Diagnosis of malocclusions I.

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1. **Collection** of Information
    1. Medical and Dental History
    2. Extraoral Examination
    3. Functional Examination
    (TMJ, orofacial muscles, tongue position, respiration, habits)
    4. Intraoral Examination and Study Models
    5. Radiographs
        - panoramic
        - cephalometric

1 Patient's History

History

- Chief complaint:
  - It is really important to write the reason for the visit in the terms described by the patient
    - Ex: I have an overbite….
    - Ex: My teeth are crooked..
- Medical, Dental and Familial History
  - This allows you to detect problems which are environmental and or genetic

- **MEDICAL HISTORY-** full medical history is recorded before orthodontic treatment.
- Few medical conditions contraindicate the use of orthodontic appliances such as;

- Epilepsy
- History of blood dyscrasias
- Diabetic patient
- Rheumatic fever
- Cardiac anomalies
- Physically and mentally handicapped children

- The medical history should include information on drug usage.
- The use of certain drugs like aspirin may impede orthodontic tooth movement.
- DENTAL HISTORY -it includes information on the age of eruption of the deciduous and permanent teeth,decay,history of extraction, restoration and trauma to dentition.
- Past dental history helps in evaluation of patient and parent's attitude towards treatment.

- POST NATAL HISTORY -it includes information on the type of feeding, presence of habits and on the milestones of normal development.
- FAMILY HISTORY- class 11,class111 malocclusions and congenital conditions such as clefts of lip & palate are inherited.
- Family history should record details of malocclusion existing in other members of the family.

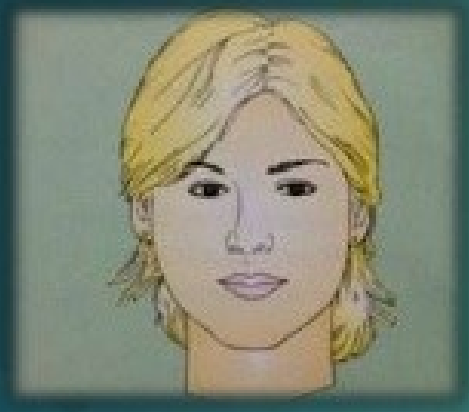
Extraoral examination

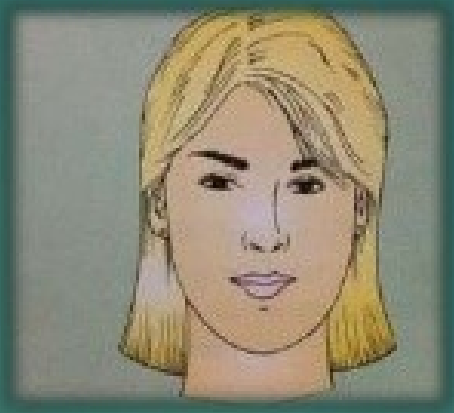
- Determine the harmony of facial structures
- Judge facial symmetry
- Analyze the smile (Gummy smile ?, complett or incomplett lip closure)
- Evaluate the position of the teeth in relation to the soft tissue of the face

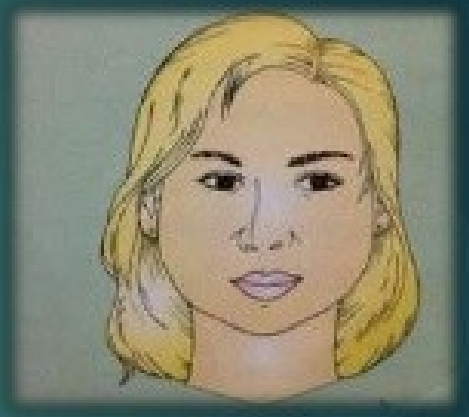
EXTRA ORAL EXAMINATION

SHAPE OF THE HEAD:

- A)MESOCEPHALIC-average shape of the head. posses normal dental arches
- B)DOLICOCEPHALIC-long and narrow head . They have narrow dental arches
- C)BRACHYCEPHALIC-broad and short head. broad dental arches







Mesocephalic,dolicocephalic,brachyce
phalic

Brachycephalic

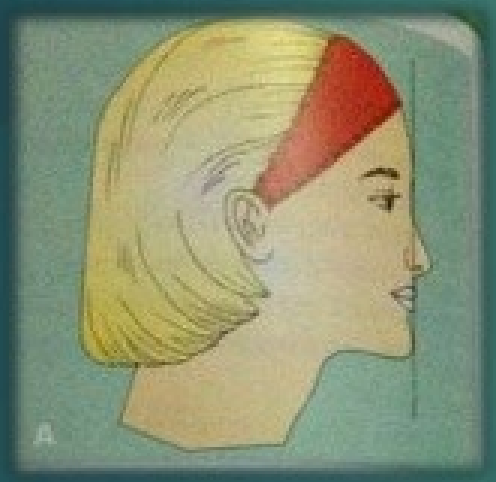
Tendency for a deep bite

Dolichocephalic

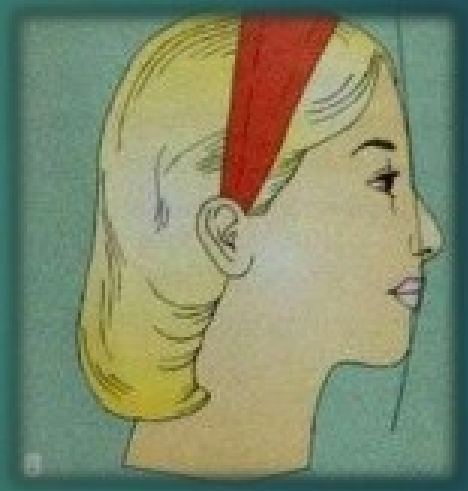
Tendency for an open bite

Glabella
Nose
Chin

- STRAIGHT PROFILE-the two lines form nearly straight line.
- CONVEX PROFILE-the two lines form an angle with concavity facing the tissue.
- This kind of profile occurs as a result of prognathic maxilla retrognathic mandible as seen in CLASS 11,DIVISON 1 MALOCCLUSION.



STRAIGHT PROFILE



CONVEX PROFILE

- **COCAVE PROFILE**-the two reference lines form an angle with convexity towards tissue.
- This type of profile is associated with a prognathic mandible or retrognathic maxilla as in **CLASS | | MALOCCLUSION.**

Glabella
Nose
Chin

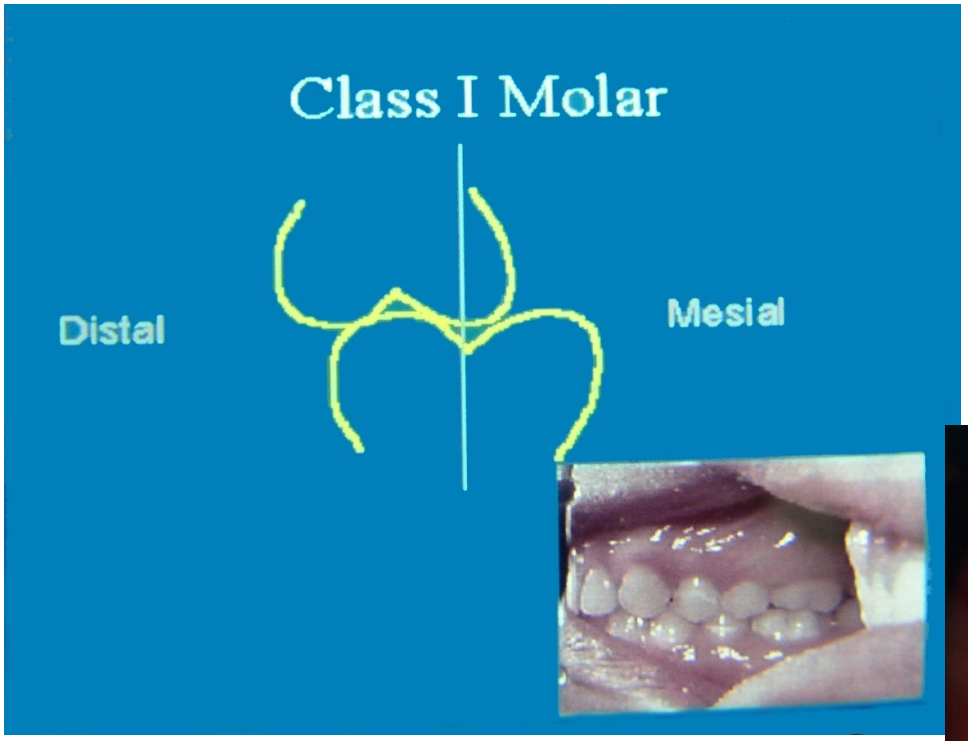
Orthodontic directions

- Orthodontic directions

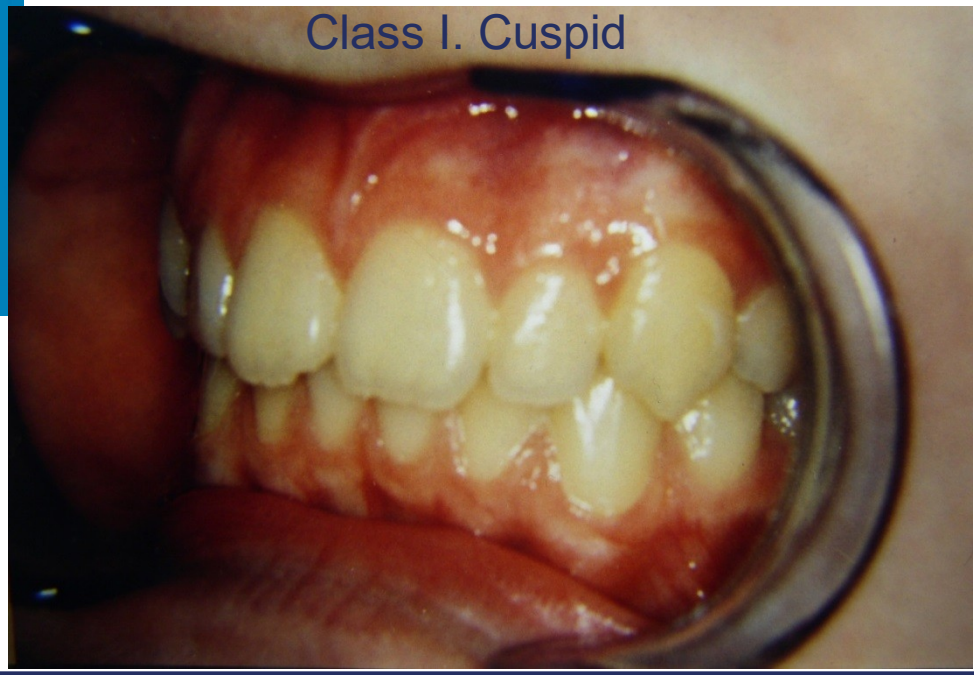
- Sagittal (mesiodistal anomalies - Angle classification)
- Vertical (deep bite, open bite)

- Transversal (narrowing)

