

# Introduction to Orthodontics

الدكتور بسام علي الطريحي

BDS MSC(ORTHO.) MFD RCSI MFDS RCSEDIN.


# Introduction of orthodontics

Orthodontics is that branch of dentistry concerned with facial growth, with development of the dentition and occlusion, and with the diagnosis, interception, and treatment of occlusal anomalies.

Ortho (**from Greek**) which is mean straight. Malocclusion is **not** a disease , it is variation from ideal occlusion

# Prevalence of malocclusion


Malocclusion has been described as a disease of Western societies, and certainly within developed **polygenic** populations, certain occlusal traits such as crowding are more common.



**The USA National Health and Nutrition Examination** (1988–1991) examined 7000 individuals and found that 57–59% had a need for orthodontic treatment (Proffit et al, 1998);



**Within the UK**, around 35% of 12 year olds had a definite need for orthodontic treatment on dental health or aesthetic grounds, which increased to 43% when those already in treatment were included (Chestnutt et al, 2006).



Ethnicity also has a significant bearing on malocclusion. **Class II problems** are commoner in Caucasian populations of **Northern European, Middle Eastern and Indian descent**, whereas **class III malocclusion** is a common trait amongst East Asian societies, such as **China and Japan**

**Did you know?**

Dr. Edward  
Angle is the  
father of  
modern  
orthodontics.

---



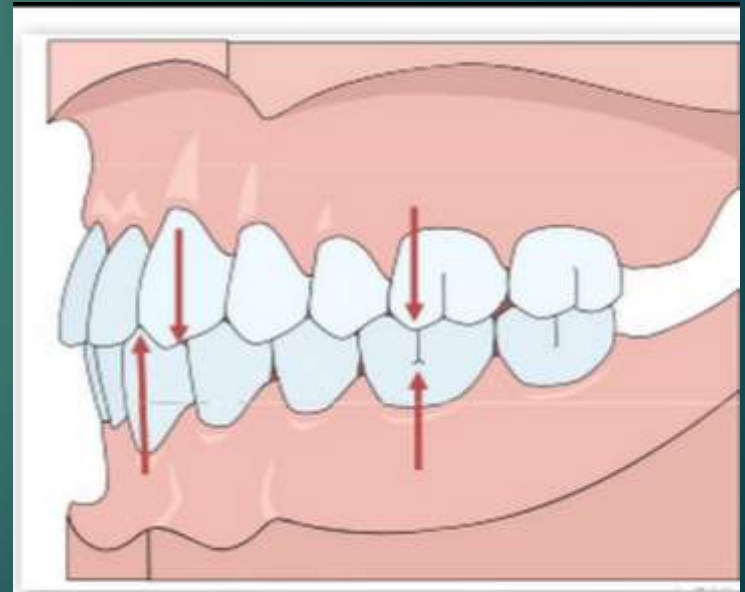
**Edward Angle** was an American dentist born in 1855. Originally trained as a prosthodontist, he developed an interest in occlusion and was instrumental in developing orthodontics as a speciality of dentistry. Amongst his many achievements, including developing the principles upon which most modern fixed appliances are based, Angle proposed a classification of malocclusion that is still relevant today. He suggested that normal occlusion was based fundamentally around the position of the first permanent molar teeth. **Angle's molar classification is still used today**, but it is now realized that the first molar position is not immutable and the position these teeth come to occupy in the dental arch can be influenced by numerous factors, including early loss of primary teeth.





# Angle classification

**Class I normal occlusion:** Mesio Buccal cusp of the maxillary first molar in the buccal groove of the mandibular first molar and intra-arch relationships among teeth are correct.



