# An Alternative Approach for Reducing Complicated Symptoms Related to Nonfunctional Tooth Contact: A Case Report

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## Abstract

The various symptoms related to nonfunctional tooth contact can be reduced by focusing on avoiding excessive contact. Although patients make a conscious effort to keep their teeth apart after receiving advice from their dentists, this approach may not work in some patients. For such patients, we propose an alternative approach that involves unilateral intraoral application of a small device onto the maxillary premolars. The device, which has a thickness of 1.0–1.5 mm, inhibits inadvertent tooth contact by maintaining a space between the device and the opposing teeth. It is advisable to wear the device throughout the daytime, except while eating and drinking. The actual duration for which the device is worn during the day is considered as the amount of time the teeth are kept apart. Device breakage or tooth pain upon wearing the device indicates unconscious biting on the device. In the case presented herein, the proposed alternative approach considerably reduced tooth complications and masticatory muscle pain, as opposed to patient education, which was ineffective when employed alone. There has been no recurrence of severe symptoms during the last two years. Since there is the potential for swallowing the device and tooth intrusion/extrusion with long-term use of the device, this approach should be considered temporarily until reduction of symptoms. Use of this approach requires a thorough understanding about the principles of its use among the patients and a good rapport between the dentist and the patient.

*Key Words: Behavioral approach, Habit awareness, Masticatory muscle pain, Nonfunctional tooth contact, Tooth pain*

## Introduction

Nonfunctional tooth contact can lead to various individual symptoms in patients [1], including pulpal and periodontal symptoms [2,3], tooth wear [2,4], tooth mobility [5], tooth fracture, bone reduction around teeth or implants [2], cheek or tongue pain, and temporomandibular disorders [6-9]. Since most patients are unaware of the tooth contact, increasing the awareness of this phenomenon is the first step in controlling excessive and unnecessary tooth contact. Once patients are made aware, they usually maintain a conscious effort to keep the teeth apart while awake, which usually results in an effective reduction of symptoms [2,10]. However, since symptomatic improvement occasionally takes time, some patients doubt the utility of their efforts, and the symptoms may complicate further. In such situations, there is a question of uncertainty as to how many hours the patients keep the teeth apart during the day or whether they truly do it at all. This report introduces an alternative approach for symptom reduction in cases where conscious efforts alone are ineffective. This approach requires patient education in avoidance of nonfunctional tooth contact, application of a small device to keep the teeth apart, and allowing dentists to understand the degree of avoidance required. We describe the principles and process employed in this approach through a clinical case where pain in multiple tooth abutments and masticatory muscles manifested during fixed prosthetic treatment.

## Case Report

A 64-year-old woman complained of a chewing disturbance during her first visit. The second premolar and first and second molars in the patient's left mandible were absent and the opposite teeth showed extrusion. She also presented with small, secondary caries of fixed prostheses at some of the contralateral premolars and molars of both jaws. The fixed partial dentures and the secondary caries at the right maxillary and mandibular posterior teeth were removed, and provisional teeth were placed. Periapical periodontitis of the first premolar on the left mandible was also treated endodontically. The patient received two implants at the second premolar and first molar regions of the left mandible (*Figure 1*), and then wore provisional restorations on the implants and the opposing teeth. Occlusal modification was required frequently owing to the discomfort in occlusal sensation (*Figure 2*). During this period, the right maxillary canine, an abutment of a caries-free fixed partial denture, was suddenly attacked by pulpitis, which was later treated endodontically. After confirming the absence of discomfort, the final metal-ceramic prostheses

