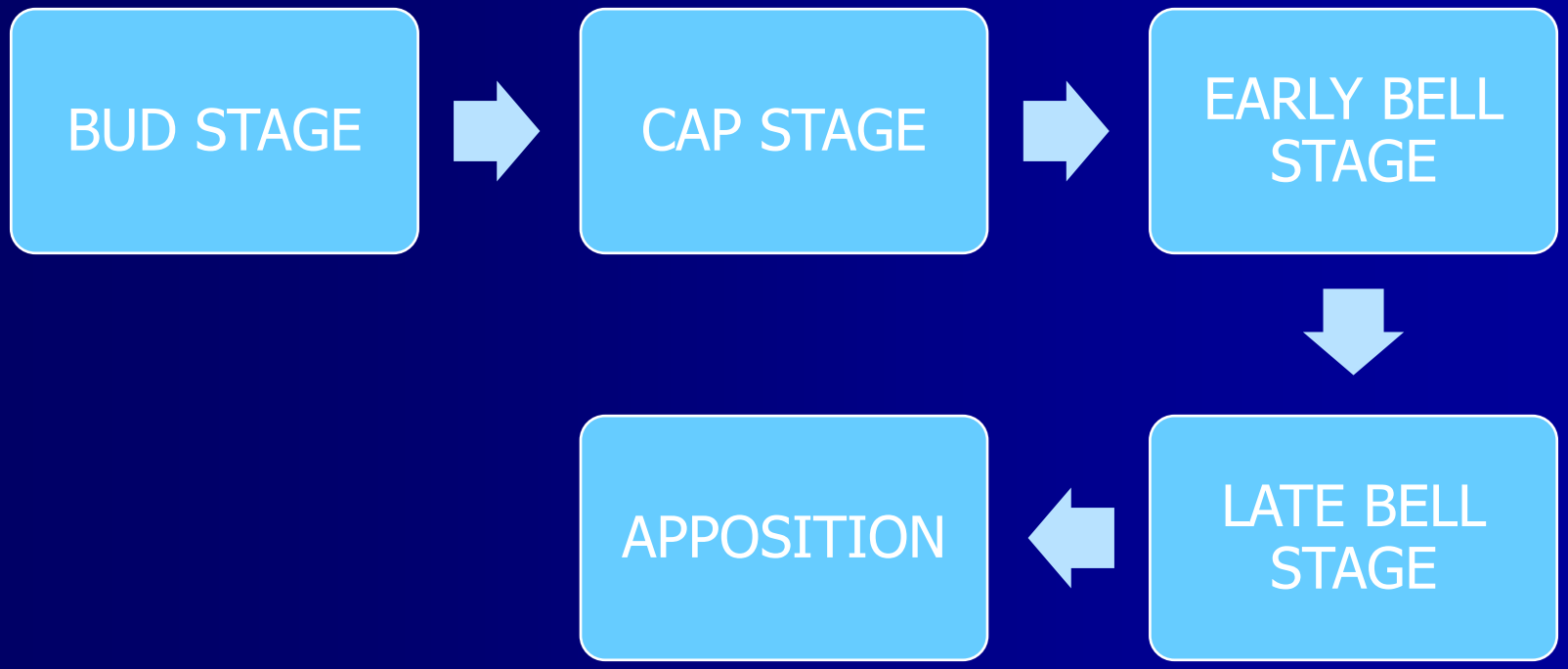
DEVELOPMENT OF DENTITION AND OCCLUSION

STAGES OF TOOTH DEVELOPMENT



GUM PADS

Alveolar arches at the time of birth

Two parts separated by dental groove

1. Labiobuccal
2. lingual

- Divided into ten segments by transverse groove

  Each segment has a deciduous tooth bud sac

Lateral sulcus:
transverse sulcus between canine and first deciduous molar segment

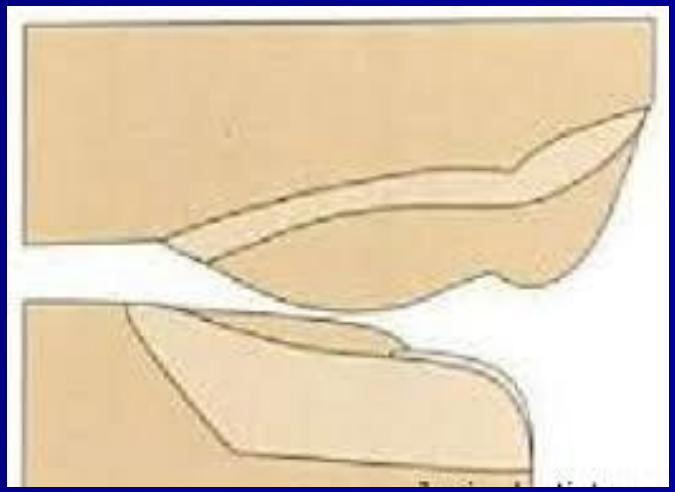
useful in judging the interarch segment relationship at early stage

