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Case Report

Mandibular movement during sleep bruxism associated with current tooth attrition

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ABSTRACT

Patient: Observation of attrition patterns suggests that mandibular movement in sleep bruxism (SB) may be associated with current tooth attrition. The aim of this study was to confirm this phenomenon by investigating mandibular movement and masseter muscle activity. The subject was a healthy 21-year-old Japanese male. We recorded biological signals including mandibular movement and masseter electromyograms (EMGs) with a polysomnograph. Based on the EMG using Okura's criteria, SB events were classified into clenching, grinding and mixed types according to mandibular movement criteria. The close-open mandibular movement cycles (CO-cycles) during grinding and mixed type events were selected based on mandibular movement trajectories.

Discussion: Fifty-eight CO-cycles were selected in seven grinding and three mixed types. We found that SB mandibular movements associated with current tooth attrition. Excessive lateral movements (ELM) beyond the canine edge-to-edge position were observed in the closing (10.3%) and opening (13.8%) phases of the CO-cycle. Total masseter muscle activity was significantly higher during voluntary grinding (VGR) than during CO-cycle including ELM (working side: $P = 0.036$, balancing side: $P = 0.025$). However, in the middle and late parts of the opening phase, working side masseter muscle activity was significantly higher during CO-cycle including ELM than during VGR ($P = 0.012$). In the early part of the closing phase, balancing side masseter muscle activity was significantly higher during CO-cycle including ELM than during VGR ($P = 0.017$).

Conclusion: These findings suggest that excessive forceful grinding during ongoing SB events may have caused canine attrition in this patient.

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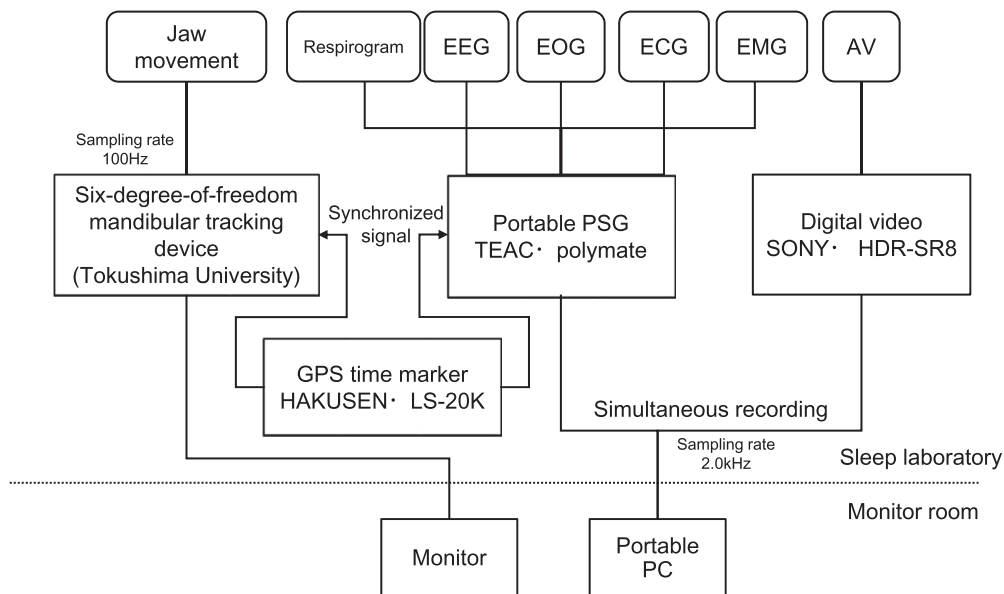


Fig. 1 – The six-degrees-of-freedom mandibular tracking system for studying sleep bruxism (SB) was developed at Tokushima University and allows simultaneous recording of mandibular movement data and polysomnograph data. We recorded mandibular movement, respirogram, electroencephalogram (EEG), electrooculogram (EOG), electrocardiogram (ECG), electromyogram (EMG) and audio visual data (AV). To temporarily synchronize the data stream, a GPS time marker and an image recording tool program were used.



Fig. 2 – Intra-oral photographs of the subject. Attrition was observed on the buccal surface (severe) and palatal surface (moderate) of the upper right canine.

1. Introduction

Bruxism is caused by the hypertonic contraction of the masticatory muscles and is defined as a diurnal or nocturnal mandibular parafunction that includes clenching, bracing,

gnashing, and grinding of teeth [1]. In general, it includes parafunctional habits, such as finger sucking or nail biting [2,3]. Sleep bruxism (SB) can cause damage to the masticatory system including tooth fracture, severe attrition, tooth abfraction, periodontitis, dental prosthesis breakage, dental implant body drop out, temporomandibular disorders, headache or shoulder

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