

ORIGINAL ARTICLE

Occlusal dysesthesia—A clinical guideline

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Abstract

Background: The diagnosis and management of patients suffering from occlusal dysesthesia (OD) remain a major challenge for dental practitioners and affected patients.

Objectives: To present the results of a literature-based expert consensus intended to promote better understanding of OD and to facilitate the identification and management of affected patients.

Methods: In 2018, electronic literature searches were carried out in *PubMed*, *Cochrane Library* and *Google Scholar* as well as in the archives of relevant journals not listed in these databases. This approach was complemented by a careful assessment of the reference lists of the identified relevant papers. The articles were weighted by evidence level, followed by an evaluation of their contents and a discussion. The result represents an expert consensus.

Results: Based on the contents of the 77 articles identified in the search, the current knowledge about clinical characteristics, epidemiology, aetiology, diagnostic process, differential diagnosis and management of OD is summarised.

Conclusions: Occlusal dysesthesia exists independently of the occlusion. Instead, it is the result of maladaptive signal processing. The focus should be on patient education, counselling, defocusing, cognitive behavioural therapy, supportive drug therapy and certain non-specific measures. Irreversible, specifically an exclusively dental treatment approach must be avoided.

KEYWORDS

facial pain, malocclusion, oral health-related quality of life, phantom bite syndrome, somatic symptom disorders, temporomandibular disorders

1 | INTRODUCTION

Occlusal dysesthesia (OD) was originally described by *Marbach* in 1976, who coined the term “phantom bite”.¹ The common used term today, “occlusal dysesthesia,” was introduced by *Clark* in 1997.² The diagnosis and management of patients suffering from OD

remains a major challenge for both patients and treatment providers. Therefore, the present clinical guideline was developed by an expert group of the German Society of Craniomandibular Function and Disorders. The finalisation of the guideline was realised in cooperation with the German Society for Prosthetic Dentistry and Biomaterials; the Society of Psychology and Psychosomatic Medicine

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(German Society of Dentistry and Oral Medicine); and the German Pain Society (German chapter of the International Association for the Study of Pain).

The present guideline, which applies to adults, is intended to promote better understanding of OD and to facilitate the identification and management of affected patients. This should improve the quality of care in terms of selecting evidence-based approaches and of avoiding approaches that do not achieve the therapeutic objective.

The guideline has been developed according to the regularities of the Association of the Scientific Medical Societies in Germany (Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften), which is the German member in the Council for International Organizations of Medical Sciences (CIOMS).¹ To our knowledge, it is the first guideline that has ever been released on the topic of OD.

2 | METHODS

Electronic literature searches were carried out in September 2018 in the *PubMed*, *Cochrane Library* and *Google Scholar* databases as well as in the archives of relevant journals not listed in these databases (Table 1). It was supplemented by manual searches in the reference lists of identified articles. Seventy-seven articles were found. The papers were evaluated only if they were available in full text. They were weighted by evidence level (Table 2), and their contents were discussed by the authors. We graded the level of evidence of the included papers according to the suggestions made by the Oxford-based Centre for Evidence-Based Medicine.³ The overall result represents an expert consensus.

3 | DEFINITION

Occlusal dysesthesia is a condition in which tooth contacts that are not clinically identifiable as premature contacts nor associated with other disorders (eg of the periodontal tissues, the dental pulp, the masticatory muscles or the temporomandibular joints⁴⁻⁸) have been perpetually (ie for more than six months) perceived as disturbing or unpleasant.

The clinical findings bear no recognisable relation to the type and strength of the complaints reported. Affected patients suffer from severe psychological and psychosocial stress.^{9,10}

4 | CLINICAL CHARACTERISTICS

Affected patients complain about occlusal discomfort.⁷ The patients' preoccupation with their occlusion is an expression of the

condition itself.⁶ They experience OD as a continuous impairment of their oral or physical well-being.^{7,9} It is frequently accompanied by other non-specific physical complaints, which patients often associate causally with their unpleasant perceptions of tooth contact.^{7,11}

Occlusal dysesthesia can only be perceived in the waking state.⁷ It may occur in isolation or—more frequently—as a comorbidity of craniomandibular disorders (CMD).^{2,4-6,12-15}

Occlusal dysesthesia patients regularly experience psychosocial stress, are less capable of adapting to changes in their dentition and are often diagnosed with depression, anxiety disorders or somatic stress disorders related to other parts of the body.^{5,6,9,11,12,16}

Patients complain about persistent (more than 6 months) emotional stress in everyday life. They are cognitively stressed (excessive preoccupation with the meaning of their symptoms), emotionally stressed (high levels of anxiety) or behaviourally stressed (excessive time required for treating their occlusion).¹⁷ OD meets the criteria for a "somatic symptom disorder" (Code 300.82)¹⁸⁻²¹ pursuant to the criteria laid down in the 5th edition of the Diagnostic and Statistical Guide to Mental Disorders (DSM-5).

