Growth modulation by class III and class II orthopedics

Prof. Hugo De Clerck D.D.S., Ph.D.

Miniplates resist better high discontinuous forces than miniscrews do. Therefore they can be used for intermaxillary orthopedic traction. Class III elastics can be fixed between Bollard anchors on the buttress of the maxilla and in the canine region of the mandible in young growing patients. Which biomechanical approach should be used, which loading protocol? What is the best timing? Can the growth of the maxilla and/or mandible be stimulated, restricted or redirected? Is the outcome predictable? Is this protocol an alternative for orthognathic surgery after growth? The results of this continuous bone anchored traction will be discussed based on Cone-beam CTs at T1 and T2 registered on the anterior cranial base. The outcome will be compared with a control group and face mask orthopedics with or without RPE.

There is poor evidence that the amount of condylar growth can be restrained by class III orthopedics. However, the impact of orthopedics on modeling processes in the ramus and gonial angle has been underestimated in the past. Our research on bone anchored class III orthopedics has clearly shown that the gonial angle can be reduced by more than 4°, resulting in less forward projection of the chin.

Condylar growth stimulation is the main treatment goal of class II orthopedics but so far there is hardly any evidence that these changes are clinically significant. Orthopedic correction of class II malocclusions mainly results in dento-alveolar compensations: moderate retroclination of the upper incisors and a lot of proclination of the lower incisors. In order to reduce tooth movement, bone anchorage should be used not only in class III orthopedics but also for correction of class II growth.

Class II orthopedics aim to increase the forward projection of the chin by stimulation of mandibular growth. After more than one century of clinical research, it still is doubtful that orthodontists can increase the amount of chondral growth in the condyles. Also the anterior displacement of the glenoid fossa by modeling changes, seems to have a minor effect on the position of the chin. True rotation of the mandible is the main mechanism behind anterior chin displacement, independent of the vertical growth pattern. Forward rotation implicates significant modeling changes in the ramus, gonial angle, and lower border of the mandible. Therefore, force application by functional appliances should be focused on the creation of distinct zones of strain and compression in the mandibular bone, rather than on condylar growth stimulation.