On the Interface of Occlusion

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Most contributions to the Interface of Occlusion included sections titled "What do we know" and "What do we not know." However, after reading the "What do we know" sections closely, one might agree with one of the authors who stated that theories abound but evidence is short. He also wrote that we need to maintain constant vigilance to assure that the questions of *why* and *when* to intervene are given equal priority compared with the more popular and commercial question of *how* to intervene. Nevertheless, the Interface of Occlusion provides very few answers in regard to why and when to intervene, given occlusal situations that might be related to complaints or that might be relevant for the maintenance of dentitions over the long run.

The Balance: What We Know Versus What We Do Not Know

Even the sections "What we know" include considerable uncertainties. For example, in the "what do we know" section in the article on individuals with craniofacial anomalies such as cleft lip and palate,[1] Ross wrote, "Actual problems, not deviations from normal, should be treated." He also wrote that "a primary goal of treatment is to establish optimum facial esthetics." What do we know then exactly and what does that mean? Possibly it means that the most actual problem is the deviation from "normal" esthetics. Moreover, what are optimum esthetics? In another "what do we know" section, this one from the article about the nonphysiologic occlusion in the young dentition,[2] it was stated that "risks of tooth wear and temporomandibular disorders (TMD) have also been attributed to malocclusion; however, scientific evidence questions any essential role that malocclusion has in the pathophysiology of either condition." What do we know then exactly? Obviously, the author means that evidence is not conclusive. How important is an "essential role"? In the article on determinants of a healthy aging dentition (centric stops and vertical dimension),[3] it was stated that "occlusal contacts change throughout the day and over longer intervals and depend on the pressure and physical state of the masticatory system." It was also stated that "Postural jaw position varies within the same person and is influenced by body posture, speech, and emotional tension." "Measurements of clinical freeway space depend on the methods used," wrote the author. "...The patient has a good chance of adapting to an increase in vertical dimension." What do we know then exactly, apart from "variations"? Which individual patients have "a good chance" to adapt? With respect to determinants of a healthy aging dentition (the dimensional freedom of occlusal contacts), another "what do we know" section[4] reveals that "while the contribution of occlusal factors to various forms of temporomandibular disorders (TMD) is not zero, most of the variation in each disease population was not explained by occlusal factors." What exactly is "not zero"? Obviously, some relation between TMD and occlusal factors is suggested. Regarding local factors associated with parafunction and prosthodontics, it was stated that "Although occlusal interference has historically been regarded as a cause of bruxism, evidence countering this historic concept has been reported."[5] What do we know then? Does "historic" mean that the concept has been definitively rejected?

These are all examples illustrating that even the "what do we know" sections (leaving aside the long lists of issues in the "what do we not know" sections) include many uncertainties. Conclusively, the balance of what we know versus what we do not know is negative. Only very few answers or guidelines are given on why, when, and how to intervene, given functional problems of individual patients.

Possible Impact on Clinical Practice

Given the many questions on the issue of occlusion, a clinician has to use a best estimate of a certain dental situation to determine expectations of a treatment or nontreatment outcome. Such estimates differ from concrete measurements, such as body temperature, and expectations of treatment outcomes are not guarantees. Because they are just estimates and expectations, 4 strategies can be used to prevent mismanagement or a particular form of mismanagement, overtreatment. These strategies are: *(1)* consider a problem-oriented approach, *(2)* consider "wait-and-see" periods, *(3)* do not change occlusion (in prosthodontic procedures) if the stomatognathic system functions appropriately, and *(4)* in case of "occlusal therapy," start with reversible types of treatment.

1. A problem-oriented approach is based primarily on the functional requirements of the patient. An important part of a problem-oriented approach is the recognition of a possible relationship between the observed signs and symptoms (complaints) and occlusal parameters (ie, of a possible

pathogenesis). Then the problem has to be defined: an inventory of the recognized problems must be made, and the problems must be appraised critically to find out whether they are relevant to the patient or to the maintenance of the dentition. Treatment options, including no treatment, should be balanced, and prognosis of the treatment should be discussed extensively with the patient.

