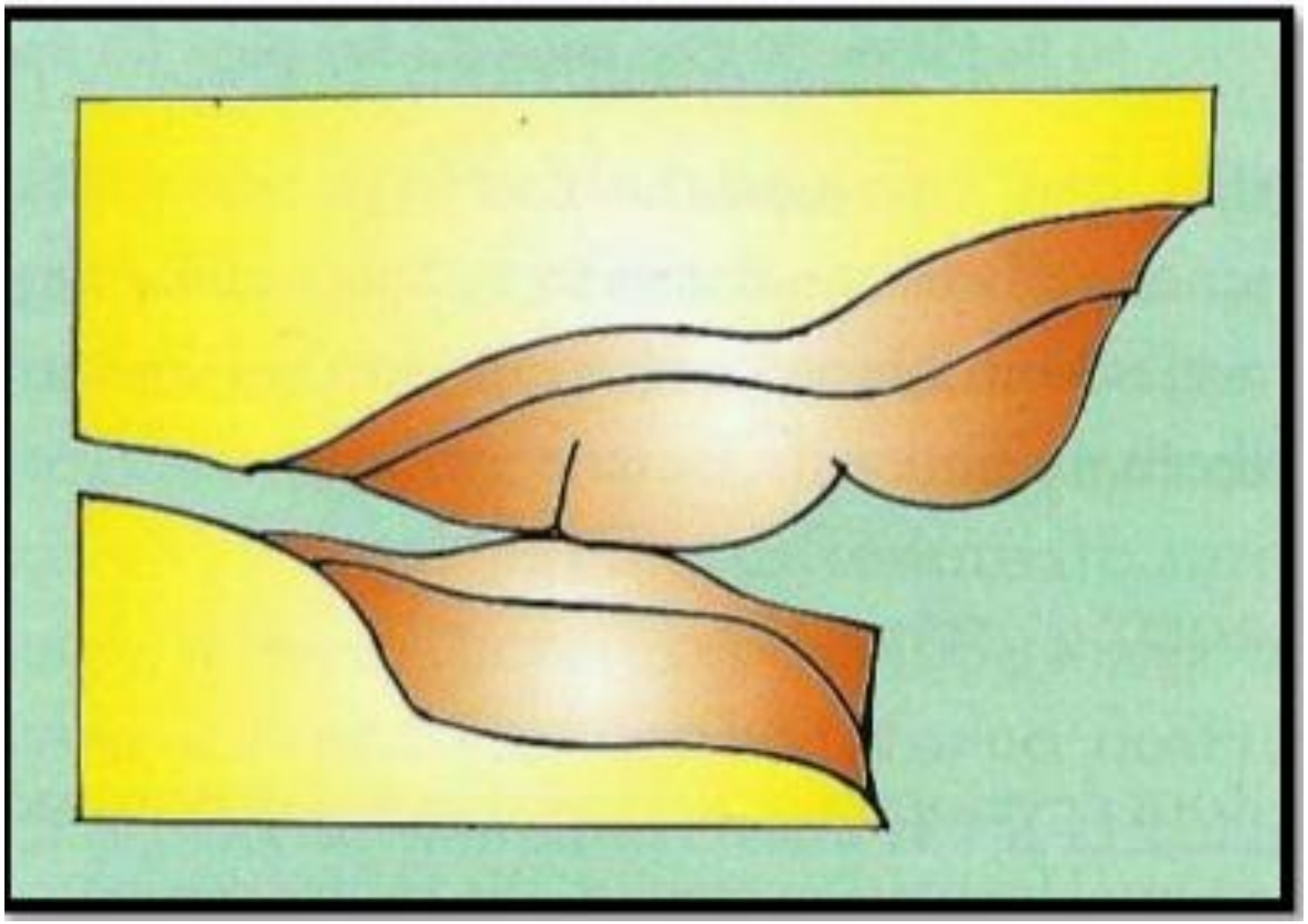
- Pre-Dental Period
- Deciduous Dentition Period
- Mixed Dentition Period
- Permanent Dentition Period

Pre-Dental Period

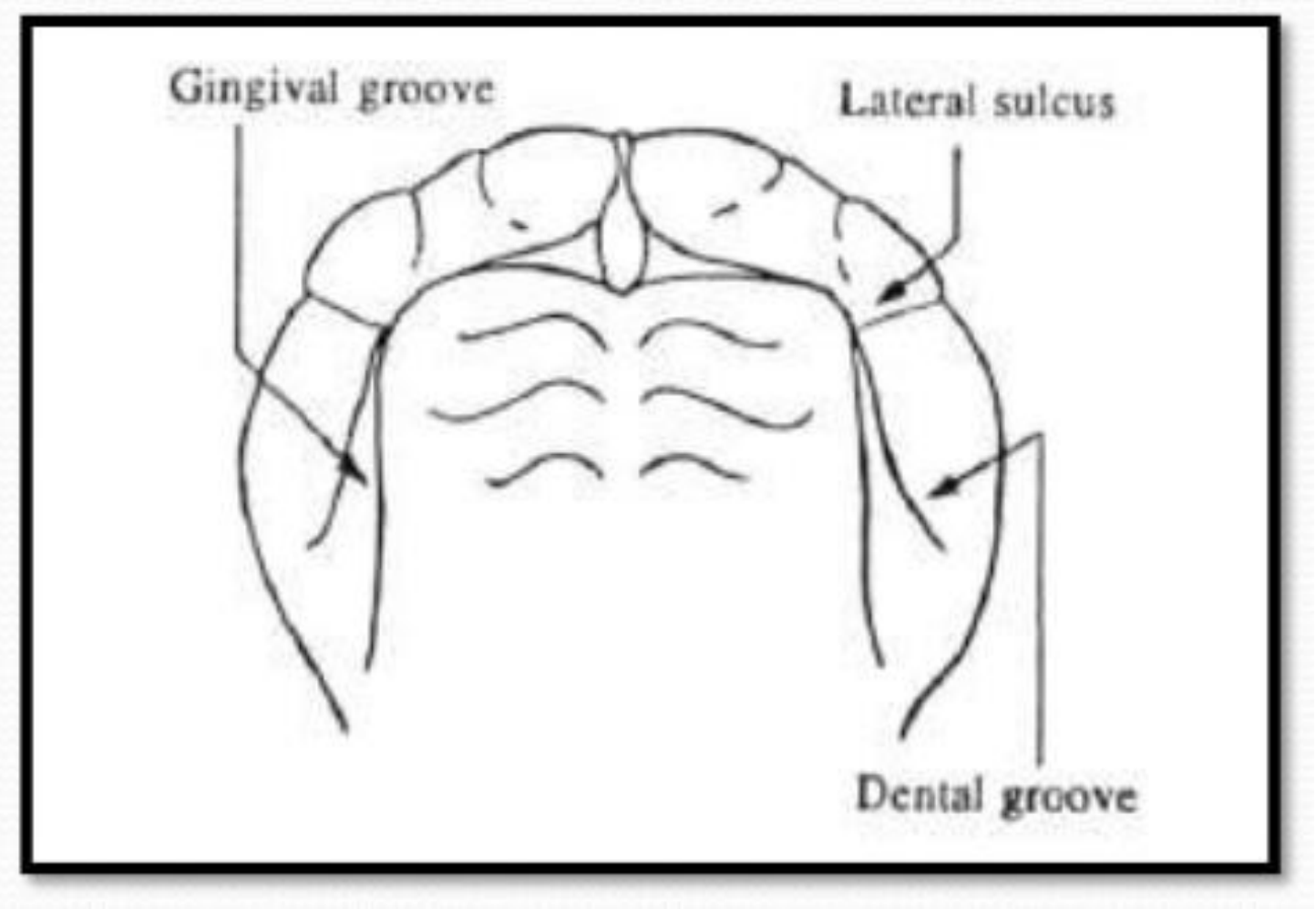
- The period after birth during the neonatal doesn’t have teeth
- Last for 6 months

Gum Pads

- Alveolar processes at the time of birth
- Pink, firm and are covered by a dense layer fibrous periosteum



