

Review

Occlusal dysesthesia: a topical narrative review

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SUMMARY Occlusal dysesthesia (OD) is a disorder characterised by the sensation of uncomfortable bite with no obvious occlusal discrepancy. It is usually associated with emotional distress and is elicited by dental occlusal procedures. Multiple dental treatments are often provided to try to resolve the symptoms, but the outcome is usually dissatisfying for the dentist and disappointing for the patient. To summarise the specific features of OD, a PubMed search was carried out looking for all papers related to the topic. The references from the studies selected and from review articles were also examined for further relevant papers. A total of 138 articles were first identified, of which 18 of

them were considered relevant to the topic. This article reviews the epidemiology, taxonomy and etio-pathophysiology, symptomatology, diagnosis and treatment of OD, with special relevance to issues of clinical importance and dental therapy. Any dental treatment must be avoided in patients with OD, because the results could be inadequate and it usually worsens the symptoms.

KEYWORDS: occlusal dysesthesia, phantom bite, topical review, dental treatment, diagnostic criteria

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Introduction

Occlusal dysesthesia (OD) is a disorder characterised by the sensation of uncomfortable bite with no obvious occlusal discrepancy, usually associated with emotional distress (1, 2). Based on patients' self-reports, the onset almost always begins after a dental procedure involving a change of the bite, such as occlusal adjustment, orthodontic, prosthodontic and restorative treatments (1, 3). In 1976, Marbach (4) described for the first time such condition using the term 'phantom bite'. He explained the disease as a variation of the phantom phenomenon, such as phantom limb and phantom tooth, and stressed the fact that these patients undergo numerous dental treatments and occlusal adjustments trying to achieve the goal of a 'correct bite' (4). Following that report, many other articles were published on the topic, examining the features of those patients and frequently associating the disease with psychiatric

conditions (5, 6). The aim of this article was to review the epidemiology, taxonomy and etio-pathophysiology, symptomatology, diagnosis and treatment of OD. A special relevance was given to issues of clinical importance and dental therapy.

Materials and methods

To summarise in a narrative review the specific features of OD, a literature search was carried out to try to find all relevant articles written on the disease. A PubMed search was performed on the 15th of January 2015 using the following key words: 'occlusal dysesthesia', 'phantom bite', 'occlusal neurosis', 'positive occlusal sense', 'positive occlusal awareness', 'occlusal hyperawareness', 'uncomfortable bite' and 'uncomfortable occlusion'. The terms were searched as 'All Fields', and a total number of 138 references were found. After evaluating the titles and abstracts, 120 publications were eliminated because they were not

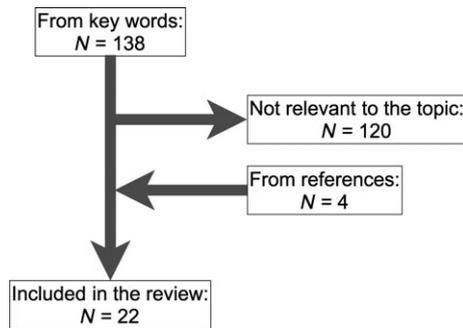


Fig. 1. Flowchart of the literature search.

related to occlusal dysesthesia, and 18 articles were selected. The references of the articles retrieved were then examined to search other relevant papers, and additional 4 articles were found. Thus, a total of 22 articles were included in the review (Fig. 1). The full text of those selections was obtained. The results of those papers are displayed and discussed in the following sections.

Epidemiology

OD is generally considered a rare condition (7), although no precise data on its prevalence and incidence in the population have ever been reported (8). However, in a survey of patients with temporomandibular disorders (TMD), over 30% reported some bite discomfort, and about 10% reported uncomfortable bite almost all of the time (9, 10). It seems to be differently distributed between the genders with higher female prevalence (1, 3, 11–14), similarly to the higher female prevalence of TMD that sometimes are comorbid with the disease (2, 8, 15, 16). However, such female preponderance is not reported in all the studies (8, 17). The age of the patients can vary widely from 20 to 80 years with a mean age of 40–50 years (1, 8, 11, 14). First onset of the symptoms occurs at the mean age of 45 years, with mean time of symptoms duration of 6 years (1). In a survey by Watanabe *et al.* (14), among 130 patients over 70% reported that symptoms developed after a dental treatment.

