UNIVERSITI SAINS MALAYSIA

A to Z ORTHODONTICS

Volume: 01








INTRODUCTION

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Contents

1. Orthodontics…….....3
2. Malocclusion…… 4-6
3. Overjet and overbite……6-8
4. Andrew's 6 keys to occlusion……..8-10
5. Aims, branches and scope of orthodontics…… 11-14
6. Types of Orthodontic appliance.....14
7. Factors which determine the decision to give orthodontic treatment.....15
8. Angles classification…….....15-18
9. Incisor classification……. ……..19-20
10. Skeletal classification..…….....21

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Orthodontics:

The word orthodontic derived from two Greek words – ‘Orthos’ means right or correct and ‘Dons’ means tooth. The term orthodontics was internationally used by Frenchman, LeFoulon in 1839.

The branch of dental science which deals with the normal growth and development of the body generally, jaws and teeth particularly; their variation and abnormalities and prevention and treatment of dentofacial abnormalities within accepted range of normal.

Edward Hartley Angle an American dentist, widely regarded as the father of modern orthodontics. Edward H. Angle in his early forties, near the time that he established himself as the first dental specialist. From 1905 to 1928, Angle operated proprietary orthodontic schools in St. Louis, New London, Connecticut, and Pasadena, California, in which many of the pioneer American orthodontists were trained.

Occlusion

It is the relationship of the teeth of one arch to that of another arch when the jaws are closed to maximum cuspal contact

Normal Occlusion

Occlusion within the accepted deviation of ideal.

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Malocclusion

Irregularities of teeth beyond the accepted range of normal.

Or

Any deviation from normal occlusion of tooth is called malocclution. A tooth is in abnormal position in relationship to basal bone of alveolar process to the adjacent tooth or an objective.

It may be associated with:

1. Malposition of individual tooth.
2. Malrelationship of the dental arch.
3. Malrelationship of the dental base.

Due to malocclusion the following unfavourable sequealy may be happen:

- **Poor facial appearance of the patient:**

  Malocclusion is capable of producing poor facial appearance.

- **Risk of caries:**

  Mal alignment to teeth makes oral hygiene maintain difficult and thereby increasing the risk of development of caries.

- **Predisposition of PDL Diseases:**

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Malocclusion is one of the common cause of PDL disease, beside poor oral hygiene, traumatic occlusion may leads to PDL tissue damage.

- **Psychological Disturbance:**

  Poor facial appearance of the patient makes a person highly selfconcious withdrawal from the society & introvert.

- **Risk of Trauma:**

  Severely proclined teeth arc at high risk during playing or accidental fall.

- **Abnormalities in function:**

  Mainly malocclusion causes abnormalities in function such as improper diglutation, speech problem, and improper respiratory pattern.

- **TMJ Problem:**

  Malocclusion associated with premature contacts and deep bite may lead to TMJ prolem such as pain and disfunction (cliking sound)

- **Impacted and unerupted teeth:**

  If there are impacted or unerupted teeth, they can lead to cystic change and damage the adjacent teeth.

<u>Criteria of normal occlusion</u>

a. The mandibular teeth are set one inclined plane in advance of the maxillary teeth (because the mandibular incisors are narrower than the maxillary incisors).

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b. The maxillary teeth are set half a cusp buccal to the mandibular teeth (Mandibualr teeth are overlapped by the buccal cusp of maxillary teeth).

c. The mesiobuccal cusp of the upper first permanent molars occludes with the anterior buccal groove of the lower first permanent molars. (Class I molar relationship).

d. The upper permanent canines occlude in the embrasure between the lower permanent canine and first premolar, (Class I canine relationship).

e. The lower incisor edges occlude with the middle third (cingulum platue) of the palatal surface of the upper incisors.

Over Jet

It is the horizontal overlapping between the upper and lower anterior teeth.

Normally it is 2-3 mms.

Variation of over jet

- Normal.
- Decreased.
- Increased.
- Reverse over jet or cross bite-where lower anterior overlap the upper anterior.
- Edge to edge bite.

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Measurement

It is measured from the labial surface of lower anterior to incisal edges of upper anterior [most proclined tooth] normal over jet is 2-3mms.

Aetiology [class II div 1] ⇒

- Hereditary.
- Habits.
- Unknown.

Overbite

It is the vertical overlapping of upper and lower anterior teeth.

