

# Occlusal analysis and management of a patient with low-frequency hearing loss and ear fullness: A case report

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## Abstract

Although the relationship between aural symptoms and dental occlusion, as well as the improvement of tinnitus using occlusal position correcting therapy have been reported, the treatment of low-frequency hearing loss and ear fullness using occlusal position correcting therapy have not yet been reported. Occlusal improvement was achieved using the occlusal position correcting therapy on a patient with low frequency hearing loss and ear fullness. Occlusal analysis was performed by mounting dental models on an articulator and identifying a premature occlusal contact on the right second molars and a deviation of the habitual occlusal position from the muscular reference position. Occlusal modification was performed to make the habitual occlusal position coincide with the muscular reference position. The low-frequency hearing loss and fullness on the right ear disappeared and have not recurred at 2-year follow-up. The low frequency hearing loss and ear fullness were thought to be caused due to the tensor tympani and stapedius tension synchronously produced with the masticatory muscle contraction.

## Introduction

The relationship between temporomandibular disorders and aural symptoms (tinnitus, low-frequency hearing loss and ear fullness) have been reported [1-8]. However, to be the best of our knowledge the relationship between these aural symptoms (low-frequency hearing loss and ear fullness) and dental occlusion has not yet been reported. Various symptoms have reportedly been caused by the occlusal discrepancy between the habitual occlusal position (HOP) and the muscular position (MP) [9]. Some masticatory muscle tension might be caused due to the occlusal discrepancy, which may affect tensor tympani and stapedius [10,11]. The present case study might be useful to understand one of the mechanisms of low-frequency hearing loss and ear fullness.

## Case presentation

A 66-year-old woman presented with a chief complaint of pain of the lower right third molar. She had right tinnitus, difficulty in hearing low-frequency sound, and right ear fullness. She initially visited an ENT clinic. After various tests, she was diagnosed with sudden deafness and low-frequency hearing loss. She was treated with oral steroids, such as isosorbide, diphenidol and domperidone without any improvement of the symptoms [12]. Her medical history was unremarkable, except for the above-mentioned aural symptoms. She reported sounds and pain of the temporomandibular joints (TMJs) during jaw movements, a right stiff shoulder, right tinnitus, low-frequency hearing loss and right ear fullness. Mouth opening was 40 mm and the opening pass deviated laterally to the right. There was no TMJ tenderness; however, tenderness of the right temporal and medial pterygoid muscle on palpation was observed. Dental occlusion was anatomically normal (Figure 1). The TMJs bilaterally appeared normal on the computed tomography images taken in the HOP at the initial consultation (Figure 2).

The lower right third molar was extracted at the initial visit. At the second visit (5 days later), an HOP record was obtained using a

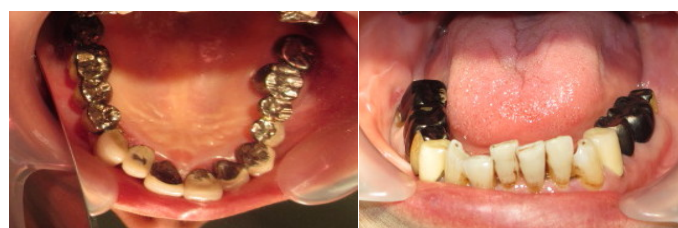


Figure 1. Upper and lower dental arches after the extraction of the right lower third molar

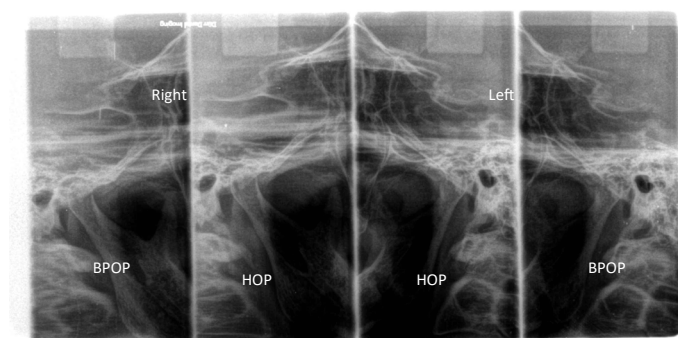


Figure 2. Bilateral tomographic images of TMJ in the HOP and the BPOP

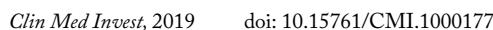
vinyl polysiloxane bite registration material (Exabiite, GC, Tokyo, Japan), while the patient was seated upright with her jaw voluntarily closed. Subsequently, the upper and lower jaw impressions were