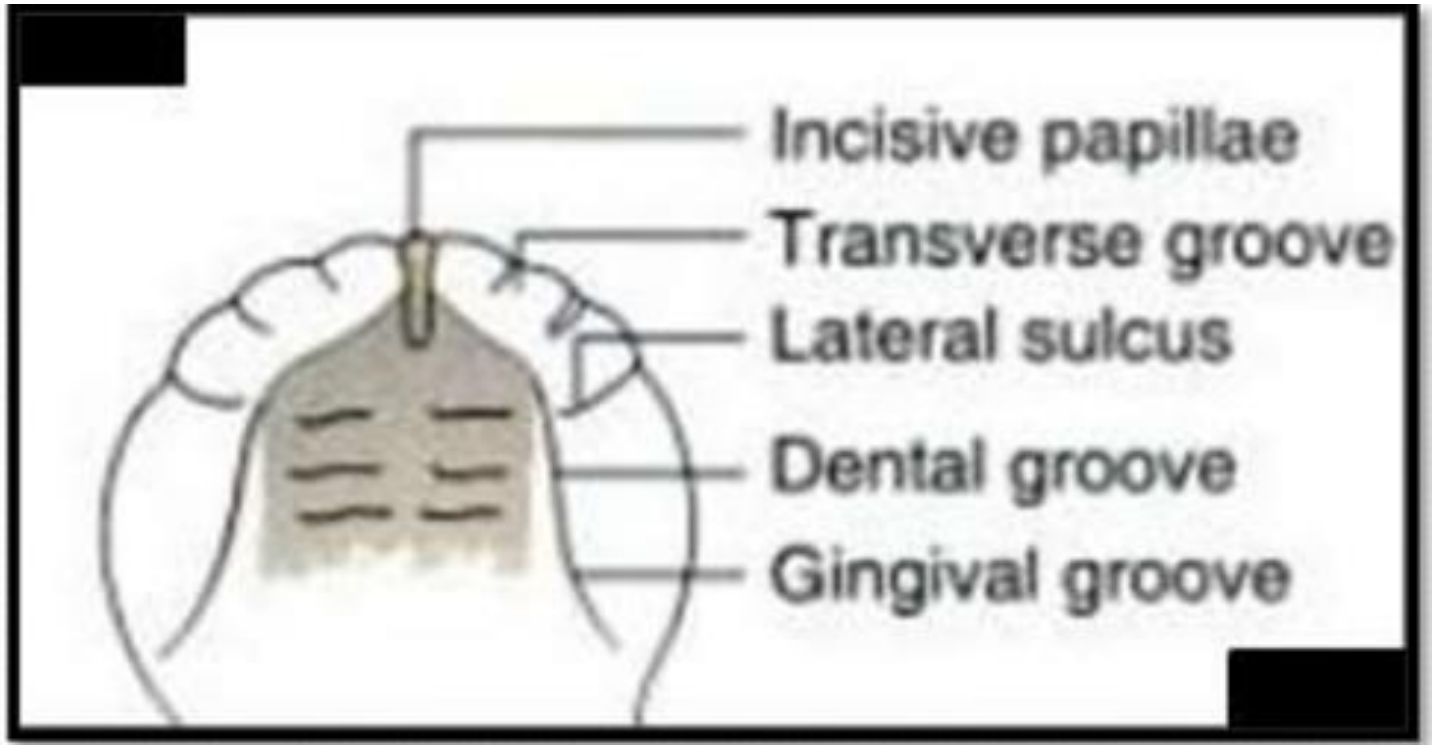
- Horse-shoe shaped and developed in two parts
- Labio-buccal portion & lingual portion
- Two portions of gum pads are separated by a dental groove



- Gum pads are divided into 10 segments by certain grooves called transverse grooves

- Each of these segment consists of developing deciduous tooth suc

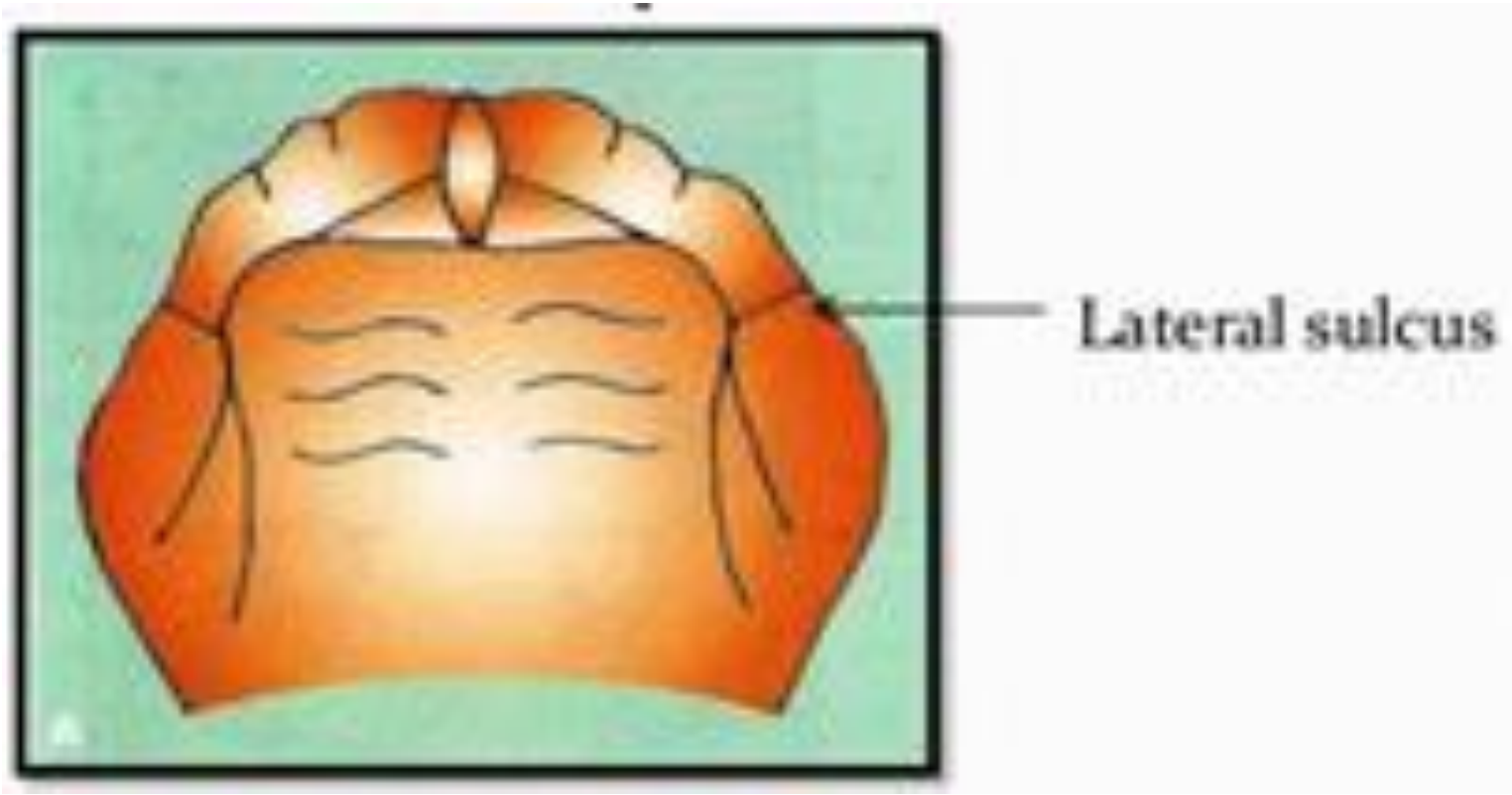
- Gingival groove separated gum pads from the palate & floor of the mouth



The transverse groove between the canine & first deciduous molar segment is called the lateral sulcus

Lateral sulci are useful in judging the inter-arch relationship at a very early stage

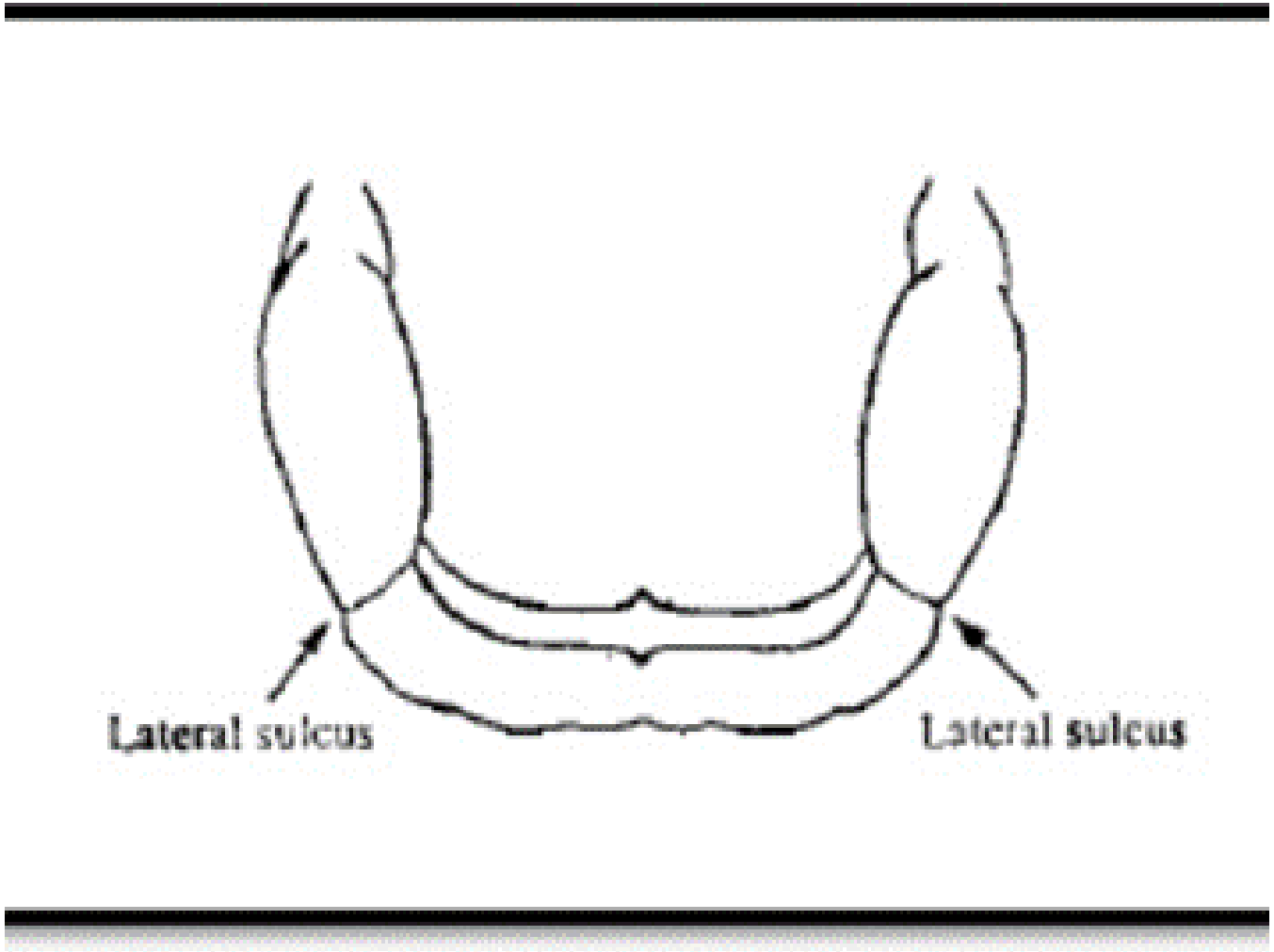
The lateral sulcus of the mandibular arch is normally more distal to that the maxillary arch