Normal is 2 to 3 mm.

Variations:

- Normal.
- Deep bite – Complete deep bite
- Incomplete deep bite
- closed bite
- Open bite

Deep bite: Where the overbite is more than 2-3mms.

Complete deep bite: Where the lower anterior contact either the upper anterior or palatal mucosa.

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Incomplete deep bite: Where the overbite is increased but the lower anterior fail to contact upper anterior or palatal mucosa, usually seen in tongue thrust swallowers.

Closed bite: Where the upper anterior overlap the lower anterior completely Characteristic feature of class II division 2 malocclusion.

Open bite: Lack of vertical overlapping of teeth.

Measurement:

To measure the overbite, make a mark of the incisal edges of upper anterior teeth on the labial surface of lower anterior teeth. The distance between the incisal edges of lower incisor to the mark gives over bite in mms.

Ideal Occlusion

Occlusal, structural & functional relationship that includes idealized principles & characteristics that an occlusion should have.

ANDREW'S SIX KEYS TO NORMAL OCCLUSION – 1970S.

(1) **Molar interarch relationship:**

- The mesiobuccal cusp of the upper first molar should occlude in the ant. buccal groove of lower first molar.
- The mesiolingual cusp of the upper first molar should occlude in the central fossa of lower first molar.

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- ❖ The crown of the upper first molar must be angulated.
- ❖ Distal marginal ridge of upper first molar occludes with the mesial marginal ridge of lower second molar.

(2) **Mesio distal crown angulation, the mesio distal tip**:

It refers to the angulation of the long axis is judged by mid developmental ridge on the labial or buccal surface of the crown. It molar it is the vertical groove on buccal surface.

The degree of crown tip is the angle between the long axis and a line bearing 90° from the occlussal plane.

A (+) reading is said when the gingival portion of the long axis of the crown is distal to the incisal portion.

A (-) reading is when the gingival portion in mesial to the incisal portion.

Different teeth exhibit different crown angulations.

(3) **Labio lingual crown inclination:**

It is the angle formed by a line which bears 90° to the occlusal plane and line tangents to bracket site.

Positive crown inclination **–** If the gingival area of the crown is more lingually placed than the occlusal area.

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Negative crown inclination – In case the gingival area of the crown is more labially or buccally placed than the occlusal area.

* The maxillary incisors exhibit positive crown inclination while the mandibular incisors show a very mild negative crown inclination. The maxillary and mandibular posteriors have a negative crown inclination.

(4) **Rotation:**

Normal occlusion is characterized by absence of any rotation. Rotated posterior teeth occupy more space in the dental arch while rotated incisors occupy less space in the arch.

(5) **Tight contacts:**

In normal occlusion there should tight contact between adjacent teeth.

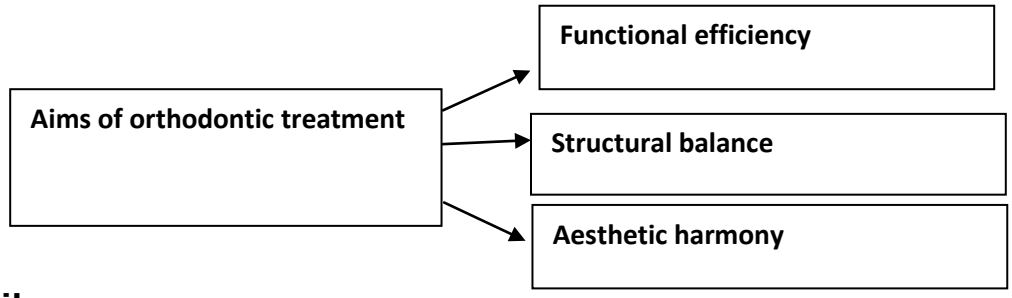
(6) **Curve of spee / occlusal plane:**

A normal occlusal plane according to Andrews should be flat, with the curve of spee not exceeding 1.5mm. A deep curve of spee results in a more contained area for the upper teeth making normal occlusion impossible.

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Aims of orthodontic treatment:

There are 3 main objectives of orthodontic treatment.