2. Wait-and-see periods are related to a problem-oriented approach. An approach which is not problem-oriented may lead to overtreatment because a defined aim, other than just to restore, is lacking. In many cases treatment leads to retreatment, and excessive treatment can be a serious problem. Wait-and-see periods are recommended in order to evaluate and monitor oral conditions and see whether a patient can adapt to a changed situation. They also can be used to see whether functional problems disappear spontaneously or are brought within the adaptive capacity of a patient after just a limited treatment. These periods are used to judge whether intervention can be avoided or reduced to a defined aim.

3. If we do not change the occlusion in restorative cases where the stomatognathic system functions adequately, we minimize the risk of provoking problems. For example, if fixed or removable partial dentures are made, all efforts should be made to reproduce the existing occlusion. Interferences introduced by restorations usually are relatively large, and they are always prompt. Large and prompt interferences might introduce problems in healthy individuals similar to that reported by patients with TMD. Changes of the occlusion for prosthodontic reasons (eg, an increase in vertical dimension) should be considered only in cases where they are inevitable. In other words, never change a winning team.

4. Starting with reversible therapies has the advantage of doing no real harm. The first reversible step is to provide information. Explain the problem to the patient as well as the magnitude of that problem. Explain what can be expected from a wait-end-see period. Discuss the possibilities of various forms of reversible types of therapy (eg, occlusal splints) and what can be expected of "permanent" restorations in terms of treatment outcome and cost.

Possible Impact on Research

Extensive research has been published on the occlusal interface. Still, many causal relationships are not clear or cannot be quantified. Sometimes, research or review papers conclude that evidence of relations cannot be demonstrated. This does not mean that they are nonexistent.

It has been stated that "the hypothesis of a causal role of occlusal factors cannot be tested in treatment studies. Minimal requirements are that the study must be longitudinal, start before the presumed risks are present, and include subjects with and without the presumed occlusal risk."[6] It has also been stated that "occlusion could be excluded as a causal factor if the absence or presence of occlusal interferences does not affect the incidence rate of TMD in longitudinal studies."[7] Theoretically, these statements might be true, but given the multifactorial etiology of functional problems described in articles in the Interface of Occlusion, and given the various components of the stomatognathic system, and the broad range of variability in the oral situation and background variables (psychological, psychosocial, and behavioral aspects), this might imply that conclusive research is almost impossible. Moreover, because of the multifactorial etiology of functional problems related to occlusion, we must distinguish between *causal factors* and *sufficient cause*.[7] One or another occlusal factor can be a sufficient cause (in itself), or it can be a causal factor (in combination with other factors). For example, if both stress and a certain occlusal factor are needed to develop TMD, than this occlusal factor is a causal factor but not a sufficient cause for TMD.[7] Maybe we have to admit that the highest attainable evidence on many issues in regard to occlusion is just circumstantial evidence. This results from the best available evidence from what is practically possible and ethically acceptable.

One might also conclude that much of the massive research discussed in the Interface of Occlusion is scientifically and statistically sound but unfortunately limited with respect to clinical relevance. An alternative strategy for improvement of clinical relevance, ie, for generating more research that has the potential for improving the treatments provided to the public, might be a research approach or agenda based on the experiences of and problems faced by clinicians in daily practice. This was proposed both by some authors of the Interface of Occlusion and indeed by Mjör.[8] Dentists have worked for decades to develop improvements based on positive and negative outcomes from clinical experience. The establishment of networks of clinicians, guided by researchers and research protocols, differs considerably from the "it works in my hands" approach. Research agendas established by clinicians in "real-world" situations in routine general practice might be more fruitful than those established by academics doing research on potential and theoretical clinical problems. Undoubtedly the demand for basic science researchers in dentistry will be as great as ever. However, until scientific evidence bases for clinical procedures are established, treatment (or no treatment) based on confirmed clinical experience as documented by research networks will prevail.[8]

As long as conclusive evidence on certain interventions related to certain functional problems and deviations from a "normal" occlusion is lacking, strategies to prevent mismanagement or overtreatment will prevail and remain useful.

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