



Short Communication

How Condylar modifications occurs

Rohit Kulshrestha*

Department of Orthodontics and Dentofacial Orthopedics, Terna Dental College, Navi Mumbai, Maharashtra, India

***Address for Correspondence:** Rohit Kulshrestha, Senior Lecturer, Department of Orthodontics and Dentofacial Orthopedics, Terna Dental College, Navi Mumbai, Maharashtra, India; Email: kulrohit@gmail.com

Submitted: 13 December 2018

Approved: 28 December 2018

Published: 31 December 2018

Copyright: © 2018 Kulshrestha R. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited



Functional appliances used in correction of class II malocclusions are shown to modify the neuromuscular environment of dentition & associated bones. There are many studies related to the skeletal, dental and neuromuscular changes which are evaluated cephalometrically, clinically as well as with the recent diagnostic aids like MRI. The aim of this short communication was to highlight and discuss the different aspects of condylar modifications and its role in its growth.

The Twin Block has higher effectiveness & comfort as compared to other removable functional appliances [1,2]. The action of Twin Block & Bionator is for 24 hours so effects are more with these appliances. Over the years, several theories have emerged attempting to shed light on condylar growth. One of the earliest theories, the *genetic* theory, suggests the condyle is under strong genetic control like an epiphysis that causes the entire mandible to grow downward and forward. Although this may be related more to development of the prenatal than postnatal condyle, the theory does indirectly question the effectiveness of orthopedic appliances in condylar growth as proposed by Brodie [3,4]. Several long-term investigations actually showed clinically insignificant condylar growth modification after continuous mandibular advancement with a reasonable retention period in human beings although the initial treatment results appeared encouraging. This leads to the conclusion that the general growth of the condyle appears relatively unalterable in long-term studies.

A second hypothesis based on the earliest available acute and blind EMG monitoring technique, suggests that hyperactivity of the lateral pterygoid muscles (LPM) promotes condylar growth. Rees reported that other muscles and tendons, including those of the deep masseter and temporalis, also attach to the articular disk region. Attachments of the LPM to the condylar head or articular disk may be expected to cause condylar growth, but anatomic research has not found evidence that significant attachments actually exist [5,6]. The LPM tendon is observed attaching, however, to the anterior border of the fibrous capsule that in turn attaches to the fibrocartilage of the condylar head and neck anteriorly. At the same time, it is doubtful that initial hyperactivity could occur where the LPM muscle has been shortened by continuous mandibular displacement therapy. By using LPM myectomy in rats, which may have disrupted condylar blood supply, Whetten and Johnston found little evidence that LPM traction had any pronounced effect on condylar growth. More recently, permanently implanted longitudinal muscle monitoring techniques have found that the condylar growth is actually related to decrease postural and functional LPM activity. This notion was also supported in human studies by Auf der Maur, Pancherz and Anehus- Pancherz, and Ingervall and Bitsanis that reported decreased muscle activity. The LPM hyperactivity theory brought forward by Charlier et al. Petrovic, and later espoused by McNamara however, was important in prompting further investigations in muscle-bone interactions [7,8].

A third hypothesis, the *functional matrix* theory, postulates the principal control of bone growth is not the bone itself, but rather the growth of soft tissues directly

associated with it. Although this was supported in part by investigations testing the different growth and developmental responses between the condyle and epiphysis, there has been no explanation as to exactly how condylar growth would be stimulated. Thus, this theory's validity has been questioned. One of the reasons was that there was little explanation of the specific mechanism by which the condyle was stimulated to grow. Endow and Hans presented an excellent overall perspective suggesting that mandibular growth is a composite of regional forces and functional agents of growth control that interact in response to specific extra-condylar activating signals [9,10].

References

1. Pancherz H. The Herbst appliance—its biologic effects and clinical use. *Am J Orthod.* 1985; 87: 1–20. **Ref.:** <https://goo.gl/boQL1t>
2. Rabie AB, She TT, Ha`gg U. Functional appliance therapy accelerates and enhances condylar growth. *Am J Orthod Dentofacial Orthop.* 2003; 123: 40–88. **Ref.:** <https://goo.gl/A7gp9w>
3. Rabie AB, Xiong H, Ha`gg U. Forward mandibular positioning enhances condylar adaptation in adult rats. *Eur J Orthod.* 2004; 26: 353–358. **Ref.:** <https://goo.gl/cAaTX8>
4. Shen G, Rabie AB, Zhao ZH, Kaluarachchi K. Forward deviation of the mandibular condyle enhances endochondral ossification of condylar cartilage indicated by increased expression of type X collagen. *Arch Oral Biol.* 2006;51: 315–324. **Ref.:** <https://goo.gl/eJnphG>
5. Fuentes MA, Opperman LA, Buschang P, Bellinger LL, Carlson DS, et al. Lateral functional shift of the mandible: Part II. Effects on gene expression in condylar cartilage. *Am J Orthod Dentofacial Orthop.* 2003; 123: 160–166. **Ref.:** <https://goo.gl/WPjfq2>
6. Woodside DG, Metaxas A, Altuna G. The influence of functional appliance therapy on glenoid fossa remodeling. *Am J Orthod Dentofacial Orthop.* 1987; 92: 181–198. **Ref.:** <https://goo.gl/mXkCJ8>
7. Hinton RJ, McNamara JA Jr. Temporal bone adaptations in response to protrusive function in juvenile and young adult rhesus monkeys (*Macaca mulatta*). *Eur J Orthod.* 1984; 6: 155–174. **Ref.:** <https://goo.gl/9J3LiF>
8. Rabie AB, Zhao Z, Shen G, Ha`gg EU, Dr O, et al. Osteogenesis in the glenoid fossa in response to mandibular advancement. *Am J Orthod Dentofacial Orthop.* 2001;1 19: 390–400. **Ref.:** <https://goo.gl/898yhG>
9. Bergman RA, Afifi AK, Heidger PM. *Histology.* Philadelphia, Pa: WB Saunders; 1996.
10. Shen G, Darendeliler MA. The adaptive remodeling of condylar cartilage—a transition from chondrogenesis to osteogenesis. *J Dent Res.* 2005; 84: 691–699. **Ref.:** <https://goo.gl/UUmNdr>