Mandibular lateral sulcus much distal to maxillary lateral sulcus

Relationship of gum pads

- Maxilla much mesial to mandible
- Class II relationship

  Anterior open bite till the molar segment to help in suckling
  complete overjet

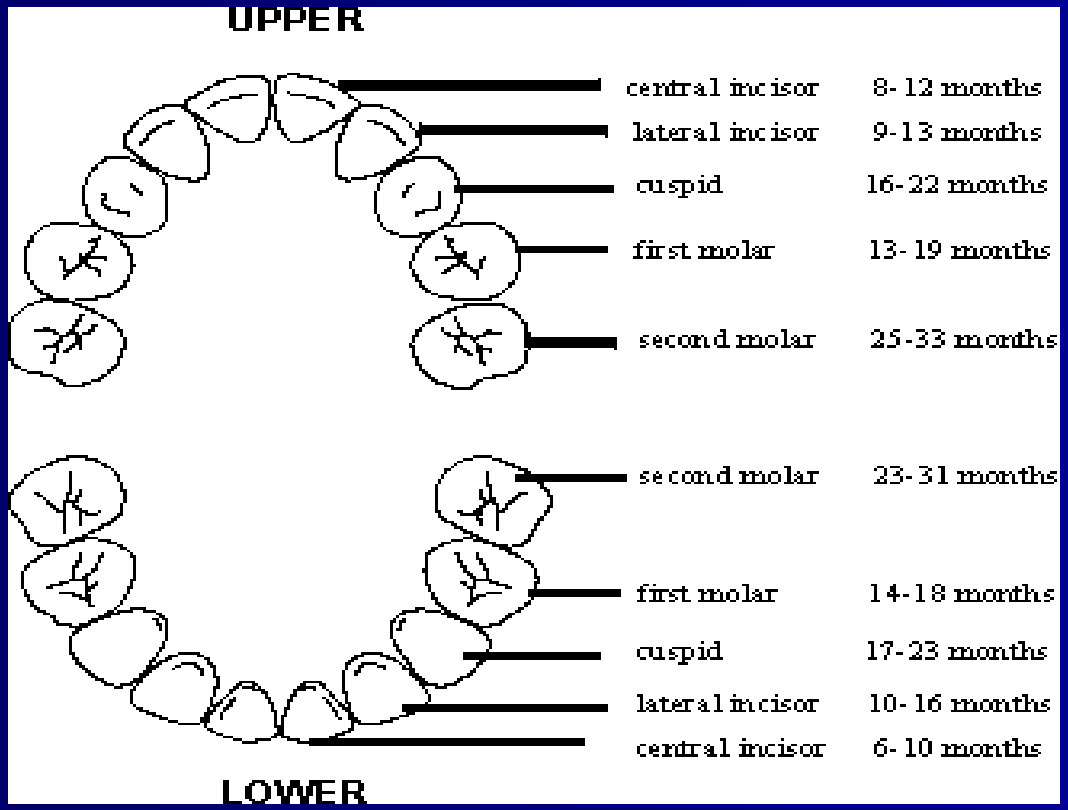


- Neonate without teeth in the first six months of life
- Deciduous teeth erupt by 6 months and complete deciduous dentition by 2 1/2 years
- Order of eruption A-B-D-C-E

NATAL AND NEONATAL TEETH

- Teeth erupted at the time of birth- natal teeth
- Teeth erupted within the first month- neonatal teeth
- Familial tendency/ lower incisor region

CHRONOLOGY OF DECIDUOUS TEETH ERUPTION



FEATURES OF DECIDUOUS DENTITION

1. Generalised spacing in the anterior region
2. Primate spaces
3. Flush terminal plane
4. Deep overbite

Generalised Spacing

Spacing in the deciduous dentition is considered normal.

It helps to accommodate – larger permanent teeth

Absence of spacing may indicate crowded permanent teeth

DEEP BITE

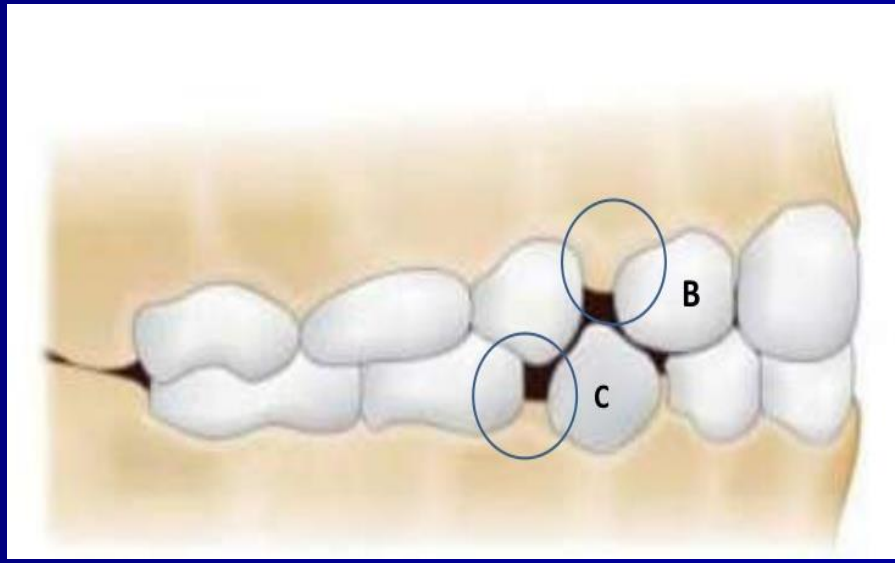
Maxillary deciduous incisors are completely overlapping the mandibular deciduous incisors.

In permanent dentition normal overbite is achieved by physiologic bite raisers – unlocks the mandible.

Primate Spaces

DEVELOPMENTAl or SIMIAN/ ANTRHOPOID Spaces

Mesial to deciduous canine in the maxillary arch and distal to deciduous canine in the mandibular arch.



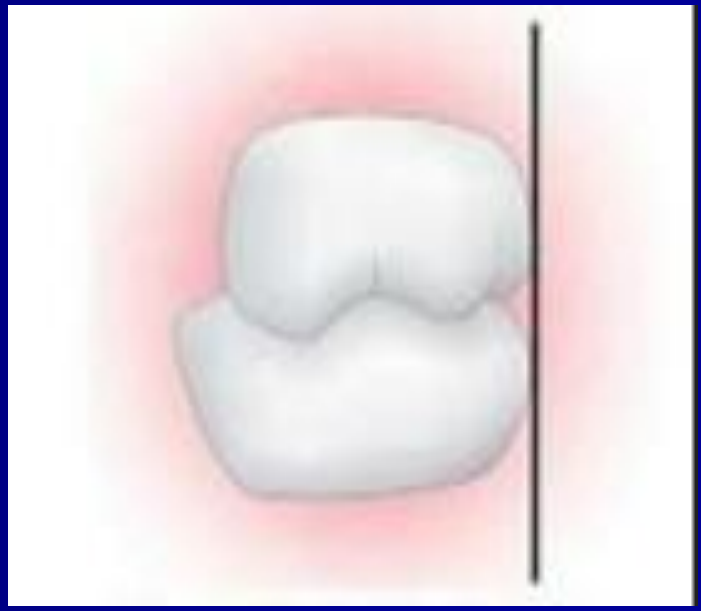
- Helps to accommodate the permanent incisors [larger width], achieve normal molar relation
  Anthropoid or Simian spaces

