Brain Activity after Wearing a Twin Block Appliance

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To investigate the effects of mandibular advancement with a twin block appliance (TBA) on brain activity in the prefrontal cortex during gum chewing in Class II division 1 malocclusion. The study group consisted of 20 males (25.1±3.0 years old), who were divided into 10 Class I individual normal occlusion subjects with a favorable facial morphology and 10 Class II div. 1 malocclusion subjects with retruded mandible. Brain activity in the prefrontal cortex was measured using near-infrared spectroscopy (NIRS). Without wearing a TBA, we found that the concentration of oxygenated hemoglobin (O_2Hb) in the left prefrontal cortex was significantly lower in the Class II group than in the Class I group. In both groups, the concentration of O_2Hb in the right prefrontal cortex was significantly elevated when a TBA was used at the 0-mm protruding position as compared to when a TBA was not used. No statistically significant differences were observed between the groups with a TBA at the 0-mm protruding position. There was no increase in O_2Hb concentration in the Class II group when the mandible was advanced stepwise to the 8-mm protruding position with a TBA. In contrast, VAS (visual analog scale) scores, used for rating the level of discomfort, increased in accordance with the increase in mandibular advancement. Our results suggest that measurement of brain activity in the prefrontal cortex by NIRS might be useful for monitoring discomfort when masticating with a TBA.

Key words : prefrontal cortex, Twin block appliance, emotion, mandibular advancement, NIRS

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