Def:

as that phase of science and art of orthodontics employed to recognize and eliminate the potential irregularities and malpositions in the developing dentofacial complex.

(by the American Association of Orthodontists 1969)

It include:

- Crowding
- crossbite
- Space regaining
- Midline diastema
- Orthopedic guidance
Incisal liability

Permanent incisor being larger than their deciduous counterparts results in crowding.

Crowding may resolve:

- **Interdental spacing** - when permanent incisors erupt, deciduous canine shift laterally to align themselves and relieve crowding. If interdental spacing is absent, shift is not possible.
- **Intercanine arch width**: increase by 6 mm in maxilla and 4 mm in mandible
- **Inclination of the permanent incisors**: forward inclination
- **Ratio of size between permanent and primary teeth**
MANAGEMENT OF CROWDING

1. Observation: crowding < 2mm will correct themselves
2. Disking of primary tooth
   - Space required ≤ 3-4mm
   - Grinding mesial surface of canine
3. Extraction of teeth → Serial extraction
   → Timely extraction
   → Wilkinson's extraction
   → Balancing extraction
## SERIAL EXTRACTION

### HISTORY

- **initiated** - Bunon (1743)
- **coined** - Kjelgren (1929)
- **popularised** - Nance (1940)

(father of serial extraction)
DEF:
Dewel (1967) orderly removal of selected primary and permanent tooth in a predetermined sequence.
current concept: as a correctly timed planned removal of certain deciduous and permanent teeth in mixed dentition stages with dentoalveolar disproportion i.e. teeth to supporting bone imbalance in order to:
A) alleviate crowding of incisor teeth
B) allow unerupted teeth to guide themselves to improved positions
C) lessen the period of active appliances therapy
or eliminate it
INDICATIONS

1. Class I with anterior crowding
2. Arch length deficiency
   a. lingual eruption of L1.
   b. midline shift potential - unilateral canine loss
   c. crowded upper and lower anteriors
   d. lack of physiologic spacing
   e. anomalies like ankylosis, ectopic eruption
   f. lower anterior flaring
   g. abnormal primary canine root resorption
3. Patients with straight profile and pleasing appearance
CONTRAINDICATIONS

1. Mild to moderate crowding
2. Congenital absence of teeth providing spaces
3. Extensive caries of 1st perm molar
4. Open bite / deep bite
5. Severe class II or III
6. Cleft lip / palate
7. Midline diastema
8. Spaced dentition
9. Anodontia/oligodontia
Procedures
1. Dewels method
2. Tweeds method
3. Nance method
4. Dales method

1. Dewels method
   sequence: cd4
2. Tweeds method
   sequence: d4c
3. Nance method
   1st - D    2\textsuperscript{nd} - C+4
4. Dales method

Advantages of serial extraction
- further appliance therapy is minimized /eliminated
- more physiologic
- reduces the duration of multibanded fixed treatment
- Psychologic trauma associated with malocclusion can be prevented
• Better oral hygiene possible

**DISADVANTAGES**

• Often followed by fixed appliance therapy
• Used only selectively in class II malocclusion
• Lack of patient cooperation
• Canines may remain impacted
• Chances of developing anterior deep bite with extraction of buccal teeth.
• Ditching:
TIMELY EXTRACTION
(BY STEMM 1973)

- Similar to serial extraction
- No perm teeth are removed
- Sequential removal of deciduous teeth
38.8a Timely extraction—Pretreatment

Fig. 38.8b Post-treatment
- WILKINSONS EXTRACTION
  extraction of all 1st permanent molar
- BALANCING EXTRACTION
  to avoid shift of midline to extraction space
CLASSIFICATION:
- Anterior /posterior
- Unilateral/bilateral
- True/functional
- Combination

ANTERIOR CROSSBITE
Should be treated as it is:
- Self perpetuating (deciduous→mixed→permanent)
- Leads to skeletal malocclusion → ortho treatment and surgeries
- Traumatic occlusion → stripping of gingival tissue → pocket formation , unsightly wear facets
TREATMENT