The upper & lower gum pads are almost similar to each other

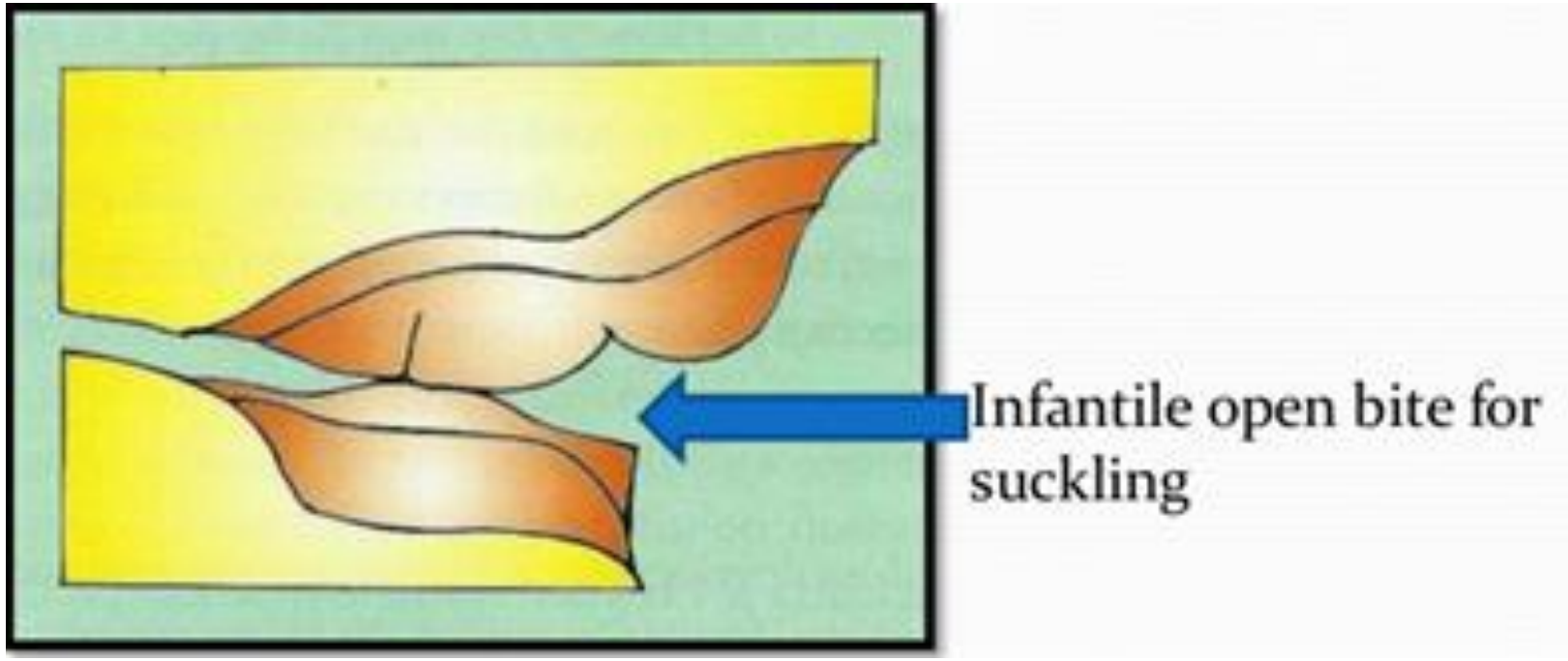
The upper one is both wider as well as longer the mandibular

When upper and lower gum pads are approximated there is a complete overjet all around



Contact occurs between upper & lower gum pads in first molar region and space exists between them in the anterior region

This infantile open bite is considered normal and it helps in sucking



Status of Dentition

- Neonate is without teeth for about 6 months of life
- All birth gum pads are not sufficiently wide to accommodate the developing of incisors which are crowded in the crypts

- Teeth that are present at the time of birth are called natal teeth

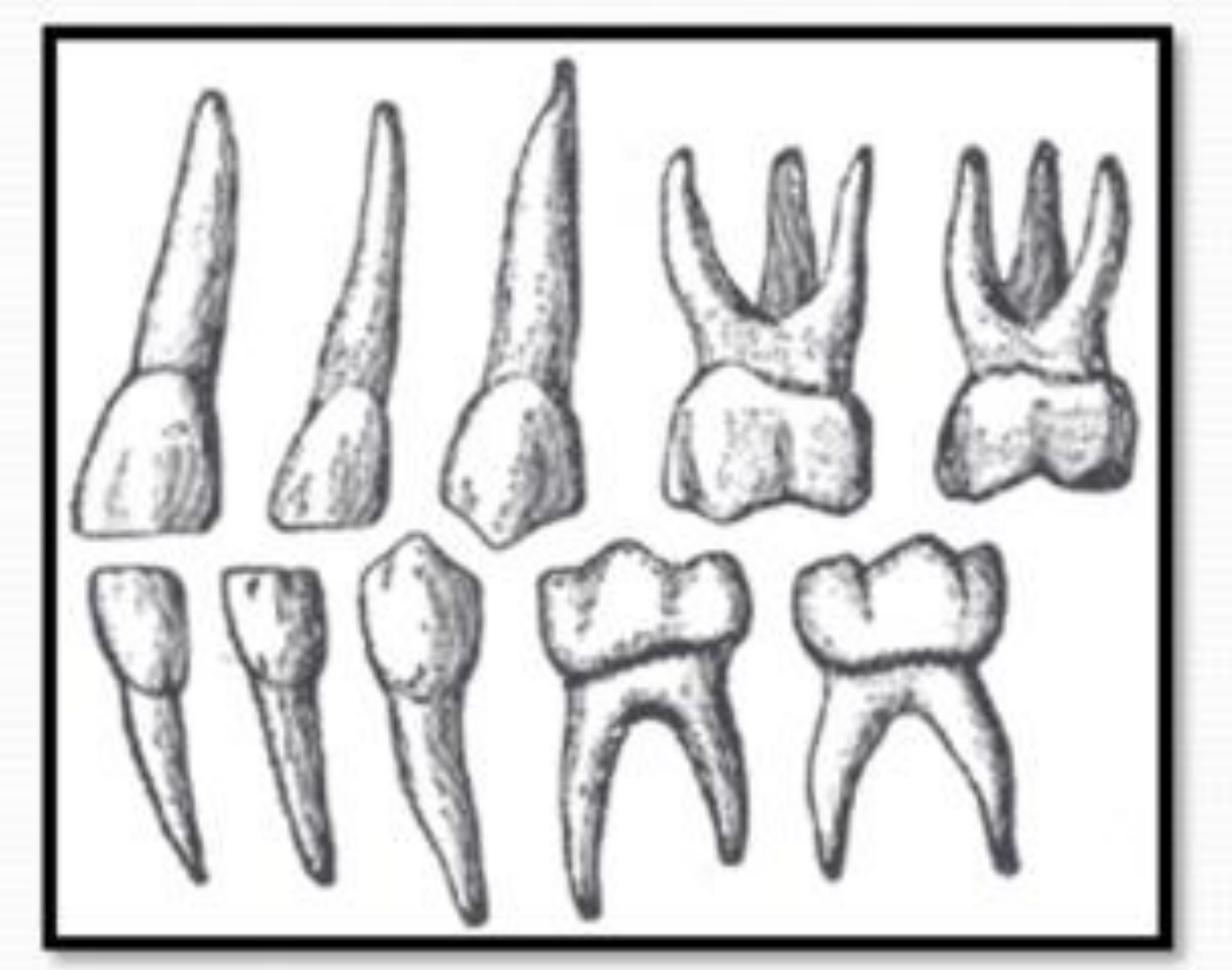
- Teeth that erupt during the first month of age are called neonatal teeth

- The natal and neonatal teeth are mostly located in the mandibular incisor region

