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CANINE GUIDED OCCLUSION IN PROSTHODONTICS - A REIEW OF LITERATURE

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ABSTRACT
Tooth loss is a very common problem, so the use of dental implants is also very common. Despite the fact that research on dental implant designs, materials, and techniques has increased in recent years and is expected to continue. Occlusal overload can result in implant biomechanical failures, marginal bone loss, or even complete osseointegration failure. As a result, clinicians must understand the role of occlusion in implant long-term stability. This systematic review contributes to a better understanding of occlusion on dental implants, the effects on surrounding peri-implant tissues, and the effects of occlusal overload on implants. A complete literature search using PubMed and other database relevant journals. Relevant articles from January 1950 to March 20, 2022 published in the English language were considered for this study. The current study showed that Canine guided occlusion can be used as a favorable occlusal scheme during prosthetic replacement of the missing teeth. The ideal occlusal scheme for an implant prosthesis is intended to control biomechanical stress on the implant system, provide a prosthetic and biologically acceptable implant interface, and ensure long-term stability of the marginal bone, soft tissue, and prosthesis. Canine Guided occlusion decreases lateral tooth contact and the possibility of interfering contacts and hence would be considered as an ideal occlusal scheme for dental implants.

Key Words: Canine guided occlusion, tooth loading, occlusal forces.

INTRODUCTION
Occlusion has been and will proceed to be a determinant of the success or failure of most prosthetic reconstructions. The hypothesis is that different occlusion principles can be used and that there is no evidence that one concept is superior to others. Lateral occlusion is essential for masticatory function, comfort, and aesthetics (1). Canine guided occlusion and group function occlusion are the two most frequently utilized lateral occlusion schemes. The canine guided occlusion is a mutually protected occlusion wherein the vertical and horizontal overlap of canine teeth causes posterior teeth to disengage all through lateral mandibular movement. Multiple contacts between the maxillary and mandibular teeth in lateral movements on the working side are the foundation of group function occlusion (2,3). Because of the strategic location, anatomy, and proprioceptive properties of the canine, canine guided

occlusion protects the posterior teeth laterally. Group function contributes to a more equal distribution of occlusal forces across multiple teeth, making it more convenient and functional.

Restoration, tooth wear, and fracture will all have an impact on lateral occlusion. The primary goal of prosthodontic treatment is to improve oral function and to monitor changes in occlusal contacts (4,5). Each tooth restoration, prosthetic device, extraction, and orthodontic treatment alters the dynamic and static occlusion. Balanced occlusion is provided in complete dentures, where all static relations are balanced. To be successful with removable partial dentures, the occlusal pattern of the natural teeth should be in sync with the temporomandibular joints, and the same occlusal pattern should be incorporated into the artificial teeth (6).

The purpose of implant-supported restorations is to replace missing teeth and dentition elements, to maintain or restore form, function, and aesthetics, and to achieve maximum longevity of the restored or remaining dentition. To support the functional and parafunctional demands of occlusal loading, implants and their bony housing must be planned and placed. With the continued development and breakthroughs in implant dentistry, occlusal restorative concepts developed over time.

Mechanical stresses and strains beyond the physical limits of hard tissue have been suggested as the primary cause of both initial and long-term bone loss around implants after osseointegration (7,8). If the occlusal overload is not resolved, crestal bone loss will continue until the implant fails. Occlusion is a determining factor for implant success in the long run because occlusal overload can cause mechanical stresses on dental implants and implant prostheses (9,10).Our team has extensive knowledge and research experience that has translated into high quality publications(11–30).

Occlusal overload is commonly perceived as a significant cause of peri-implant bone loss and implant prosthesis failure because it can cause crestal bone loss, increasing the anaerobic sulcus depth and peri-implant disease states in patients who are unable to clean well (31,32). Therefore a primary occlusal scheme is important for the long term longevity of implants. Hence the main topic covered in this section is determining if canine guided occlusion is the best occlusal scheme for implant-supported prostheses.

OCCLUSION SCHEMES

Proper implant occlusion is vital for adequate oral function and preventing negative outcomes such as implant overloading (33). Dental implants are thought to be more prone to occlusal overloading than natural teeth due to loss of periodontal ligament, which provides shock absorption, and periodontal ligaments, which provide tactile sensitivity and proprioceptive motion feedback.

Posterior teeth crush and prepare food for digestion during mastication and stabilize the mandible during swallowing. The skull has posterior intercuspation for posterior occlusal support, with maximum force application at the zygomatic base above the first and second molars. The sinus and nasal cavities are located directly above the apices of the teeth in the maxilla, with occlusion forces distributed peripherally along the facial aspect of the maxilla and premaxilla by in-plane loading. Periodontal tissues in alveolar bone support the teeth in the mandible, which are surrounded by thicker mandibular cortices. Except for the posterior mandible, all maxillary and mandibular teeth have very thin buccal plates. The posterior areas of maximum loading are more trabeculated than the anterior,

especially in the mandible. In a wide range of normal distribution, the anterior teeth are used for incision and food preparation, with vertical and horizontal overlap varying between Class I, II, and III relations.

To simulate occlusal loading, several physical and mathematical modalities are used. These include two- and three-dimensional photoelastic models, strain gauge analysis, and two- and three-dimensional finite element analysis. While each has advantages and disadvantages, they all show points or areas of relative stress concentration in modeled superstructures, implants, and supporting structures. Some quantify strain and relate it to calculated fatigue overload values in bone deformation models. There is some correlation between animal and clinical outcomes, as they all show an increase in cervical stress concentration with increased load, off-axis inclination, and bending moments. While they are not directly applicable, they are useful in indicating the relative degrees of biomechanical risk for various loading situations (34–37).

