

Dr. Charles Burstone

## Common Myths in Orthodontics

Dr. Burstone reviewed myths in orthodontics, dividing his presentation into four subject areas:

1. Myths about torque in orthodontics
2. Myths about smiles in orthodontics
3. Myths about orthopedic jaw movement
4. Illusions in orthodontics – Why do we believe what is not true?

## Torque

The term “torque” is not used properly in orthodontics:

1. Torque is a force system. It is produced by torsion in an arch wire that creates a couple when interacted with a bracket slot, which is the result of twist in the wire compared to the bracket slot.
2. Torque is not “in the wire”. Torque is not the angle of the bracket slot. Torque is not the axial inclination of the tooth. These are common orthodontic misuses of the term.
3. Torque applied to a tooth created by torsion in the arch wire against the bracket slot spins the tooth around its center of resistance.

In orthodontics mechanics, 3<sup>rd</sup> order twist in the arch wire only produces a couple (torque).

1. A wire twisted to produce lingual root torque to the maxillary incisors will also extrude the maxillary incisors.
2. A wire twisted to produce labial root torque to the maxillary incisor will also intrude the maxillary incisors.
3. To counter these effects, additional forces are placed near the center of resistance of the incisor segment (e.g. a j-hook headgear placed to act distal to the lateral incisors to counter the extrusive effect of incisor lingual root torque).

## Tooth movement pearls

1. The application of a couple to a tooth is not dependent on where it is applied (because it is a free vector).
2. When a single force (without a couple) is applied to a tooth, the apex moves in the opposite direction of the applied force (e.g. retracting flared incisors without torque causes the crown to move lingual and the roots to move labial as the incisor spins about a center of rotation just beneath its center of resistance).
3. When a single force is combined with a couple, the tooth spins about a center of rotation apical to its center of resistance (less labial root movement in the above example).
4. To improve lingually inclined maxillary incisors, a labially directed force will spin the tooth about an axis near its center of resistance. A couple (labial root torque) will spin the tooth about an axis apical to its center of resistance.

5. To improve buccally inclined maxillary molars, a lingually directed force will spin the tooth about an axis near its center of resistance. A couple (buccal root torque) will spin the tooth about an axis apical to its center of resistance.
6. Incisor intrusion is best accomplished with sectional mechanics, placing the intrusive force distal to the center of resistance of the incisor segment.

Burstone, CJ, Biomechanics of Deep Overbite Correction, *Seminars in Orthodontics*, 2001;7:26-33.

### Smiles

1. Incisor exposure at rest is 2-3 mm on average.
2. A sample of 454 subjects showed variable vertical display with smile. 11% showed high smile, 69% showed average vertical display, and 20% showed a smaller amount of vertical display.  
Tjan AH, Miller GD, The JG. Some esthetic factors in a smile. *J Prosthet Dent*. 1984 Jan;51(1):24-8.
3. Psychologist Paul Ekman has categorized smiles based on emotion and draws a distinction between a genuine smile and a forced smile. A genuine smile shows more involvement of the zygomaticus major and risorius muscles than a forced smile. Forced smiles are further categorized in to 20 types (e.g. contempt, contrived, posed, social, yearbook, etc.). Forced smiles tend to be more asymmetric than natural smiles. Frank MG, Ekman P, Friesen WV. Behavioral markers and recognizability of the smile of enjoyment. *J Pers Soc Psychol*. 1993 Jan;64(1):83-93.
4. Examples were shown of actresses (e.g. Hillary Swank, Meg Ryan) where their natural smiles showed more gingival display than their posed smiles.
5. Take home message: Incisor exposure during speech and smile is difficult to assess.

### Aging changes and smiles

1. Does the amount of upper incisor exposure change with age? Reviewing 3 studies, Dr. Burstone concludes there is 1 -2 mm of change with age which he believes is not clinically significant.
2. Dr. Burstone gathered his own "longitudinal" data for actors Sally Field, Yule Brenner, Jane Russell, Don Southerland, and Ronald Reagan, by comparing their smiling photos at various ages. He concludes he does not see less upper incisor exposure with age for any of these subjects.

### The smile arc

1. The smile arc is defined as the upper incisal edge line which should be concordant with the lower lip line during smile.
2. Dr. Burstone believes this phenomena occurs because the occlusal plane is parallel to the lower lip from the 45° facial view.
3. The smile arc changes if head posture or the amount of mandibular opening changes (example photographs shown).
4. The smile arc can only be changed if the cant of the occlusal plane is changed.

The smile and buccal corridors (Dr. Burstone reviewed a number of photos to make the following points).

1. Buccal corridors are very prevalent in the smiles of actors and actresses.
2. Their size depends on the amount (width) of the smile.
3. Their size depends on how the photograph is taken or the view of the face.
4. Their size depends on the amount of mandibular opening.
5. The width of the dental arches is only one of many factors involved in the presence of buccal corridors during smile.

The battle for the skeletal modification of the face – maxillary orthopedics

1. Dr. Burstone cited a study by Tanne et al. which showed the treatment effects of maxillary protraction headgear are largely dental with clockwise rotation of the mandible.  
Tanne K, Sakuda M. Biomechanical and clinical changes of the craniofacial complex from orthopedic maxillary protraction. *Angle Orthod.* 1991 Summer;61(2):145-52.
2. Dr. Burstone also discussed a case report of maxillary protraction using an implant as anchorage for the protraction. The results showed improvement in lip posture. Cephalometric evaluation showed lingual inclination of the lower incisors from the effect of the chin cap and clockwise rotation of the mandible. No maxillary skeletal effect was seen.

Why is evidenced-based treatment not practiced?

1. Traditions, emotions, beliefs, commercialism, gurus, easy-learning, appliance worship all contribute to the lack of evidenced-based treatment in our specialty.
2. In research, evidence is clouded by sampling methods, traditions, and tendencies to follow authority figures.
3. Epidemiologic data has limits with regard to understanding the mechanism of response to treatment. Scientific understanding of the mechanism is essential to solid evidence-based treatment.