Reports in the literature state that most patients were experiencing an unusually stressful phase of their lives around the time of the first manifestation of the condition and that they had undergone dental treatment at the same time.²²⁻²⁴ The manifestation of the condition is independent of the type and intensity of the dental therapy. An evaluation of the occlusion has been at the centre of almost half of the relevant expert opinions, not least with regard to the question of whether the occlusion may have triggered other (unspecific) syndromes.²⁵ It has been described as being associated with tooth extractions, simple fillings, and various extensive restorative treatments.²³ Defining factors include a patient focus on their occlusion as a perceived disturbing influence and the development of a supposed or actual occlusal hypersensitivity.²³

Occlusal dysesthesia gives rise to numerous complex therapeutic courses at disproportionately high cost.⁹ Many patients have a long history of frequent changes in both treatment providers and unsuccessful occlusal interventions. They report having "lost" their bite and are looking for their "ideal" occlusion.^{1,4,6,9,15,21,26-28} The complaints often represent a central aspect of the OD patient experience. The patients are intensely preoccupied with their syndrome, and they readily share their thoughts with their surroundings. They stay attached to their own somatic explanations, namely that their tooth contacts alone are responsible for their misery. Therefore, they demand changes to their occlusion, sometimes quite vehemently

²In contrast to the term "temporomandibular disorders" (TMD), according to the definition of the German Society of Craniomandibular Function and Disorders (DGFD) the term "craniomandibular disorders" (CMD) includes occlusal problems (see below).

Both terms, that is TMD and CMD, include temporomandibular pain (ie pain in the masticatory muscles and/or temporomandibular joints) and dysfunction in the masticatory muscles and the temporomandibular joints [28].

³The German-language guideline has been accepted for publication in the German directory of Clinical Practice Guidelines (registration number: 083-037, stage of development: S1—expert consensus). [URL: <https://www.awmf.org/leitlinien/detail/II/083-037.html>; last access: November 4, 2019].

TABLE 1 Database search results, 76 different articles were identified. No additional relevant results were found using German search keys. One German article was identified by hand search

Search key	pubMed	Relevant in pubMed	Google scholar	Relevant in Google scholar
Phantom bite	53	20	188	36
Occlusal dysesthesia	49	14	957	31
Occlusal hyperawareness	2	2	15	11
Occlusal hypervigilance	90	43	22	2
Uncomfortable occlusion	41	6	71	12

TABLE 2 Level of evidence, regarding 33 articles directly related to occlusal dysesthesia

Level of evidence	References
1	None
2	None
3	3,5,38,75
4	7-9,15,19,20,22,25,28,40,45,63-65,70,73,78
5	1,4,10,11,14,27,42,47,55,67-69

and in much detail.^{7,9} It is difficult for practitioners *not* to comply with these requests.

The literature describes cases in which treatments were carried out in the absence of objective dental findings, simply because patients demanded them. These interventions and their possible consequences (eg further aggravation) may subsequently give rise to legal disputes between the patient and the practitioner.^{7,9} A typical characteristic of OD is that otherwise effective therapeutic measures targeting the occlusion are perceived as ineffective by patients. Instead, the interventions may even lead to an exacerbation of the symptoms, even if the dental interventions were performed *lege artis*.^{7,9,16} A differential diagnosis that considers the possibility of an occlusal interference (see below) is particularly important here.

Dentists often perceive their interaction with the patient as rather aggravating, given that the dentist-patient relationship is characterised by uncertainty on both sides. Typically, an occlusal adjustment will initially relieve the symptoms, but it may well be felt to have achieved the opposite effect after a few weeks. The emotional burden on the practitioner grows the longer the intervention draws out in time, accompanied by frustration and exhaustion on the part of the patient, who often had been the one to request or at least support the therapeutic interventions in the first place. Taken together, these findings are clear indications that a somatic stress disorder is present.²⁹

5 | EPIDEMIOLOGY

No epidemiological information on the prevalence of OD has been found in the literature.

Based on the limited data available, the mean age of OD patients is given as 52 ± 11 years. Women are affected five times more

often than men.^{5,7,8} It is assumed that the condition sets on at the age of 45 years on average (95% confidence interval: 32-59 years).^{5,9} According to current data, only adults are affected.⁷ Therefore, no case reports on children or adolescents were identified in our literature research.