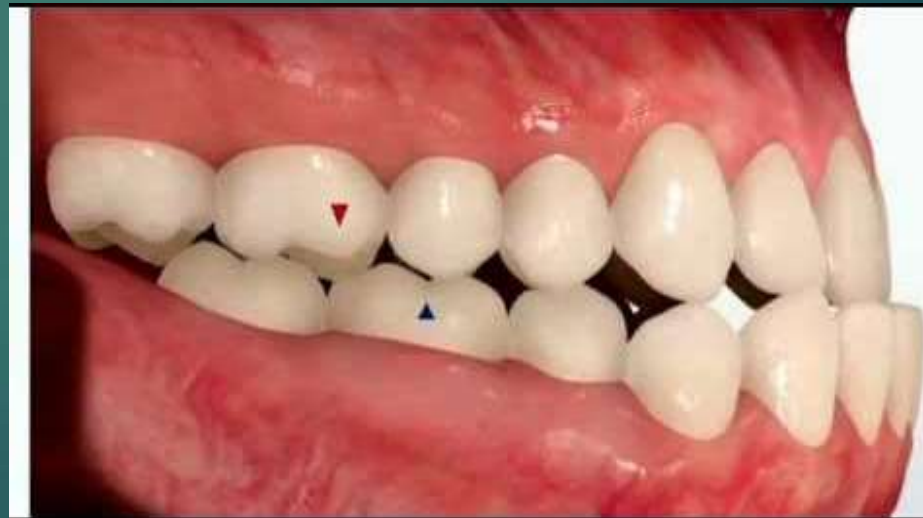
Class II. Mesio Buccal cusp of the maxillary first molar anterior to the buccal groove of the mandibular first molar.

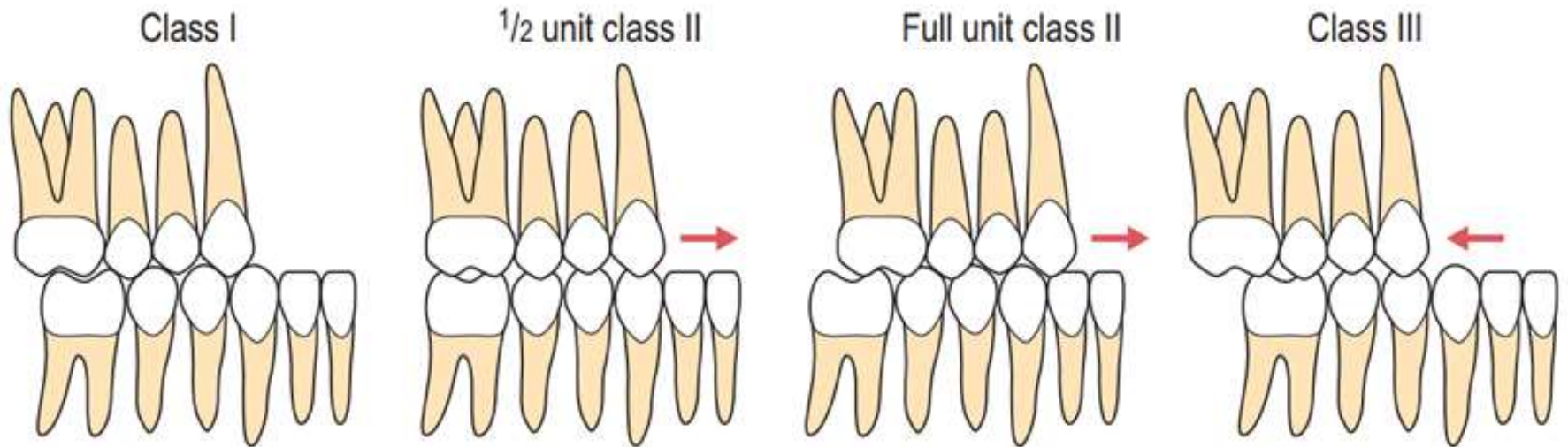
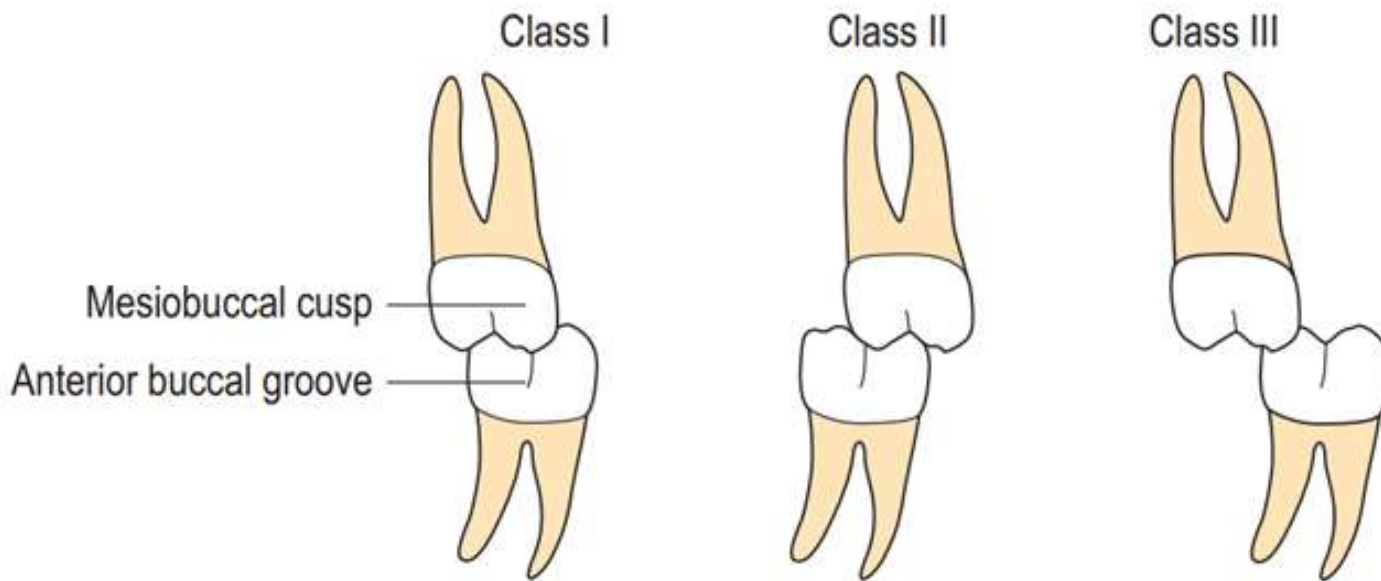
Class II division 1 – upper incisors are protruding