Taxonomy and etio-pathophysiology

There is no official classification of OD, because there is no agreement on its aetiology and characteristics.

For the same reason, the neurological mechanisms through which OD develops are not clear, but a few hypotheses have been made. These hypotheses fall within three major categories: psychopathologic aetiology, neuromatrix theory and altered dental proprioception.

Psychopathologic aetiology

Marbach *et al.* (8, 17) identified the disease as a mental disorder described by the term monosymptomatic hypochondriacal psychosis (MHP), where the sole symptom is the feeling of abnormal bite. Monosymptomatic hypochondriacal psychosis is described as a somatic type of delusional disorder and is defined as an erroneous conviction of bodily disease, abnormality or alteration (8, 17). The fifth edition of the diagnostic and statistical manual of mental disorders (DSM)-V, published in 2013, does not use the term MHP, but describes the delusional disorder as characterised by the presence of one or more delusions with the duration of 1 month or longer. Delusions are ‘fixed beliefs that are not amenable to change in the light of conflicting evidence’, and their content can embrace different subjects. One of these subjects is the somatic type, which applies when the central theme of the delusion regards bodily functions or sensations, as in the case of patients with OD (18).

Marback also hypothesises that some of these patients might suffer from dysmorphophobia [the new edition of the DSM-V uses the new term body dysmorphic disorder (18)], which is defined as a belief in or a primary complaint of a cosmetic defect (8, 17). However, this is limited to the patients with OD who also complaint of the fact that ‘the teeth don’t look right’, in addition to the complaint of bite discomfort, and patients with OD rarely complaint about appearance of their teeth, they rather focus their attention on tooth contacts.

Clark and Simmons support Marback’s belief of a psychologic aetiology of OD (9, 16). They mention the possibility of the occurrence of the psychotic disorder termed MHP or the neurotic disorder termed dysmorphophobia, as reported by Marback, but proposed a major role of a somatoform disorder to explain OD symptoms. Similarly, Reeves and Merrill classify OD as a somatoform disorder (6), as described by the DSM-IV (19). Again, the new edition of the DSM-V modifies the diagnosis of somatoform disorder

into somatic symptom disorder (18). It is characterised by the presence of one or more somatic symptoms that are distressing or result in significant disruption of daily life, causing excessive thoughts, feelings or behaviours related to it (18). Specifically, in the case of OD, such somatic symptom is represented by bite discomfort. Conversely, a psychopathological aetiology is not supported by another study that described 5 patients with OD and only one of them was diagnosed with somatoform disorders (13), and by a recent study where <50% of the subjects displayed psychiatric disorders (14). However, in the former study, the criteria used to reach the diagnosis were not provided, while in the latter, the patients were evaluated based on the clinical records and the referral letters of the patients psychiatrists.

Neuromatrix theory

In 1996, Marbach revised his interpretation of the pathophysiology of OD using Melzack's theory of the neuromatrix (20–22). According to this theory, a matrix of neurons exists in the central nervous system, genetically predisposed and influenced by external stimuli, and the output of those neurons is called neurosignature, which represents the self-knowledge of the whole body. Applying this theory to the field of dentistry, Marbach assumed that a self-knowledge of individual's dental occlusion exists, which can be called occlusal neurosignature, and it includes the feeling of all occlusal contacts (20–22). When such information is modified by dental treatments, a distorted interpretation of the changed bite can lead to OD in predisposed subjects (1, 20). The experience can be compared to a phantom phenomenon in case of limb amputation (1, 20). As a consequence, such patients do not recognise their new occlusal contacts as their own bite, and constantly seek care with the aim of achieving a comfortable dental occlusion (1, 20).

Altered dental proprioception

A second theory suggested recently by Clark and Simmons to explain the development of OD proposes that the kinaesthetic ability of the jaw, which is the accuracy of the subjects to discriminate the position of the mandible, might be altered, leading to an impaired interdental thickness discrimination (9, 16). The same hypothesis was made by Jaeger and Korszun men-

tioning Klineberg's book (15, 23), where it is called 'iatrogenic dysproprioception' caused by changes in dental occlusion. This event needs a new adaptation or relearning of new mandibular movements and perception (15, 23). However, a recent study by Baba *et al.* (12) compared the perceptive and discriminative abilities of patients with OD and healthy subjects using three tests: (i) thickness discrimination test using occlusal registration foils, (ii) thickness discrimination test using bite block and (iii) mouth opening reproducibility test (12). While patients with OD displayed better thickness discrimination ability than controls (8 micron vs. 14 micron), such difference was not statistically significant, and the rest of the tests showed no difference between the groups (12). Similar results were obtained more recently by Tsuyukiyama *et al.* (5), who displayed similar ability of interdental thickness discrimination between patients with OD and a control group. Therefore, the hypothesis that an altered interdental thickness discrimination ability is responsible for the development of OD cannot be supported. It seems more likely that those patients do not have higher sensitivity to proprioceptive stimuli, but that they misinterpret normal occlusal sensations.