A field study conducted by ten specialists in private practices in Germany reported that 9 of 1041 CMD patients examined between February 2014 and January 2015 met the criteria for OD.¹²

As a rule, OD is associated with psychological stress associated with a depression, obsessive compulsivity, other somatic stress disorders and anxiety, a personality disorder or other mental conditions.^{5,7,12,30,31}

6 | AETIOLOGY

The following factors have been discussed as aetiological factors of OD^{5,10,32}:

1. Psychopathological influences
2. Neuroplasticity and phantom phenomena
3. Changes in proprioceptive stimuli and their transmission

However, the exact aetiology is not sufficiently understood.

Excessively frequent attempts at modifying the occlusion to treat non-specific complaints may constitute an iatrogenic contribution to the development of OD.⁶

People do not usually consciously perceive their occlusion,²³ but OD patients certainly do. It has been assumed that central stimuli are processed differently by OD patients.^{23,33,34} This may manifest itself, for example, in patients consciously concentrating on the perception of their occlusion.³⁵ Changes in the occlusion result in subconscious neuroplastic changes in the brain. If patients start giving these adjustment processes a negative emotional significance, a somatic stress disorder, hence OD, may develop.²³

The proprioceptive interpretation of the occlusion takes place subconsciously and reflexively based on an evaluation of (unknown) body signals. "Heightened attention to the body (ie bodily hypervigilance) and a selective focus on detected sensations increase the perception of somatic sensations."²³

Occlusal dysesthesia often commences at the same time as a dental treatment, but it can also manifest itself without any discernible cause.^{8,24}

Contrary to popular belief, studies have found no statistically relevant difference in the tactile perception of the occlusion, which was an average 8 and 13 μm in OD patients (equivalent to the thickness of a Shimstock foil) and an average 14 and 15 μm in healthy subjects without OD.^{26,36,37} This highlights the greater role of signal interpretation as opposed to signal intensity.^{4,7,23} It has been suspected that a greater frequency of tooth contact might contribute to the syndrome due to an excessive stimulation of desmodontal (Ruffini-type) mechanoreceptors.³⁸

In clinical practice, some OD patients may be hypersensitive to occlusal contacts, perceiving them at well below the stated values of 8 to 13 μm .^{39,40} If in this situation, dentists (repeatedly) adjust the occlusion, and this may strengthen patients' perception that their occlusion is to blame for their symptoms, which they consider to be physical in nature. "Dentists continue to make the mistake of targeting the occlusion in an attempt to fix the bite when a patient presents with concomitant pain, TMD and bite changes."⁶ⁿ

7 | DIAGNOSTIC PROCESS

Occlusal dysesthesia is a syndrome in which tooth contacts are permanently perceived as disturbing or unpleasant. The clinical findings related to the occlusion bear no discernible relation to the type and strength of the complaints reported. Affected patients suffer from severe psychosocial stress.^{9,10,24}

Occlusal dysesthesia patients often report that multiple treatment providers have unsuccessfully tried to "reasonably adjust" their occlusion.^{9,24} May patients present the dentist with older dental casts or even articulators to explain their concerns.^{1,7,9,24}

The following may be indicators that OD may be present:

- There have been repeated but unsuccessful modifications to the occlusion.^{6,7,10,15,41}
- There is a discrepancy between the occlusal findings and the patient's subjective sensation.^{6,7,10,15,41}
- Patients cite their occlusion as the cause for their unspecific complaints.^{6,7,10}
- Patients describe their problem in detail, sometimes using medical or dental terminology.^{7,10}
- Patients have strong negative emotions regarding previous treatment providers, combined with excessive positive expectations of their new treatment provider(s).^{7,10,42}

If occlusal therapy is performed, it is typically characterised by an excessive number of appointments with often only minor changes to the occlusal or splint surfaces.^{9,24}

The following structured procedure is generally recommended for the diagnostic phase:

Any additional physical complaints as well as any relevant personal and social aspects should be anamnestically investigated right from the beginning and in parallel to the dental examination.^{9,43} The occlusion must be checked by appropriate clinical methods. The

findings should be interpreted by taking into account differential diagnoses such as CMD,⁴⁴ including possible occlusal interferences, periodontal disease, and diseases of the pulp.