Angle Class I.= neutral occlusion

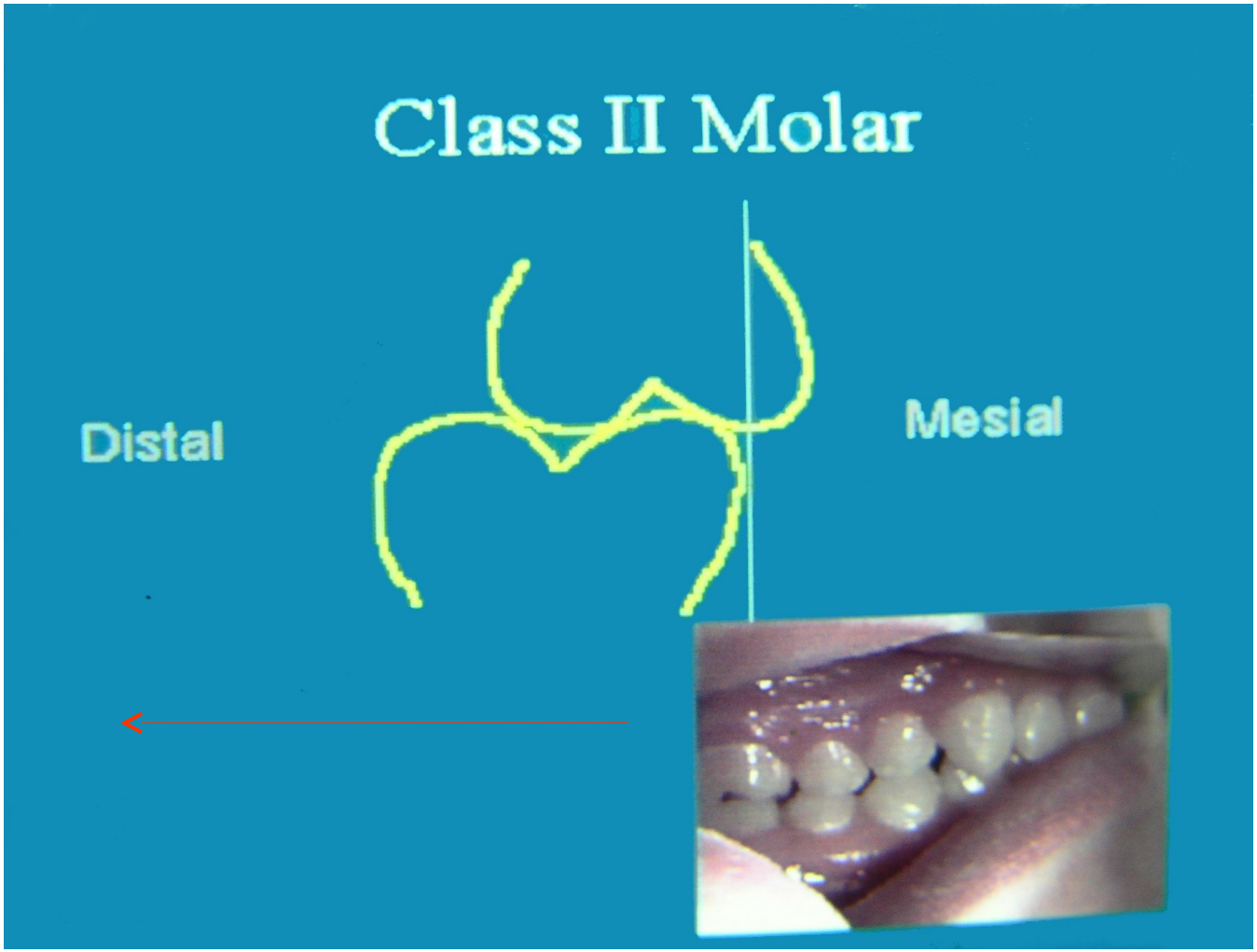


Angle classification
based on:anteroposterior (sagittal) relationship of the jaws



Two malocclusions which present with a Class I malocclusion (or almost)

Angle II.= distocclusion



Angle II/1

Overjet

Distocclusion

-The mandible is usually behind or small (microgenia)

-Sometimes the prognathism of the upper jaw is also responsible for the amomaly

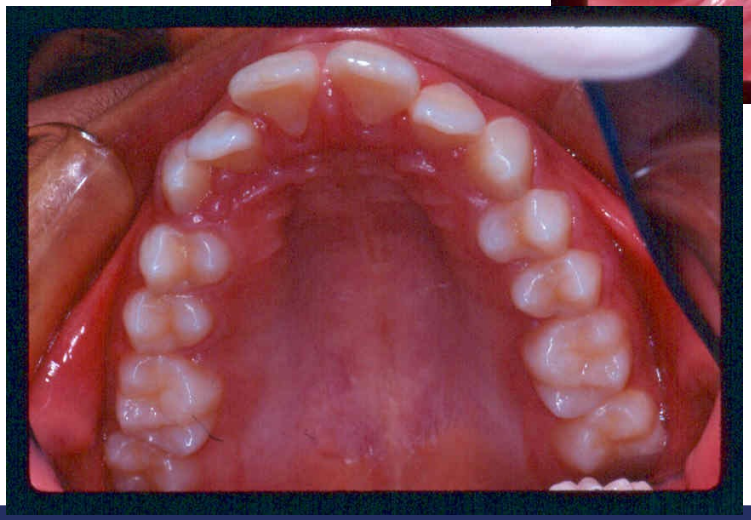
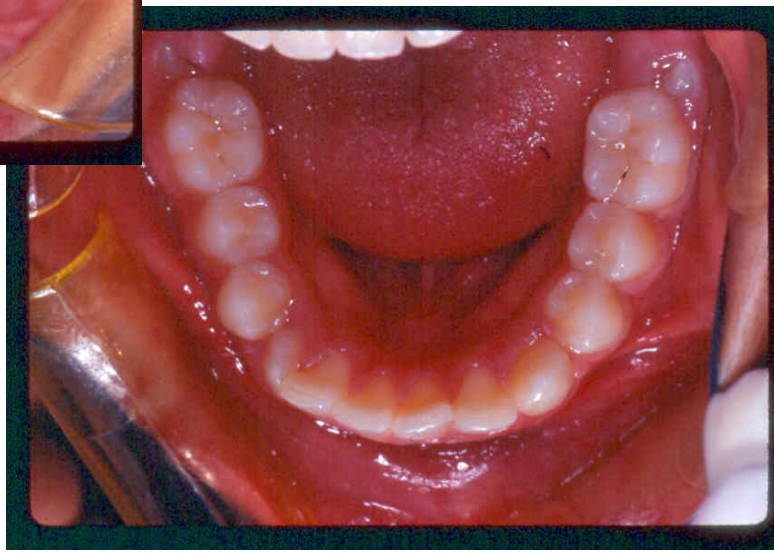
Deep bite 70-80 %

Mouth breathing (often)

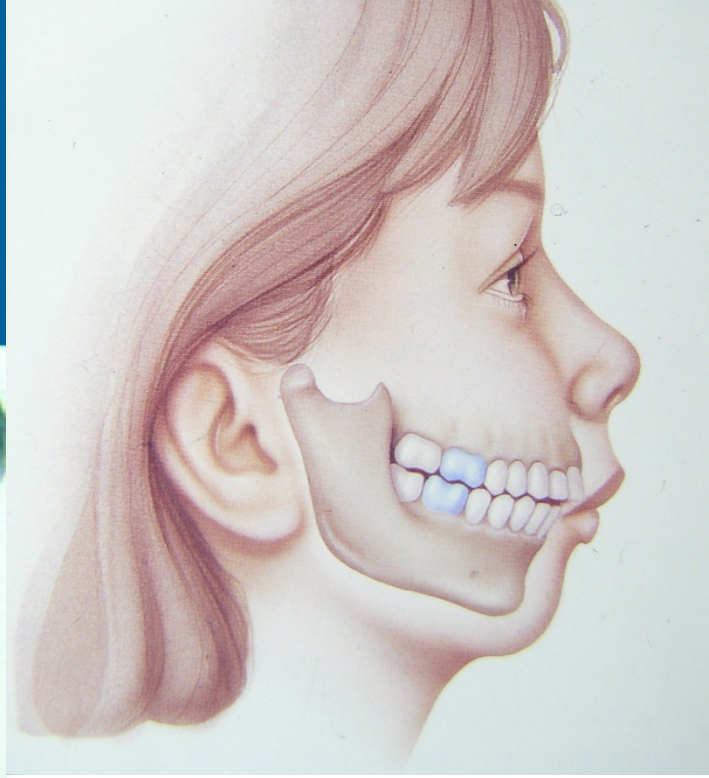
Incomplett lip closure

Often acquired anomalies (bad habit, tongue)



Angle II./2.

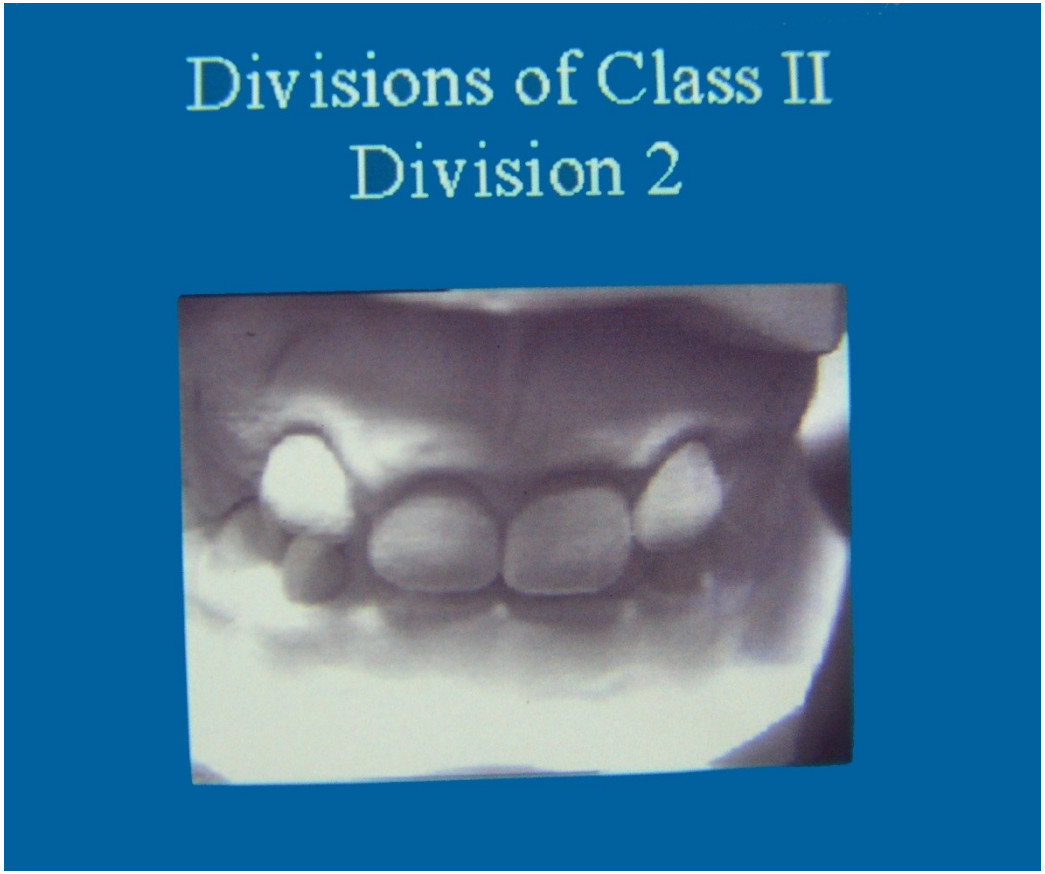


Distoocclusion
Overbite (always)
Retrusion of upper incisors

Divisions of Class II Division 2

Angle II./2

- Hereditary anomaly
- Excessive function of the upper lip
- Pronounced sulcus mentolabialis (deep bite)
- Nose breathing
- „Forced distooclusion”



