Effects of head posture on resting EMG activity of craniocervical muscles and on occlusal contacts

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ABSTRACT

This study was performed to investigate influence of the changes of head posture on resting electromyographic(EMG) activity in anterior temporalis(TA), masseter(MM), sterno-cleidomastoid muscle(SCM) and trapezius(TI), and on status of occlusal contacts. For this study twenty-nine patients with temporomandibular disorders(TMD) and thirty dental students without any masticatory symptoms were selected as patients group and control group, respectively.

EMG activity(μV) at rest was observed in four kind of head postures such as natural or normal head posture(NHP), forward head posture(FHP), upward head posture(UHP), downward head posture(DHP), and in NHP and FHP, EMG activity with flat occlusal splint was also checked. BioEMG® (Bioelectromyograph, Bioresearch Inc., USA) was used to record EMG activity in the above four muscles with eight locations on both sides.

The author used T-Scan® (Tekscan Co., USA) system to investigate the changes of occlusal contacts on clenching in the four head postures about number, force, time(duration) and total left-right statistics(TLR, occlusal stability crossing left-right dental arch on clenching).
For taking in upward or downward head posture, head was inclined 10° upward or downward and CROM® (cervical-range-of-motion, Performance attainment Inc., USA) was used to maintain same posture during the procedure. The results obtained were as follows:

1. EMG activity of TA did not show any difference by change of head posture, but that of MM and SCM showed higher value of EMG activity in FHP and UHP, and that of TI showed higher value of EMG activity in FHP and DHP.
2. EMG activity of TI was higher than that of any other muscles in NHP, FHP, and DHP, but the activity in UHP was the lowest reversely.
3. Patients group showed higher EMG activity than control group did in all the muscles in NHP. And significant difference between the two groups were also observed in TA in FHP, in SCM in UHP, and in SCM and TI in DHP with higher activity in patients group.
4. There was no change of EMG activity in NHP with splint, but EMG activity in TA and MM was decreased in FHP with splint.
5. In general, status of occlusal contacts was not changed with head posture in all subjects, and difference between patients group and control group was only noted for number and force of tooth contact in UHP and DHP with more value in control group.
6. Correlationship between EMG activity and number and force of tooth contacts was shown negatively with regard to MM in NHP, and TI in UHP and DHP.

I. 서 론

착추의 하후두부에 의해 조절되는 머리의 움직임으로 하악의 안정위 및 겨자째 구조물들에 상태가 변화될 수 있음을 보고되어 왔다.  
Brodie와 Thompson은 하악연진위에서 두부자세의 영향에 대해 하악의 안정위는 후경부근육들과 오함, 겨자, 연하, 발음 등의 기능을 수행하는 척추전방의 근육들이 함께 관여하여 이루어지는 위치라고 하면서 이들 근육 간의 균형에 의해 영향을 받고 있다고 하였고, Cohen, Funakoshi 등, Prieskel, McLean 등, Mohl 등도 저작근활성도 머리위치에 따라 변화되며 결과적으로 하악의 위치를 변화시킨다고 하였 다. 따라서 불량한 자세로 인해 두경부 근골격계의 불균형이 초래되고 이에 대해 적절한 치료를 통해 다시 균형된 상태를 이루게 되는 경우에는 하악의 안정위도 새로운 위치를 찾을 수 있다고 간주되었다.

하악의 안정위 및 운동이 영향을 미치는 요인으로 교합, 축두하악장애, 안면동통 등 다양한 요인들이 겹치고 있으며 경추를 비롯한 두경부자세의 이상도 고려되어야 한다. 그러므로 교합체득이나 수복치료, 교합조정 등과 같은 일반적인 치과치료를 시행할 경우에 두부자세를 올바로 하는 것이 중요하며 특