Symptomatology

The main symptom and the major focus of patients with OD is bite discomfort (1–8, 11, 14–17, 20, 24–26); such discomfort is usually associated with emotional distress (1, 2, 6, 7, 15, 17, 20, 24). Patients often use expressions like 'my bite is not comfortable' (9, 16), 'my bite is off' (9, 16), 'I don't know where my teeth belong anymore' (9, 16), 'my jaws are not biting correctly' (24), 'I feel my bite wrong, my jaws are always wandering around looking for a comfortable position' (15), or generally describe their bite as uneven. They also frequently spend a long time describing their dental history with details on the shape, size and height of their teeth, previous dental therapies such as occlusal adjustments, orthodontics, restorative and prosthodontic treatments, which failed to achieve the correct bite, supporting their theories with numerous radiographs, dental casts and dental appliances (1, 3, 4, 6, 8, 15, 17, 26). It is often associated a feeling of irritation against the previous clinicians who were not capable of resolving the symptom and sometimes made it worse (4, 6, 7, 15, 17, 26).

Those symptoms can occur isolated, but can also be associated with comorbid conditions such as TMD (1, 3, 6, 7, 16, 25), tooth clenching (4, 6, 24, 27, 28), anxiety (1, 6, 14, 29), depression (1, 3, 5, 6, 11, 14, 15, 24), obsessive compulsive tendencies (1, 3, 6, 7, 15), and somatoform disorder (1, 3, 5, 6, 9, 13, 14, 24).

The onset of OD is usually preceded by dental treatments (1, 4, 6, 7, 14, 15, 17, 20, 24–26), conversely, repeated dental procedures attempted to try to resolve the problem fail to achieve the expected results (1, 4, 6, 7, 11, 14–17, 24–26).

Diagnosis

Many studies described the numerous complaints of patients with OD, but few of them propose specific diagnostic criteria.

The first report of criteria for the diagnosis of OD is limited to a single question included in a questionnaire used for the diagnosis of TMD; the question was ‘Do you have a problem with your bite being uncomfortable?’ (9, 16). The subjects included in the study had to rate the answer using a 0 to 4 scale, where 0 corresponded to ‘No bite problem’, 1 corresponded to ‘Maybe a little’, 2 corresponded to ‘Quite a lot’, 3 corresponded to ‘Almost all the time’ and 4 corresponded to ‘All the time without stopping’ (10). Although the authors did not specify what answer would be suggestive of a diagnosis of OD, they mention that about 30% of the responders scored 2 or higher to that question (9, 16).

Later, Toyofuku and Kikuta selected their patients with OD using four criteria: (i) preoccupation with their dental occlusion and a false belief that their dental occlusion was abnormal, (ii) a long history of repeated dental surgery treatment failures with persistent requests for the occlusal treatment that they are convinced they need, (iii) no history of significant psychiatric illness and (iv) absence of obvious psychosocial problems (11).

Reeves and Merrill suggested that patients with OD suffer from a somatoform disorder; therefore, they listed those criteria for the diagnosis OD (6). As the new DSM-V modified the diagnostic criteria of the now called somatic symptom disorder, the actual criteria are the following: (A) one or more somatic symptoms that are distressing or result in significant disruption of daily life; (B) excessive thoughts, feel-

ings or behaviours related to the somatic symptoms or associated health concerns as manifested by at least one of the following: 1. disproportionate and persistent thoughts about the seriousness of one’s symptoms, 2. Persistently high level of anxiety about health or symptoms and 3. excessive time and energy devoted to these symptoms or health concerns; (C) although any one somatic symptom may not be continuously present, the state of being symptomatic is persistent (typically more than 6 months) (18).