Angle III – progenie - mesiocclusion

CLASS III MALOCCLUSION

Real III. class: macrogenia or anterior position of the mandible

ANTERIOR CROSSBITE

Pseudoprogeny: when the maxilla is responsible for the anomaly (micrognathia) or early contact of the cups forses the mandible forward (functional anomaly)

The six keys of occlusion (by Andrews) are:

- Molar inter-arch relationship
- Perfect mesio-distal crown angulation
- Perfect labio-lingual crown inclination = torque
- Absence of rotation
- Tight contacts
- No (or mild) curve of Spee

Angle **subdivion -** if the occlusion on the right side and left side are different

By narrowing of the arches
the lateral cusps forces the mandible to lateral direction
(functional assymmetry)

7.Number of teeth and sequence of dental eruption

- What is normal?
- Can we take advantage of the sequence of eruption? [redacted]
- Is the timing early or late?

Patient age 16 years: slow eruption and multiple impacted teeth

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       (TMJ, orofacial muscles, tongue position, respiration, habits)
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        - panoramic
        - cephalometric

3. Functional Examination

FUNCTIONAL EXAMINATION

- It is now established that normal function of stomatognathic system promotes normal growth and development of oro-facial complex.
- The functional examination should include the following;

1. Assessment of postural rest position and inter occlusal space.
2. Path of closure
3. Assessment of respiration
4. Assessment of TMJ
5. Examination of swallowing
6. Examination of speech

EVALUVATION OF SWALLOWING

In a new born, tongue is relatively large and protrudes between the gumpads and takes part in establishing the lip seal .this kind of swallow is called infantile swallow and is seen till one and half to two years of age .

Infantile swallow is replaced by mature swallow as the buccal teeth start erupting. The persistence of infantile swallowing can cause malocclusion .thus the swallowing pattern of the individual should be examined.

The persistence of the infantile swallow is indicated by the presence of the following features:

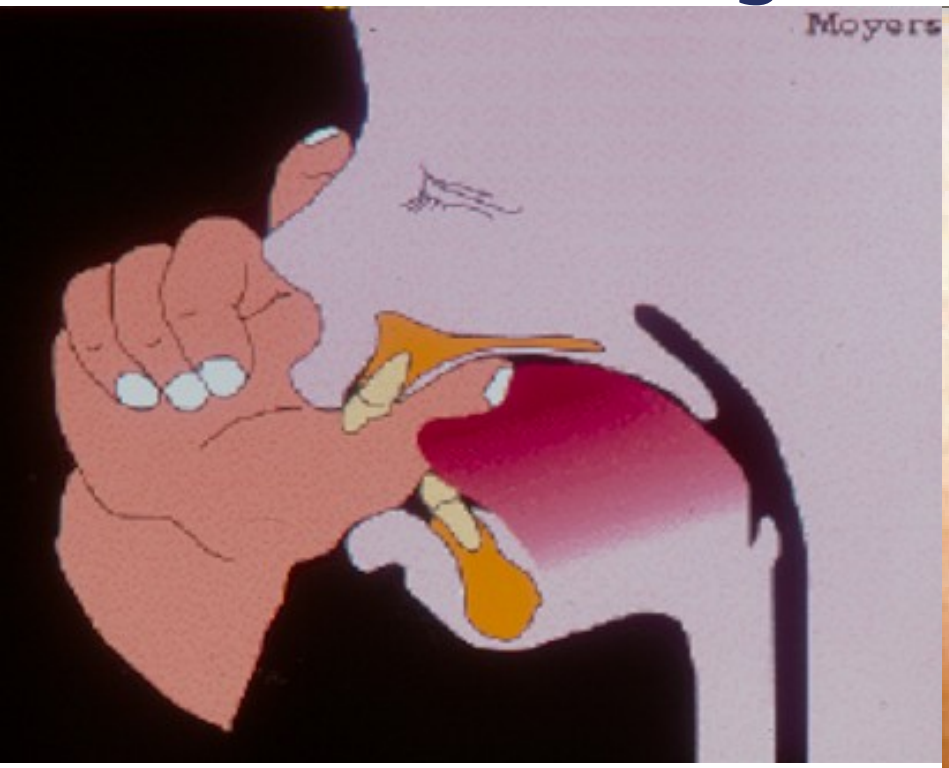
a. Protrusion of the tip of tongue
b. Contraction of perioral muscles during swallowing
c. No contact at the molar region during swallowing

Tongue –thrust swallow

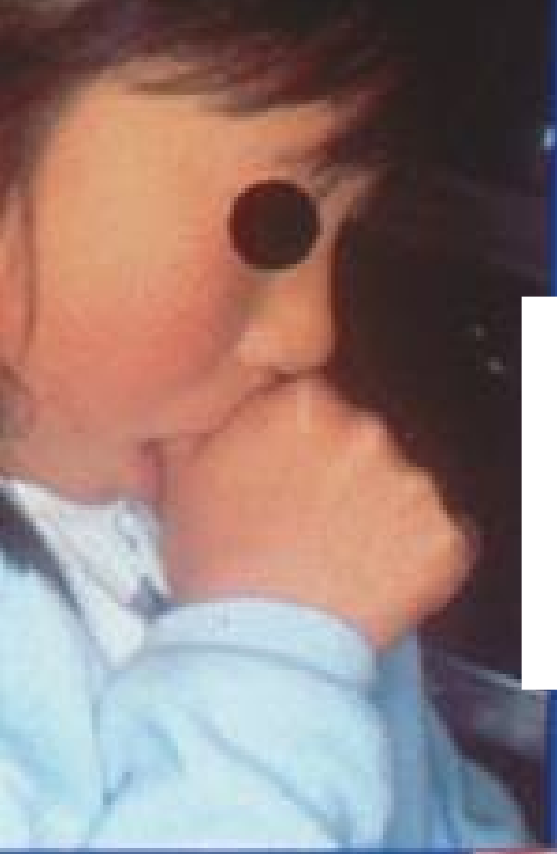
Orthodontic treatment and speech terapist

Lip-pressure swallow

Thumb sucking



Ujjszopás



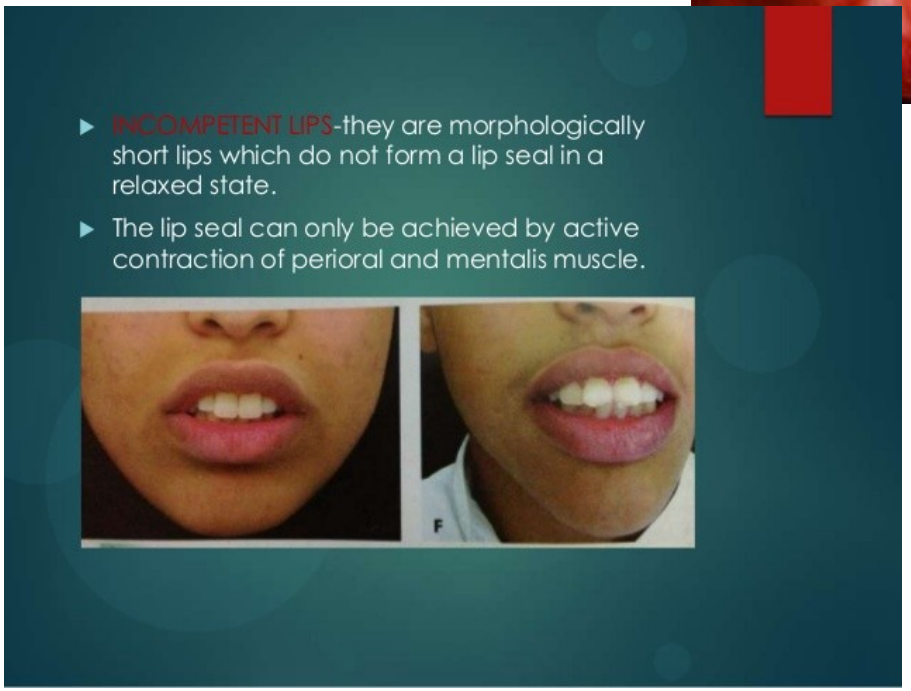
-Consequences of thumb sucking

-Open bite
-Protrusion of upper incisors
-Retrusion of lower incisors
- Distalocclusion

Mouth breathing

the nasal cavity is usually closed(nasal gland, polyp etc.)

Upper incisors are protruded
Open bite
Inflammated marginal gingiva



- **Observation** : in nasal breathers the external nares dilate during inspiration .in mouth breathers ,there is either no change in the external nares or they may constrict during inspiration

EXAMINATION OF T.M.J.

The functional examination should routinely include auscultation and palpation of temporomandibular joint and musculature associated with mandibular opening.

The patient should be examined for the symptoms of temperomandibular joint problems like clicking, crepitus , pain of masticatory muscles ,limitation of jaw movement , hyper-mobility and morphological abnormalities.

The maximum mouth opening is determined by measuring the distance between the maxillary and mandibular incisal edges with mouth wide open.
The normal inter incisal distance is 40- 45 mm

EVALUVATION OF PATH OF CLOSURE

The path of closure is the movement of mandible from the rest position to habitual occlusion .

- **Forward path of closure:** a forward path of closure occurs in patients with mild skeletal and prenormalcy or edge to edge incisor contact. In such patients ,the mandible is guided to a more forward position to allow the mandibular incisors to go labial to the upper incisors. III Class
- **Backward path of closure:** class 11 ,division 2 exhibit premature incisor contact due to retroclined maxillary incisors. Thus the mandible is guided posteriorly to establish occlusion
- **Lateral path of closure :** lateral deviation of mandible to left or right side is associated with occlusal prematurities and a narrow maxillary arch

SPEECH

Certain malocclusions may cause defects in speech due to interference with the movement of tongue and lips .this should be observed while talking with the patient .

The patient can be asked to read out from a book or asked to count from 1-20 while observing the speech.