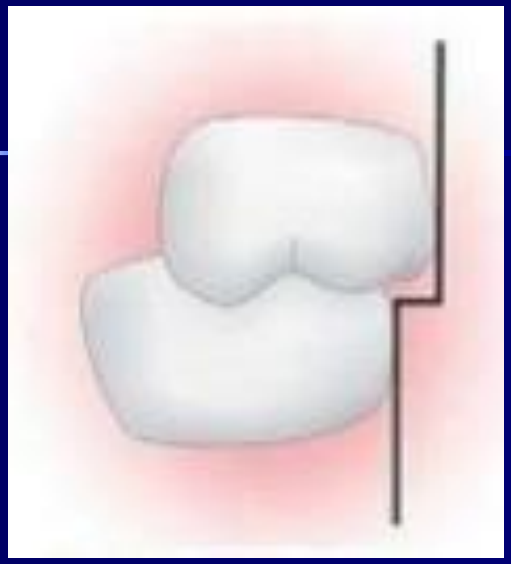
  Early mesial shift in mandibular arch at six years during eruption of mandibular first molar

Flush Terminal Plane

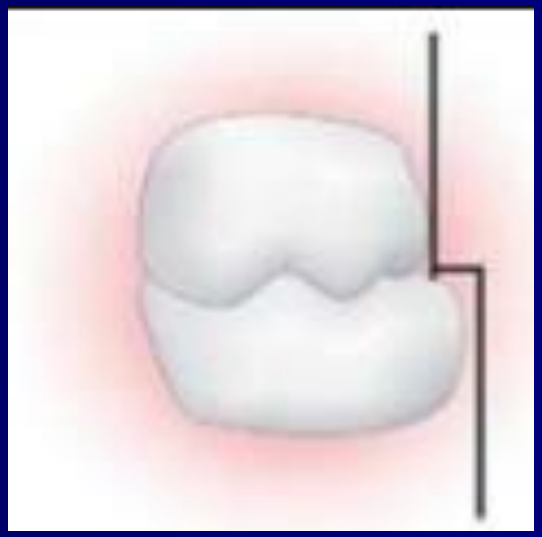
Distal surface of the primary second molars are in the same plane.

The permanent molars erupt in the same relationship but shift mesially to attain class I relation.





Mesial step: Distal surface of the mandibular e is mesial to distal surface of maxillary e



Distal step: Distal surface of mandibular e is distal to distal surface of maxillary e

Permanent Teeth	Crown Formation	Eruption	Root complete
11,21	4-5 yrs	7-9 yrs	2-3 yrs after eruption
31,41	"	6-8 yrs	"
12,22	"	7-9yrs	"
32,42	4-5 yrs	6-8 yrs	"
13,23	6-7 yrs	11- 12yrs	"
33,43	"	9-10 yrs	"
14,24	5-6 yrs	10-11 yrs	"
34,44	"	10-12 yrs	"
15,25	6-7 yrs	10-12 yrs	"
35,45	"	11-12 yrs	"
16,26,36,46	2.5-3 yrs	6-7 yrs	"
17,27,37,47	7-8 yrs	11-13 yrs	"
18,28,38,48	12-16 yrs	17-21 yrs	"

Mixed dentition

- First transition period
- Intertransition period
- Second transition period

MIXED DENTITION YEARS

First Transitional Period:
- Eruption of first molars
  - Early mesial shift
  - Physiologic bite raisers
- Eruption of incisors
  - Bite opening
  - Incisor liability

FIRST TRANSITION PERIOD

- First permanent molar erupts
- Permanent incisors erupt inexchange for the deciduous incisors

Eruption of mandibular molar

- Molar erupts in end on relation due to flush terminal plane

- It has to move forward by 3-5mm to attain class I relation
  achieved by
  early mesial shift
  late mesial shift

Early mesial shift

First molar erupts

Primate space closes

Early mesial shift

Mesial step

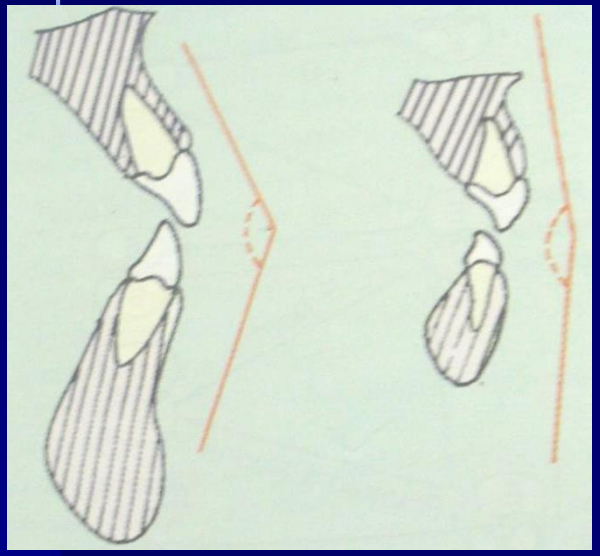
Permanent molar erupts in class I

Deep bite in primary dentition

- Corrected by
  Change in angulation of incisors

  Physiologic bite raisers

INCISOR ERUPTION



Permanent incisors erupt with increased angulation whereas primary incisors were upright

Permanent Incisors are lingual to the deciduous counterparts and erupt labially and occlusally.