DECIDUOUS DENTITION PERIOD

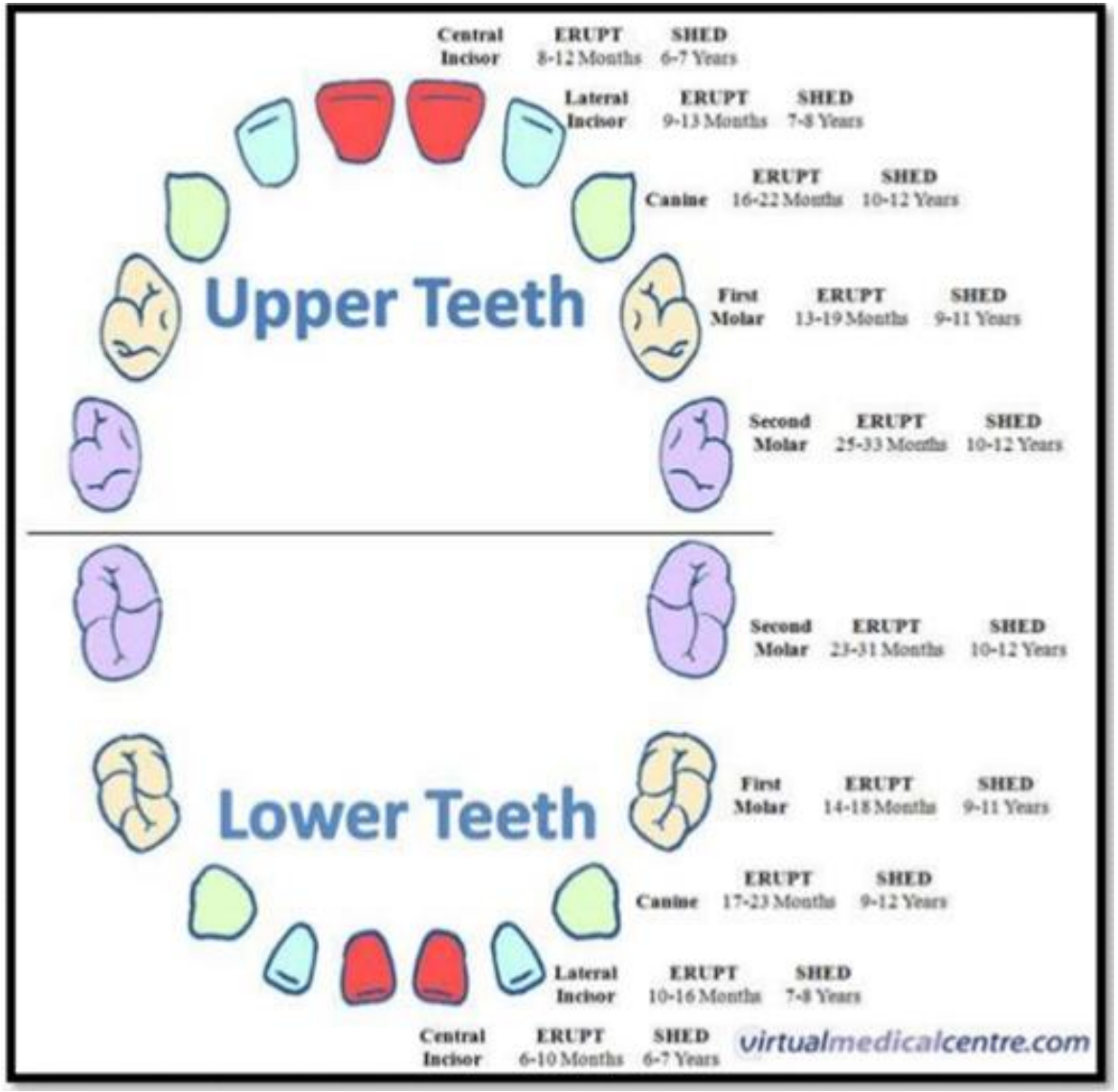
- Initiation of primary tooth buds occurs during the first six weeks of intra-uterine life

- Primary teeth begin to erupt at age about 6 months
- Eruption time for primary teeth: 2.5 – 3.5 years



Eruption Age and Sequence of Deciduous Dentition

- A-B-C-D-E
- 6 months – 3 years



	Tooth		Emergence of Teeth (Months)
Upper	i1	E, F	10 (8–12)
	i2	D, G	11 (9–13)
	c	C, H	19 (16–22)
	m1	B, I	16 (13–19)♂ (14–18)♀
	m2	A, T	29 (25–33)

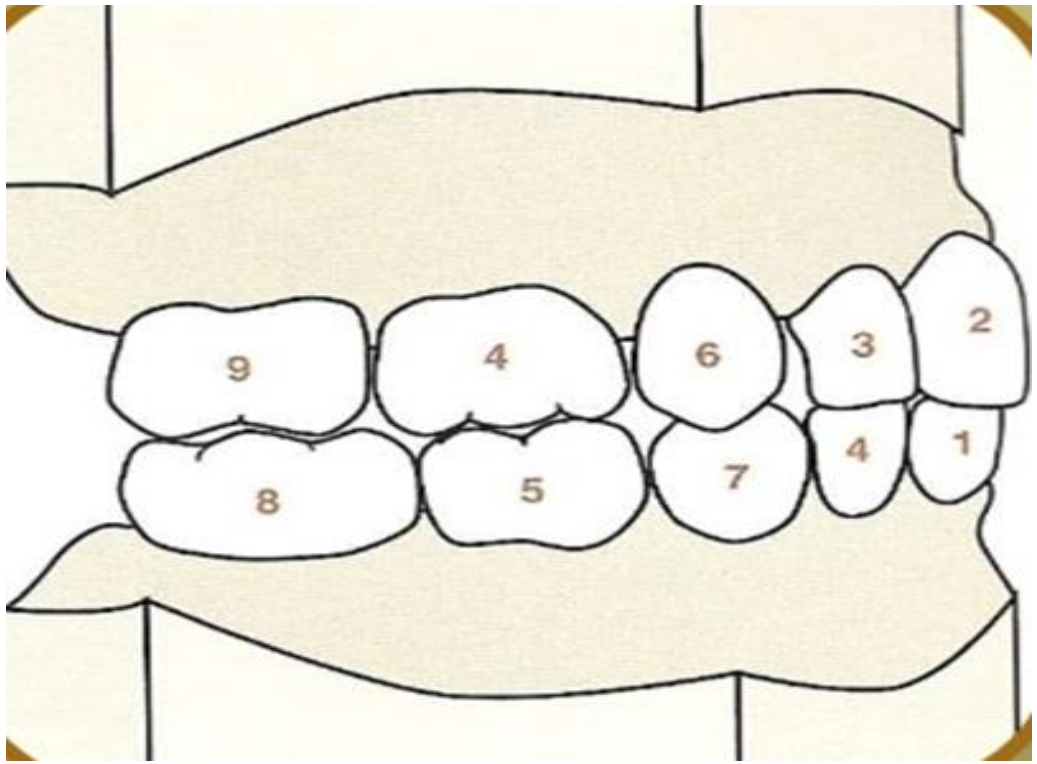
Maxillary Teeth

Right	A	B	C	D	E	F	G	H	I	J	Left
	T	S	R	Q	P	O	N	M	L	K	

Mandibular Teeth

Lower	i1	P, O	8 (6–10)
	i2	Q, N	13 (10–16)
	c	R, M	20 (17–23)
	m1	S, L	16 (14–18)
	m2	T, K	27 (23–31)♂ (24–30)♀

SEQUENCE OF ERUPTION



Spacing in Deciduous Dentition

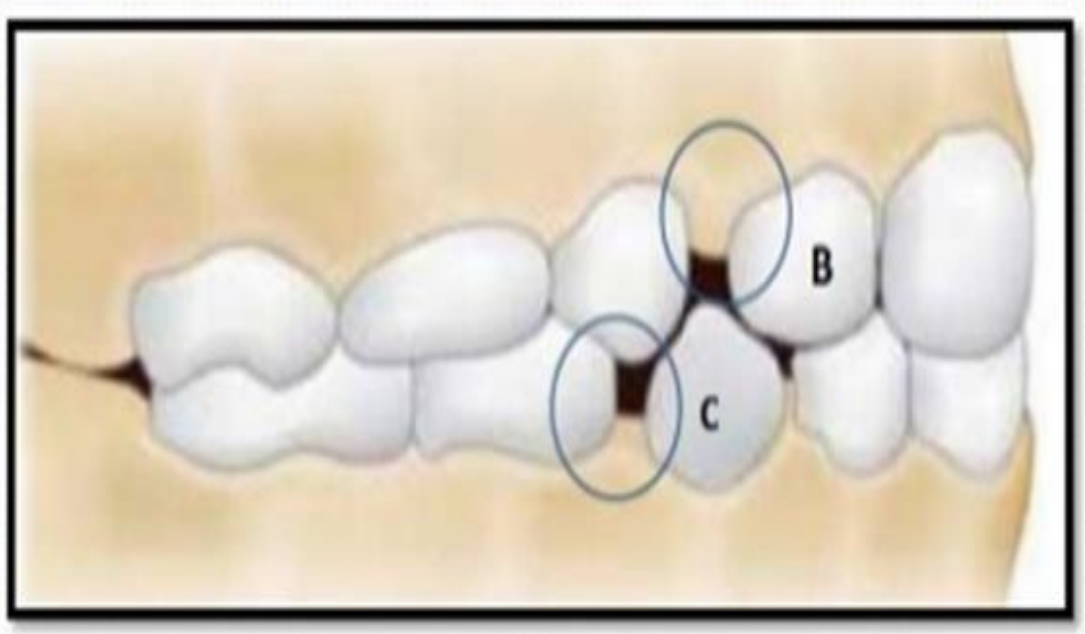
- Spacing usually present between deciduous teeth and called physiological spaces or developmental spaces