Patients having tongue thrust habit tend to lisp while cleft palate patients may have a nasal tone

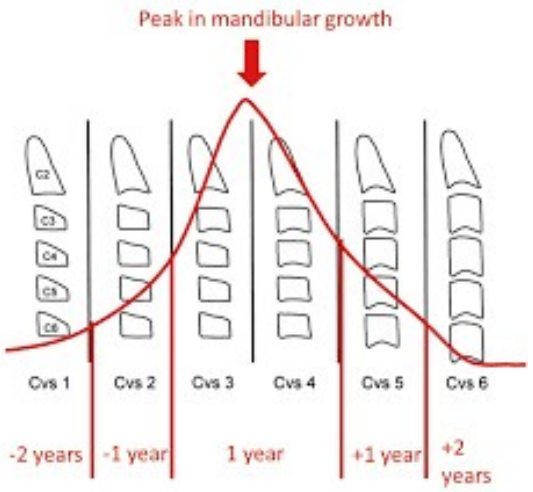
Maxilla – mandible, when?

- In CVMS 1 é CVMS 2 phase worth expanding the upperjaw

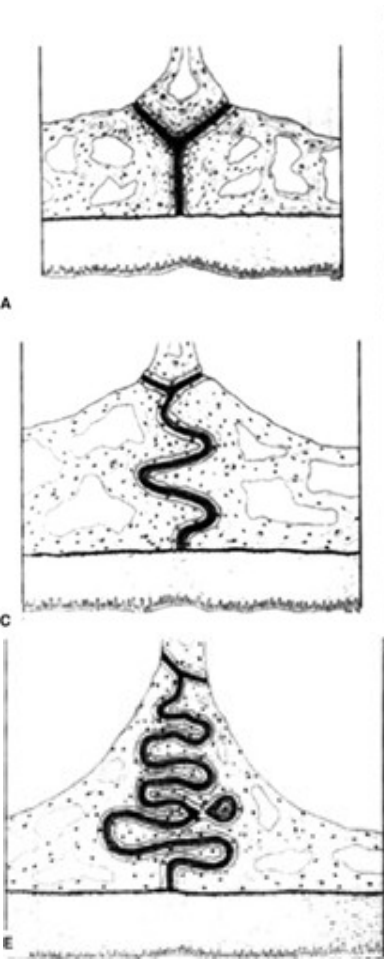
The application of the CVM method has revealed that:

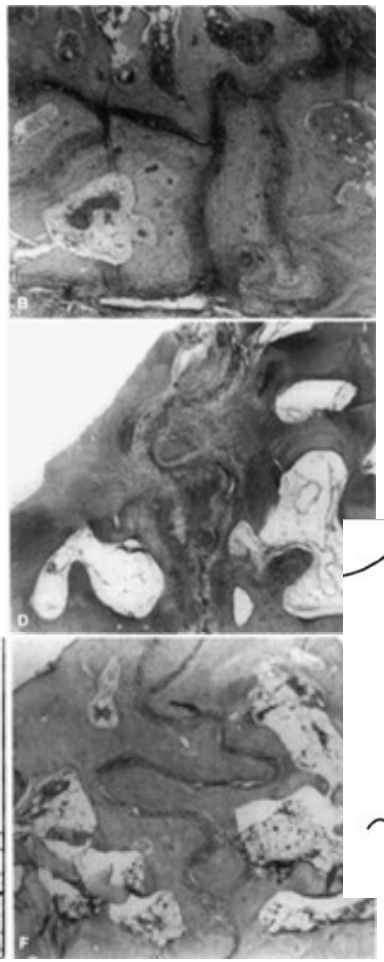
1. Class II treatment is most effective when it includes the peak in mandibular growth; CS3 – CS 4 and Cl III ttt to restrict mandibular growth
2. Class III treatment with maxillary expansion and protraction is effective in the maxilla on when it is performed before the peak (CS1 or CS2).
3. Skeletal effects of rapid maxillary expansion for the correction of transverse maxillary deficiency are greater at prepubertal stages,(CS1-CS2) while pubertal or post pubertal us of the rapid maxillary expander entails more dentoalveolar effects
4. Deficiency of mandibular ramus height can be enhanced significantly in subjects with increased vertical facial dimension when orthopedic treatment is performed at the peak in mandibular growth (CS3).

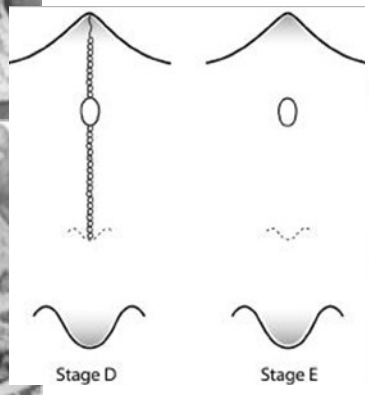
To summarize, effects of therapies aimed to enhance/restrict mandibular growth appear tc be of greater magnitude at the circumpubertal period during which the growth spurt occurs in comparison to earlier intervention,
while effects of therapies aimed to alter the maxilla orthopedically (maxillary protraction/maxillary expansion) are greater at prepubertal stages

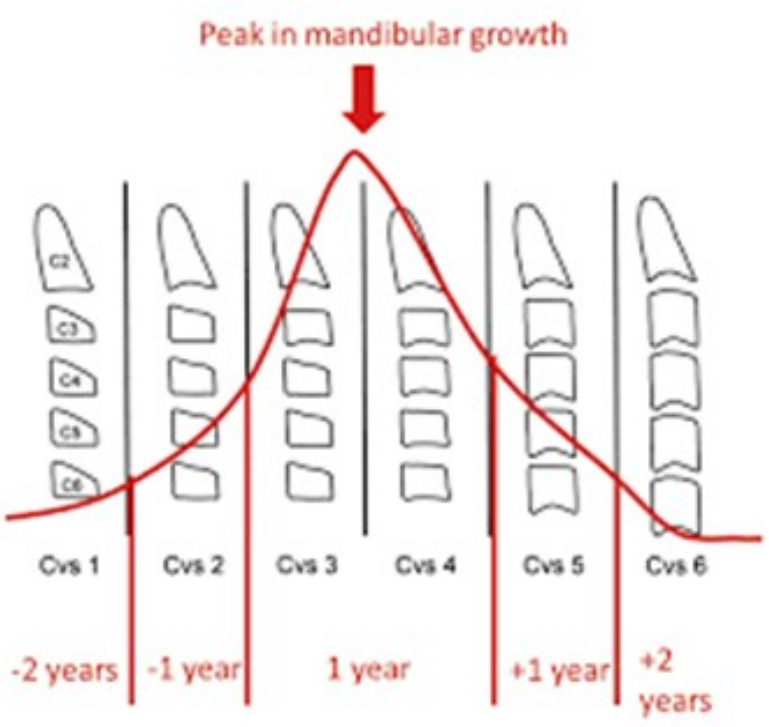


SUTURA PALATINA MEDIANA CSONTOSODÁSA



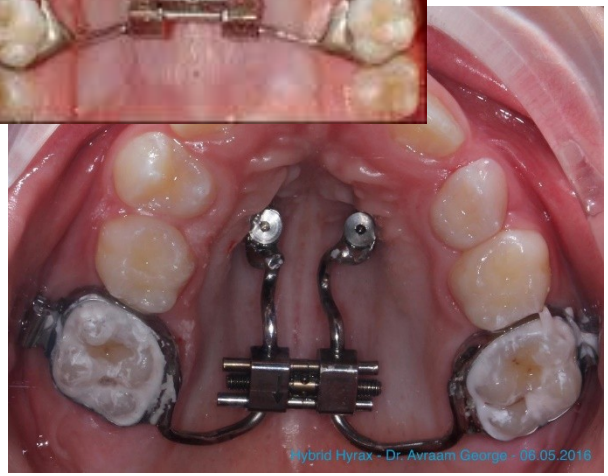






Dr Juhász Fanni és Dr. Szegedi Levente vizsgálata

Rögzített tágító készülékek



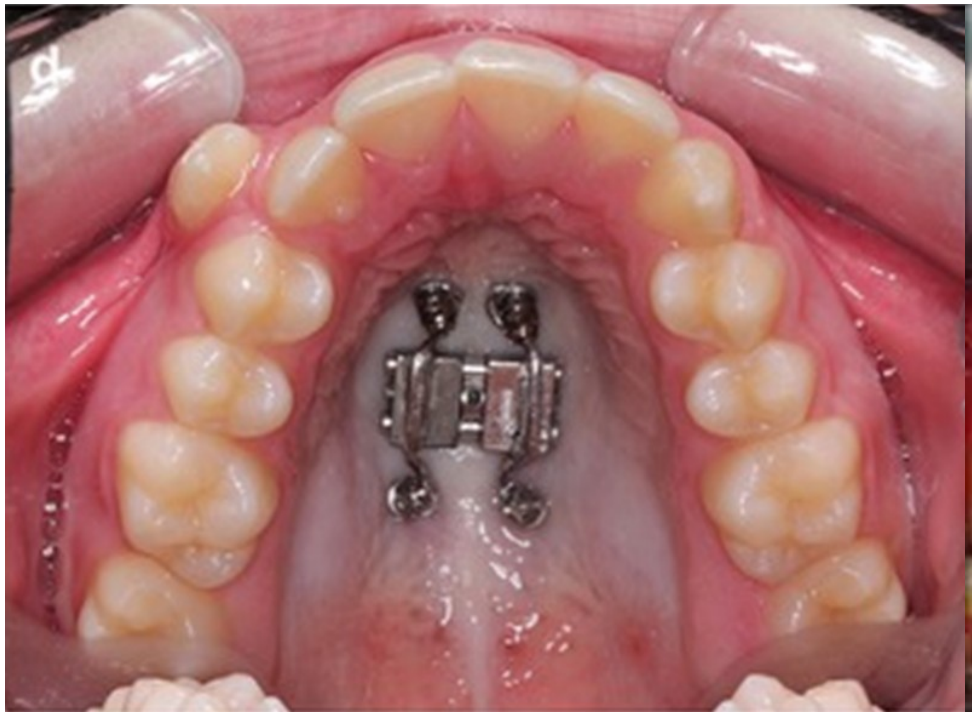
Szkeletális tágítás !!
- Hyrax
- Hibrid-hyrax
- Microfour, microsix
- Dystractor

Hibrid hyrax

CVMS 4-5 fázisban még alkalmazható a maxilla tágítására ?