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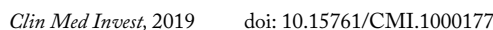
**Key words:** low frequency hearing loss, ear fullness, habitual occlusal position, muscular position, occlusal position correcting therapy

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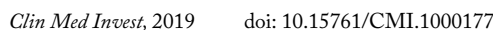
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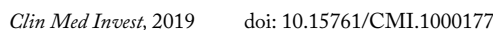
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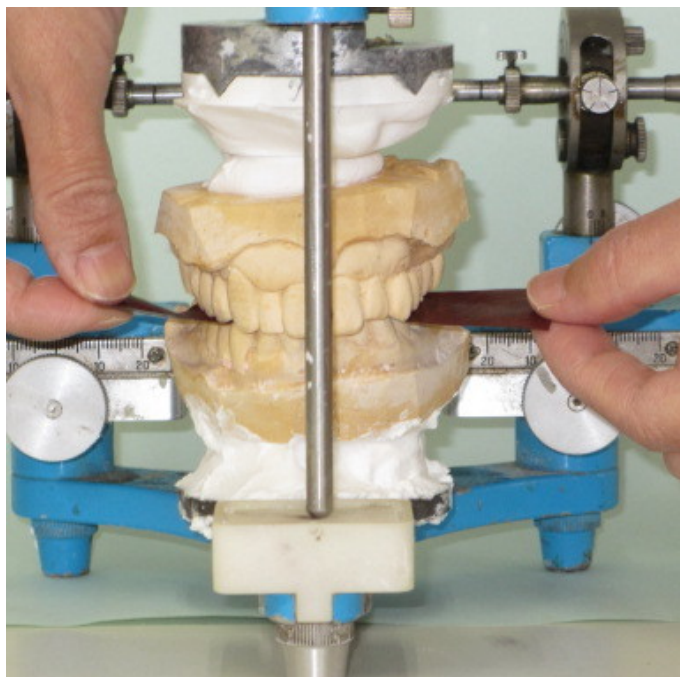
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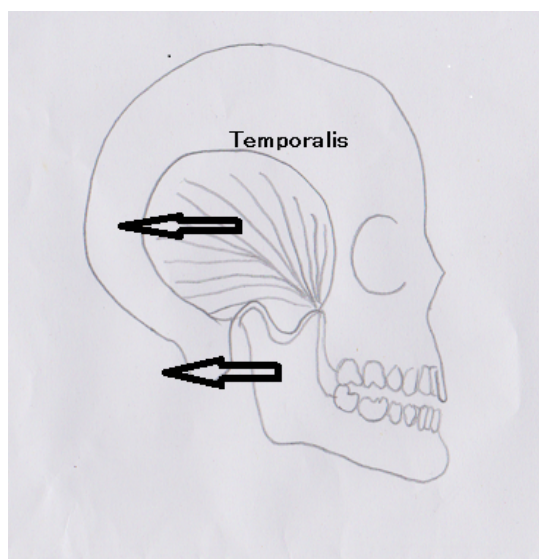
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[11]. This means that unilateral deviation of the mandible might cause the tension of the masticatory muscles and the tension in turn might cause tinnitus with the spasmodic synkinesis of the tensor tympani and the stapedius [11]. In the present case, the premature occlusal contact on the right second molars retracted the mandible backward with the contraction of the right temporal muscle, making the teeth meet together and causing the tensor tympani and the stapedius tension to be synchronously produced with the temporal muscle contraction (Figure 8) [10]. The tensor tympani and stapedius tension restricted the movement of auditory ossicles (malleus, incus, and stapes), causing low-frequency hearing loss. Moreover, the tensor tympani tension caused the contraction of the semicanalis muscoli tensoris tympani that resulted in ear fullness.



**Figure 7.** Confirmation of occlusal contacts on both sides in the muscular contact position



**Figure 8.** The temporalis strongly pulls the mandible backward for the teeth to meet together

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## Competing and conflicting interests

The author declares no competing interests.

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