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Correlation Between Bruxism And Dental Implant Failure-Review.

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ABSTRACT

Bruxism is a multifactorial disease that affects about 10% of the world's population. It is characterized by night grinding and clenching of teeth, although there is also a daily variant of this disease. Earlier bruxism was classified as a contraindication for implant-prosthetic therapy because the chewing forces in bruxers are 4-7 times higher than in the healthy population, which could lead to an overload of dental implants. Therefore, the aim of this study was to review so far published literature regarding the relationship between bruxism and dental implants on the following searches: PubMed, Scopus and Embase. 133 papers were found from the period of year 2004. till 2018. The results of this study show that it is important to establish a prosthetic led placement of dental implants after careful analysis of occlusion and existing condition in the patient. In order to minimize complications, it is recommended to use larger diameter and length implants as well as a larger number of dental implants. Prosthetic procedures are usually made by use of PFM, whereas in the non-aesthetic parts metal crowns are often used. Splinted superstructures are related to the better distribution and load transfer. It is not recommended to use cantilevers and it is necessary to wear a hard, rigid splint as a protection overnight. The complications are mainly of mechanical nature: ceramic chipping, screw loosening, screw fracture and implant fracture. Well-timed patient's education about possible undesirable complications, as well as regular controls, might help to foresee some situations which largely reduce failure.

Keywords: bruxism; failure; dental implants; complications

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INTRODUCTION

Bruxism is an oral movement disturbance which is characterized by tooth grinding and clenching. It might happen during the night (night bruxism) or during the day (daily bruxism) (1). It affects 8-10% of the adult population with multifactorial aetiology. In the past, causes of bruxism were thought to be exclusively morphological factors such as occlusal interferences and malocclusion. Today it is known that behind bruxism, a central dopaminergic system is involved together with psychological factors such as stress and personality traits. It is frequently seen in well-educated persons while occlusion is of the minor importance (2). Due to the increased masticatory forces it is of utmost importance to plan detailed therapy with implants in these patients. The concept has to prosthetically guided implant placement with primary feature of the final prosthetic solution, which is followed by the surgical placement of the implants. Extraction of the natural teeth leads to the loss of proprioceptors within the periodontal ligament as well as amortization possibilities, absorption and load distribution and stress along the root (3,4). Dental implants are surrounded by bony tissues therefore, tactile senses are decreased while the stress solely accumulates on the crestal bone (4). With time, higher incidence of implant prosthodontic therapy failures has emerged due to the increased overload as a consequence of the uncontrolled bigger masticatory forces. Resulting complications might be divided into biological and mechanical ones. Mechanical complications are more often and refer to the damage of the prosthetic parts and damage of the dental implant system. Numerous studies suggest that bruxism is a contraindication for dental implant placement due to the unpredictable long-term treatment outcome and additional patient costs (5). However, still no causative correlation between bruxism and dental implant failure exists mainly due to the fact the bruxism is hard to diagnose (2). On the International Consensus from the year 2013 upon bruxism, it has been suggested that bruxism might be divided into three forms: possible (obtained data from patient detailed medical history), probable (detailed medical history and clinical examination) and definitive form which is also confirmed by polysomnography finding apart for detailed medical history and clinical examination. The gold standard for diagnosis of bruxism is polysomnography (PSG) which is rarely performed (6). PSG might be used together with electromyography of the masseter muscle, electroencephalography, electrooculography, electrocardiography and audio-visual recordings (7). In order to correlate bruxism with decreased time of implant prosthodontics therapy and more frequent complications in some patients, bruxism should be defined and diagnosed according to this consensus. The aim of this paper was to systemically retrieve recent data upon bruxism and dental implant failure.

MATERIALS, METHODS AND RESULTS

The following databases were searched: PubMed, Scopus and Embase in order to find out papers upon bruxism and dental implant failure. Key words were: bruxism, dental implant failure, dental implant complications. There were 133 papers included from the year 2004. till the year 2018. Including criteria were: studies involving humans, retrospective and prospective studies, literature reviews, meta-analysis, 3D stimulations which were published in English language. Excluding criteria were studies published before the year 2003, studies on animals, zygoma and orthodontic dental implants, case reports, studies without any failures and papers not published in English language.

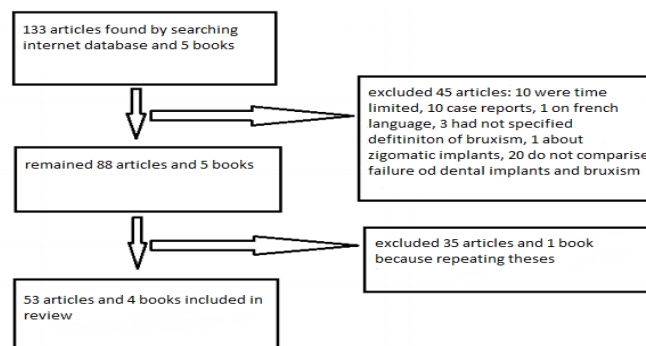


Figure 1. Process of analysis of the published papers. Out of original 133 papers included, only 53 papers were included. Furthermore, out of five books, only four books were included.

DISCUSSION

Most studies confirmed hypothesis that increased dental implant failure is seen in patients with bruxism. However, bruxism is not a contraindication for implant prosthodontics therapy (2). The problem is that there are not many well-designed clinical studies upon bruxism and dental implant failure (8). Bruxism cannot be solely diagnosed on the clinical examination, upon finding of tooth wear facets because tooth attrition is an evidence of strong contacts, but not an evidence of bruxism (8,9). Most of the studies diagnose bruxism solely on the basis of detailed medical history and clinical examination without PSG.