Dr Juhász Fanni és Dr. Szegedi Levente vizsgálata

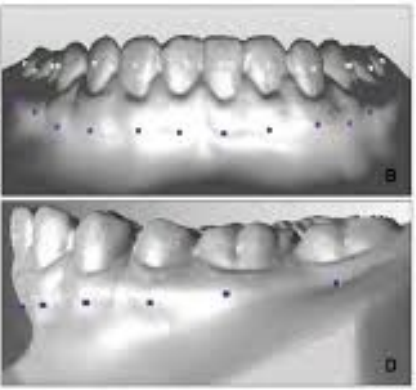
Micro-2, micro-4

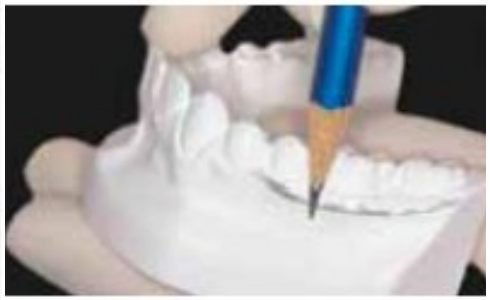


Indexes

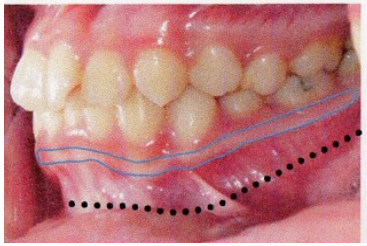
- WALA analysis
- Space analysis (Steiner)
  - Moyers-index (mixed dentition)
- Pont-index
- Schmuth-index
- Bolton analysis

WALA analyzis - WALA ridge

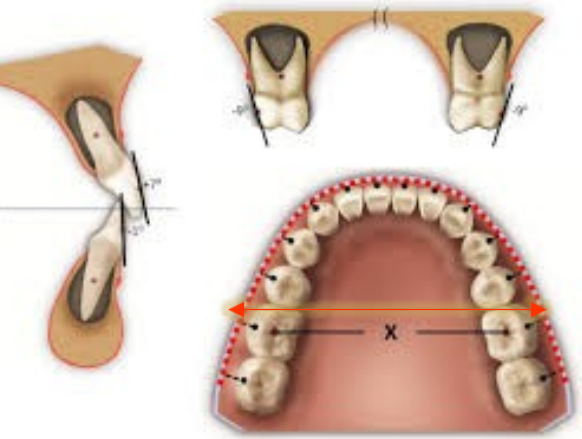


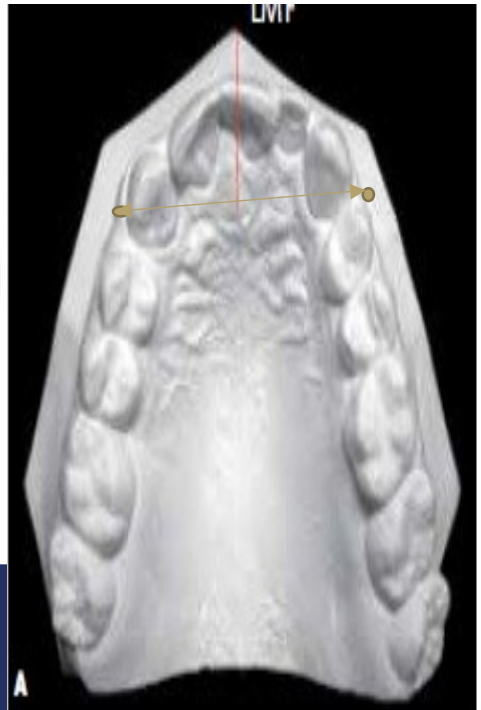


IGURE 2 - Demarcation of the WALA ridge
ıade with a graphite surface.



← Andrews WALA ridge placement
← line of vestibular fornix (typically over apical 1/3 of roots)





The distance between the “outermost” point of the process alveolar of lowers molars and the distance between the center of lower molars (or mesiopalatinal cusps of upper molars) között

The difference is 13,5 mm.

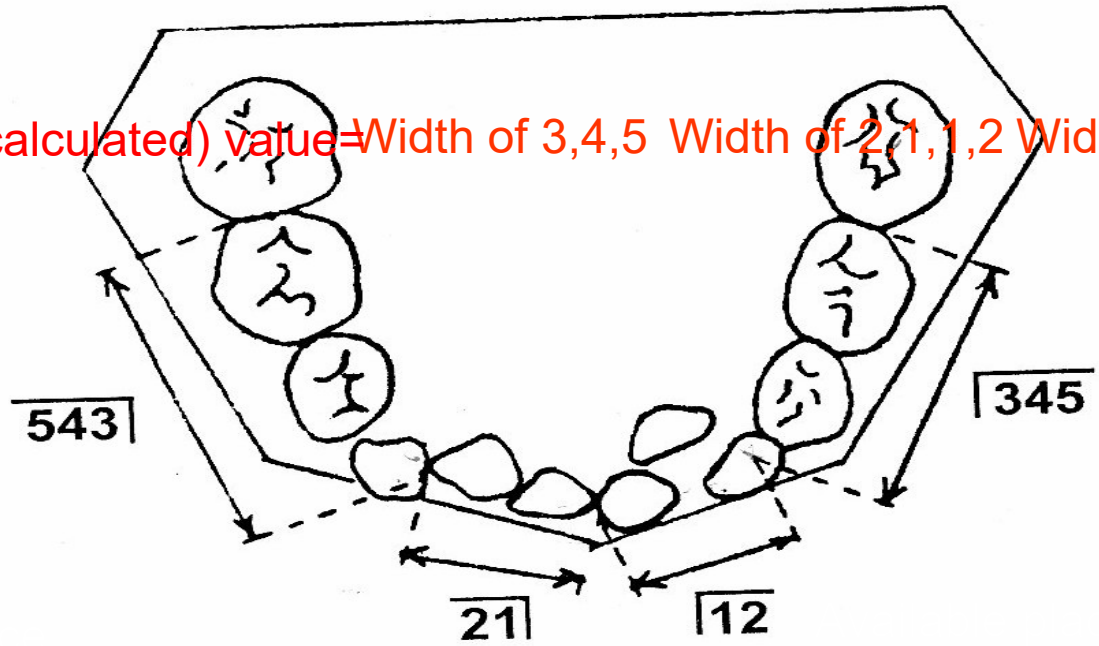
The study shows how much can be conservatively expanded in a dental arch (quad-helix, transzpalatinal bar, removable appliances).

Is this crowding a concern?

space analysis we compare the necessary (calculated) place with the
(available) place in the denture

Steiner

Necessary (calculated) value=Width of 3,4,5 Width of 2,1,1,2 Width of 3,4,5



A RENDELKEZÉSRE ÁLLÓ HELY

			12	345
MEGLÉVŐ HELY			9,5	20
SZÜKSÉGES HELY	24	12	11,5	23
KÜLÖNBÖZET	−2	−1	−2	−3
TEK ÖSSZEGE	−3		−5	

vailable(measured) val

Calculated value

Difference

Sum of differences

Place analysis

- The lower jaw is more important, because we are not able to increase the size of the mandible !!!

Inferences

Difference between the measured & calculated values determines the needs for expansion

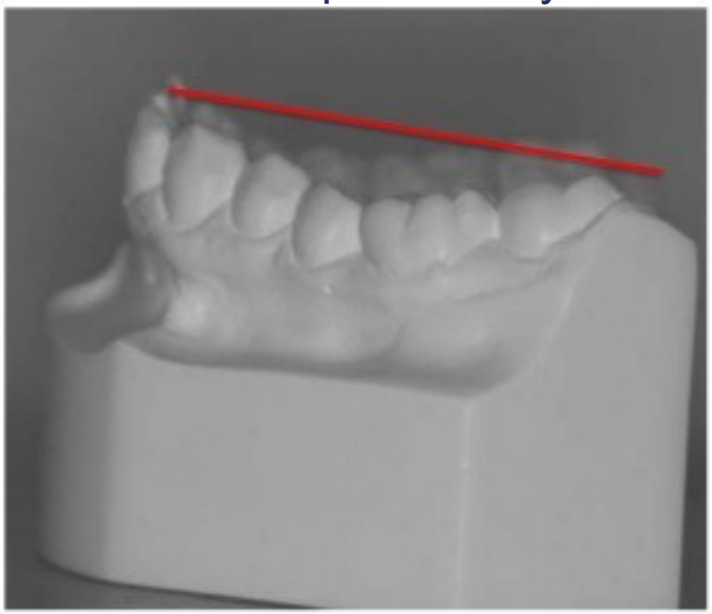
1) if measured value is less, expansion is required or extraction

2) if measured value is more, no need for expansion

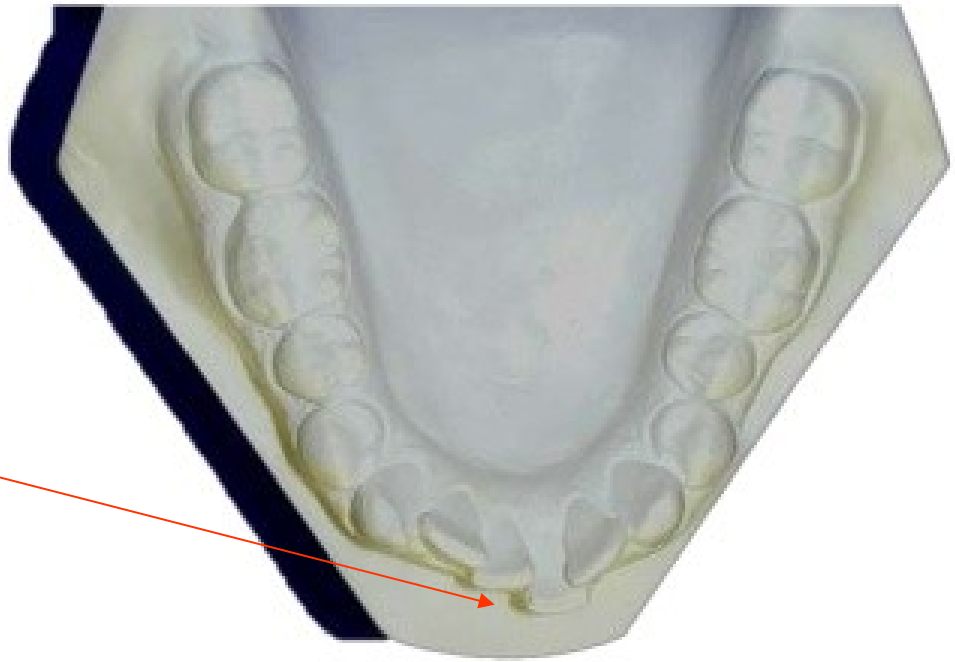
Curve of spee

- Flat (normal)
- Deep. Probably a skeletal malocclusion

place analysis



- There are different factors to consider



- Inclination of the lower incisors
- Non-apparent available space (non anatomic restorations)