Indications of co-factors of OD, such as anxiety/anxiousness, depressive preoccupation/depression, emotional stress, somatisation and chronification,^{5,9,45,46} can be assessed using suitable questionnaires. Once the questionnaires have been evaluated, the results should be discussed with the patient. The following questionnaires are often used for these purposes:

- Pain-related impairment of daily activities: GCPS^{47,48}
- Anxiety, depression: HADS,⁴⁹ PHQ-4,⁵⁰ DASS^{51,52}
- Emotional stress: SRRS,^{53,54} THAT,^{51,52} DASS^{51,52}
- Somatisation: BL-R/BL-R',⁵⁵ SSS-8⁵⁶
- Pain localisation: Full-body drawings⁵⁷ of all existing painful areas

Delimiting mental or psychiatric conditions with the corresponding diagnoses according to ICD-10/ICD-11 or DSM-5 is outside the dentist's field of competence and should only be carried out by a specialist.

8 | DIFFERENTIAL DIAGNOSIS: OCCLUSAL DISEASE

Conditions with similar clinical signs should be considered in the differential diagnosis when establishing the diagnosis OD. If patients complain of an occlusal disturbance or indicate that their "bite is no longer correct," this finding *alone* does not meet the diagnostic criteria for OD as stated above. Interfering tooth contacts in static or dynamic occlusion, which can be verified objectively by the dentist ("occlusal disease"), should be ruled out as a matter of routine by standard corrective measures.

Occlusal disease may have dental, muscular, joint-related or skeletal causes. It is encountered frequently in everyday dental practice and can occur in the context of static or dynamic occlusion. It may appear with or without a previous dental treatment, last for different periods of time and be accompanied by additional discomfort.

If necessary, occlusal disease can be treated successfully using conventional dental treatment methods. Occlusal disease can be verified by examination with occlusion foils or by instrumental diagnostic systems and successfully adjusted by specific corrective measures (subtractive, additive, functional, orthodontic or surgical).

Changes in the posture of the head and trunk as well as changes in the tension of the masticatory muscles will result in changes of the occlusion. These alterations are physiological and do not require intervention.^{10,58}

Mixed forms occur in clinical practice. Mixed forms exist in OD patients if an occlusal disease is present concurrently. In these cases, OD will usually be the syndrome that governs the treatment provider's actions.

9 | MANAGEMENT

9.1 | General

The sole objective of OD management is to improve oral health-related quality of life. Defocusing and acceptance are the key concepts when managing OD patients.^{32,59,60}

Case reports, case series and expert reports are available for the care of OD, but no publications with results from controlled clinical trials. Given the weak data available, the therapeutic recommendations in this guideline should be considered an expert-based consensus.

As with all functional physical complaints,⁶¹ the first step a patient needs to take is to build a relationship of trust with the dentist because within an empathic patient-dentist relationship it makes it easier for the patient to accept multimodal care.^{62,63} The fundamental prerequisite for the success of any therapy is for the practitioner to take the patient seriously.^{32,61} Anamnestic information regarding any complaints affecting the entire body, taking into account personal and social aspects,⁶¹ will usually provide starting points for the subsequent therapeutic interventions.

Confrontations should be avoided, even though patients and their (mis)interpretations of the situation are sometimes perceived as provocations.^{6,10,61} It is important to repeatedly offer patients alternatives to their habitual interpretations, alternatives that they may and can adopt in the course of the overall therapy.^{6,9,61}

9.2 | Patient counselling and education

Patient counselling and education about the nature of the syndrome are the focus of dental care ("information therapy"). Since the patients' subjective perception is fundamentally based on maladaptive processing of a stressful life situation, psychological or psychiatric care is important.

The therapeutic focus should be on promoting an adequate signal assessment of tooth contacts on the part of the patients.^{28,32} Patients should be encouraged to avoid unnecessary tooth contact whenever possible.^{32,64} They should also be informed that their persistent perception of dental contacts being present has nothing to do with the contacts themselves but are a result of (central) signal processing.

Concomitant short-term therapy with an oral appliance serves the purpose of stimulus reduction,^{4,5,27,65} where the therapeutic intention is to defocus the patient's attention to the perception of tooth contact. This may also help control muscular forces triggered by the excessive use of tooth contacts. However, the use of occlusal aids or oral splints in the context of OD has been discussed controversially, especially because it may further direct the patients' focus at their occlusion. Some groups of authors therefore advise against the use of these devices.⁷

9.3 | Relaxation and psychotherapy

EMG-controlled biofeedback may be a useful therapeutic addition.⁶ The literature has recommended cognitive behavioural therapy, which is aimed at lessening the intensity of the patient's perception and evaluation of occlusal contacts.^{5,6,24,27,28,32,42,66,67} Mindfulness training⁶⁸ and learning to take control of one's emotions are at the centre of this approach. Any comorbidities in terms of depressive mood or depression, anxiety/anxiousness or mental or psychiatric conditions should also be included in the therapeutic concept.⁶⁹