INCISOR LIABILITY

- Permanent incisors wider than primary incisors by 2-3mm. Spacing in the primary dentition is critical.

- ARCH WIDTH
- INTERCANINE SPACE
- CROWN ANGULATION

- Amount of space needed for the incisors- amount of space available = Incisor liability

  Incisor liability in lower arch 5 mm and 7mm in upper arch

SPACE GAIN TO ACCOMMODATE PERMANENT INCISOR

Intercanine width:
Increases by 2mm slightly outward eruption of teeth

Boys greater than girls
Maxillary arch greater than mandibular arch

- Labially positioned permanent incisors:
  Teeth arrange along the arc of a larger circle
  1-2mm of additional space
- Primate space:
  Canines move back in the primate space in the mandibular arch
- If crowding was severe initially it may still persist

INTER TRANSITION PERIOD

- Maxillary and mandibular arches consist of primary canines and molars and permanent molars and incisors
- This phase is stable and no change occurs

SECOND TRANSITION PERIOD

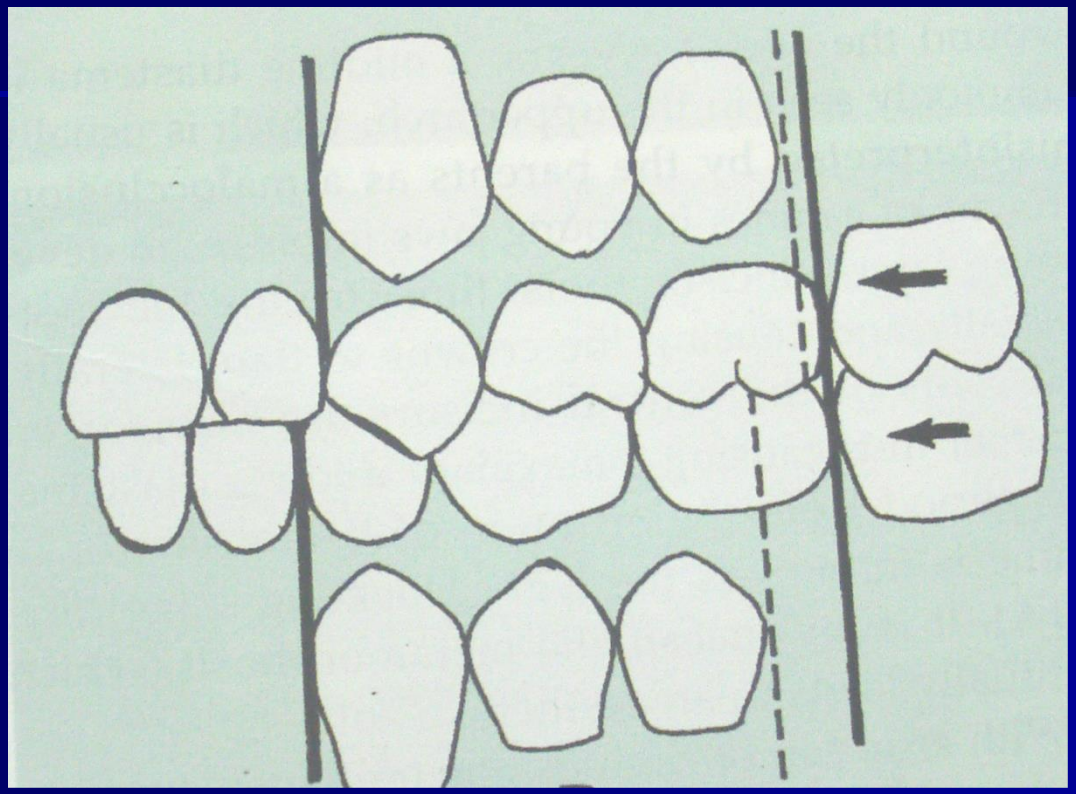
Eruption of permanent canines and premolars, deciduous canines and molars shed

Eruption of second molars

LEEWAY SPACE OF NANCE

Combined width of deciduous cuspid, deciduous 1st and 2nd molar is greater than the combined mesiodistal width of permanent canine and the premolars.