MOYER'S MIXED DENTITION ANALYSIS

In mixed dentition we don't know the size of the permanent canines and premolars

according to Moyer a high correlation exists among the sizes of different groups of teeth in an individual thus by measuring one group of teeth, it is possible to make a prediction of the other group of teeth

incisors

MOYERS MIXED DENTITION ANALYSIS

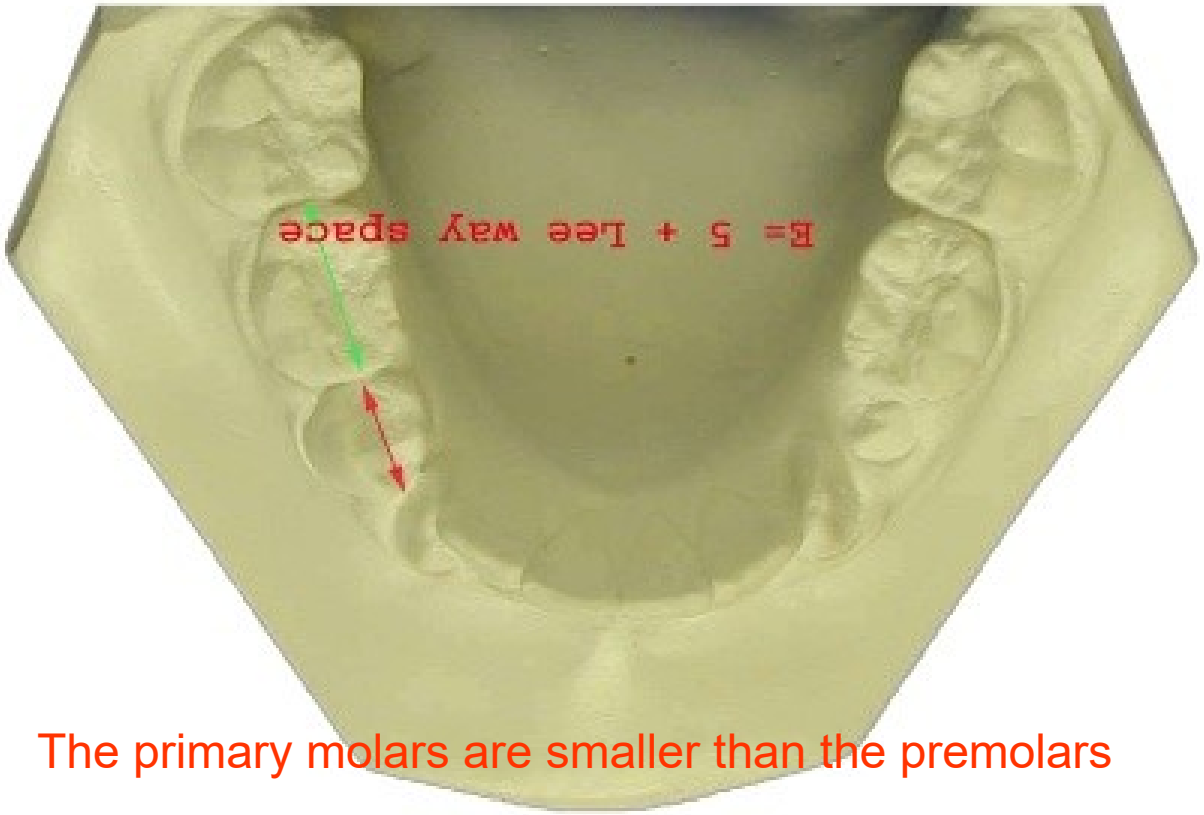
- The purpose of a mixed dentition analysis is to evalute the amount of space available in the arch for the erupting permanent canines and premolars. In this analysis the size of the unerupted permanent cuspids and premolars are predicted from the knowledge of the sizes of incisors

Moyers- index

Total mandibular incisor width	width of 345
19.5	20.6, 20.1
20.0	20.9,20.4
20.5	21.2,20.7
21.0	21.3,21.0
21.5	21.8,21.3
22.0	22.0, 21.6
22.5	22.3,21.9
23.0	22.6,22.2
23.5	22.9, 22.5
24.0	23.1, 22.8

Leeway space

Mixed dentition

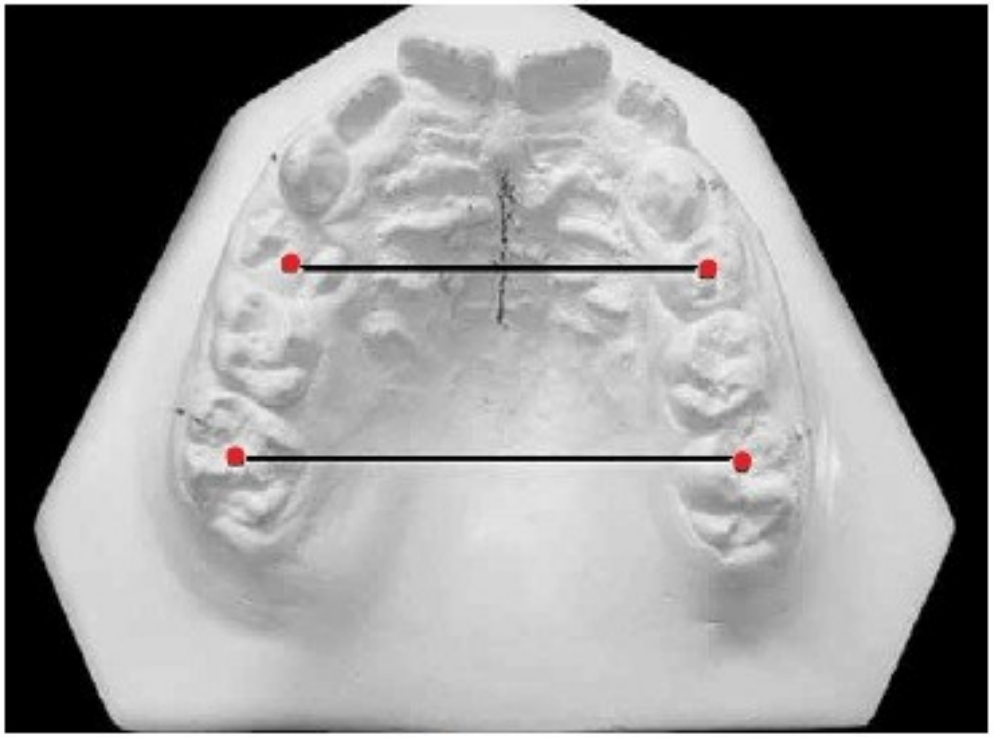


The primary molars are smaller than the premolars

The control and utilization of the Leeway space is really important

PONT'S ANALYSIS

- Pont's in 1909 presented a system whereby mere measurement of Incisors automatically gives width of the arch in premolar &molar region



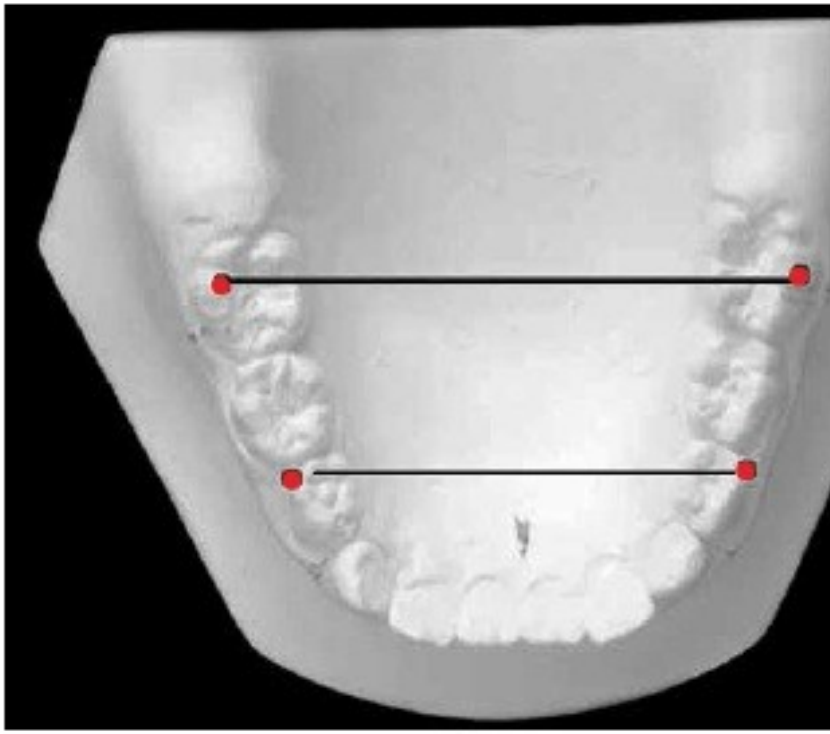


Figure 2 - Mixed or deciduous dentition measuring points.

Pont-index

Procedure

We have to decide how to create place = expansion or extraction ?

- The greatest width of incisors is measured with calipers recorded on a line, & their sums when recorded in millimeters this is termed as *"sum of incisors" (SI)*

SI = summa incisivum

- *Calculated premolar value (CPV)*

  The expected arch width in the premolar region is calculated by formula:-

$$\frac{SI \times 100}{80}$$

- *Calculated molar value (MV)*

  The ideal arch width

  the expected arch width in the molar region:-

$$\frac{SI \times 100}{64}$$

Pont-Index

- If the difference between the optimal premolar, molar distance and the measured premolar, molar distance (on the model) is less then 5 mm EXPANSION
- If the difference between the optimal premolar, molar distance and the measured premolar, molar distance (on the model) is more then 8 mm EXTRACTION
- Between 5-8 mm BORDERLINE CASE

Modell analysis

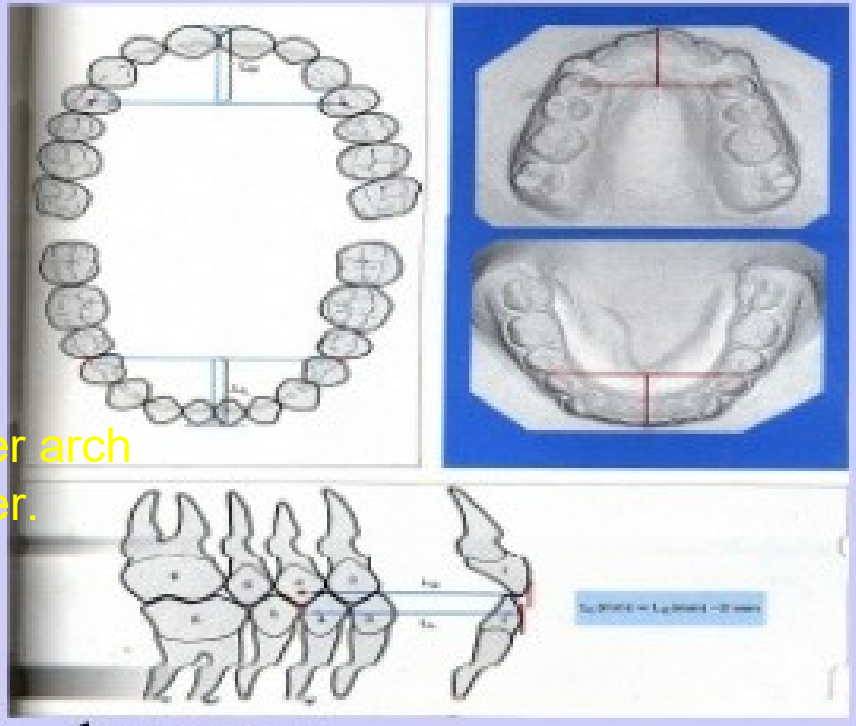
- ***KORKHAUS ANALYSIS***-This is similar to pont's analysis. According to this,for a given width of upper incisor,a specific value of the distance b/n midpoint of inter premolar line to point in b/n the max.incisor exist.

INFERENCE-Increase in this measurement denotes proclined upper anteriors, while reduced value indicates retroclined upper anteriors.