Class II division 2 – upper incisors are lingually inclined.



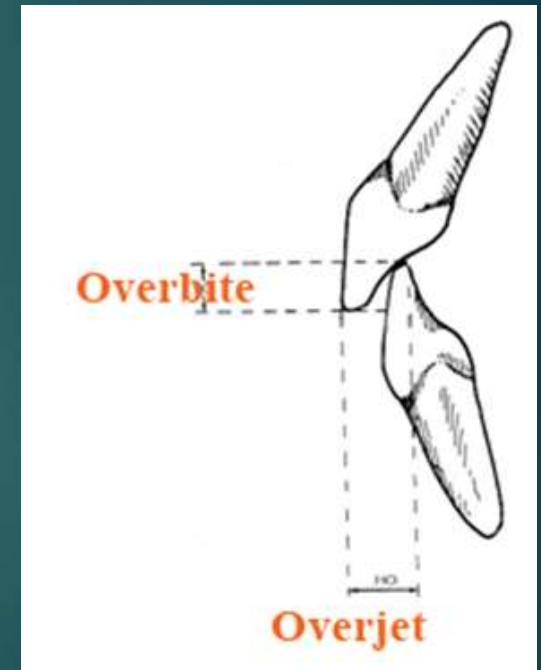
**Class III. Mesio Buccal** cusp of the maxillary first molar posterior to the buccal groove of the mandibular first molar.





