

Occlusal Analysis and Management of a Patient with Median Nerve Palsy of Unknown Etiology: A Case Report

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ABSTRACT

A patient presented with a diagnosis of median nerve palsy in the fingers of the right hand of unknown etiology by an orthopedic surgeon. Occlusal analysis showed that the habitual occlusal position and the muscular position were inconsistent, and in the muscular position the left second premolars were in premature contact. When the biting force was examined, it was mean 37 kg for the right and mean 13.3 kg for the left at first visit. The left-right difference in bite force was significant ($p < 0.005$). As a result of five times of occlusal adjustment, occlusal contact of both molars was obtained, and the occlusal force was mean 20 kg on the right and mean 21 kg on the left, and there was no left-right difference. The median nerve palsy of the right hand also disappeared. In this case, the bite force on the right side was abnormally stronger than that on the left side, and the trigeminal motor nucleus on the right side was abnormally excited. It was considered that the activity of the trigeminal spinal cord nucleus was suppressed, resulting in median nerve palsy.

Keywords: occlusal discrepancy, occlusal force, trigeminal motor nucleus

INTRODUCTION

Median nerve palsy appears due to various causes such as trauma, tumor, overwork, etc., but there is no report on extreme left-right difference in occlusal force. It has been reported on the relationship between occlusal force and temporomandibular joint sound, occlusal force and hearing and on various symptoms with occlusal discrepancy between habitual occlusal position and muscular position [1-3]. This case may help us understand the relationship between occlusion and limb motor skills.

CASE PRESENTATION

A 68-year-old woman presented with the complaint of food getting stuck in her upper right premolar. She reported that three months earlier she had lost the ability to pinch with her right thumb and forefinger and had been seen by an orthopedic surgeon who was diagnosed with a median nerve palsy of unknown etiology (Fig. 1).



Figure 1: Median nerve palsy of right index finger and thumb

The patient's medical history included hypertension and taking medication. The patient had 25 teeth and was missing the mandibular left and right second molars and the maxillary right second molars. All but five mandibular anterior teeth and the right first premolar had undergone crown restoration (Fig. 2).



Figure 2: Lower and upper dental arches

No abnormalities in the temporomandibular joint (TMJ) were observed on the computed tomography images taken in the habitual occlusal position (HOP) at the initial consultation (Fig. 3).



Figure 3: Bilateral tomographic images of temporomandibular joint

The maximum mouth opening was 47 mm, the opening was straight, and no tenderness was observed in the masticatory muscles, trapezius, and sternocleidomastoid on palpation. At the first visit, the HOP record was obtained using a vinyl polysiloxane bite registration material (Exabite, GC, Tokyo, Japan), while the patient was seated upright with her jaw voluntarily closed. The bite force was then measured at the first molars using an occlusal force meter (MPM 3000, NIHON KOHDEN, Tokyo, Japan). Three measurements performed on each side after asking the patient to bite as strongly as possible. The statistical differences between mean values were evaluated using a t-test. The mean value was 37 kg on the right side and 13.3 kg on the left side, respectively. The statistical difference between the mean values was significant ($p < 0.005$). Subsequently, the upper and lower impression were obtained, and dental models were fabricated. An anterior flat biteplate was fabricated on the upper model using self-curing acrylic resin (Ortho-fast, GC, Tokyo, Japan). At the second visit, the patient wore the bite plate for 5 min and the bite plate-induced occlusal position (BPOP) record was obtained, using the same material as used for obtaining the HOP record. A BPOP wax record was obtained using wax registration material (Bite wafer, Kerr US, Romulus, MI, U.S.A.) in the previously described manner. The upper and lower models were mounted on an articulator with the BPOP wax record. Regarding the occlusion of the upper and lower models, the right molar was not occlusion (Fig.4).



Figure 4: The arrow indicates the gap between upper and lower molars on the right side.

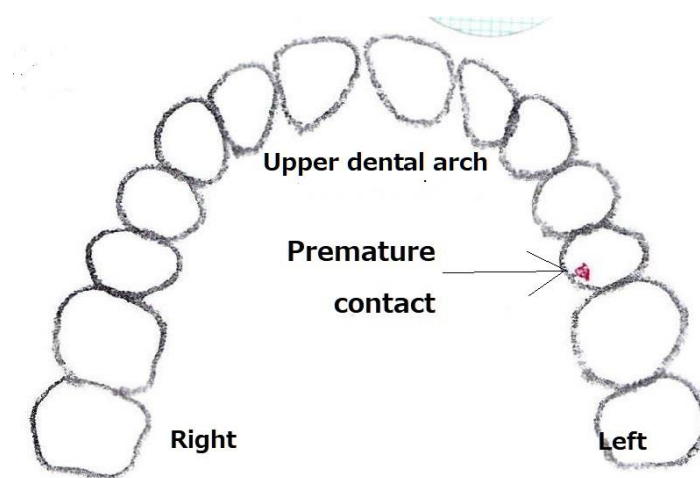


Figure 5: Recorded premature occlusal contact

Premature occlusal contact was recognized on the left second premolar (Fig. 5). To examine the direction from the BPOP to HOP, two-dimensional measurements were performed on a

modified articulator using previous records. The recording disc was approximately the same as that of a condyle of TMJ. Therefore, the shift was caused by one of the condyles (Fig. 6).