Upper arch – 0.9mm per side
Lower arch – 1.7mm per side



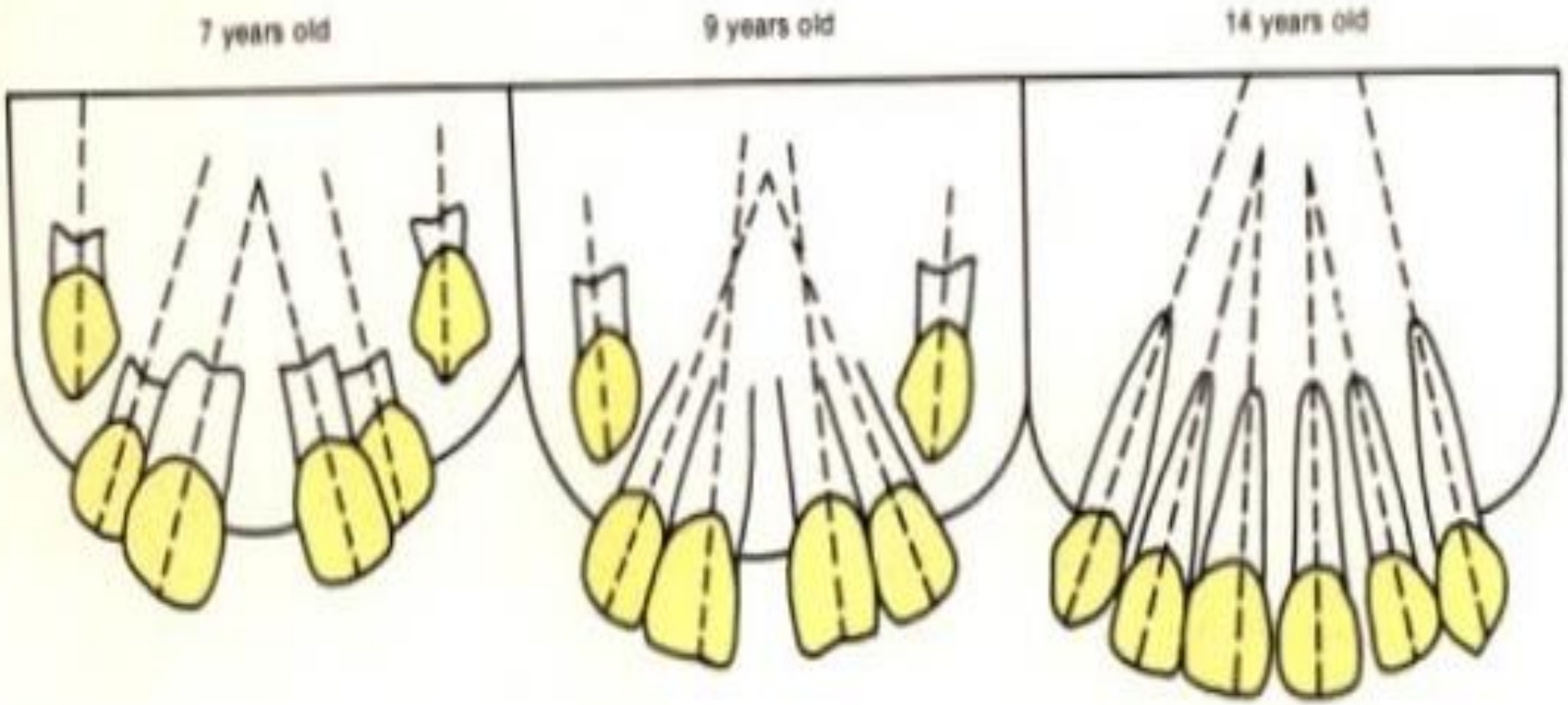
LATE MESIAL SHIFT OF MOLARS

Between 10-12 years, replacement of deciduous cuspids and molars by permanent canines and premolars is a critical chronological event.

Decrease in arch length by mesial shift of molars both in maxillary and mandibular arches.

Shift more in mandible than maxilla – full cusp class I occlusion is achieved. Correction of the class II tendency does not imply a stable relation, careful monitering is needed.

UGLY DUCKLING STAGE



Broadbent – Ugly duckling stage

9-11 yrs Eruption of the maxillary canines push the roots of the laterals medially.

- The crown of maxillary central and lateral incisors diverge laterally creating diastema between centrals and laterals giving an ugly duckling appearance
  2mm or less of diastema close spontaneously
  Greater the spacing lesser the likelihood of spontaneous space closure

LATE MANDIBULAR CROWDING

- Imbrication
- Third molar eruption considered to reduce the arch length
- But late mandibular growth from ramus to the mental foramen is considered to be the cause.
- Presence of third molar may interfere with the repositioning of the teeth in the arch

SAFETY VALVE MECHANISM

- Maxillary inter canine width in both male and female waits for the pubertal growth to be completed – esp basal horizontal mandibular growth – downward and forward.
- Max intercanine width acts as a safety valve.
- Mand dentition is brought forward to eliminate the class II tendency.

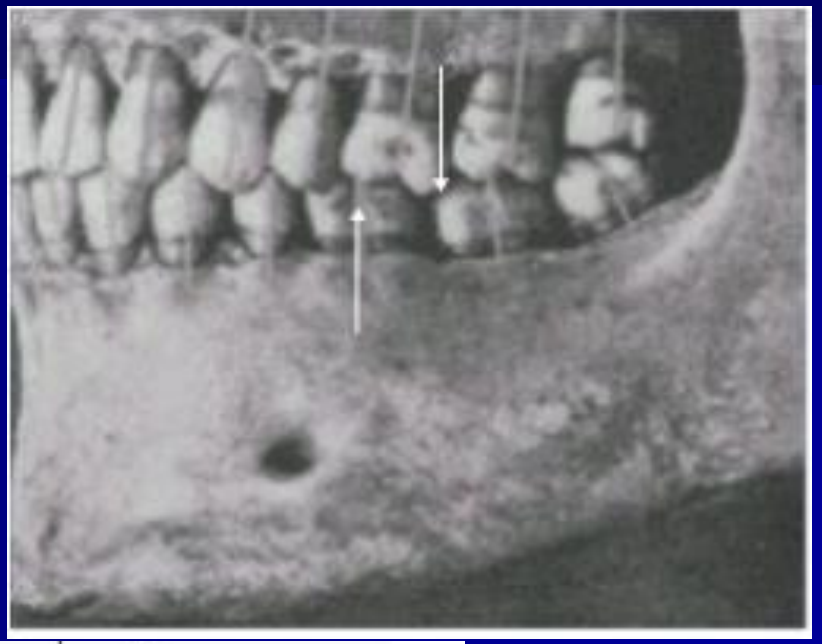
TRANSIENT MALOCCLUSION

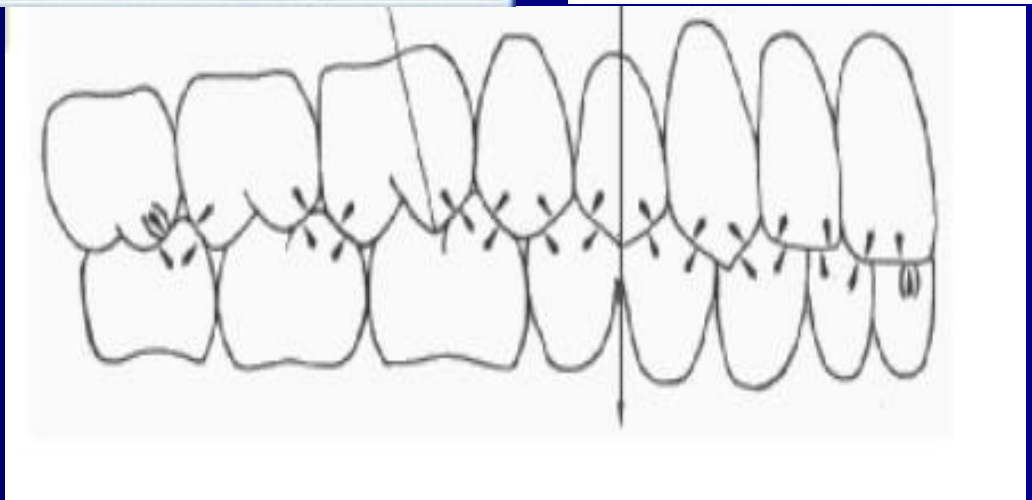
- Spacing
- Deep bite
- Flush terminal plane
- Ugly duckling stage
- Mild crowding during incisor exchange