**Overjet** is the Distance between the upper and lower incisors in the horizontal plane.

**Overbite** is the Overlap of the incisors in the vertical plane.



# Incisor classification

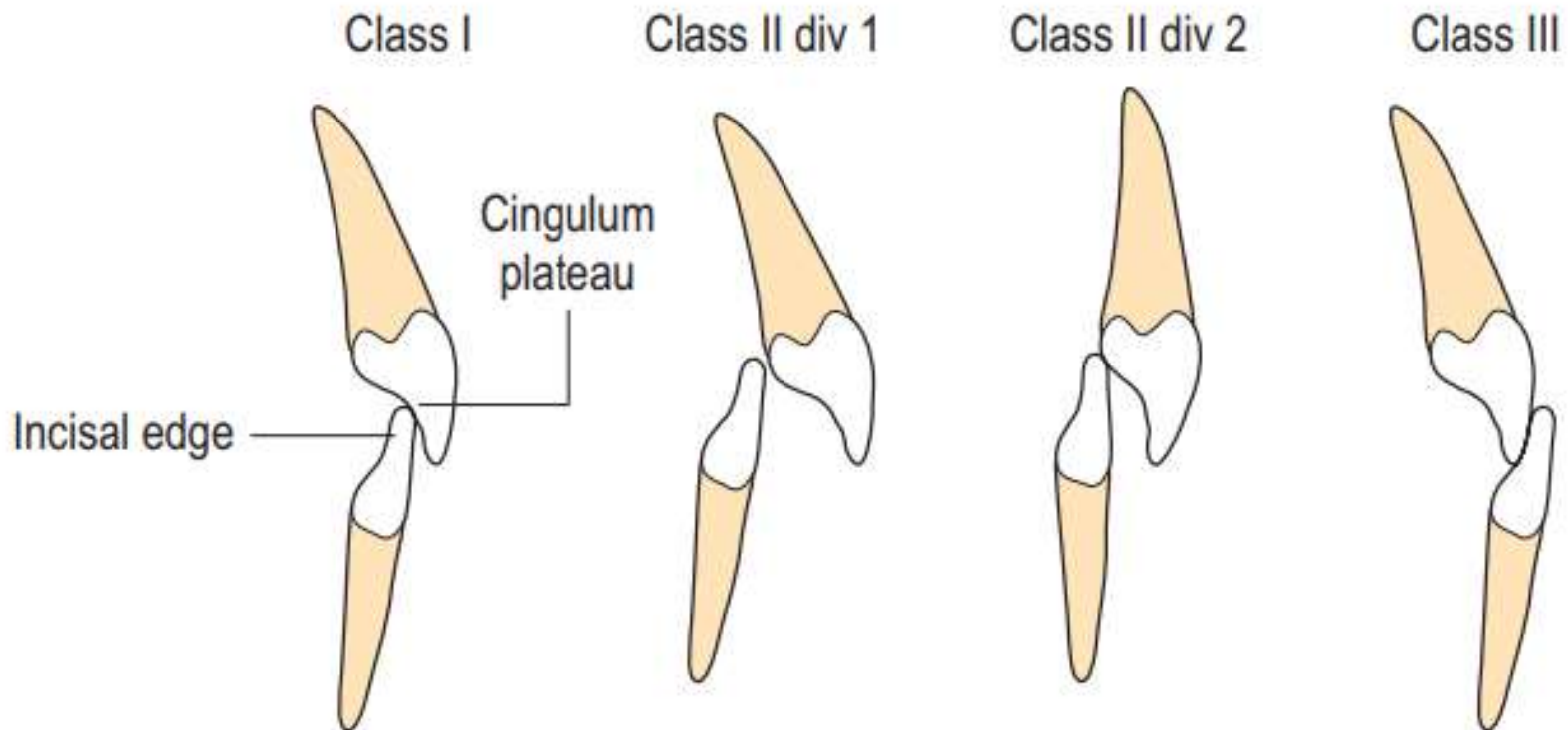
A more clinically relevant method of classifying malocclusion is based upon the relationship of the maxillary and mandibular incisors.