9.4 | Drug therapy

No specific drug treatment for OD has been described. Depending on the cause, an antidepressant could be prescribed, or drugs such as those used in the management of chronic pain.^{4,6,8,10,70-73}

In one study, the tricyclic antidepressant amitriptyline, the noradrenergic and specific serotonergic antidepressant mirtazapine and the atypical antipsychotic drug aripiprazole have been identified as potentially effective. The therapeutic effect of these drugs was particularly good in cases where OD first manifested itself after a dental treatment if patients did not suffer from any additional psychiatric condition.⁸

9.5 | Physical exercise

In addition, all affected patients—just like patients with chronic pain⁷⁴—should be (re-)activated physically and socially. The recommendation is to encourage OD patients to participate in endurance sports several times a week and to maintain and cultivate their social contacts.^{32,61,71}

9.6 | Occlusal therapy

Two published single-case reports—according to which patients with OD can be successfully treated with a complex occlusal therapy^{75,76}—should be regarded as rare outliers. They should not be interpreted as recommendations, especially since the OD diagnosis in these cases may have been incorrect. Therefore, those reports do not call into question the international consensus described in this Guideline on the nature of OD as a somatic stress disorder.

In view of the aetiological factors mentioned above, it is generally inadvisable to treat a suspected OD by adjusting the occlusion,^{1,5,9,28,42,55,59} because an occlusal adjustment may intensify the syndrome.^{9,10}

From the recommendations for the therapy of OD, it follows that a possible preventive step might be for dentist to refrain from prematurely viewing pain and discomfort in the oro-facial region as occlusion-related. Rather, patients should be informed about the

TABLE 3 Recommendations of the key issues for the management of occlusal dysesthesia

1. Information and counselling (explanation of pathophysiological relationships, documentation of occlusal contact pattern if necessary; defocusing attempts)
2. Cognitive behavioural therapy
3. In selected cases: oral splints (as a dental adjunct)
4. Medication

psychosocial aetiology of their syndrome and their (pathologically) altered perception. The significance of psychosocial influences is comparable to that seen in patients with oro-facial pain.^{61,77,78}

The key issues of OD-related management are summarised in Table 3.

10 | PROGNOSIS

As a rule, acceptance of the “occlusal dysesthesia” diagnosis is low among patients. Instead, patients with OD will often stay attached to their somatic explanations.^{9,67} It takes an exceptionally time-consuming and emotional commitment on the part of the dentist for this situation to be resolved in terms of improving the patient's oral quality of life.⁹ Because from the patient's point of view, the focus is on the occlusion,^{7,9} defocusing is the main therapeutic objective.⁹ A referral to a specialised clinic that offers concomitant psychological therapy may be required.⁹ Drug therapy may be used to address psychological disorders related to OD, but it is not necessarily needed to improve OD itself.

Unfortunately (as with all somatic stress disorders), the result of the therapeutic efforts will be disappointment in many cases, even if the patients are cared for according to the consensus.^{7,9}

11 | CONCLUSION

Occlusal dysesthesia may appear after any dental treatment, not just after an occlusal adjustment. Manifestations without previous dental treatment have also been described.

To assume that the occlusal situation or dental treatment measures have been the cause of OD would be too short-sighted. OD exists independently of the occlusion; rather, it is the result of maladaptive signal processing. For this reason, OD is not primarily a dental condition but a psychosomatic one. Nevertheless, the dentist is the primary point of contact for affected patients. The focus should be on patient education, counselling, defocusing, cognitive behavioural therapy, supportive drug therapy and certain non-specific measures.

Adjusting the occlusion is usually not a solution. OD will often persist if an exclusively dental treatment approach is chosen.

When patients complain about problems with their bite, one should always examine not only occlusion itself but always evaluate

the psychosocial stress factor in a structured manner—at the time of the diagnosis itself as well as in relation to the time of the symptoms' onset. This evaluation should be performed in parallel with the examination of any somatic findings and is just as important.

CONFLICTS OF INTERESTS

The authors declare that they have no conflict of interest.

AUTHOR CONTRIBUTIONS

Bruno Imhoff coordinated the project. He performed the basic literature research and drafted the first version of the manuscript. Jens Christoph Türp contributed by manual search for German-language literature and supervised the entire literature search. Marc Schmitter added further literature identified by manual search and arranged for the translation of articles from Japanese into English. M. Oliver Ahlers, Alfons Hugger, Matthias Lange, Peter Ottl and Anne Wolowski—as well as the other authors mentioned above—discussed the successive versions. They also contributed to the manuscript at multiple on-site meetings in Düsseldorf as well in a structured Delphi process chaired by Bruno Imhoff.

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