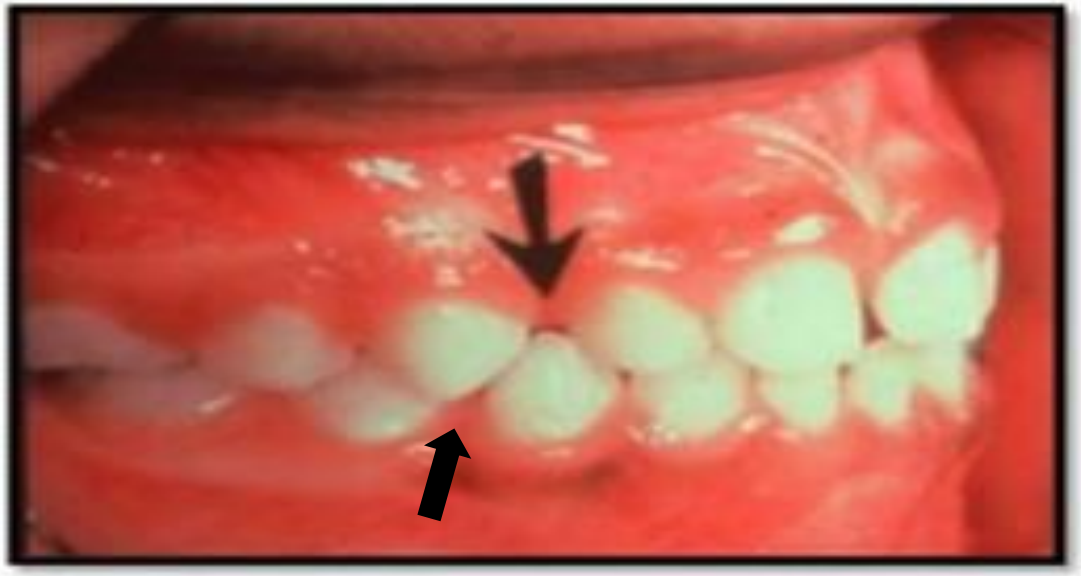
- Spaces in primary dentition is important for normal development of permanent dentition

Absence of spaces in primary dentition can cause crowding of permanent teeth

Spacing invariably is seen mesial to maxillary canines & distal to mandibular canines

These spaces are called primate spaces or simian/anthropoid spaces as they are seen commonly in primates → help in placement of the canine cusps of opposing arch



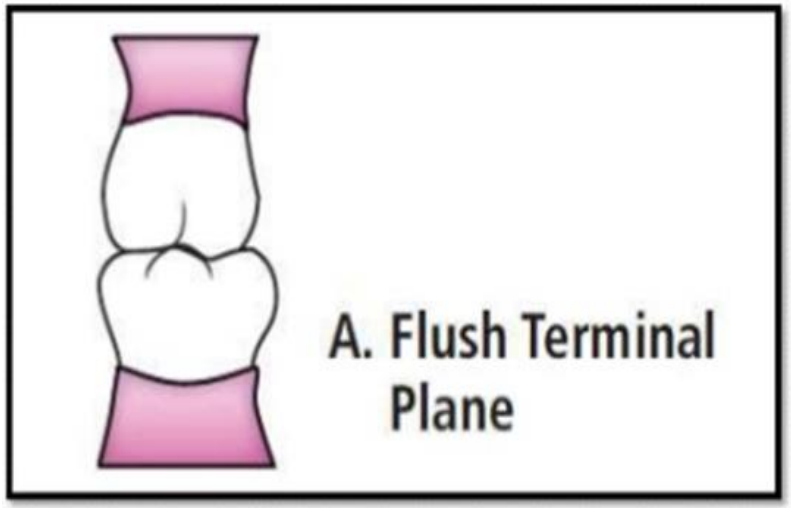


Characteristic clinical features of deciduous dentition:

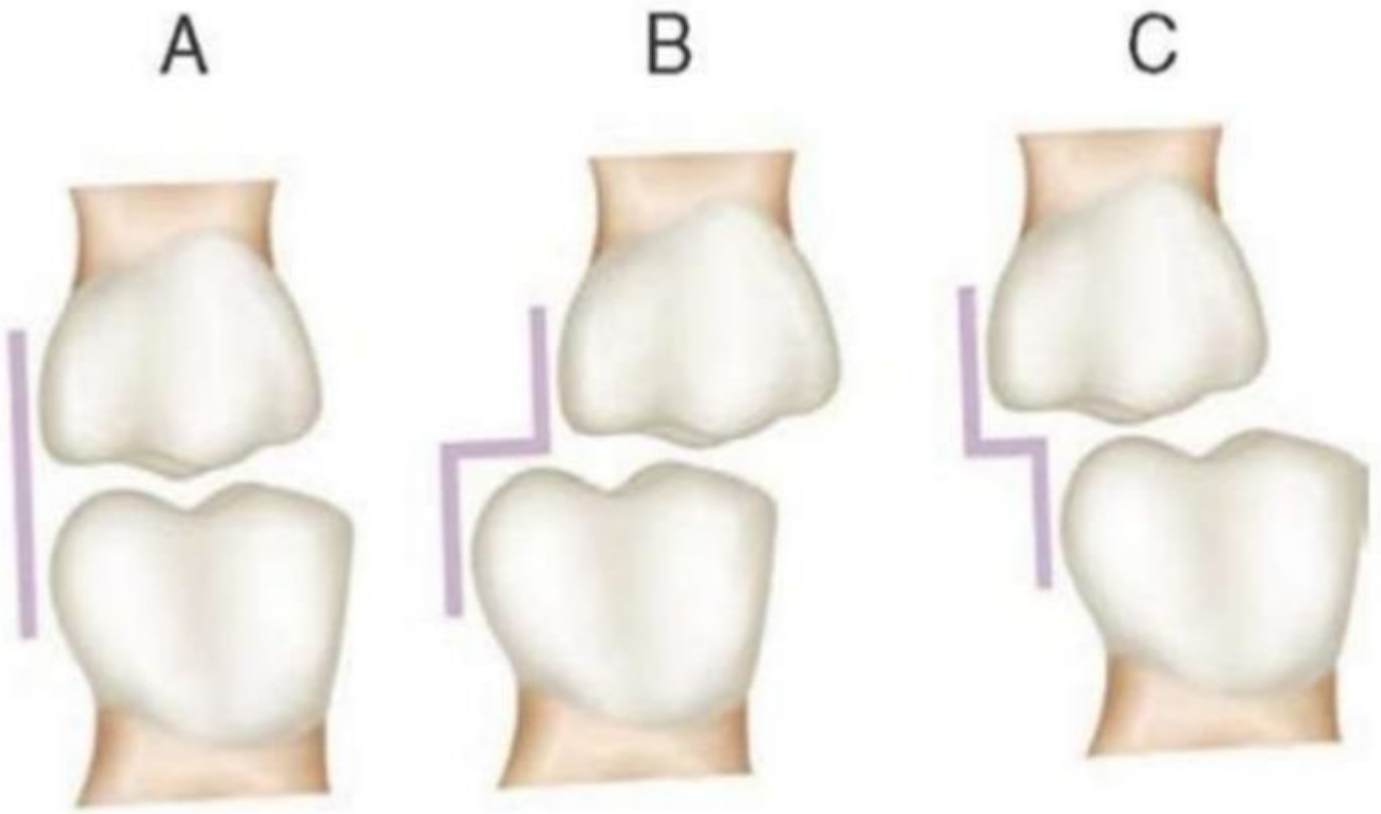
1. Dental arches are half round or ovoid in shape
2. Almost no curve of Spee is present
3. Shallow cuspal interdigitation
4. Slight overjet
5. Deep bite
6. Vertical inclination of the incisors
7. Spaced dentition (include primate space)
8. Different maxilla-mandibular relations: flush, mesial, distal terminal planes

Flush Terminal Plane

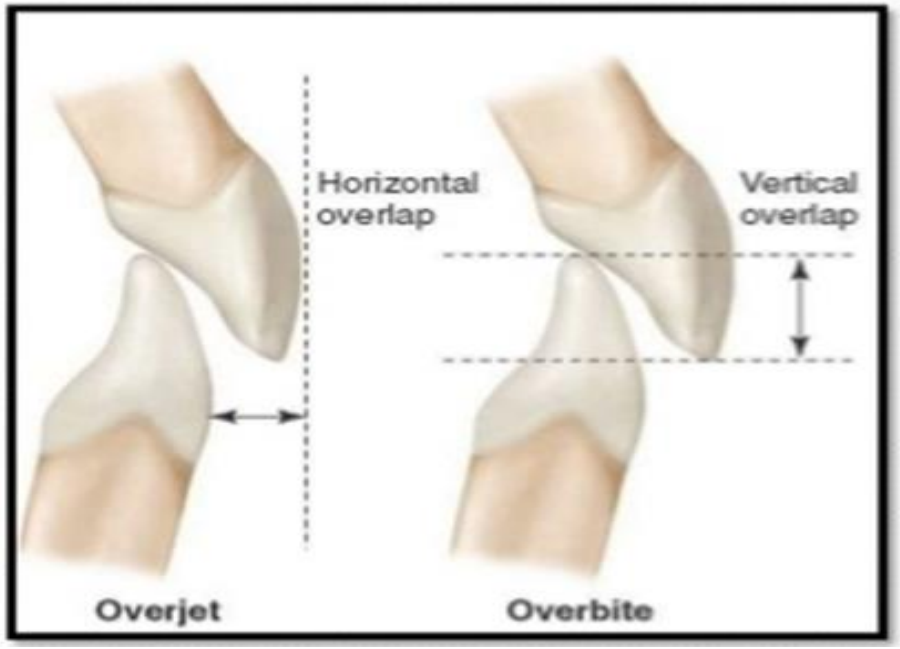
- Mesio distal relation between distal surfaces of upper & lower second deciduous molars is called terminal plane
- A normal future of deciduous dentition is a flush terminal plane: distal surfaces of upper & lower second deciduous molars are in same vertical plane



- 3 types of mesio-distal relations between distal surfaces of upper & lower second deciduous molars