## The British Standards of incisors relationship :

- Class I – the lower incisor tips occlude or lie below the cingulum plateau of the upper incisors;
- Class II – the lower incisor tips occlude or lie posterior to the cingulum plateau of the upper incisors. This classification is further subdivided into:
  - Class II division 1 – the overjet is increased with upright or proclined upper incisors; and
  - Class II division 2 – the upper incisors are retroclined, with a normal or occasionally increased overjet.
- Class III – the lower incisor tips occlude or lie anterior to the cingulum plateau of the upper incisors.



# The British Standards of incisors relationship



# Ideal occlusion

## Box 1.2 Andrews' six keys of occlusion

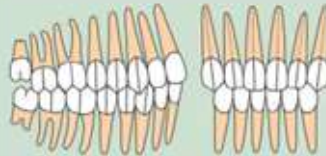
KEY 1



Key 1

Molar relationship – the distal surface of the distal marginal ridge of the upper first permanent molar occludes with the mesial surface of the mesial marginal ridge of the lower second molar. The mesiobuccal cusp of the upper first permanent molar falls within the groove between the mesial and middle cusps of the lower first permanent molar

KEY 2



Key 2

Crown angulation or mesiodistal tip – the gingival portion of the long axis of each tooth crown is distal to the occlusal portion of that axis. The degree of tip varies with each tooth type

KEY 3



Key 3

Crown inclination or labiolingual/buccolingual torque – for the upper incisors the occlusal portion of the crown labial surface is labial to the gingival portion. In all other crowns, the occlusal portion of the labial or buccal surface is lingual to the gingival portion

KEY 4



Key 4

Rotations – there should be an absence of any tooth rotations within the dental arches

KEY 5



Key 5

Spacing – there should be an absence of any spacing within the dental arches

KEY 6



Key 6

Occlusal plane – the occlusal plane should be flat

Key 2 : Angulation



Key 2: Inclination



Key 4 : Rotation



Key 5 : Spacing



# Benefits of orthodontic treatment

## i. Resistance to caries and

Dental caries is endemic in most developed societies and the primary aetiological factors are the presence of cariogenic flora in dental plaque and the frequent intake of refined sugars. The disease process can be controlled with good diet and oral hygiene and is unrelated to the presence or absence of a malocclusion. **Straight teeth make it easier to keep mouths clean** and recipients of orthodontic treatment have been demonstrated to have lower plaque scores.

## ii. Resistance periodontal disease

Gingival recession of a lower incisor due to an anterior crossbite with an associated displacement



Traumatic overbite resulting in stripping of the labial gingiva from the lower incisors.



### iii. Improvement in speech

Speech patterns are established very early in life and, in most cases, a long time before eruption of the permanent dentition. Some speech problems are related to certain traits of a malocclusion, such as anterior open bite and a lisp, but treating the malocclusion will not guarantee resolution of the problem



#### iv. Psychological benefits

In its original constitution the World Health Organization defined health as 'a state of complete physical, social and mental well-being and not merely the absence of disease and infirmity'. Therefore, even though a malocclusion is not a disease state, the benefits of treating it should be considered in terms of both the social and mental well-being of an individual. Certain occlusal traits, such as an increased overjet, appear to make a child more susceptible **to teasing and bullying**, which can have a profound impact on self-esteem and lead to long-term health and social problems





# Risks of orthodontic treatment

## 1. Enamel demineralization

The incidence of demineralization during fixed appliance therapy is high and can result in the development of enamel opacities on the labial surfaces of the teeth



## 2. Root resorption

External root resorption is an almost universal finding following orthodontic treatment, but this is usually not clinically significant and has no influence on long-term health of the teeth. Severe root resorption, when more than one-third of the root length is lost, has been reported to occur in between 1% and 5% of orthodontically treated teeth. The greatest amount and severity of root resorption is seen in the anterior maxillary region, especially the **maxillary lateral incisors**.



### 3. Pain and damage to the pulp

Orthodontic treatment, especially with fixed appliances, can be painful. However, this pain usually subsides within a few days of appliance activation and can be controlled with analgesia. The use of excessive force or pushing the apex of teeth through the cortical plate can result in a loss of vitality.