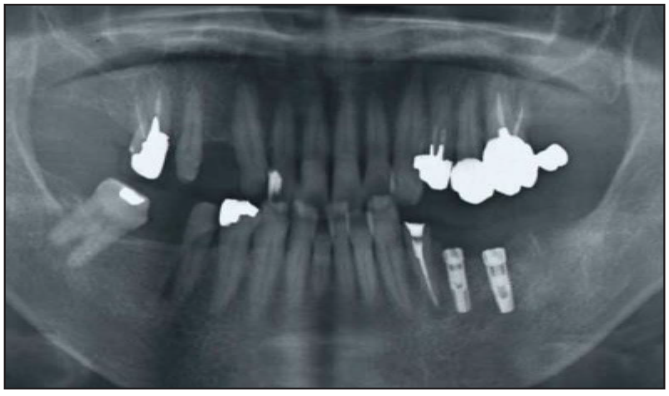

***Figure 1**. Panoramagraph after two implant insertions.*

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were fabricated (*Figure 3*) and placed on the abutments using an interim cement (Hy-bond temporary cement; Shofu Inc., Kyoto, Japan) without premature occlusal contact or cuspal interference.

One month after the interim cementation, the patient complained of slight pain in the right masseter muscle. We did not rule out the possibility of excessive nonfunctional tooth contact; therefore, we instructed her to keep her teeth apart for as long as possible during the day. Since the symptom persisted even after two months of cementation, the same instruction was repeated. However, three weeks later, the patient complained of a sudden severe soreness of all premolars and molars accompanied by a heavily compressive sensation, and strongly requested the removal of all cemented prostheses. Most abutments showed slight mobility, and some had become hypersensitive. At the same time, the patient experienced severe pain on palpation of the masticatory muscles on both sides, i.e., the masseter, temporal, and posterior digastric muscles. Since all symptoms were thought to be aggravated by the habit, we suspected that she could not avoid the contact sufficiently. We explained to the patient again that avoidance of contact was indispensable in reducing the symptoms. She was further informed that, if her conscious effort alone turned to be ineffective, an alternative approach consisting of the combination of a conscious effort and intraoral application of a small device to assist it may be helpful. We carefully explained the principle of this approach using the mock-up device and jaw model (*Figure 4*). This device is intraorally fabricated using tooth-colored auto polymerizing acrylic resin (Provinice; Shofu Inc., Kyoto, Japan), the same material as the mock-up device, and can be placed on the maxillary premolars and the first molar unilaterally. After placement, the patient should try to maintain a space between the device and the opposing teeth. The thickness of this device (1.0–1.5 mm) can create a 2.0–3.0-mm space, which does not disturb speech because the physiologic rest position makes an interocclusal space of 5 to 12 mm between the incisors [11]. The device should be worn while awake for as long as possible, except during eating and drinking. Although dentists apply the device to allow for sufficient retention to the teeth, it still has the potential risk to be swallowed. The patient must keep this risk in mind, and wear it only during the times stated above. This approach is continued until the symptoms are reduced and the patient gets used to keeping the teeth apart.

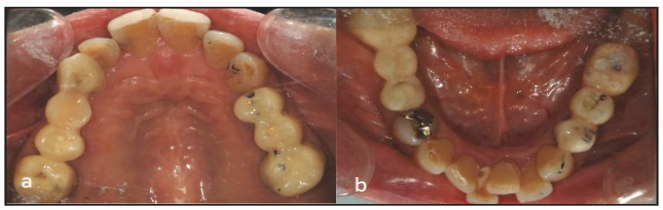


***Figure 2a and 2b**. Intraoral views of provisional restoration after frequent occlusal adjustments.*

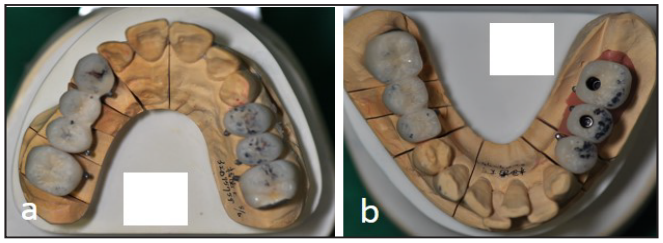


***Figure 3a and 3b.** Bisque metal-ceramic prostheses after intraoral evaluation.*

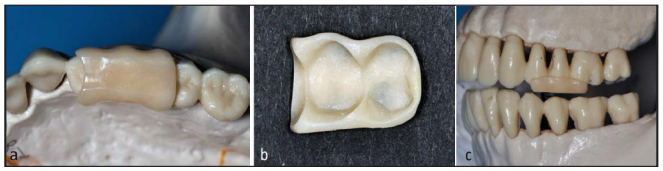


***Figure 4.** (a)Mock-up device on teeth of jaw model; (b) teeth-facing view of the device; (c) explanatory view of avoiding teeth contact using the device and jaw model.*

