CONCERNING THE INFLUENCE OF WEARING BITE UP ORAL APPLIANCE ON REACTION TIME OF THE EXERCISE

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Abstract

It is thought that for some sports so called the "agility" accomplishes the key role from the viewpoint of the improvement of the performance and the injury prevention. Therefore we examined the influence of bite up with the oral appliances on the agility.

Tested sporting event were cervical retroflexed force. EVA mouthguard and resin splint were used for the oral appliances. Reaction time was measured as a response to stimulated light by the activating time of the masseter muscle and activating time of the main muscle.

It is found the reaction time of neck muscles movement tends to be shortened by wearing of the oral appliances.

These results were seemed to be based on decrease of a free way space by the bite up with the oral appliances resulted in shortening the reaction time of the masseter and the stabilized occlusion(141 words)

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key word : agility, reaction time, oral appliance, mouthguard, splint

Introduction

The influence of improvements of oral conditions and wearing of oral appliances such as the splint or the mouthguard on sports performance and a daily moving ability has been paid attention recently.

There are many reports that bite up by the splint or the mouthguard affects the muscular power not only masticator muscles but also whole body.

However, for some sports, it is thought that so called "agility" like speed and instantaneous power is the key effect for improvements of performance and injury prevention capacities.

In our previous study, it was reported that wearing the bite up appliances such as the splint or the mouthguard reduced the agility as a reaction time in vertical jump and back strength significantly^{1~3}).

In the present study, cervical retroflex was selected as a tested exercise item to measure the whole body reaction time. And contractions of a masseter muscle and an upper part of trapezius muscle were examined.

Methods

We selected five healthy men(range, 20~30 years : mean, 27.8 years)as subject who have the normal occlusion and conscious of clenching when muscular power is demonstrated.

Two types of bite up appliances were chose, one was a resin splint(SP)and another one was mouthguard(MG)which made from ethylene vinyl acetate, both appliances had 2 mm vertical bite up at the first molar.

Tested exercise was such as cervical retroflexed force.

A masseter muscle(MM)on the habit mastication side was selected in the muscle of the stomatognathic system, and an upper part of trapezius muscle(TRS)was selected in the analysis muscle in the cervix part.

The electromyogram record was obtained by means of the multi telemeter system(WEB-5000, Nihon Kohden)

The recorded electromyogram was converted into electric output voltage through A/D converter(MP-

Fig. 1. Bite up oral appliance and analysis item.

The bite up oral appliance (SP, MG) used for actual experiment in the upper part of figure is shown.

The reaction time was measured as a response to stimulated light by the activation time of masseter muscle (MM) and the trapezius muscle (TRS). The analysis item of electromyogram waveform were activity start time (ST) and the time of average amplitude (AA).

100A, Biopac System) and analyzed with a personal computer.

Reaction time was measured as a response to stimulated light by the activating time of the MM and the TRS.

Measured electromyogram was analyzed with a personal computer, about activity starting time (ST) and reaching time to average amplitude (AA) of MM and TRS (Fig. 1) with waveform acquisition and analysis software (AcqKnowledge, Biopac System).

Statistical comparisons were made with using ANOVA and Tukey HSD ($p < 0.05$).

Results

As for the value of ST and AA, shortening about 50 ms was seen by wearing the bite up oral appliances compared with NO. The activity of TRS appeared compared with MM a little delaying. Moreover, a significant difference was not admitted

between SP and MG. (Fig. 2)

Discussion

Both ST and AA of MM were admitted a little earlier than that of TRS. And it was found that wearing of the oral appliances shortened the reaction time of cervical retroflex (ST, AA). In other words, wearing of the splint or the mouthguard quickens the immediate shrinkage of masseter muscle and improves the agility.

These results were seemed to be based on decrease of a free way space by the bite up resulted in shortening the reaction time of the masseter and the stabilizing occlusion with the splint and the mouthguard.

Namely, the bite up with the splint or the mouthguard can be expected another merits of shortening the muscle activity time when the whole body movement, in addition to energy absorbing ability of

Fig. 2. Average value of all five subjects.

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the mouthguard and an increase in amount of muscle activity that have been said up to now. As a result, these appliances have a possibility to decrease or prevent injuries and improve performance not only around oral but also whole body.

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