1. **Occlusal equilibrium**: remove premature tooth contacts - incisal grinding

2. **Tongue blade therapy**:  
   Simple tooth anterior crossbite

3. **Lower inclined plane (by catalan)**
   
   Disadvantage
   - possibility of opening bite by wearing it longer than 2 or 3 weeks
   - exact amount of labial movement is not predictable
4. Stainless steel crown
5. Composite incliners
6. Removable hawleys appliance - with z springs - wear 24 hrs a day
7. Fixed appliance-lingual arch or auxiliary springs with lingual or palatal arches
POSTERIOR CROSSBITE TREATMENT:

- Occlusal equilibrium (bilateral lingual crossbite)
- Removable W arch appliance (bilateral dental crossbite conditions)
- Cross elastic appliance (unilateral crossbite) disadvantage - patient cooperation, ↑d armamentarium
• Removable hawleys appliance with offset jackscrew (two teeth unilateral dental crossbite)
  → appliance should be worn for retention
Skeletal correction-2forms
   a. Slow palatal phase
   b. Rapid palatal phase

Appliance used are:
   - minnesota expander
   - hyrex jackscrew
   - fixed splint palate acrylic appliance
Space maintenance is necessary in early loss of posterior primary teeth because it contributes to development of occlusal disharmonies. So when space is lost, therapy should be done to regain it. Considerations:
- Alignment and space needs of the other teeth in the arch
- The relationship of teeth to denture base
- The transverse and sagittal dental relationship
- The vertical relationship
FIXED SPACE REGAINER

1. Gerber space regainer
   - short appointment
Fig 5 Gerber's space regainer
2. Opencoil space regainer
   used in mandibular arch when the first premolar has erupted into oral cavity
   → molar band on 1st permanent molar - molar tubes
   - requires no lab work
3. Hotz lingual arch
   advt: it facilitate frequent removal of the arch for the purpose of activation
4. Sectional arch technique
   - Upto 4mm space can be regained
   - Used when 2\textsuperscript{nd} molar has erupted

5. Lip bumper
   - Used when bilateral movement is required

6. Anterior space regainer

REMOVABLE SPACE REGAINER

1. Free end loop space regainer

2. Split saddle / split block space regainer
   - Acrylic block is split buccolingually and joined by no 0.025 wire in the form of a buccal and lingual loop
3. Sling shot space regainer:
Here distalizing force is produced by the elastic stretched on the lingual surface of the molar to be moved.

4. Jack screw
Encorporates expansion screw in edentulous space
as the space greater than 0.5 mm between proximal surface of adjacent teeth.

ETIOLOGY AND TREATMENT PLAN

1. Normal developing dentition
   - resolves by itself with eruption of permanent canines
2. Familial evidence
   - appliance therapy
3. Parafunctional habits
   - correction of habits
   - habit breaking appliance
4. Tooth size discrepancies
   a) excessive anterior vertical overlap
b) retrognathic or prognathic mandible

5. Frenum attachments

6. mesiodistal angulation of tooth
   correction of crown angulation

7. tooth anomalies
   supernumerary tooth - removal + closure of diastema
   peg shaped laterals - orthocorrection + esthetic correction
   absence of laterals - fixed prosthesis + ortho treatment
APPLIANCE THERAPY

I. Removable appliance
   - active plate incorporating palatal finger springs or modified cantilever spring
   - Split labial bow
   - Hawleys plate with an active labial bow

II. Fixed appliance
    long term retention needed
Helps in improving aberrant muscle function

**MASSETER MUSCLE**

- clenching of teeth by the patient while counting to ten. Repeat this for some duration of time.