After the patient understood the principles and requested use of this approach, we fabricated the device and applied it intraorally. Three weeks after application, the symptoms considerably reduced: only a slight hypersensitivity of some teeth remained during eating. At two months after application, the hypersensitivity and mobility had disappeared completely. As she began to feel a slightly premature, weak occlusal contact, the prostheses were re-veneered to correct this. During this process, the final prosthesis was replaced with interim prostheses one by one (*Figure 5*), and correspondingly, the device was renewed to adjust it to the re-veneered occlusal surface. Sometime after the interim cementation of all renewed prostheses, there was no recurrence of symptoms and we luted the final prostheses (except the implanted ones) using an adhesive resin cement (Clearfil SA cement; Kuraray Noritake Dental Inc., Kurashiki, Japan). Since the symptoms did not recur thereafter, the patient stopped using the device (*Figure 6*). She refused to wear a splint for prevention of porcelain breakage because she was concerned about sleep disturbance. During the two years after final cementation, we did not observe any recurrence of severe symptoms. The intensity of minor symptoms was significantly lower than before, and the symptoms themselves could be controlled by the patient herself without the aid of the device.

## Discussion

This case report shows that about 3 months after a switch from the provisional to the final restoration, the patient complained of such severe soreness and compressive sensation on the remaining premolars and molars that she strongly requested removal of the final restoration. The report also demonstrates that complete avoidance of tooth contact reduced the symptoms and prevented recurrence. Although it was difficult to diagnose the etiology, we primarily suspected unconscious and excessive tooth contact to be the cause rather than the tooth itself, based on multiple symptoms. The first such symptom was multiple pains in the premolars and molars and compressive sensation regardless of complete removal of caries and masking of abutments by prostheses. The second symptom was the precedence of pain in the masseter muscle over severe tooth soreness and the subsequent amplification and expansion of the pain into other masticatory muscles. The third symptom was the history of frequent requests for minor occlusal modification during provisional restoration due to discomfort in occlusal sensation. The last symptom was the sudden occurrence of pulpitis in the caries-free right maxillary canine during provisional restoration. Although it

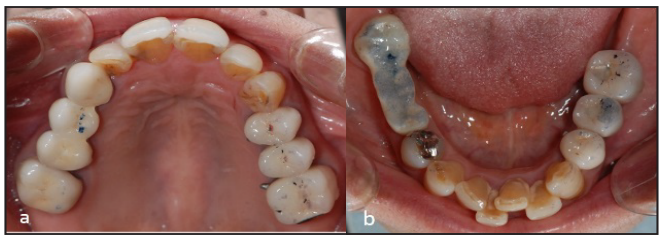

***Figure 5a and 5b**. Intraoral views at a stage during re-veneering the final prostheses one by one after reduction of symptoms. An interim partial denture was worn at the right mandibular molar region during the re-veneering laboratory procedure of the corresponding partial dentures.*

***Figure 6a to 6d.** Intraoral views of the re-veneered final prostheses after confirming no recurrence of symptoms and discontinuing use of the device.*

is yet to be demonstrated, the literature suggests that heavy forces applied to a tooth can increase blood pressure and passive congestion within the pulp, causing pulpitis and pulpal necrosis [1], or that heavy forces interrupt the intratubular and intrapulpal fluid movement, and these changes are associated with increased pain sensation [12]. For final restorations, the right maxillary canine that previously suffered from occlusal trauma allowed making group function at the right side to protect the canine from overloading, while the left maxillary canine without any damage and dental reduction enabled the left side to establish canine guidance.