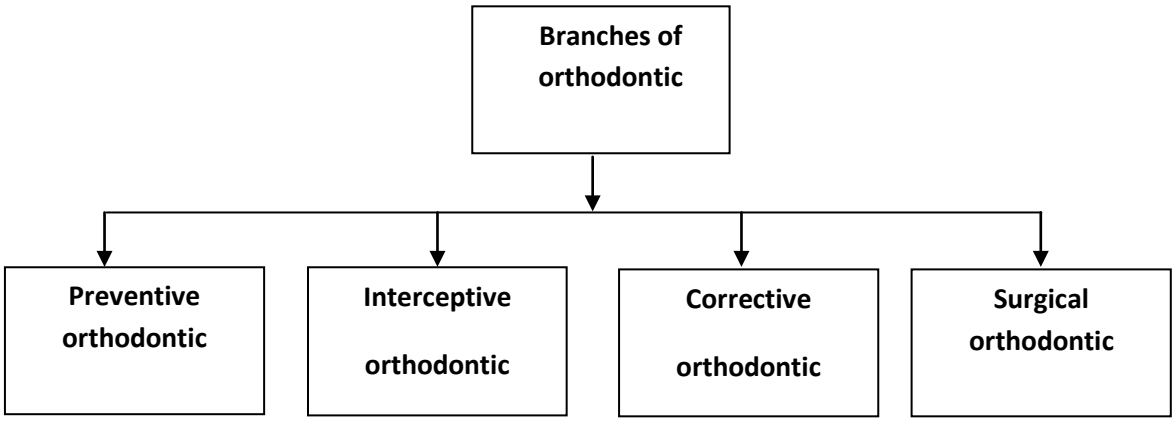


In details:

- To improve the aesthetic of the patient: It can result in a total change of personalities.
- Reduce the susceptibility of dental caries.
- Reduce the susceptibility of PDL disease.
- Reduce the susceptibility of accidental injury.
- To correct abnormal muscle activity.
- To correct oral habit, nail biting & tongue thrusting.
- To manage TMJ problem.
- To alignment of supporting teeth.
- To guide the impacted and unerupted teeth into proper position.
- In case of severe skeletal malocclusion, helps to reduce the degree of skeletal problem.

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Branches of orthodontics



Preventive orthodontic:

It is the action taken, to preserve the integrity, what appears normal for the age.

e.g. (i) Early correction of carious lesions.

(ii) Early recognition and elimination of oral habits.

(iii) Using space maintainers, in case of early loss of deciduous teeth.

Interceptive orthodontic:

It is the procedure that can take at an early stage of malocclusion to eliminate or reduce the severity.

e.g. Serial extraction.

Corrective orthodontic:

Orthodontic procedure to correct a fully established malocclusion.

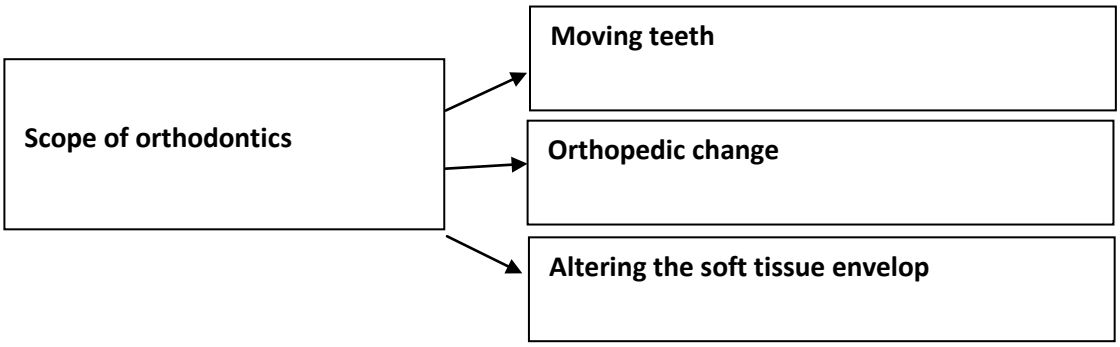
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Surgical orthodontic/Orthognathic surgery:

It is the combination of surgical and orthodontic management that carries severe skeletal problem.

e.g. Severe skeletal problem.

Scope of orthodontics:



Moving teeth:

The main reason for the existence of this specialty was its capability of moving teeth. Performance of moving teeth depends upon the nature of malocclusion and capability and efficiency of each individual clinician.

Orthopedic change:

Using functional appliances and latest orthognathic techniques, it is possible to more entire jaws in to more favorable position.