A. Flush terminal plane, B. Distal step terminal plane, C. mesial terminal plane



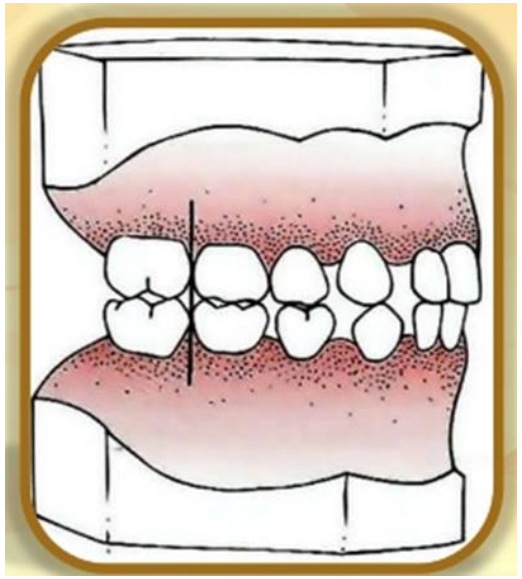
Deep Bite

- A deep bite may occure in initial stages of development
- Deep bite is accentuated by fact that deciduous incisors are more upright than their successors

MIXED DENTITION PERIOD

There are 3 phases:

1. First transitional period
2. Inter transitional period
3. Second transitional period



First transitional period

- Eruption of 1st permanent molar and the exchange of deciduous incisors with the permanent incisors
- The location & relation of the 1st permanent molar depends on the distal surfaces of the upper and lower 2nd deciduous molars

For transition of such an endon molar relation (flash terminal plane) to a class I molar relation, lower molar has to move forward by about 3-5 mm relative to upper molar

Utulisation of physiologic spaces & lee way space in lower arch & differential forward growth of mandible

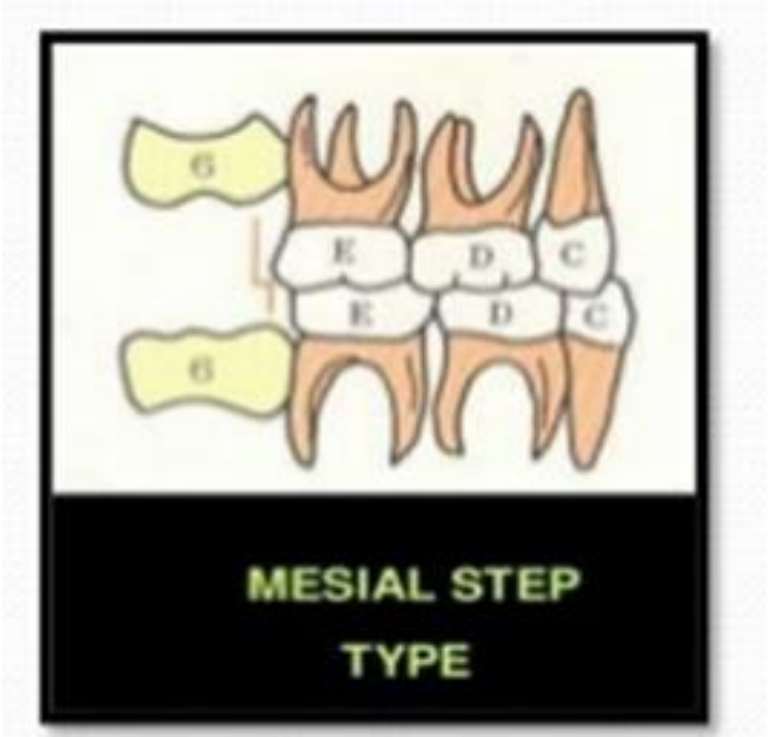
Shift in lower molar from a flush terminal plane to a class I can occure in 2 ways : Early and Late shift

Early Shift

- Occure during early mixed dentition
- Eruptive force of 1st permanent molar is sufficient to push m1 & m2 forward in arch to close primate space & establish a class I molar relationship
- Since this occure early in mixed dentition period it is called **Early Shift**

Late Shift

- Many children lack primate space & thus erupting permanent molars are unable to move forward to establish class I relationship
- When m2 exfoliate, M1 drift mesialy utilizing leeway space
- This occure in the late mixed dentition → called **Late Shift**

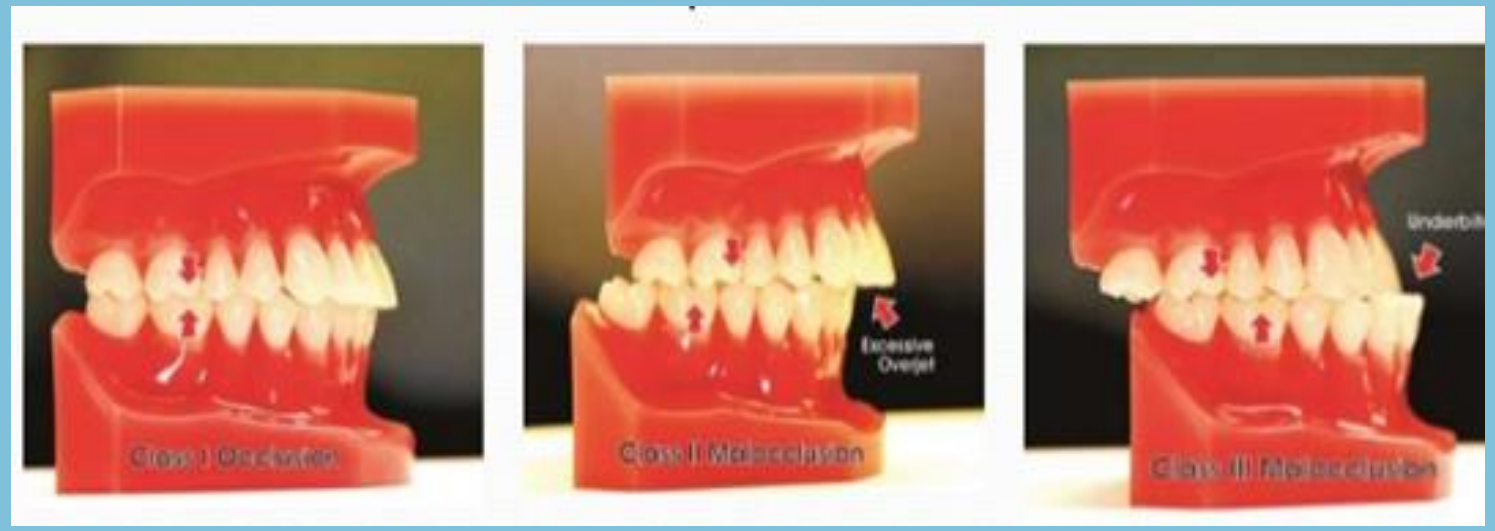


Mesial Step Terminal Plane

Distal surface of lower m2 being more mesial to that of the upper

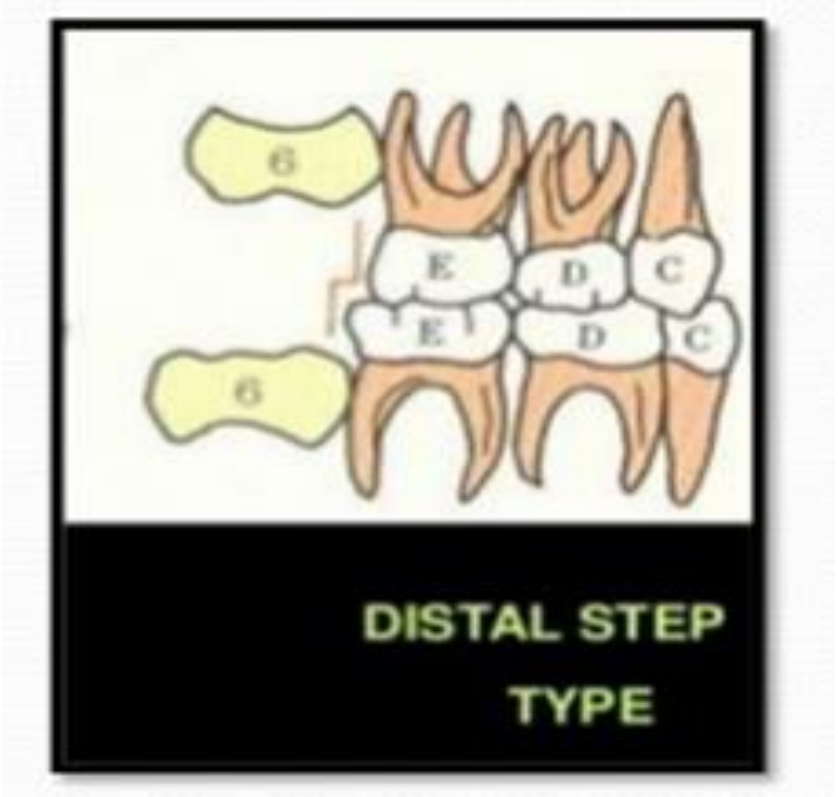
M1 erupt directly into Angle's class I occlusion

MS terminal plane most commonly occurs due to early forward growth of mandible



If differential of mandibular growth in forward direction persist, it can lead to Angle's class III