ANDREW'S SIX KEYS TO OCCLUSION

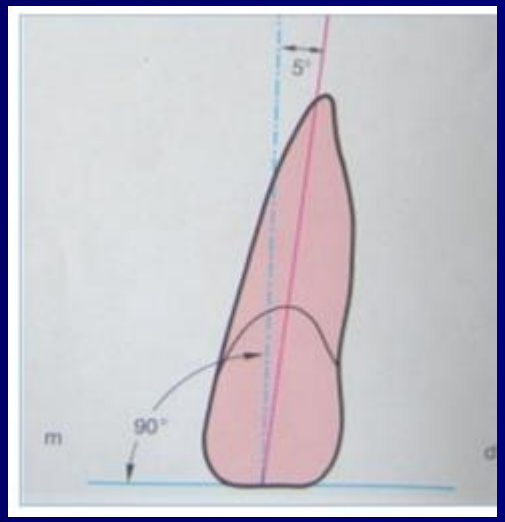
1. MOLAR RELATIONSHIP
2. CROWN ANGULATION
3. CROWN INCLINATION
4. ABSENCE OF ROTATIONS
5. TIGHT CONTACTS
6. CURVE OF SPEE - FLAT

KEY I MOLAR RELATION

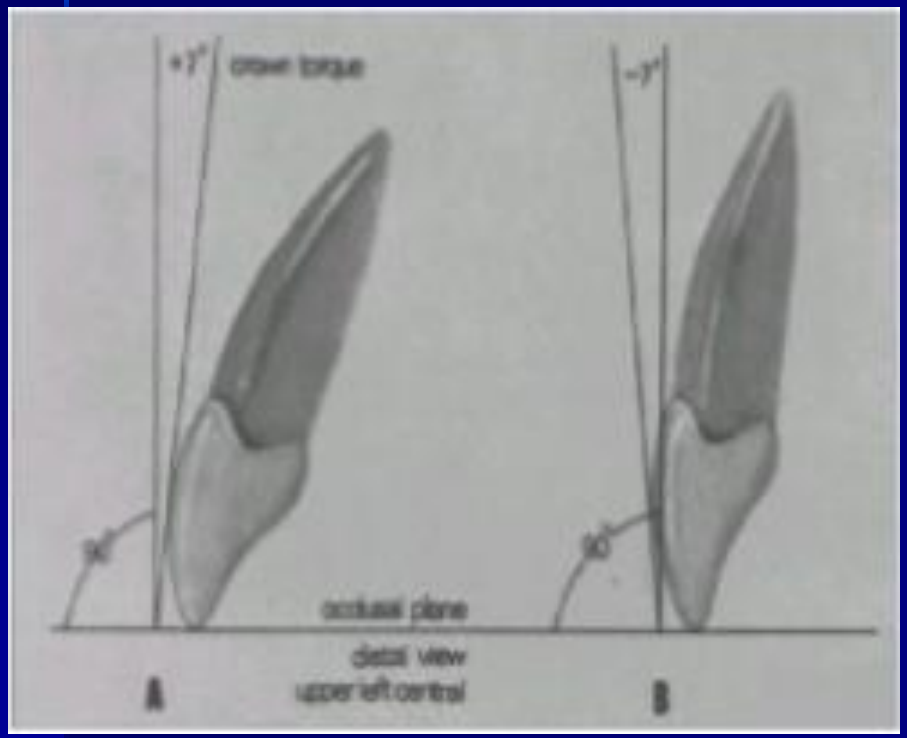


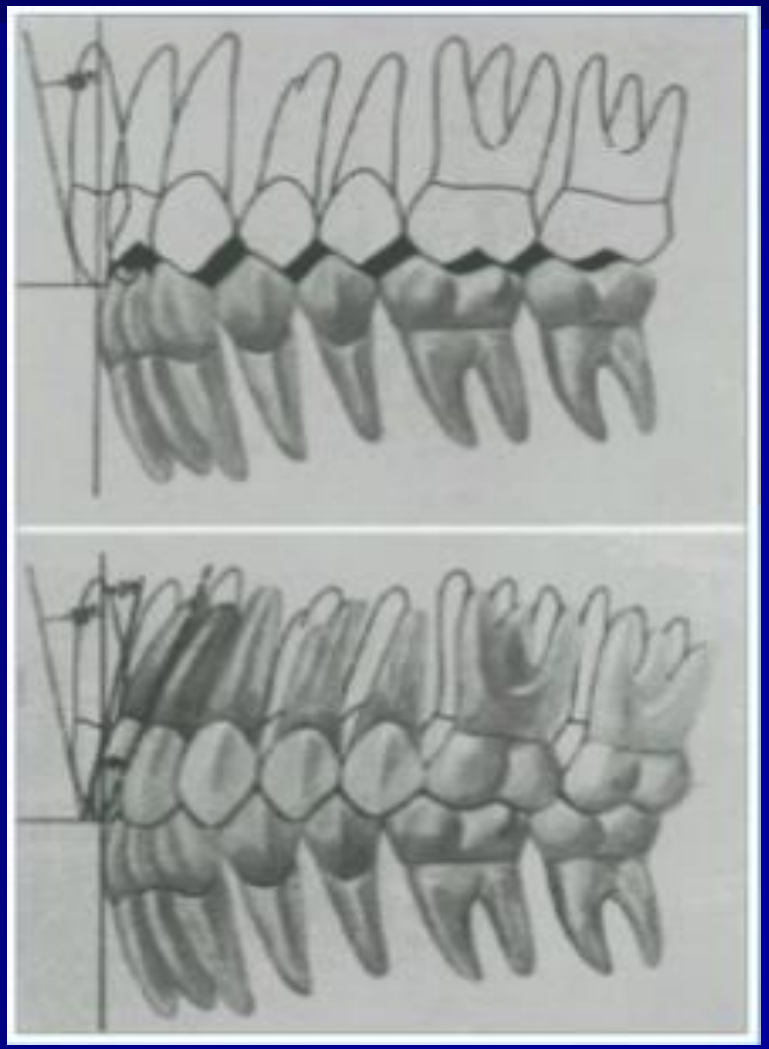


KEY 2 CROWN ANGULATION / TIP

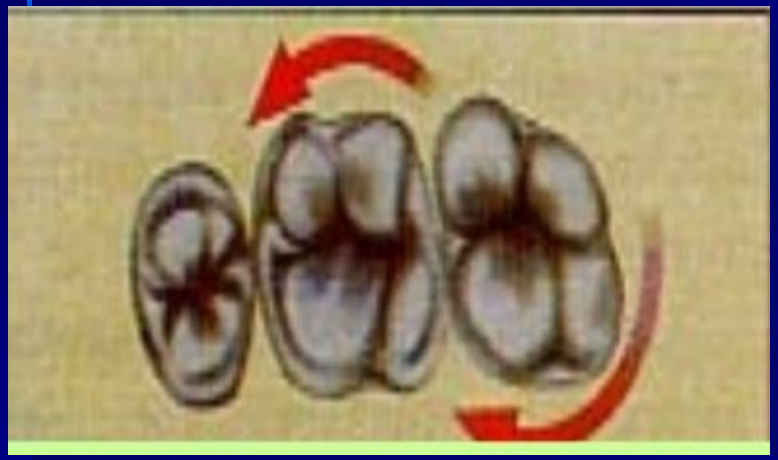


KEY 3 CROWN INCLINATION/ TORQUE

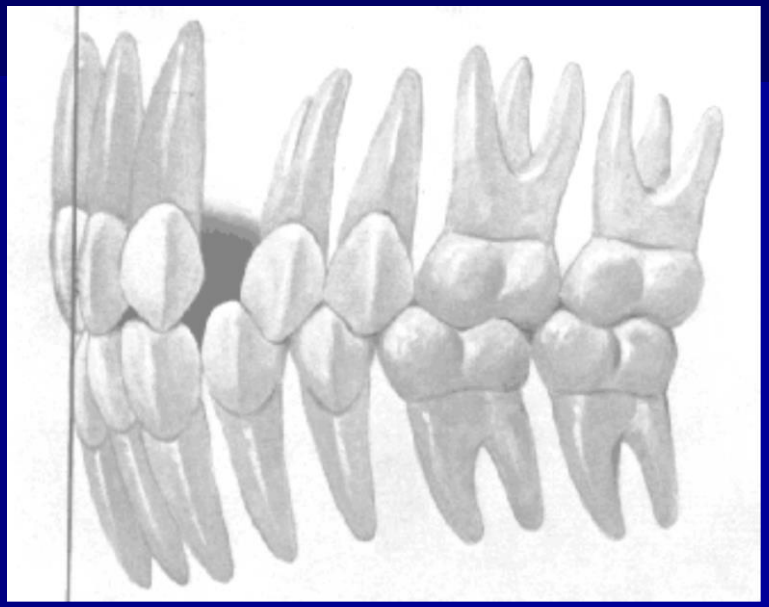