Ideal upper anterior length:

$$\frac{SI \times 100}{160}$$

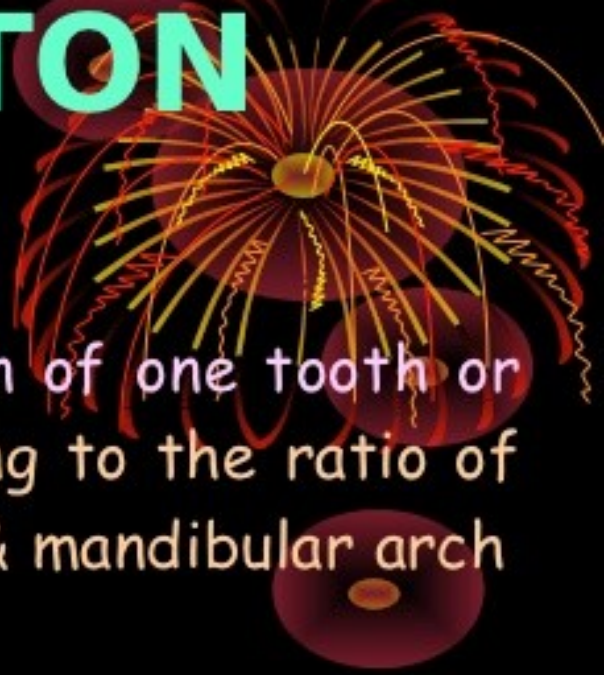
The optimal length of the lower arch
Is 2 mm shorter than the upper.



S.No.	Sum of Incisors (in Mms)	Arch Width in Premolar region (in Mms)	Arch Width in Molar Region (in Mms)	Perpendicular Distance from Incision to Inter-premolar line (in Mms)
1.	27	32	41.5	16
2.	27.5	32.5	42.3	16.3
3.	28	33	43	16.5
4.	28.5	33.5	43.8	16.8
5.	29	34	44.5	17
6.	29.5	34.7	45.3	17.3
7.	30	35.5	46	17.5
8.	30.5	36	46.8	17.8
9.	31	36.5	47.5	18
10.	31.5	37	48.5	18.3
11.	32	37.5	49	18.5
12.	32.5	38.2	50	18.8
13.	33	39	51	19
14.	33.5	39.5	51.5	19.3
15.	34	40	52.5	19.5
16.	34.5	40.5	53	19.8
17.	35	41.2	54	20
18.	35.5	42	54.5	20.5
19.	36	42.5	55.5	21

Korkhaus Measurements.

WAYNE A. BOLTON ANALYSIS



Bolton pointed out that the extraction of one tooth or several teeth should be done according to the ratio of tooth material between the maxillary & mandibular arch

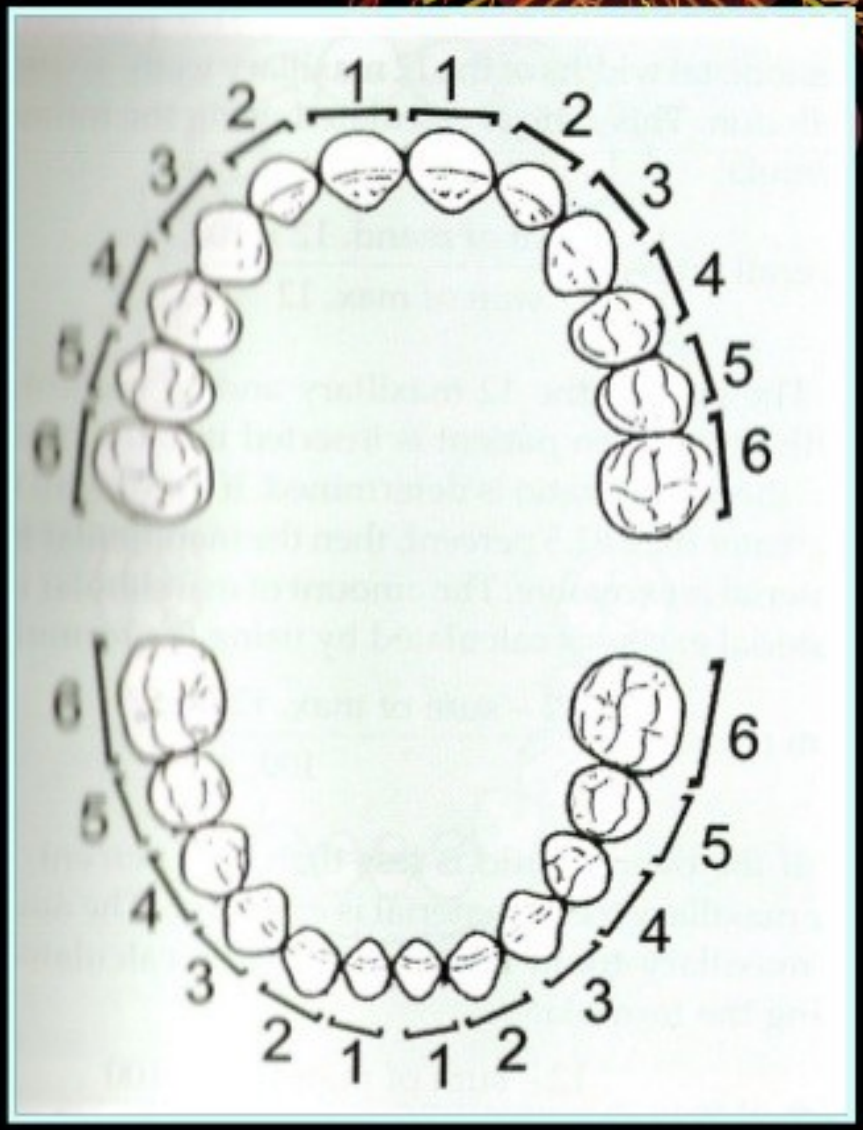
to get ideal interdigitation, overjet, overbite & alignment of teeth

to attain an optimum interarch relationship

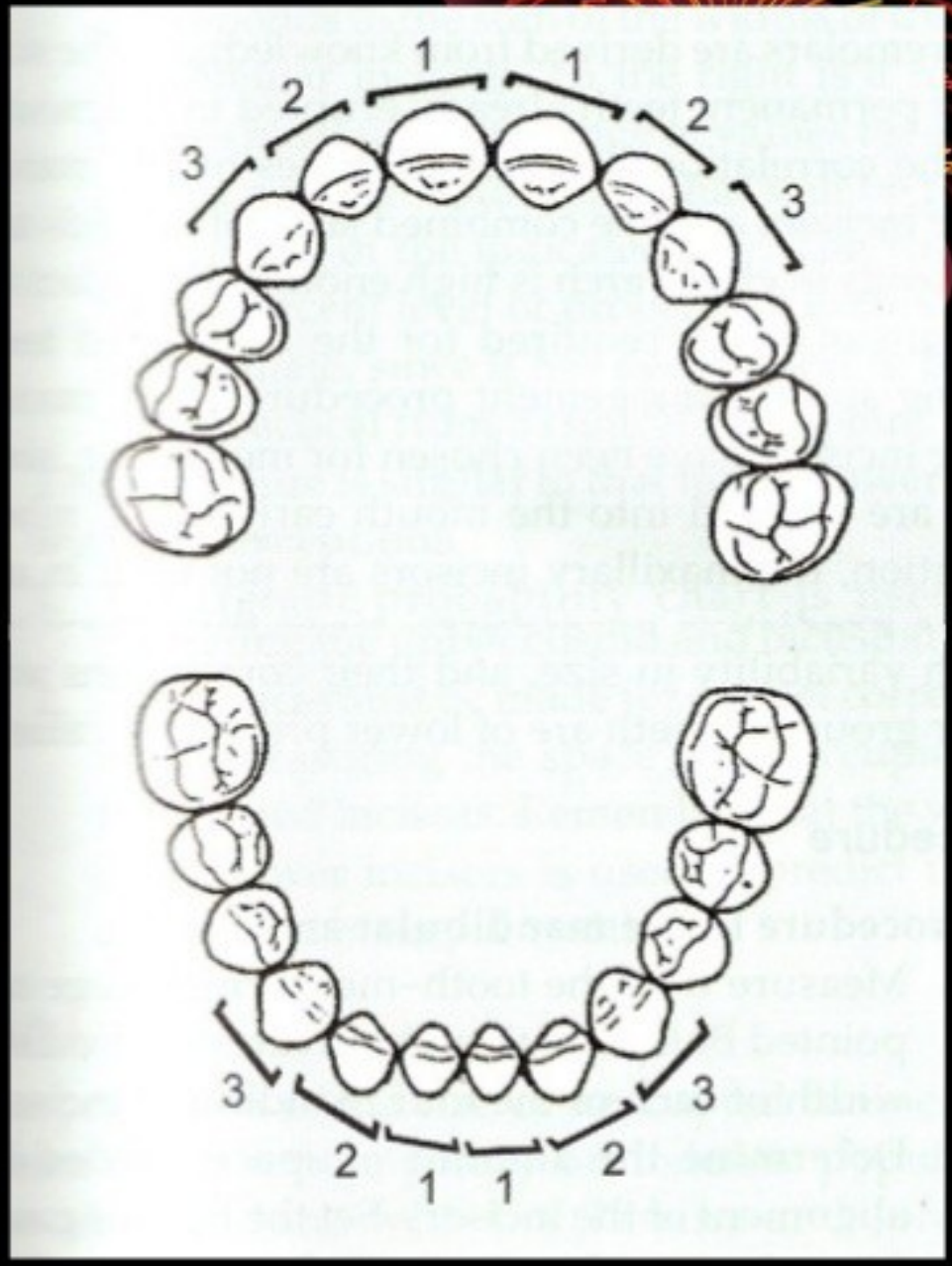
Bolton's analysis helps to determine the disproportion between the size of maxillary & mandibular teeth

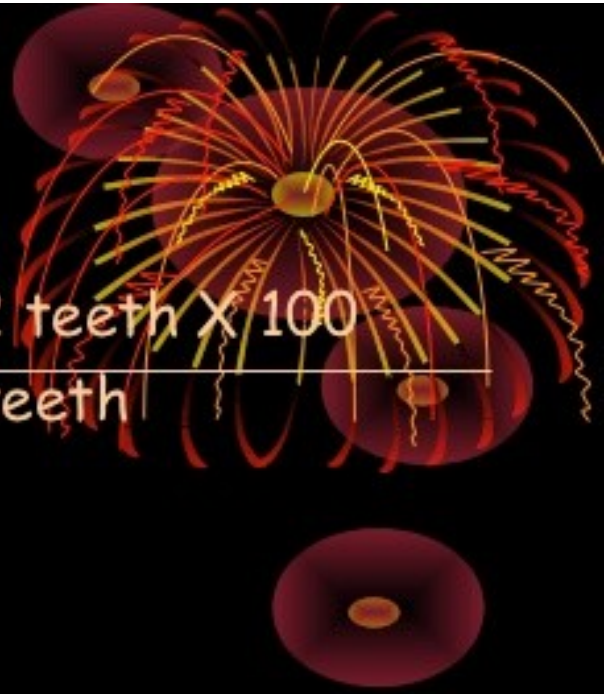
PROCEDURE

the sum of mesiodistal diameter of the 12 maxillary teeth & the sum of the mesiodistal diameter of the 12 mandibular teeth are determined



In same manner the sum of 6 maxillary anterior teeth & the sum of 6 mandibular teeth is determined.