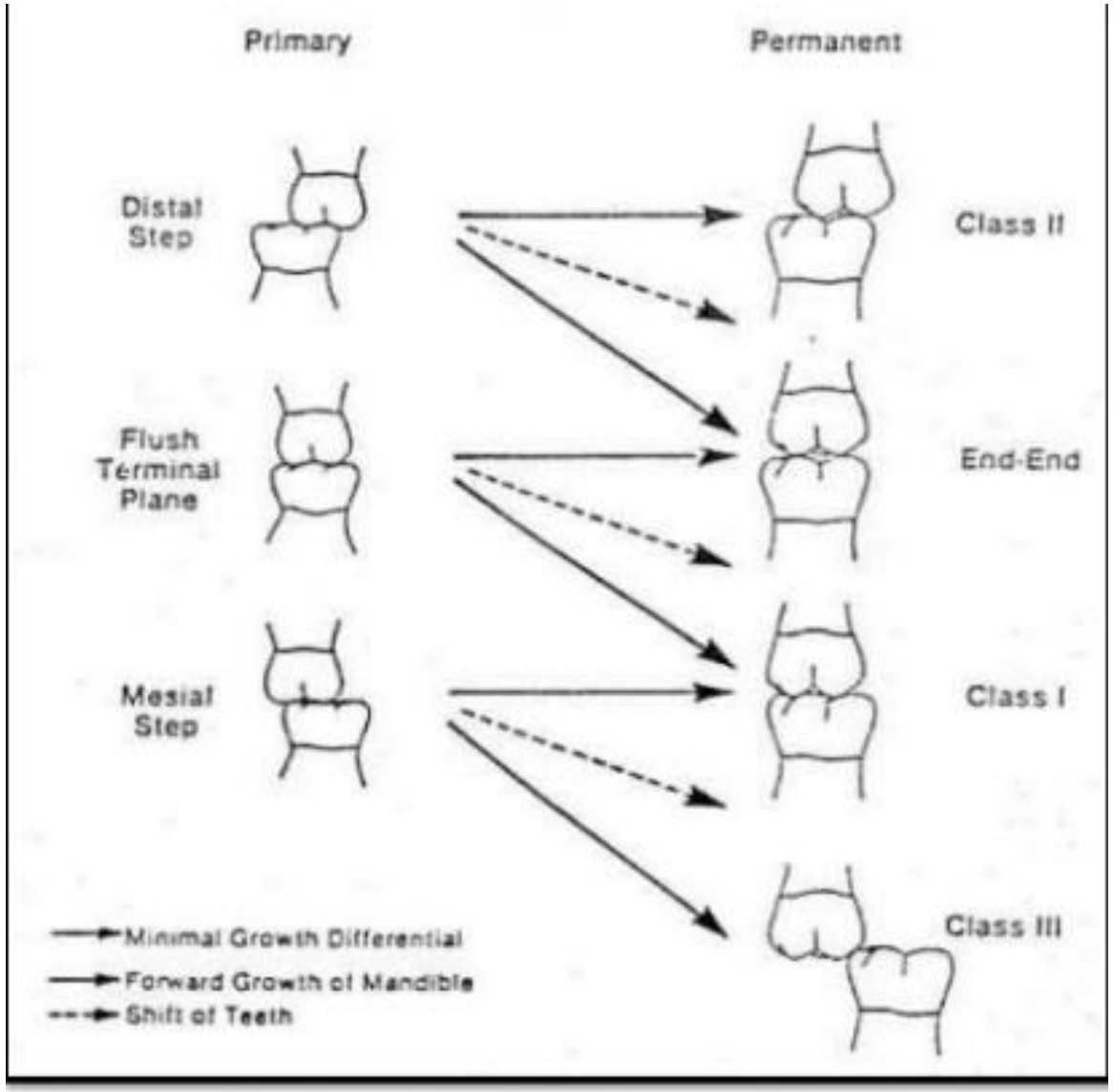
If forward mandibular growth is minimal, it can establish a class I



Distal Step

Distal surface of lower m2 being more distal to that of the upper

Thus erupting M1 maybe in Angle's Class II occlusion

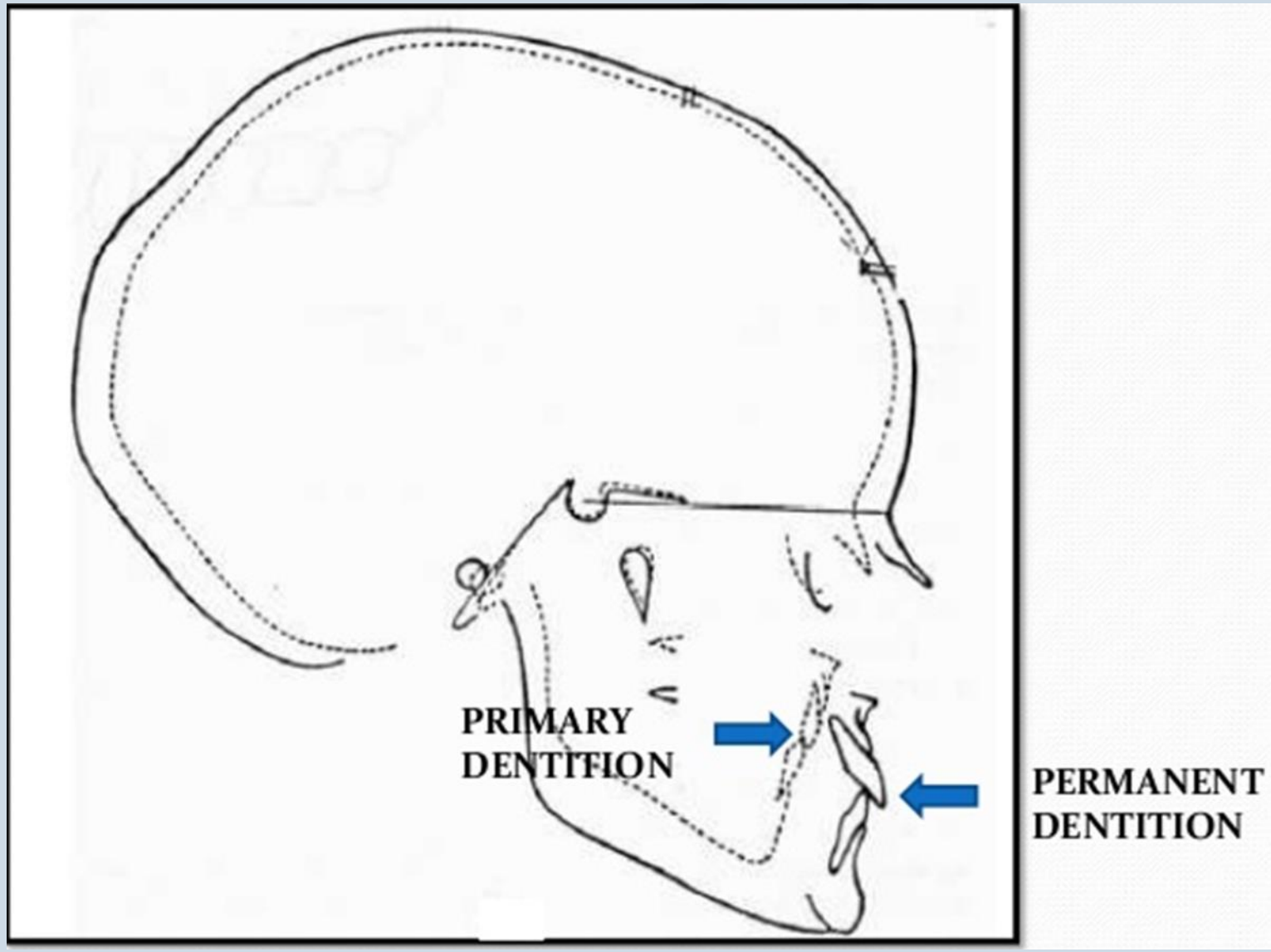


Occlusal Relationship of Primary & Permanent Molars

Exchange of Incissors

During 1st transitional period deciduous incisors are replaced by permanent incisors

Mandibular I_1 : 1st erupt
I > i

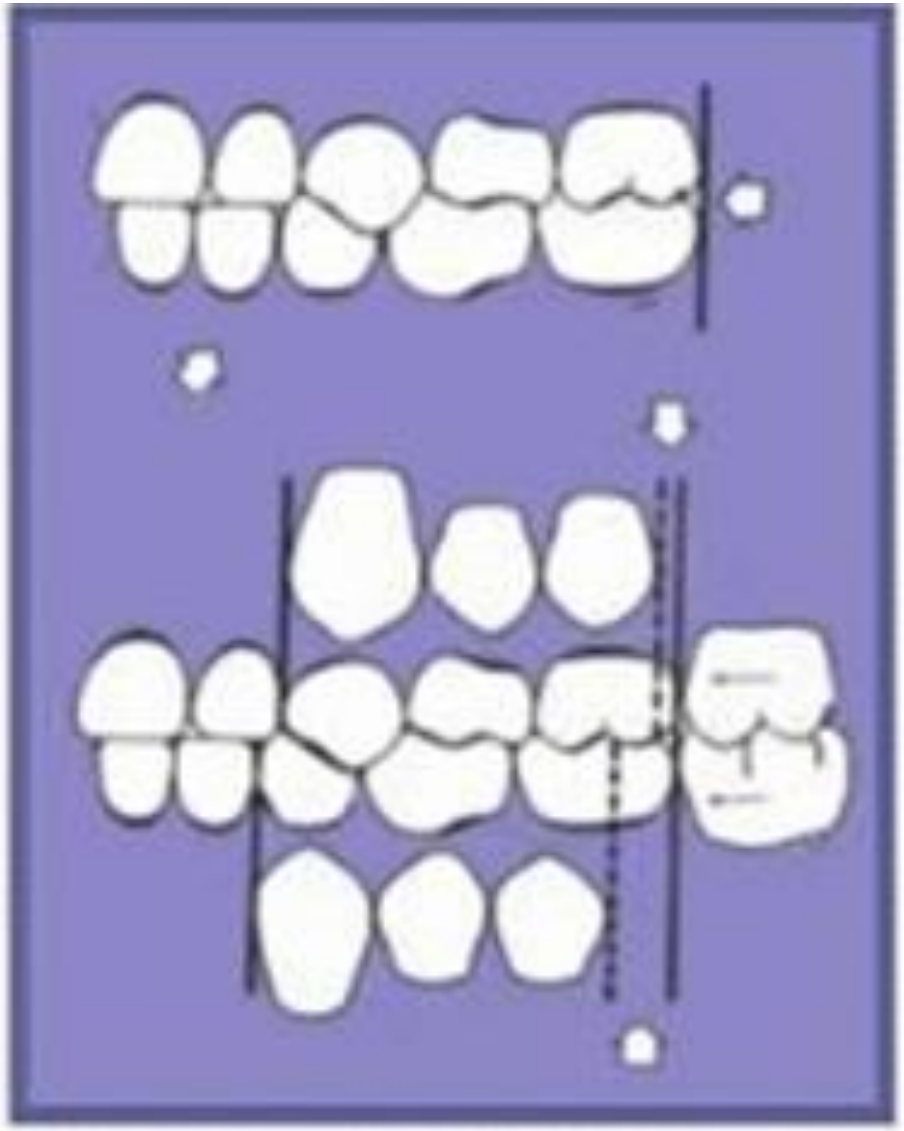

PRIMARY
DENTITION
PERMANENT
DENTITION

Inter-transitional Period

The maxillary and mandibular arches consist of sets of deciduous and permanent teeth