OCCLUSAL SCHEMES IN IMPLANTS

The ideal occlusal contact for an implant is over the body, which results in axial loading. Balanced occlusion or mutually protected occlusion is provided for implant supported full mouth rehabilitation by placing implants on the canine region.

Previous research comparing canine guided occlusion and group function occlusion found that maximum stress in the group function occlusion model was significantly higher than in the canine guided occlusion model. Another study found that using group function occlusion instead of canine guidance resulted in an excessive increase in stress (38,39). Cervical lesions appeared more frequently in group function subjects than in canine guidance subjects. The canine tooth area is important for reducing prosthesis strength because it is an important position for implant placement (40,41). Bite forces increase in the posterior regions, and due to the lack of posterior contacts, two-thirds of the masseter and temporalis muscle fibers remain relaxed. When occlusal force was taken under consideration, canine guided occlusal scheme showed to have the upper hand (42,43)**.**

CANINE GUIDED OCCLUSION

Canine guided occlusion is also known as organic occlusion or mutually protected occlusion. The basic idea behind canine-protected function is that when the mandible keeps moving laterally, only the canine contacts and therefore protects the remaining dentition from unfavorable occlusal torsional forces to and from centric relation and centric occlusion. In many dentitions with healthy periodontal tissues and limited wear, occlusion were established so that the overlap of the anterior teeth prevented the posterior teeth from making any interaction on either the working or non-working sides during mandibular excursions. The separation from occlusion was termed as disocclusion. During maximum intercuspation, all posterior teeth are in communication with forces aimed directly along their long axis. The anterior teeth are either lightly in communication or very fractionally out of contact, relieving them of obliquely directed forces. The posterior teeth are dis occluded during excursive movement, having left only the anterior teeth in contact. As a result, the anterior teeth protect the posterior teeth throughout all mandibular excursions, and the posterior teeth protect the anterior teeth at the intercuspal position, giving rise to the term mutually protected occlusion. A mutually protected occlusion cannot be used in a particular instance of reverse occlusion or crossbite, in which the buccal cusps of the maxillary and mandibular teeth interact with each other in a working side excursion (44). The tendency

of anterior guidance to exclude posterior teeth on protrusion and lateral excursions is helpful for optimal occlusion. Adverse anterior guidance can result in bone loss, tooth mobility, and restricted mandibular movement in the front. When the maxillary and mandibular canines are worn out at the incisal surface, the mandible protrudes or moves in a lateral excursion, and the palatal slopes of the canine direct the mandible downward or forward. As a result, steeper inclines can be used for single crown restoration of maxillary or mandibular canines, enabling the mandible to return to its normal position when protruded or brought into lateral excursion (45,46).

During eccentric excursions, shock contact of the upper cuspids by opposing mandibular teeth creates transfer of periodontal proprioceptive impulses to the mesenchyme root of the fifth cranial nerve, which alters motor impulses transmitted to the musculature. This involuntary action lessens musculature tension, reducing the amplitude of the forces applied. The natural vertical and horizontal overlap of the upper cuspids prevents contacts that could develop horizontal vectors, causing premature periodontal fatigue or restoration failure. When this canine protection is eliminated, muscles stay operational, resulting in clenching, teeth grinding, abfraction, and gingival recession.

TOOTH LOADING

The forces are directed in the axial direction by limiting the contact of the posterior teeth's support cusps to their opposing fossae at or near their intercuspal position. Mastication is attained through a pounding motion similar to that of a meat maul. Well-formed marginal ridges, triangular ridges, grooves, and fossae could indeed increase functional efficiency by allowing the occluding cusps to quickly enter fibrous food in a shredding, chopping manner. Canines are placed and inclined so that, while allowing full contact of all teeth in centric occlusion, they force the jaw open as the upper and lower canines slide over each other, disengaging all cusps of teeth as the person begins to grind side to side, a phenomenon known as cuspid rise. The reason for redirecting load applied is that anterior teeth are situated far from the TMJ and have more leverage to compensate.

The horizontal force is limited further by reducing the mediolateral cusp angle.
Guidance is established that is so ineffective for mastication that a patient will indeed only use it for guidance instead of grinding food. For several reasons, the canine is better suited for this role.

- The canine has a favorable crown to root ratio.
- Canines are the last teeth in the dentition to be lost.
- Canines have a relatively larger root which in turn results in a larger crown root ratio.
- Canines have good proprioception.

In comparison to the relevant published artificial occlusal schemes, canine guided occlusion is a reliable occlusal scheme for the arrangement of complete denture teeth. Canine guided occlusion is favored over other occlusal schemes due to the simplicity and ease of fabrication (47). Canine guided occlusion, the posterior teeth disengage during all mandibular excursive movements, with the canine teeth overlapping vertically and horizontally. Superior functional efficiency for chewing or mastication has been reported using anterior teeth group function or the canine-guided occlusal scheme. According to the literature review, differences in patients ' satisfaction were noted in relation to various factors such as stability, function, muscle activity, aesthetics, and retention (48). According to several

researchers, canine guided occlusion was preferred over other artificial occlusal schemes in terms of function and stability.

CONCLUSION.

The ideal occlusal scheme for an implant prosthesis is intended to control biomechanical stress on the implant system, provide a prosthetic and biologically acceptable implant interface, and ensure long-term stability of the marginal bone, soft tissue, and prosthesis. In conclusion, the goal of canine guided occlusion for dental implants is to reduce occlusal overload. Clinicians should incorporate these principles into their implant restorations to keep forces within physiologic limits and to ensure the implant system's long-term stability. Furthermore studies are to be conducted in the future to assess the ideal occlusal scheme for dental implants.

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