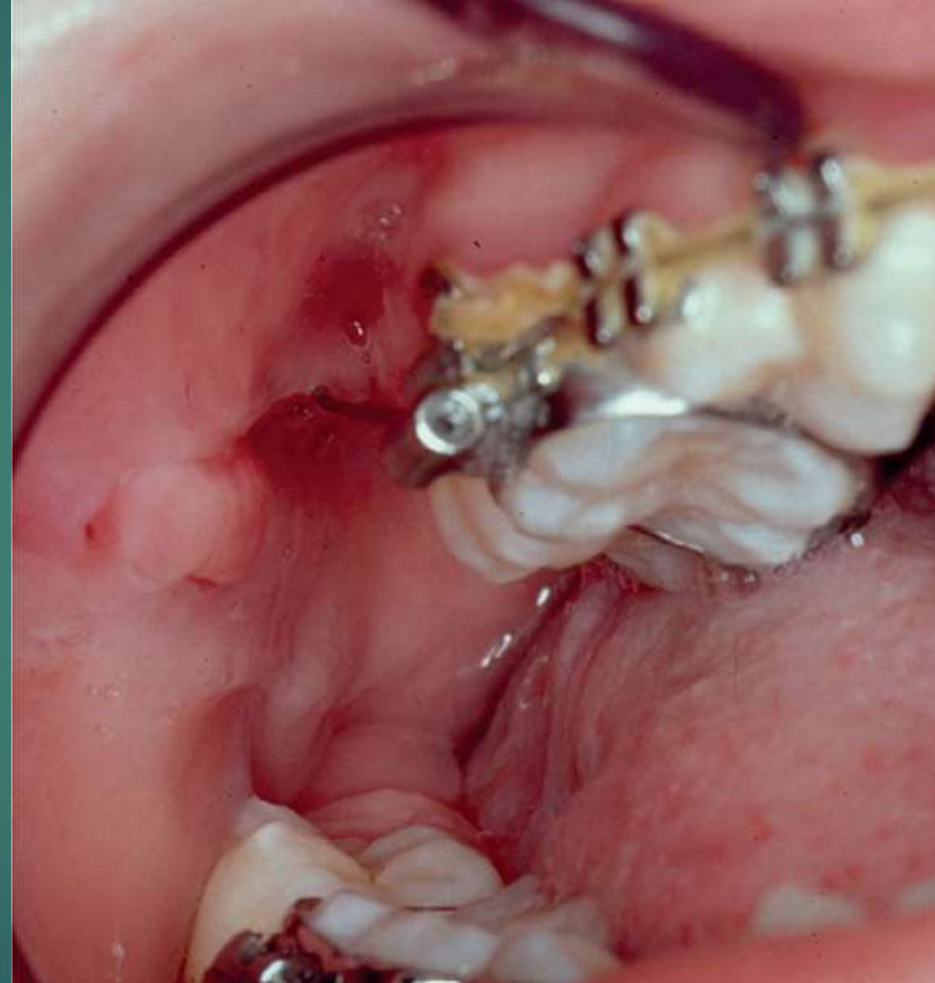
## 4. Gingivitis

Gingival irritation is inevitable with the use of fixed appliances and this is exacerbated by poor oral hygiene that can result in gingival hyperplasia. Gingival health improves significantly following the removal of appliances, with a reduction in probing depths mainly due to shrinkage of hyperplastic tissues



## 5. Oral ulceration

Traumatic ulceration in susceptible individuals is common with fixed appliances, particularly during the early stages of treatment and can be a great source of discomfort and irritation for the patient



## 6. Allergic reaction

Orthodontic wires and brackets contain nickel and nickel allergy is increasing in frequency. Its prevalence has been reported to be approximately 10% in the United States and Europe, being more common in females. It is usually a type IV allergic reaction related to wearing jewellery or watches and body piercing. Fortunately oral reactions are rare, although prolonged exposure to nickel-containing oral appliances may increase sensitivity to nickel. Intraoral signs are non-specific and have been reported to include erythematous areas and severe gingivitis despite good oral hygiene.



Thank you for you attention