Bruxism patients exert increased masticatory forces during the tooth grinding and clenching. The most dangerous forces are those applied outside the axial OS of dental implants.

Patients self-control is of utmost importance in case of conscious bruxism (10, 11). Patient should change their life habits, decrease level of stress and apply stress relieving activities (11).

Canine guided occlusion during the daily bruxism is also important as decreased muscle contraction leads to the decreased incidence of complications as masticatory forces are smaller.

Forces in the buccal-lingual direction produce the biggest stress on the alveolar bone with values more than 6 MP on the buccal surface of the alveolar bone. Forces which act on the mesial-buccal aspect of the alveolar bone are 1 MP (3). Bruxism lead to an overload of bony structures, therefore increased resorption, microfractures and dental implant failure occurs. Bone resorption i.e. bone loss is substituted with epithelium which is unwanted side effect (12). Overload is directed on the implant which lacks periodontal ligament, tissue which normally serves for amortization together with other sensory proprioceptive function such as tactile sensation (4) and nerve impulse conduction.

Most of the authors confirm that implant prosthodontics therapy in patients with bruxism should be carefully and meticulously planned due to the probably increased incidence of complications and decreased long-term survival of implants. Therefore, increased number of implants should be placed. It is ideal that one implant replaces one tooth, especially in the posterior parts of the mandible (13). The same author (13) suggest that two dental implants in the place of first molar have bigger surface, osseointegration is increased and bending potential is decreased as compared to the placement of one implant. Therefore, wider support of restorations in the mesial-buccal and buccal-lingual direction is maintained, decreased possibility of screw loosening by parafunctional habits is seen as well as decreased overload. In cases where only one implant is placed, bone perforation on one side might occur (13). Placed implants in patients with bruxism should be with wider diameter and longer, as diameter of implants has significant impact on the stress distribution when compared to the implant length. This is explained by the decrease in the crestal bone strain together with further reduction of bone modelling (14). Cantilevers should be avoided due to the non-axial direction of the applied forces. If the implant is to be immediately loaded, reinforced restorations should be used due to the better distribution of forces throughout the arch and decreased micromovements of the dental implants (15). In other cases, immediately loaded implants are not recommended in patients with bruxism as the failure rate is much higher than in patients who do not have bruxism.

Canine-guided occlusion should be followed due to the decreased contractions of the masticatory muscles within lateral eccentric movements, while contact in the posterior parts is to be avoided. In this way, dental implants are protected from the overload during the parafunctional habits. Teeth contacts are avoided and ideally one spotted contact around central fissure close to the axis should happen. If canine-guided occlusion is impossible to attain, then group function is recommended.

The choice of prosthetic material is quite limited. In the posterior parts the use of metal crowns is suggested due to the lower incidence of complication as aesthetics is of minor importance. In other parts, use of PFM is recommended. So far, there are not many published studies upon use of total ceramics in patients with bruxism, probably due to the small number of relevant studies.

It seems prudent that dental implants should be placed slightly into infraocclusion because intrusion of the dental implants is significantly lower when compared to the one of the natural teeth. As a consequence, implants are in contact only during the maximal masticatory load, i.e. during the overload.

Prosthetic appliances should be divided into more minor parts such as left and right posterior part and frontal part (16). It is well known that when teeth are connected from molars to molars, torsion of the mandible and prosthetic work which is primarily caused with strong masseter contraction together with bruxism might lead to the various complications (17).

Therefore, regular follow-ups are recommended in order to foresee eventual complications. For example, non-passive seat of the prosthetic work leads to the unwanted stress which in turn might lead to the screw loosening which might indicate future dental implant fracture (3,18). When strong non-axial forces are applied on the dental implants, bending moment causes screw loosening and subsequently fracture of abutment (18).

Most frequently in patients with bruxism, chipping of the ceramics is encountered, but it is considered as a minor complication. Furthermore, fracture of the prosthesis and acrylic teeth has also been reported but they are also considered as minor complications.

The role of occlusal appliance in patients with bruxism is still questionable, although many authors do recommend its use. By increase of vertical dimension for 0.5 mm till 1 mm, muscles lose learned pattern of movements, therefore their hyperactivity decreases during the parafunctions which is additionally caused by hypertrophy of masseter muscle. Prosthetic appliances are in this way protected from the damage, and forces are evenly distributed to the whole dentition, therefore decrease in the implant load and further complications are avoided.

CONCLUSION

Exact etiologic therapy in patients with bruxism is still unknown. Furthermore, diagnosis of the bruxism is also in question. Use of higher number of implants i.e. the same number of implants as is the number of missing teeth should be applied. Implants should be of wider diameter and longer. Canine guided occlusion should be applied due to the contraction 1/3 of masseter muscle and temporal muscle during the movements which results in decrease of masticatory forces applied on the dental implants. Furthermore, use of protective occlusal appliance is recommended. The material should be PFM, although use of metal crowns is recommended in the posterior parts. This results in decrease of antagonistic teeth wearing and lowered risk of chipping of the ceramics. The gold standard for diagnosing bruxism is polysomnography which is rarely used in everyday practice. Due to this reason, there is a need for controlled studies, as existing data are quite unreliable. In the past, bruxism was an absolute contraindication for dental implants, however today it is considered as a possible complication. Patients have to be informed about effect of bruxism on implant prosthodontics therapy and increased incidence of complications and possible further dental implant failure. It is of utmost importance that patients are monitored during the routine follow-ups

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