

Second opinions are common in healthcare; whether a doctor is sorting out a difficult case or a patient is not sure what to do next. In the context of our magazine, the first opinion will always belong to the reader. This feature will allow fellow dentists to share their opinions on various topics, providing you with a "Second Opinion." Perhaps some of these dentists' observations will change your mind; while others will solidify your position. In the end, our goal is to create discussion and debate to enrich our profession.

— Thomas Giacobbi, DDS, FAGD, *Dentaltown* Editorial Director

Occlusion Confusion

Gordon J. Christensen, DDS, MSD, PhD



This editorial begins with a sad but true commentary on the apparent state of dental occlusion knowledge among dentists in 2006. Take a moment to remember where you obtained your knowledge about occlusion. Like me, you were introduced to occlusion in dental school. However, each of us as students was so lacking in overall knowledge about dentistry that it was difficult to “weed out” the pragmatic occlusion information from the often esoteric pet theories of some of the instructors. Also, we had little clinical experience at that point and were so slow in accomplishing clinical procedures that it is unlikely the information about occlusion was subsequently applied into practice.

After dental school, you may have enrolled in a continuing education course that included or was limited to occlusion. This course may have taught that there was only one way to achieve success in dealing with occlusion; one articulator; one method of accomplishing occlusal equilibration; and, yes, only one type of occlusal splint

that worked. You probably had at least one academically oriented book on occlusion, and after a chapter or two of nodding off to sleep reading it, you probably retired that tome of knowledge to your bookshelf. By now, armed with at least one or two articulators, which were probably being used as expensive paperweights, and a confusing array of information, in desperation you set out to try some clinical occlusal techniques using your own knowledge and experience.

Another problem emerged. When practicing some of the allegedly excellent clinical occlusal techniques, you found it was difficult to make an income doing occlusal therapy. If you are a typical practitioner, you gave up and directed your energies at increasing your skills in endodontics, fixed prosthodontics, esthetic procedures and a few other areas of income-producing activities.

What is fact and what is fiction in occlusion? What works? What information is nice to know, but useless from a pragmatic standpoint? Can occlusion be implemented into a general practice

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Can occlusion be implemented into a general practice and become a service-oriented, profit-producing area of practice?

and become a service-oriented, profit-producing area of practice? These are a few of the questions I would like to attempt to answer, but the editorial is too short to provide my opinions on all of them.

This editorial, which may irritate some of you, is intended to make at least a little sense about occlusion as observed in the natural dentition and direct you toward some actually logical, useful, occlusal concepts and restorative procedures.

Is a Healthy Occlusion Related to the Way the Teeth Contact?

I know you have seen the majority of Angle Class I occlusion patients happy with their “bite” and pain-free. Is Class I occlusion the long-sought answer to create a healthy occlusion? No, you have also seen Class II or Class III occlusion patients happy and pain-free. Occasionally, you have even seen patients who have only a few teeth in their entire dentitions contacting in occlusion, who are pain-free and who can chew adequately. In fact, I have several mature sheepherder uncles who can chew the toughest “mutton” conceivable without any teeth, and they often challenge me on why I am trying to save teeth.

It appears that after teeth have erupted into occlusion, and the muscles of mastication, the tongue, the cheeks, and the specific chewing rhythm of the patient achieve equilibrium, the manner in which the teeth contact have little to do with occlusal health or the ability to chew. Of course, there are exceptions, where patients develop TMD signs and symptoms, and by changing the way the teeth come together and the way the muscles function, we dentists often relieve the problems. In other words, the theories that demand a certain, specific way for the teeth to occlude appear to be more myth than fact.

What Is A Typical “Normal” Occlusion As Observed In Physically Mature Young Adults And What Should We Learn From It?

I will state some easily observed characteristics of occlusion present in the majority of pain-free, dentulous patients who can chew without difficulty.

- When the mandible is manipulated gently to the most retrusive position, and the teeth are placed in contact, some of the teeth touch in what has been described as “centric relation” (CR). As the typical patient exerts biting force on the teeth, the mandible moves forward and slightly upward into the most interdigitated position known as “centric occlusion” (CO). It is clearly observable that almost all unrestored patients have this shift from CR to CO. It is generally about 1-1.5 mm. It has been my observation that when this shift is removed either by occlusal equilibration or by occlusal rehabilitation, and CR and CO are made simultaneous, the shift

returns after some months or years. Simultaneous CR and CO contact are known as “centric relation occlusion” (CRO).

- When the typical patient moves into lateral function, the canines take the majority of the occlusal load in about 75% of patients. This is the so-called “canine rise.” Bruxing patients gradually wear the canines down and eliminate the canine rise, causing tooth contact all along the posterior segment and creating a so-called “group function.” Clenching patients (few lateral or forward movements) tend to accentuate canine rise and incisal guidance, and wear the CO positions.
- When the typical patient moves the mandible into incisal guidance, the anterior teeth disclude the posterior teeth in nearly all patients, except the few (~3%) who have Angle Class III occlusion. Bruxing patients wear the anterior teeth, eliminate incisal guidance, and create a “group function” in lateral and protrusive function.
- Contrary to some expressed occlusal theories, cusps of natural teeth in healthy occlusion do not contact in neat tripod contact valleys on the teeth of the opposing arch. Research has shown that they meet on inclined planes of the teeth on the opposing arch most of the time. They are stable meeting on these inclined planes because of the equilibration of stresses created by muscle function and chewing habits. When we change tooth anatomy by placing crowns or fixed prostheses, the teeth must find new spatial locations in which to achieve muscular and functional equilibrium. You and I certainly do not achieve that equilibrium on the day we seat the crowns or fixed prostheses. Occlusal “touch-up” equilibrations are necessary a few weeks or more after seating a significant number of restorations.