Altering the soft tissue envelops:

The function of soft tissue envelops of the teeth and oral cavity have a definite impact on the growth and development of the oral and facial structures. So orthodontist can help in retain or restrain the soft tissues and

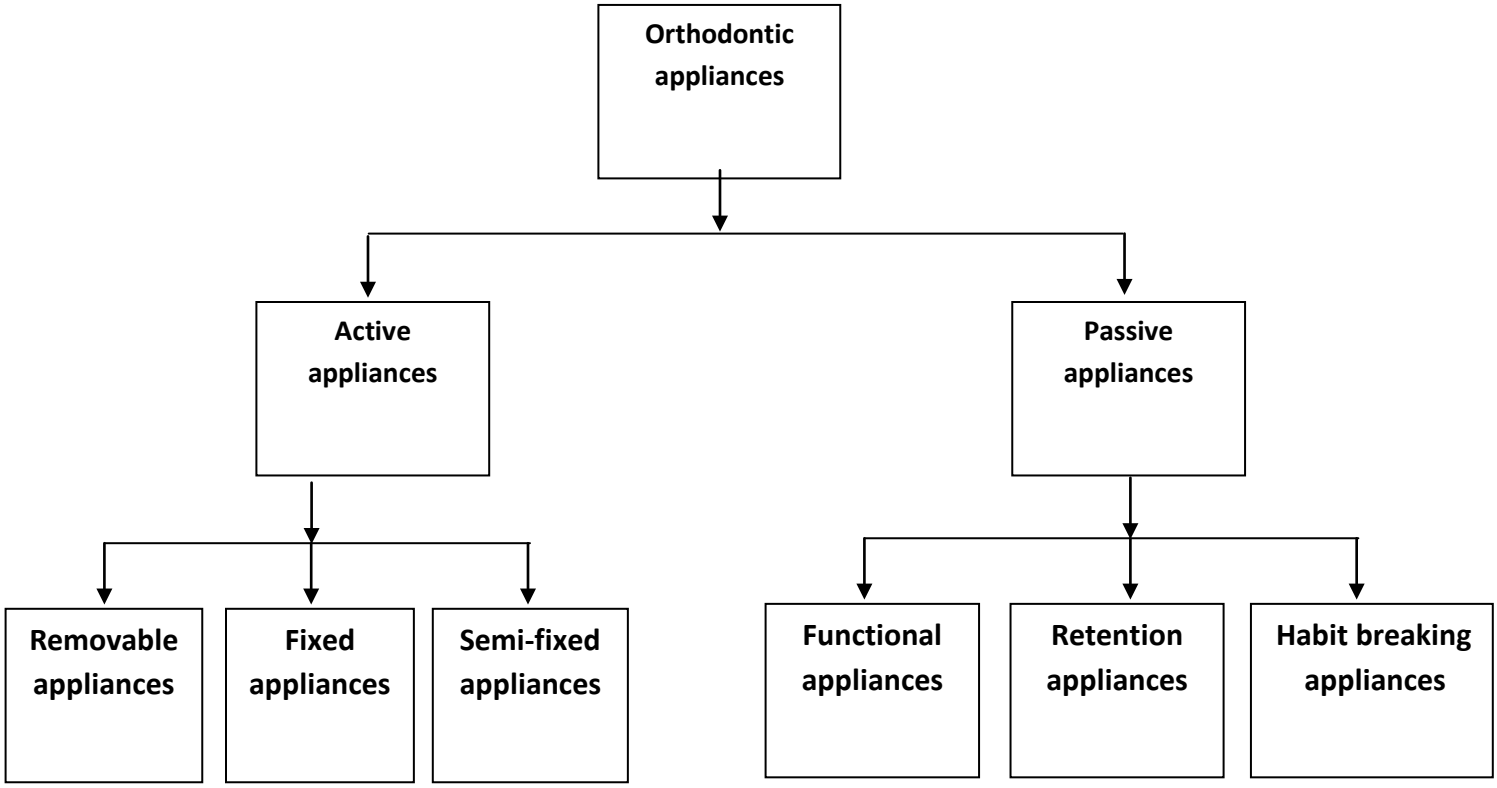
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or bring about a change in them by altering the position of the teeth or the jaws.

Types of orthodontic appliances:

Orthodontic appliances:

Orthodontic appliances are appliances by means of which pressure may be applied to tooth or a group of teeth in a predetermined direction. Orthodontic appliances can be broadly grouped as.



