특강 I

CHINCUP THERAPY FOR CLASS III PATIENTS

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Chincap has been used in interceptive procedures for correction of incipient Class III malocclusion for many years. In Weinberger's book of orthodontic history, the chincap was first shown by Cellier in 1802 and by Fox in 1803. Since then, it became a common appliance to attempt to retard the growth of the mandible and obtain a better anteroposterior relationship between the two jaws. However, the early attempts were only partly successful because of incomplete knowledge of mandibular growth, use on non-growing mandibles, and inadequate understanding of the force generated by the chincap. Since then a number of investigations were made to find its effect on the growth of the mandible. In reviewing literatures of animal studies, those generally agree that the skeletal alteration can be produced when the force is applied systematically during growth. These days, as Petrovic, McNamara and Carlson stated, it is thought that the mandible is as much more amenable to clinical control than previously thought. However, growth changes of the mandible show wide ranges of variation with chincap when it is used at pubertal growth period. It is indicated that the magnitude of the growth activity of the mandible is the key of variation and should be evaluated individually to determine a proper way of chincap use.

There are several types of prognathic framework, depending on the relative size or position of the maxilla and the mandible. The size and position of the mandible and maxilla relate each other so that it becomes important for diagnosis and treatment planning to find what kind of facial type a patient has. In this sense, cephalometric evaluation must be made. As a rule, when the maxilla is retruded or small size while the mandible is normal, we should normally apply the maxillary protractive appliance to correct skeletal imbalance. On the other hand, when the maxilla is normal and the mandible is large and protruded, we should use a chincap. However, as stated above, mandibular prognathism is a facial dysplasia produced by growth disharmony of the mandible in size, form, and position with respect to the maxilla and it is normally associated with some musculature imbalance. This may indicate that the phenomena of the Class III characteristics may give a different growth environment to the mandible which may result a different growth manner in size attainment, timing, rate, and direction. Therefore, in order to understand the effects of chincap, we first have to study the following questions about the growth of the Class III mandible.

1) Does the Class III mandible show a greater amount of growth than a Normal?
2) What direction does the Class III mandible grow predominantly ?

Then it becomes also important to see the process of growth, because a true characteristics of the facial framework may be hidden and it may reveal a different type of face after growth. Variation may exist not only in the static morphology but also in a dynamic process of the growth among individuals. Therefore when we treat a patient with chincap during growth, we must consider the variation of individual growth manner, not only from a static but also from a dynamic aspect of growth changes. Therefore we need to study the following questions as well.

1) Does the Class III mandible shows a different timing of incremental changes from normal?
2) How can we evaluate the maturational stages of the mandible and the remaining amount of growth?

Regarding formation of the Class III morphology, the following points should be also considered. First, it is whether or not the Class III mandible grow longer than the normal. If the Class III mandible may grow for a longer period than the Class I, the Class III relationship will be worse. Second, the changes occurring in the total facial framework including cranial base and dentoalveolar region should be evaluated at the same time. This is because they may relate to the progressive development of the Class III relationship. The morphology of a prognathic face may have a different characteristics from a normal not only in the size of the mandible but also in the basic structure of cranioface and dentoalveolar dynamic changes. We need to understand those matters when chincap therapy is performed.

Regarding long-term results of chincap effects, it is reported that the direction of mandibular growth (primary displacement) is altered by chincap, but original direction is latently maintained and recovers when chincap force is removed during growth (Angle Orthod, 1984 by Mitani).

It is also reported that although the skeletal profile is greatly improved during the initial stage of chincap therapy, the average skeletal profile becomes essentially same after growth (Am J Orthod, 1990 by Sugawara). This is a very important finding for the chincap therapy since most clinicians expect a permanent correction of patient's prognathic profile after chincap therapy no matter when chincap is stopped. In fact, there are some disagreements among clinicians on this matter.

From this view point, we need to study the following questions.

1) Is it possible to retard the actual growth of the mandible constantly through the growth period with a chincap?
2) Is it possible to maintain the effects obtained at early stage of chincap therapy until the end of growth?
3) Is there any possibility to have recovery growth on the mandible after chincap stop?
4) How can we maintain the initial effects of chincap permanently?

It should be also kept in mind that the chincap force is essentially unphysiological to the mandible. It may cause some TM joint disorders. Particularly, long hours excessive force is the most dangerous for TM joint function. Our force magnitude was normally about 600-700 grams or at most 800 grams at chin and it was worn normally during night only. However moderate force for a patient may not be always moderate to other patients, because each patient has its own characteristics in TM joint structure and function. For instance, the form and size of the condyle varies individually. Therefore, the resistant value of each condyle should be different. Since each condyle has a different amount of growth cartilage, proliferation and bone formation occurring at different types of condyle may produce different degree of growth activity. This I call "growth magnitude". This magnitude varies from patient to patient and within an individual by physical conditions particularly at

puberty. Consequently this may react differently against chincap force. Therefore if we like to determine the optimum chincap force magnitude, we should consider the individual growth magnitude as well. However, at least at present, it is impossible to evaluate the form and volume of the condyle of each patient clinically.

From this view point, it is unreasonable to apply the same amount of force to every patient. Furthermore, a recent study has revealed that the cartilage of the condylar fossa and disk lacks the proper amount of proteoglycans to sustain excessive or constant loading of the TM joint, and can result in degenerative changes and permanent irreparable damage to the cartilage and the structures in this joint. Thus we need to know a possible damage caused by chincap on the mandibular joint structure. I would like to discuss this matter.

Summary of the results

Regarding formation of the Class III morphology, the studies done in my department strongly indicated that the fundamental configuration of mandibular prognathism is established early life, and once established, its annual growth increment and velocity show a manner of change fairly similar to those of the normal in average through the growth period. It is clear that a chincap does produce a significant change on the skeletal profile during the initial stage of treatment. This may be associated with an actual retardation of mandibular growth at condyle occurring during the first 1-2 years and backward and/or downward redirection of mandibular growth as well as remodeling of mandibular form and posterior shift of the entire mandible. However, our long-term study indicates that individuals seems to retain and recover a tendency to return to their basic original skeletal pattern which is pre-determined morpho-genetically. This is important clinically because such tendency may cancel the results of the chincap effects after chincap stop. Furthermore, some recovery growth is suspected to take place after chincap use. It should be also kept in mind that the chincap force is essentially unphysiological to the TM joint structure and function. The reaction occurred at the joint against chincap force may not be always favorable but sometimes dangerous. Periodical examinations of the TM joint is also required in the Class III chincap therapy. Chincap should be considered as a double edged sward although one side of edge may not be sharper than the other side.

Conclusion

It is therefore concluded that the chincap should be used with a certain limitations on the basis of proper diagnosis and careful managements along with patient's individual biological conditions. I will give you my informations about chincap therapy. I did neither deny nor defend chincap therapy. You judge it good or bad.