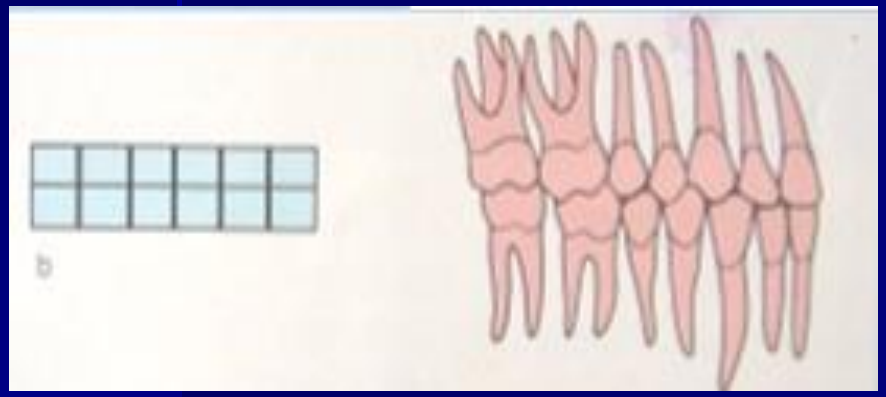
KEY 4 ROTATIONS

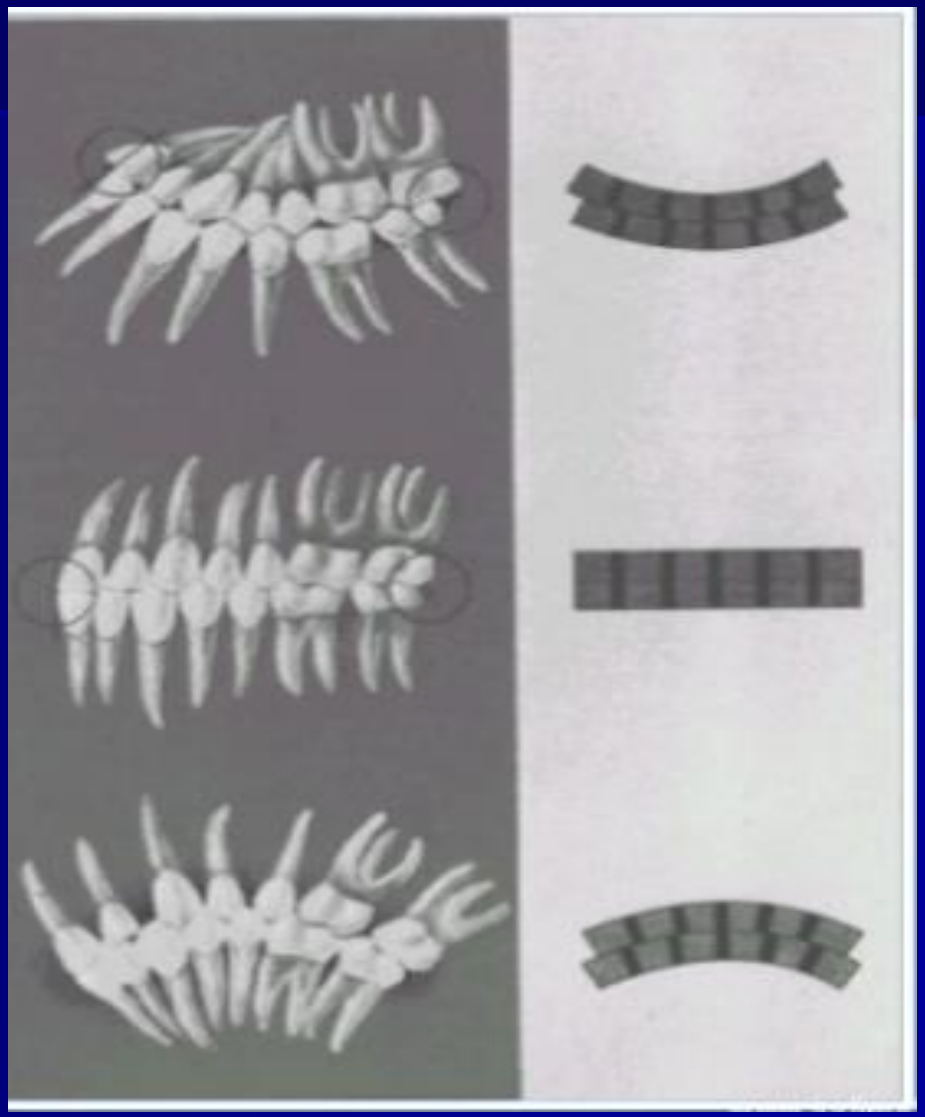


KEY 5 TIGHT CONTACTS

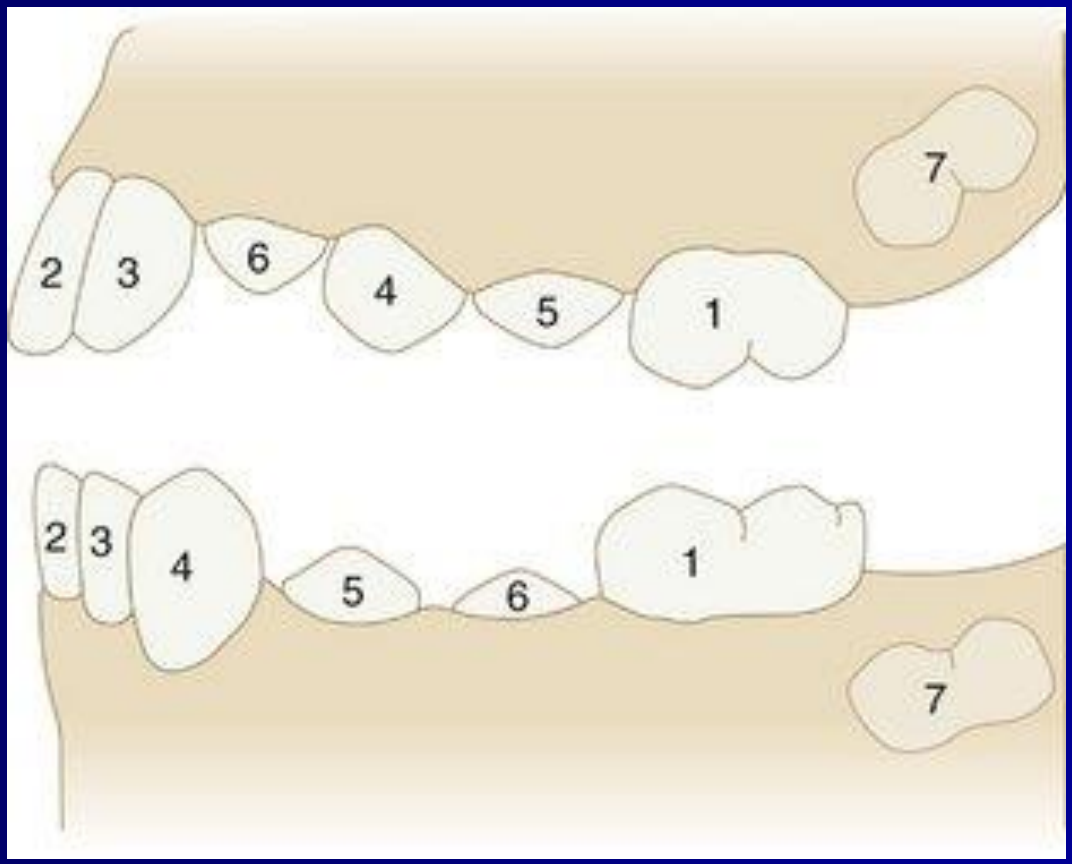


KEY 6 CURVE OF SPEE





SEQUELAE OF ERUPTION



Thank you