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Factors which determine the decision to give orthodontic treatment:

- Nature of malocclusion and its impact on patient's mind, appearance, mastication, speech and durability of dentition.
- Age of patient and co-operation expected.
- Prognosis expected.
- General physical condition of patient e.g. mentally ill and epileptic children may be left alone.
- Oral hygiene, condition of teeth, resorption, carious status, hypoplasia etc and condition of gingiva and periodontium.
- Sex and professional status.

ANGLE'S CLASSIFICATION

Presented his classification, 1898 Edward Hartley Angle based on Anterior-posterior relationship.

Basis of Angles classification:

1. Most indicative irregularity of teeth is in the anterior-posterior direction.

2. He considered maxillary 1st permanent molar to be the key to occlusion as it seldom varies from its position.

3. The curvature and size of the line of occlusion is unique to each individual.

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Different classes according to E.H. Angle:

a. Class I
b. Class II division 1.
c. Class II division 2.
d. Class II sub division, division 1.
e. Class II Sub division, division 2.
f. Class III
g. Class III sub division.

Class I:

The lower dental arch is in normal relation to the upper dental arch. In this case the mesio buccal cusp of upper first permanent molars occludes the anterior buccal groove of the lower 1st permanent molars.

This class includes cases of irregularity of individual teeth and does not involve malefaction of dental arches.

Class II:

The distobuccal cusp of upper first permanent molar occludes in the mesio buccal groove of the lower first permanent molar.

Class II Division 1 – All the upper incisors are proclaimed.

Class II Division 2 – The upper incisors show lingual inclination and the lateral incisors overlap the central incisions.

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Class II subdivision:

When the class II relationship is present on one side only and there is class I relationship is present on the other side, it is called as class II subdivision. Based on the incisor position, it can designated as

a. Class II subdivision, division 1.

b. Class II subdivision, division 2.

Class III

The lower 1st permanent molar lies mesial to upper 1st permanent molars by a premolar on a cuspal width.

Class II Subdivision

It is unilateral class III molar relationship. The opposite side molars are in class I relationship.

- **Proportion of different types of Malocclusion:**

Class I	60-70%
Class II div. 1	25-30%
Class II div. 2	5-10%
Class III	5-10%

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Drawbacks of Angle's classification:

1. The 1st permanent molars are not fixed points in the skull anatomy.
2. The skeletal and dental malocclusions are not differentiated from each other.
3. The classification of malocclusion is based on the anterior posterior relationship only.
4. The classification does not give an idea of vertical and transverse plane malpositions.
5. The individual tooth malposition cannot be visualized.
6. When the 1st permanent molars are extracted, this classification cannot be applied.
7. This classification cannot be applied to deciduous dentition.
8. The severity of malocclusion cannot be judged from the classification.
9. The classification does not differentiate between true and pseudo class III malocclusion.

INCISOR CLASSIFICATION

This classification is more helpful in clinical practice than the Angle's classification.

Class I $\Rightarrow$ This is normal incisor relationship $\rightarrow$ where the lower incisor occludes with the middle third of the palatal surface of the upper incisors.

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Class II ⇒ Where the lower incisor edges occlude posterior to the middle third of the palatal surface of upper incisors. Depending on the inclination of the upper incisors it has two divisions.

Div-1: Maxillary incisors are proclined with increase over jet.

Div-2: Maxillary central incisors are retroclined over jet usually average lateral incisors may be proclined rotation.

Class III ⇒ Where the lower incisors occlude anterior to the middle third of the palatal surface of the upper incisors. Over jet & overbite is usually reduced & may be reversed.

SKELETAL CLASSIFICATION

Based on basal bone relationship

Clinically assessment:

Class I ⇒ When the mandibular dental base is normally related to all maxillary dental base in the A-P plane.

Class II ⇒ When the mandibular dental base is posterior only positioned relative to the maxillary dental base.

Class III ⇒ When the mandibular dental base is anteriorly positioned relative to the maxillary dental base.

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Radiological assessment: Of the skeletal pattern by lateral skull radiograph. Two methods:

(1) Downs method

(2) Ballard conversion tracing method

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Dedicated To

My Mom, Zubaida Shaheen

My Dad, Md. Islam

&

My Only Son

Mohammad Sharjil

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