OVERALL RATIO:-

$$\frac{\text{sum of mesiodistal width of mandibular 12 teeth X 100}}{\text{sum of mesiodistal width of maxillary 12 teeth}}$$

MEAN = 91.3%

89.5%-93,1%, normal range

ANTERIOR RATIO:-

$$\frac{\text{sum of mesiodistal width of mandibular 6 teeth X 100}}{\text{sum of mesiodistal width of maxillary 6 teeth}}$$

MEAN = 77.2%

75.5%-78,9% normal range

INFERENCES:-

- If the ratio is more than mean value, then the mandibular tooth material is excessive

- If the ratio is less than mean value, then the maxillary tooth material is excessive

Bolton prefers to do proximal stripping on the upper arch if the upper anterior tooth material is in excess &

extraction of lower incisor, if necessary, to reduce tooth material in the lower arch

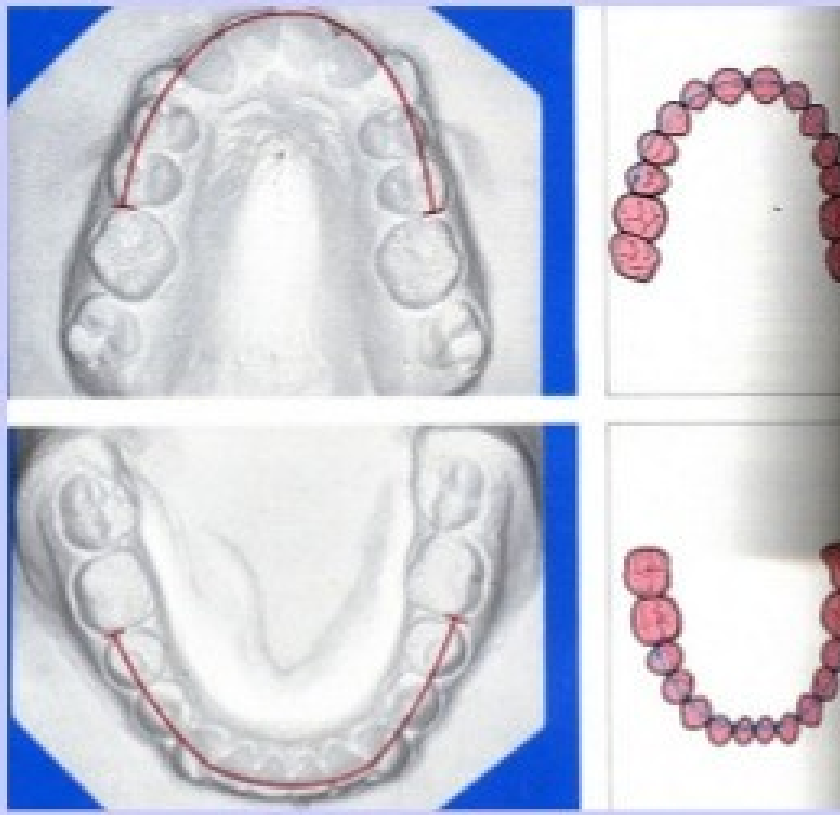

Thank you for your attention !

- ADDRESS AND OCCUPATION-recording of address and occupation helps in evaluation of socio-economic status of the patient and the parents.
- CHIEF COMPLIANT -the patient's chief compliant should be recorded in his/ her on words.
- This help the clinician in identifying the priorities and the desires of the patient.

CAREY'S ANALYSIS /ARCH PERIMETER ANALYSIS

Carey's Analysis helps in determinining the extent of discrepancy b/n arch length & tooth material discrepency.it is performed in lower cast & same on upper is called arch – perimeter analysis.

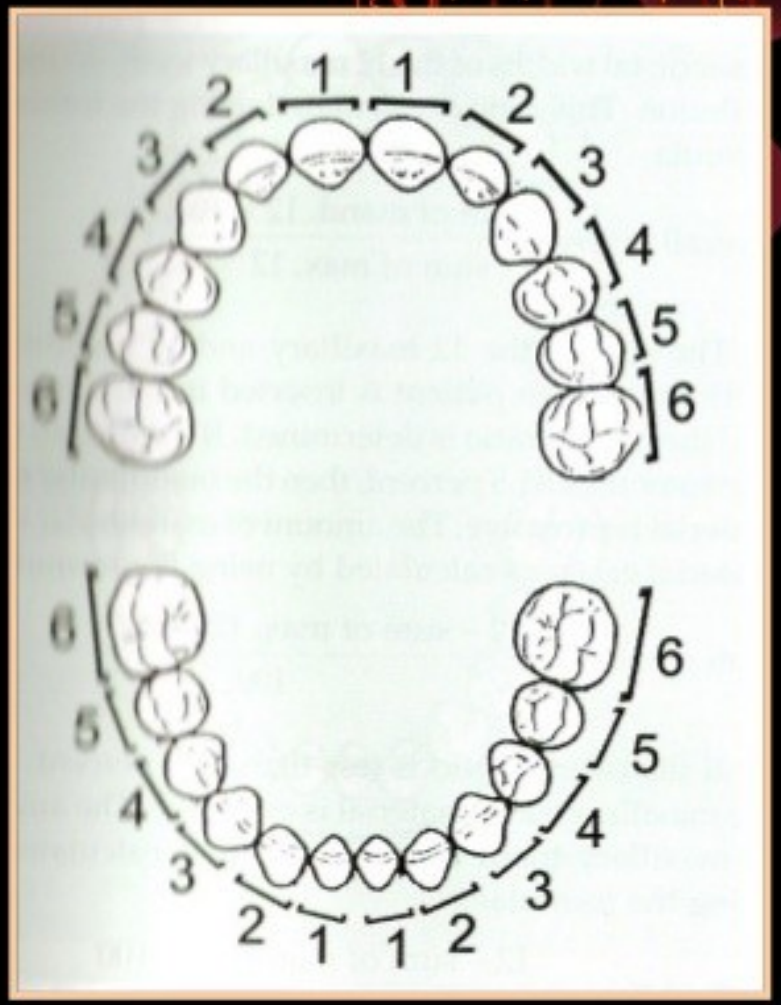
The arch anterior to the first permanent molar is measured using soft brass wire touching mesial surface of 1 st molar of one side and passed over buccal cusps of the premolar&along anteriors & is continued opposite side first molar



PROCEDURE

TTM:- Total Tooth Material

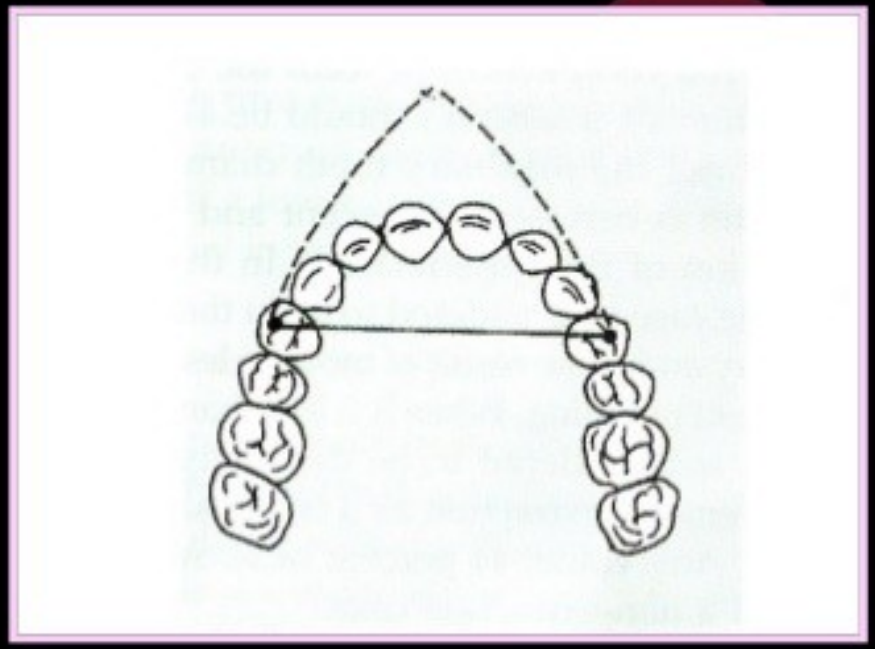
Refers to sum of the mesiodistal width of the teeth from first molar to first molar



PMD:- Premolar Diameter

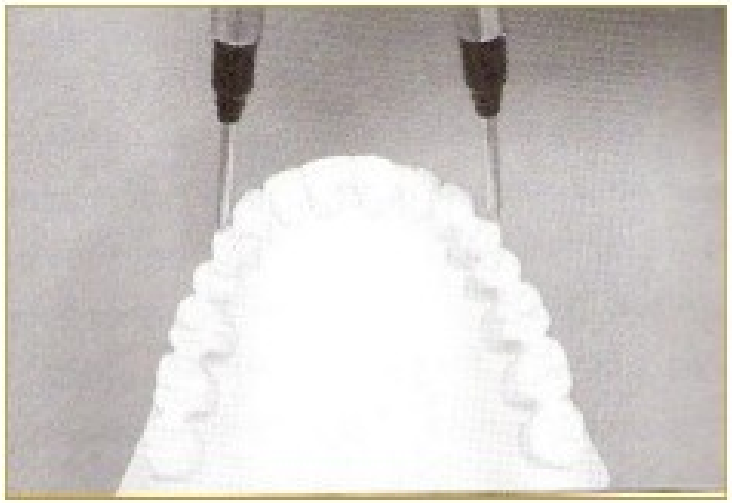
Coronal base

arch width measured from the buccal cusp tips of the first premolar on one side to the buccal cusp tip on other side



- Determination of first bicuspid coronal arch width.(**BIC.W)**

  This measurement is the distance between the summits of the buccal cusps of the first bicuspids.



PMBAW:-Premolar basal ach Width

Apical base

measured from the root apices of the first premolar on one side to the first premolar on other side

- Determination of **basal arch width(B.A.W)** above the maxillary first bicuspids and below of mandibular first bicuspids.
- Basal arch width will be greater than the coronal arch.

INFERENCES

If PMBAW > PMD :-

indication that basal arch is sufficient to allow expansion of premolars

If PMD > PMBAW :-

can be three possibilities

1) contraindicated for expansion
2) move teeth distally
3) extract some teeth

If PMBAW X100 / TTM

a) less than 37% ⟶ require extraction

b) if 44% an ideal case ⟶ extraction not require

c) if between 37-44% (border line case) ⟶ may or may not require extraction

ASHLEY HOWE'S ANALYSIS

Howe's considered tooth crowding to be due to deficiency in arch width rather than arch length

He found a relationship to exist between the total width of mesiodistal diameter of teeth anterior to the second permanent molar & the width of the dental arch in the first premolar region