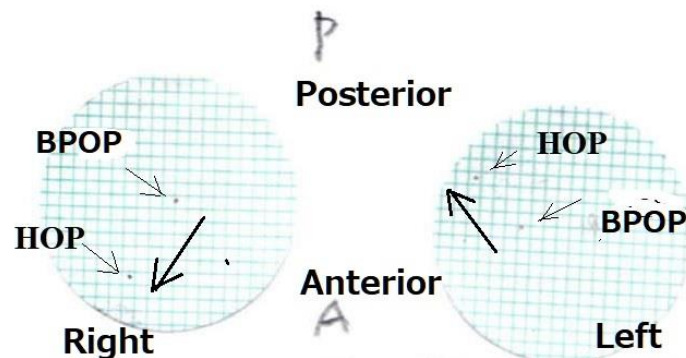


Figure 6: Recorded the habitual occlusal position (HOP) and the bite plate- induced occlusal position (BPOP). The arrow indicates the shift from BPOP to HOP.

Subsequently, to examine the direction from BPOP to HOP, three-dimensional measurements near the first molars were performed with the modified articulator using the polysiloxane records. Her HOP deviated posterolaterally to the left from BPOP (Fig. 7).

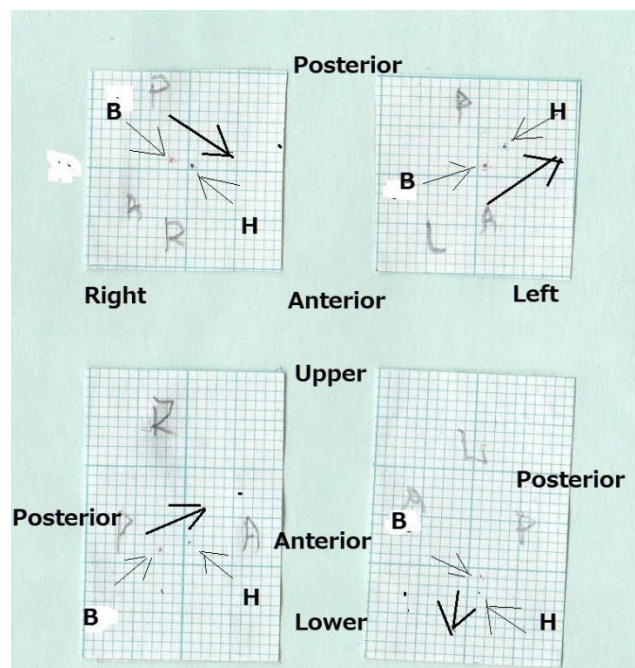


Figure 7: Three dimensional records. The arrows indicate the shift from the bite plate-induced occlusal position (B) to the habitual occlusal position (H).

Occlusal adjustment was performed on the models mounted the articulator according occlusal position correcting therapy [4]. Then, the adjustment site on the model was transferred to a template, and the template was adapted to the teeth in the mouth for occlusal adjustment. Occlusal adjustment was performed five times until bilateral occlusal contacts were obtained (Fig. 8).

After the occlusal adjustment was completed, the occlusal force was measured. The mean value was 20 kg on the right side and 21 kg on the left side with no statistical difference. Statistical difference between before and after the occlusal adjustment was observed only on the right side ($p < 0.005$). The patient's right hand median nerve palsy disappeared (Fig. 9).

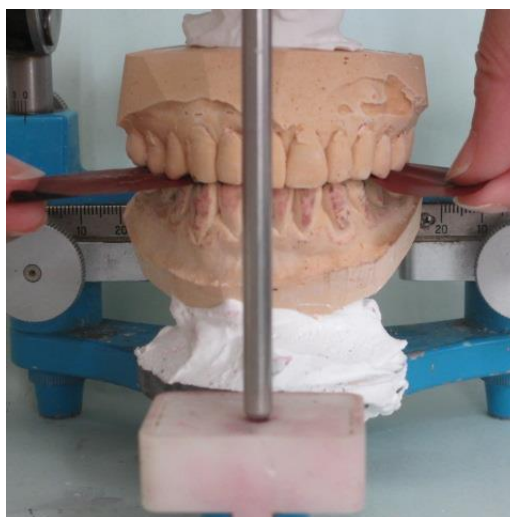


Figure 8: Confirmation of bilateral occlusal contacts



Figure 9: Disappearance of median nerve palsy

DISCUSSION

It has been reported that various symptoms appear due to occlusal discrepancy between habitual occlusal position and muscular position (3). However, the patient in this case did not show any symptoms of the temporomandibular system. Moreover, although there is report that the right occlusal force was weak when the right posterior teeth was not occluded (1), extremely strong occlusal force was shown in this case. How should we think about this? In the case of this patient, the right posterior teeth were brought into occlusal contact and unconsciously exerted an extremely strong occlusal force. Therefore, it is thought that the molars on both sides were in contact with each other in the muscular position, and that the temporomandibular system was functioning normally without any symptoms. However, if such a state in which an abnormally strong bite force must be constantly exerted continues, the

motor nucleus of the trigeminal nerve will be abnormally excited. It was considered that the activity of the trigeminal spinal cord nucleus was suppressed, resulting median nerve palsy. We learned from this case that even if there is the discrepancy between the habitual occlusal position and the muscular position, symptoms may not appear in the temporomandibular system, and abnormalities may appear in other body parts.

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