Ligas *et al.* in their survey among US orthodontists used different diagnostic criteria to identify patients with OD. They had to complain of the following: (i) excessive bite concerns, (ii) statements such as ‘my bite is off’ or ‘I lost my bite and am unable to find it’ as a consequence of previous dental procedures, (iii) detailed accounts of previous dental experiences, often expressing dissatisfaction, (iv) complaints of bite irregularity not present upon careful examination, (v) unrealistic and excessive awareness of minute tooth alignment details and how they affect occlusion and (vi) history of various bite-altering procedures such as occlusal equilibration, multiple restorations or repeated orthodontic treatments (3).

Hara *et al.* in their review summarise 4 diagnostic criteria using different criteria common to previous studies. According to the authors, although many diverse criteria were suggested in the studies reviewed, they had many common features that were grouped together. Those diagnostic criteria are as follows: (i) persistent complaint of uncomfortable bite sensation for more than 6 months, (ii) symptoms do not correspond to any physical discrepancy affecting the pulp, periodontium, muscles or the temporomandibular joints (TMJs), (iii) pain complaint may be concomitant, however, in low level and (iv) symptoms cause distress that makes the patient persistently search for dental treatments (1).

Finally, Tsukiyama in 2012 selected patients with OD by including all the subjects who complained of ‘a persistent uncomfortable sense of maximum intercuspation after all pulpal, periodontal, muscle and TMJ pathologies have been ruled out and a physically obvious bite discrepancy cannot be observed’ (5).

All the authors used specific complaints and features common to patients with OD to try to list a number of criteria to be used for the diagnosis. Obviously, most of those criteria are very similar; how-

ever, some distinct characteristics are proposed by some Authors. Most of them describe the complaint of 'uncomfortable' bite (1, 5, 9, 16), also using synonyms such as 'abnormal' (11) and 'off' (3), because this is the chief complaint of patients with OD.

Another important aspect is the acknowledgement of the emotional stress associated with the sensation of uncomfortable bite, which is typical of patients with OD. Different authors use the terms 'preoccupation' (11), 'concerns' (3) and 'distress' (1).

Three other characteristics have been highlighted by most of the Authors: the numerous dental procedures that usually such patients undergo without satisfying results, the duration of the disease (generally longer than 6 months), and the absence of both real occlusal discrepancies and other pathologies that could account for the sensation of altered bite (1, 3, 5, 11).

Because Reeves and Merrill described OD as a somatoform disorder, the diagnostic criteria they suggested are the same diagnostic criteria as any type of somatoform disorder; therefore, there is no specific mention to dental occlusion or dental treatments (6). Conversely, among the criteria used by Toyofuku and Kikuta, the presence of a psychiatric disorder was an exclusion criteria for patients with OD (11). However, the latter did not specify if the presence of a psychiatric disorder was used to rule out a diagnosis of OD or just to exclude those patients from the trial regardless of the diagnosis.

Our suggestion is to use a list of 6 criteria for the diagnosis of OD (Table 1), to try to summarise all the main features of the disease. In particular, the sensation of bite discomfort, emotional stress, duration of the symptoms, history of dental treatments, absence of dental discrepancies and other disease that could cause the symptoms. We added the con-

cept of 'occlusal discrepancies disproportional to the complaint' to avoid unnecessary dental procedures in case of minimal occlusal abnormalities such as contacts that are not even throughout the dental arch or minor dental interferences during lateral mandibular movements, which are common in the general population (30).

The last 2 criteria are important for the differential diagnosis of possible disorders that can be a cause of occlusal discrepancies or a cause of altered proprioceptive sensation leading to a perceived uneven bite. Particularly in patients who have undergone recent restorative, prosthetic or orthodontic therapies, the presence of premature occlusal contacts or dental malocclusion need to be ruled out. Dental pathologies such as dental pulpitis and periapical pathology; TMJ disorders such as inflammation, disc displacement, degenerative joint disease or systemic arthritides, masticatory muscle disorders; and movement disorders such as oro-facial dyskinesia and oromandibular dystonia, benign or malignant tumours, and long-term use of dental appliances can lead to actual or perceived occlusal changes and therefore need to be evaluated before a diagnosis of OD can be made.