Aggravation of symptoms after the change from provisional to final prosthesis may be due to the change from a soft material, resin, to a hard material, porcelain. While resin acts as a shock absorber against heavy occlusal forces, porcelain does not.

There have been discussions about several approaches to manage awake bruxism or excessive nonfunctional tooth contact viz. occlusal, behavioral, pharmacological, and other miscellaneous approaches; however, all of them have shown a paucity of evidence [13]. Based on the current concept that the etiology of bruxism is mainly regulated centrally and not peripherally [14], behavioral modification in the form of habit awareness is safe to apply and is therefore, recommended to help the patient in controlling the habit and possibly decreasing the frequency and/or the intensity of daytime tooth contact and muscle tension [4,13]. The device we propose here helps the patient in modifying the habit, especially when educating the patient alone failed to reduce the symptoms. We did not apply an alternative and popular approach using occlusal splint in this case. This patient rejected splint application because of slight sleep disturbance, for which she had previously received medication. Splints are usually considered to protect the teeth from heavy occlusal loading rather than to diminish the habit [4,13,15]. The patient found the symptoms to be severe during the afternoon than in the morning, suggesting that she had excessive tooth contact while she was awake rather than while asleep and that wearing the splint while sleeping would be less effective [15].

The 1.0-1.5-mm thickness of the device requires the patient to keep an interocclusal space of 2.0 or more mm between the premolars. Since this space ensures an interocclusal distance of 5 to 12 mm between the incisors at the physiologic rest position [11], the device does not seem to interrupt with daily activities such as speaking. Insertion of the device onto the maxillary teeth can make space for the tongue, thereby avoiding discomfort, in comparison with the discomfort experienced when it is inserted onto the mandibular teeth. The site of insertion is preferred to be the premolars and the first molar because it allows for easy placement without disturbing the aesthetic appearance of the tooth. Since the device is intended to maintain distance between the teeth and not for biting, occlusal contact with the opposing teeth is not a concern. If the patient bites frequently on the device, the teeth onto which it is inserted or the opposing teeth might become painful, or the device might get worn or break. Although we have not encountered such a case from our experience of seven years, the intervention should be stopped if these findings are noticed. It is up to the dentist to decide whether the patient can be re-educated or further treatment by this approach is inapplicable. Since the device is fabricated carefully with sufficient retention to moderately engage the undercuts, we have not encountered any case of device swallowing. However, if the patient misinterprets the instructions regarding the duration for which the device is to be worn (i.e., during the daytime except when eating and drinking), the risk of swallowing increases. Once the symptoms reduce considerably, the application should be stopped to avoid such a risk. Therefore, it is important that the dentist educates the patient thoroughly and ensures that he/she fully understands the method of application and can safely do so. If not, this application would be contraindicated.

Awareness and control of tooth contact is expected to reduce the frequency and intensity of the contact and muscle contraction in a simple, safe, and direct manner, as opposed to other approaches such as occlusal and pharmacological interventions that achieve this objective indirectly [4,10,13,15]. The former, however, presents a limitation for the dentist in terms of the difficulty in understanding if the patient is aware of the habit and controlling it in a practical way. The proposed approach that uses the device helps to overcome this limitation, by having the same or greater effect in comparison with the traditional approach involving habit control without device usage. Therefore, it can reduce compression of teeth and muscle tension, and thereby relieve all the habit-related symptoms at the tissues, including teeth, periodontal ligament, oral soft tissues such as cheek or tongue, masticatory muscles, and the temporomandibular joints [1-4,10,13].

In conclusion, this approach could become a powerful tool for complicated symptoms not reducible by education alone. The key to success is the same as that in traditional behavioral approaches: a thorough understanding among patients regarding the principles of treatment and a good rapport between dentists and patients.

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