Facial Growth: Does It Play a Role in Orthodontic Treatment?

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Summarized by Dr. Robert Quinn, Central Region Editor

Fundamental to the treatment we provide our young patients is an understanding of how their faces are changing while under our care. If we either don’t understand or don’t plan for these changes we are shortchanging our patients. Reduced friction brackets, temporary anchorage devices, lasers—all these recent technological advances pale in their influence compared to the growth-related changes our patients are experiencing.

The amazing aspect of growth is that it is not mysterious. Similar to orthodontic mechanics, when we understand it we can take advantage of it to produce a superior outcome.

Fortunately, 80% of our patients have mandibles that undergo an anterior or forward growth rotation. This growth pattern, when taken to its extreme, results in a severe overbite and short lower face. Posterior or backward rotation of the mandible during growth results in an anterior open bite and long lower face.

Growth rotations can be predicted based on structural criteria in the mandible. A short lower face height, anterior inclination of the symphysis, thicker cortical bone below the symphysis, and a characteristic downward convexity of the lower anterior border of the mandible are all predictors of a forward growth rotation. Backward rotation can be predicted by an increased anterior face height, a backward inclination of the mandible, posterior inclination of the symphysis, and a thin and straight cortical border of the mandible. Once we develop an eye for these criteria we can use them to construct custom treatment and retention plans for our patients.

- Patients with short lower face heights, the so-called forward rotators, should be started with an early phase of treatment and the anterior occlusion maintained with a bite plate and lower lingual arch. These patients are at risk for developing a deep overbite and lower crowding.
- Avoid extractions in short lower facial height patients. Expand and procline incisors to maintain a fulcrum at the incisors and prevent the overbite from deepening. Don’t base extraction decision solely on crowding.
- Maxillary premolar extraction treatment to resolve a Class II malocclusion should never be commenced prior to cessation of mandibular growth as determined by a hand wrist radiograph. If mandibular growth continues it may be impossible to close the extraction sites, and crowding of the lower incisors during or after retention will follow.
- Long lower face patients with crowding often need four premolar extractions to leave the incisors more upright on the mandible. If treated non-extraction, you will likely see the lower anteriors tip lingually and crowd after treatment.

Openbite Etiology

- Genetic (Inherited)-Facial growth pattern
- Environmental
  - Habits-Finger sucking, extensive use of pacifier
  - Tongue dysfunction
  - Airways
    - Adenoids
    - Tonsils
    - Upper airway abnormalities-Septum deviations, chronic allergies, valve deficiencies, large turbinates

When we don’t take the time to understand it, we tell our patients growth is unpredictable and may adversely affect their treatment outcome. We even devote a paragraph to it on “Risk and Limitation” forms.

Arne Bjork published the definitive work on facial growth over 30 years ago, but its lessons are still not widely incorporated into our treatment plans. Dr. Nielsen takes these lessons and shows us how to use them to make our treatment more predictable.
Patients with a strong backward rotation and open bite should not be treated until growth has ceased. They will often require surgery to produce any improvement in their skeletal balance, and treatment during growth may compromise the benefits of surgery.

Class III patients, especially those with mandibular asymmetry, should not be treated until growth has stopped. This can only be determined by head films superimposed one year apart, as the mandible does not complete its growth until the age of 21 to 22 in boys, several years after growth in height is completed.

With respect to the post-treatment period, Dr. Nielsen made the following observations:

- The best retainer is a good occlusion.
- Mandibular teeth will upright in most forward and backward rotating patients after treatment. The alignment can best be held by a bonded lingual retainer continued well past the cessation of mandibular growth at 20 to 22 years of age.