**LIPS**

- stretching of upper lips
- holding and pumping of water back and forth behind the lips
- massaging of the lips
- button pull exercise
- tug of war exercise
EXERCISE FOR THE TONGUE

1. One elastic swallow
   - 5/16 inch intra oral elastic plastic placed on tip of tongue
   - pt asked to raise the tip of tongue and hold the elastic against the rugae area and swallow

2. Tongue hold exercise
   - elastic over tongue in a designated spot with lips closed
   - pt is then asked to swallow with elastic in place and lips apart.
3. Two elastic swallow
   - two elastic are placed in tongue-1 in midline and 2\textsuperscript{nd} on tip
   - pt asked to swallow with the elastics in position

4. The hold pull exercise
   - the tip of tongue and the midpoint are made to contact the palate and the mandible is gradually opened
   - helps in stretching the lingual frenum
SURGICAL REMOVAL OF SOFT TISSUE/BONY BARRIER

- Surgical exposure of crown for unerupted tooth
- Excise soft tissue and remove any bone overlying the crown
- Surgical wound given a cement dressing for a period of 2 weeks
A functional appliance can be defined as a removable appliance which favourably changes the position of the soft tissue environment.

by frankel

CLASSIFICATION

- Removable
- fixed
- Tooth borne passive  eg:bionator
tooth borne active  eg:clarks twin block
tissue borne  eg:frankels functional regulator
Components include

1. Eruption bite plane
2. Linguo-facial muscle balance → shields and crowns
3. Mandibular repositioning-construction or working bite.

INDICATIONS:

1. Use of functional appliance alone
   → mild skeletal discrepancy, proclined upper incisors, no dental crowding
2. Use of functional appliance + fixed appliance
   → to improve anteroposterior relationship
   → useful in class II cases
3. Interceptive treatment
   → utilises growth enhancing effect
   → reduce the prominence of proclined upper incisors
COMMON APPLIANCE IN USE

1. ACTIVATOR

   Monobloc-Robin 1902
   Modified-Andresen 1936
   Activator 1957

INDICATION:-

   Class II DIV I AND DIV II
   CLASS III
   OPEN BITE

CONTRAINDICATION:-
Crowding
Individual tooth movements

DURATION OF USE:-
- Overjet of 8mm, require 10-12months
- Night wear appliance

2. BIONATOR
   Balters 1964
   - Less bulky
   - 3 types
- Standard appliance  
  For deficient mandible
- Open bite appliance  
  To inhibit abnormal position of tongue
- Class III appliance  
  To stimulate the growth of under developed maxilla

3. CLARK’S TWIN BLOCK  
  Clark 1988
4. **FRANKEL’S FUNCTIONAL REGULATOR**  
   Used to hold away muscle from dentition so that the dento-alveolar structures are free to develop.

5. **HORSE SHOE APPLIANCE**  
   Schwartz 1997  
   For class III molar relation.

6. **HEAD GEAR**  
   Extra oral force used to restrict the growth of maxilla
Anchorage in cervical, occipital and parietal regions.
Force is applied through teeth

7. PENDULUM APPLIANCE
   Used for class I skeletal relation
   Class II malocclusion
Fig 7 Pendulum appliance
8. CHIN CAP

Used in excessive growth of mandible
Fig. 38.17c Chin cap in lateral view
9. PRE ORTHODONTIC TRAINER
   Used to intercept developing malocclusion
Tongue gurad placed lingually

Starting/Phase I trainer

Finishing/Phase II trainer
(while permanent teeth are erupting and child still growing)

TYPES:-

a) STARTING/PHASE 1

  Blue colour
  Soft to wear
  Imparts lighter force on teeth
  Used for 6-8 months
  Flexible to adapt

b) Finishing /phase2

  Pink colour
Harder

Imparts higher force on malaligned teeth

PARTS:

i. Tooth channel and labial bows

ii. Tongue tag and lip bumber

iii. Base

APPLICATION:

- Early treatment of developing malocclusion
- Habit correction
- Dental alignment
- Prevents extractions
- Class II/III correction
- Limits bruxism
- Closes open bite and opens deep bite
- Resolves lower anterior crowding
FACTORS CONSIDERED WITH FUNCTIONAL APPLIANCE

- Best time: late mixed dentition
- Advantage taken of pubertal growth spurt

LIMITATIONS AND COMPLICATIONS

- Discomfort as both upper and lower teeth are joined together
- Needs patient cooperation
- Removed during mastication
- Interfere with speech
- Can be used only if horizontal growth pattern is present
- Prolonged treatment
- Lab and technical resources needed
- High cost
REFERENCE

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