Between permanent incisors and M1 are m1, m2, c

This phase during mixed dentition period is relatively stable and no change occurs



2nd Transitional Period

- Characterized by replacement of m1, m2 & c by P1, P2 & C
- Combined mesio-distal width of C, P1, P2 is usually less than that of c, m1, m2 & this surplus space is call **leeway space** of Nance
- LWS maxillary arch : 0.9 mm
- LWS mandibular arch : 1.7 mm
- For mesial drift of mandibular molars to establish class I

Ugly Duckling Stage

Maxillary incisors region between 8-9 years of age

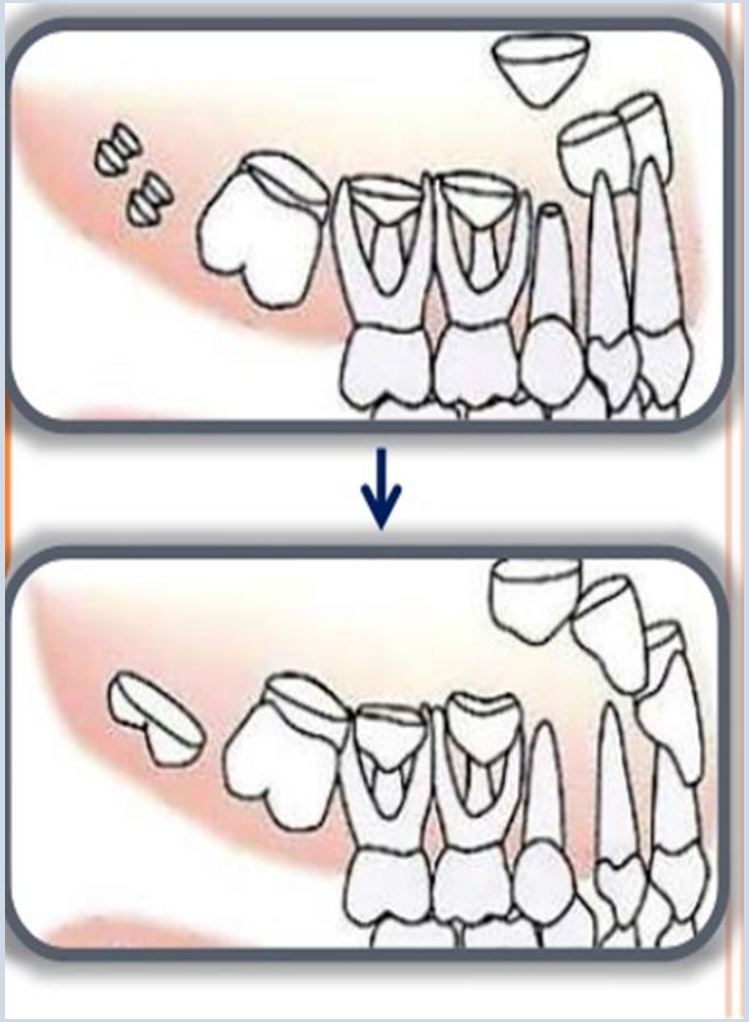
Selft-correcting malocclusion

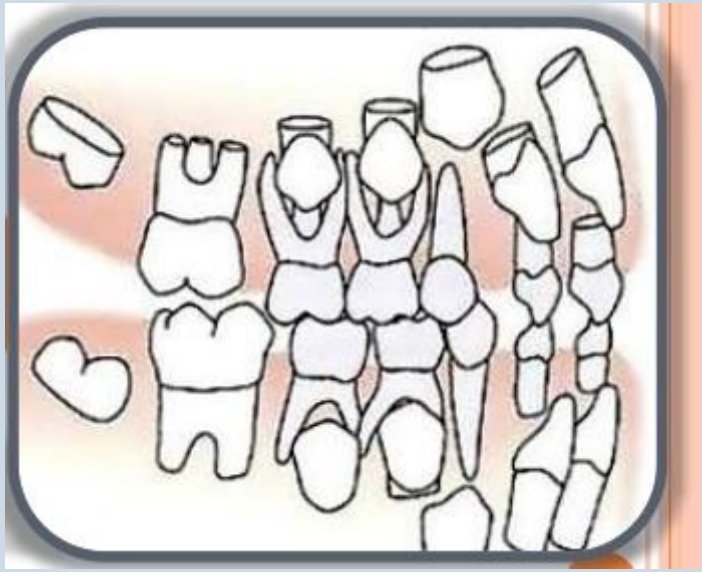
This condition usually corrects by itself when C erupt and the pressure is transferred from the roots to the coronal area of incisors

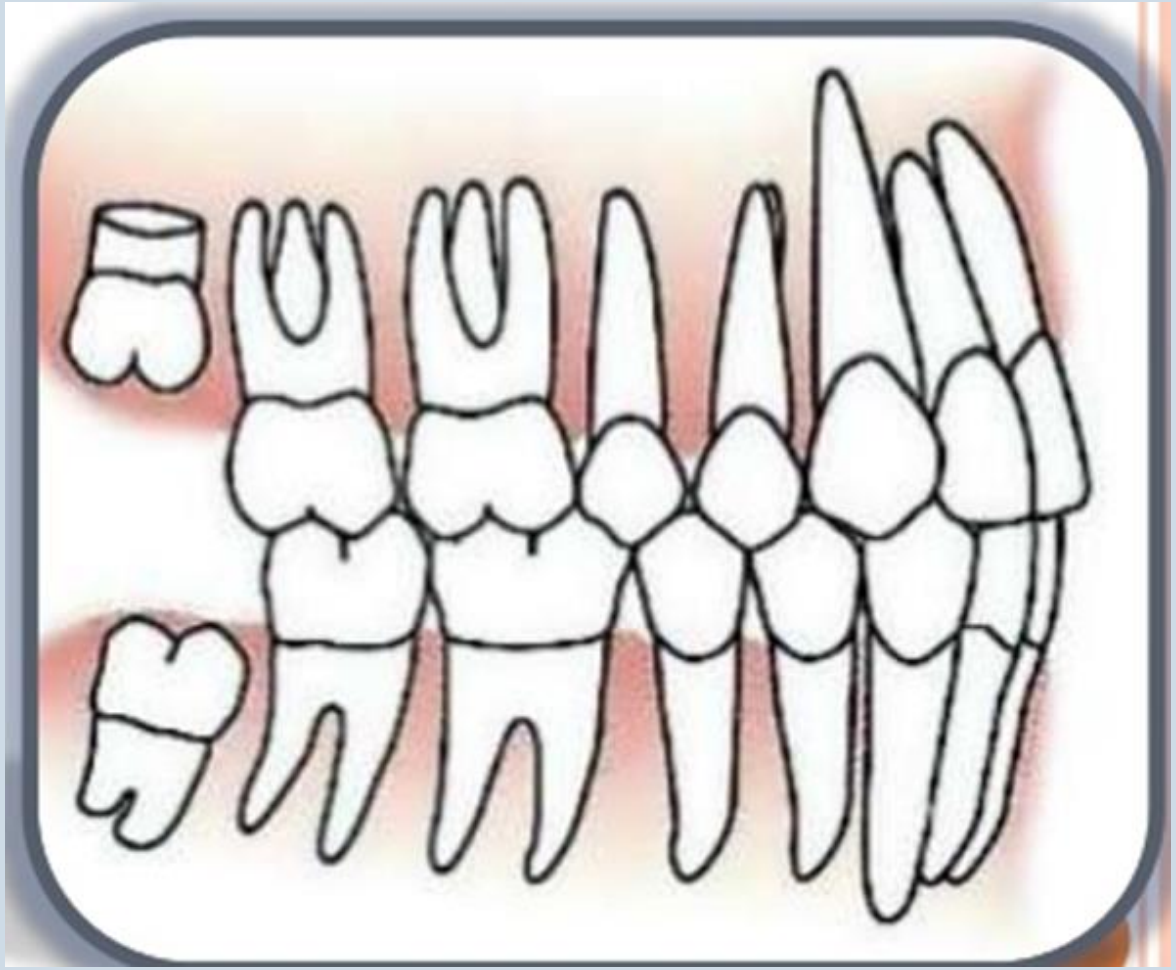
Permanent dentition period is marked by the eruption of the 4 permanent second molars

PERMANENT DENTITION PERIOD

- Permanent dentition forms within the jaws soon after birth, except for the cusps of the first permanent molars, which formed before birth
- Permanent incisors develop lingual or palatal to the deciduous incisors and move labially as they erupt
- Premolars develop below the diverging roots of the deciduous molars







At approximately 13 y.o all permanent teeth except M3 are fully erupted

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