Treatment

The main suggestion given by Marbach in his first reports of OD was that 'the best treatment is non-treatment' (4). Such statement underlines the fact that any dental treatment with the aim to achieve the 'perfect' bite, as required by the patient, must be avoided. Pharmacologic treatments have been tried. Use of pimozide, a non-phenothiazine neuroleptic drug (8, 9, 15, 17), dothiepin, an antidepressant (24), tricyclic antidepressants (14, 31), serotonin-selective reuptake inhibitors (14), milnacipran, escitalopram and duloxetine, three serotonin-norepinephrine reuptake inhibitors (11, 14, 29), monoamine oxidase inhibitors (7), mirtazapine, a noradrenergic and specific serotonergic antidepressant (14), aripiprazole, a dopamine partial agonist (14), have been proposed. Psychotherapy has also been suggested (8, 9, 15, 17).

Clark and Simmons specified that, since OD is not a physical problem, patient's education is the most important treatment tool (9, 16). In addition, the use of an occlusal disengagement device (for example an anterior bite plane) could help the patient avoid pos-

Table 1. Suggested criteria for the diagnosis of occlusal dysesthesia

1	Complaint of uncomfortable bite sensation
2	Significant associated emotional distress
3	The symptoms last for more than 6 months
4	History of various bite-altering dental procedure failures
5	Absence of dental occlusal discrepancies or disproportional to the complaint
6	Not attributed to another disorder (dental pathology, muscle, temporomandibular joint or neurologic disorder)

terior tooth contact in maximum intercuspation and consequently reduce the occlusal discomfort (9, 16). The use of an occlusal appliance was also proposed by Shetti *et al.* (3), but instead of using an anterior bite plane, they used a soft occlusal splint.

Reeves and Merrill proposed the use of cognitive behavioural therapy for patients with OD, identifying four specific areas of intervention: cognition, attention, context and mood (6). The aims were to: (i) decrease physiological arousal through relaxation, (ii) increase activity regulation through exercise and pleasant activities, (iii) increase awareness of emotions, (iv) change dysfunctional beliefs, (v) teach distraction approaches, (vi) improve communication of emotions, (vii) avoid spousal reinforcement of illness behaviour and (viii) treat associated mood disorders (6).

Summarising the treatment reported in the examined studies, we can divide them into 4 major categories: patient's education, psychologic therapy, splint therapy and pharmacologic therapy.

Patient's education mainly consists in explaining to the patient that the feeling of abnormal bite is not a physical problem, but an altered interpretation of normal occlusal contacts (9, 16). It must also be clarified that the target of a perfectly even tooth contact throughout the dental arch is unfeasible. Teeth contacts change continuously depending on posture, head position, muscle tension; therefore, the feeling of the teeth touching unevenly can be considered normal (32, 33). However, it usually happens unconsciously.

Psychologic therapy is based on individual sessions of cognitive behavioural therapy. It is complementary to patients' education and is primarily focused on distracting the patient's attention from the teeth (6, 8, 9, 15, 17).

Oral appliance therapy is used in addition to patients' education and cognitive behavioural therapy to try to help the subject not to concentrate on tooth contact. In fact the appliances suggested are either an anterior bite plane or a soft appliance, which can mask the perception of occlusal contacts (3, 9, 16). However, as the appliance is placed on the teeth and changes the perception of tooth contact, its effect on patient's behaviour must be verified, because it can sometimes increase patient's attention to the teeth instead of decreasing it.

Pharmacotherapy is accomplished by the use of medications acting on the central nervous system. Their effect is aimed to stabilise patient's mood,

decrease the anxiety related to OD and the compulsion of tooth contact (7–9, 11, 14, 15, 17, 24, 29, 31).

It must be emphasised that all the listed treatments are based only on experts' opinions and case reports. No study included a control group, thus the level of evidence of the results is very low. In addition, positive results were scarce.

All the studies agree on one point, that any dental procedure (occlusal adjustment, restorative, prosthetic or orthodontic treatments) with the aim of achieving even contacts between the teeth must be avoided in patients with OD. It usually fails to improve the symptoms and could increase patient's focus on his or her dental occlusion.

Conclusion

This review shows the main features of OD: epidemiology, taxonomy, etio-pathophysiology and patients' symptomatology. It also suggests the criteria for the diagnosis and lists the therapeutic procedures available. From a dental point of view, the most important lesson to be learnt is that any dental treatment must be avoided in patients with OD. The results could be inadequate and it usually worsens the symptoms.

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