With a few pathologic exceptions, doesn't it appear logical that when rehabilitating a dentition we attempt to create similar occlusal characteristics to the ones the patient has had for his or her life to that point? The muscles, cheeks, lips, etc. are accustomed to that occlusion, and in my experience from accomplishing hundreds of sequential and total rehabilitations, the patient will readapt to the new upgraded occlusion easily and rapidly.

How Should We Rehabilitate Occlusion?

I have just described characteristics that occur in the majority of mature healthy occlusions. It is easy to reproduce those characteristics by observing the patient and accurate diagnostic casts. My following suggestions have been developed from many years of practicing prosthodontics, hundreds of oral rehabilitations, and some failures, from which I have learned more than from the successes.

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1. **Simple restorative situations.** Observe the characteristics of the occlusion before starting the restorations. Is it a typical healthy occlusion and you are placing crowns on a few teeth? Take out any obvious occlusal prematurities, and build the restorations into harmony with the existing occlusion. I suggest most of the time leaving the CR-CO shift, the incisal guidance, and the canine rise present as nature created them.
2. **Multiple unit restorations leaving vertical dimension of occlusion "as is."** Again, observe the existing occlusion. Remove any obvious prematurities. Retain the CR-CO shift if enough occlusal contact is present on the remaining teeth. If most of the occlusal contacts have been removed because of tooth preparations, establish a CRO position by occlusal equilibration, eliminating the CR-CO shift. Why remove the CR-CO shift? CRO is an easily reproducible position, even when using simple articulators. Although the patient will not have a CR-CO shift present on seating the restorations, it has been my experience that the forces present in the occlusion will reestablish the shift in a relatively short period of time, as the temporomandibular joints apparently remodel. Minor occlusal equilibration is necessary over months or years as the occlusal harmony develops naturally. I often use simple, inexpensive transcutaneous electrical neuro stimulation (TENS) units (~\$100 from medical suppliers) to relax or fatigue the externally located masticatory

muscles with electricity. This concept has been very useful to assist in finding a relaxed CR. Developed many years ago, and currently in vogue again, is the use of a TENS device, supposedly to determine the vertical dimension of occlusion position and centric occlusion position in which the patient's oral rehabilitation should be established. This concept usually locates the patient's new occlusion somewhere anterior to the original CR and CO as described in this article. In my strong opinion, there is some truth in every occlusal theory, including the electrical one. However, as with any oral therapy concept, it is my opinion that attempting to treat *every oral rehabilitation* with only one technique is not logical or feasible. I use information from many occlusal concepts and theories when rehabilitating an occlusion, especially the information the patient demonstrates to me from his/her original occlusal characteristics.

3. **Multiple unit restorations establishing opening of vertical dimension of occlusion.** Let's assume that the teeth are mutilated or worn, the "vertical dimension of occlusion" (VDO) appears to be closed somewhat, and you are planning to open the VDO. Place an occlusal splint at the minimal VDO opening you deem necessary to allow an appropriate amount of metal, ceramic, or resin on the occlusal surfaces of the most posterior teeth. This is an easily determined guide that can be determined from radiographic observation of pulp

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Income from occlusion concepts became acceptable and comparable with some other procedures

anatomy, lip position, and apparent needed lengthening of teeth for esthetic purposes. Of course, and of high importance, we must discuss and determine the patient's desires concerning the esthetic result to be created. Leave the splint in for a few weeks. I prefer up to six weeks. If no adverse occlusal signs or symptoms occur, establish the new VDO at that position. *Reproduce the new occlusion with the same occlusal characteristics that were present in the patient's previous dentition.* If a canine rise was present, create the new rehabilitation with the new canine rise at about the same inclination as the old one. After rehabilitating many patients in which the teeth were worn flat by bruxism, I have failed several times when I have created the new occlusion with a steep canine rise. Make the new occlusion for the bruxer with *minimal* incisal guidance and canine rise. Give the patient a long-centric occlusion forward shift, and a wide-centric occlusion lateral shift to avoid fracture and failure of restorations.

In any but the most simple of the previously described levels of rehabilitations, I feel that it is mandatory to adjust and refine occlusion about six weeks postoperative. Almost always, I find that the patient needs some minor occlusal equilibration to harmonize the occlusion of the new restorations.

Making Income from Occlusal Concepts and Techniques

I suggest that some occlusal techniques can be delegated to competent staff. About one-third of the international adult population have bruxism or clenching and need occlusal splints, either full-arch or the simpler nociceptive trigeminal inhibition tension suppression system (NTI-TSS) to prevent or reduce abnormal tooth wear. In almost every geographic location, occlusal splint placement is considered to be a reversible procedure that can be legally accomplished by staff persons. For many years, I have delegated all splint fabrication and seating to qualified dental assistants or hygienists. Assuming about one-third of your patients need splints because of bruxing/clench-



NTI-TSS

ing habits, the increased practice activity related to incorporation of this staff-oriented procedure is obvious and impressive.

Most bruxing/clenching patients, TMD patients, pre- and post-rehabilitation patients, periodontally treated patients, and post-orthodontic therapy patients need occlusal equilibration. These patients account for hundreds of occlusal equilibrations per year in your practice.

Educating Staff About Occlusal Procedures

Most dental assistants and dental hygienists have meager education about occlusion – even slightly less than dentists. It is imperative that when a practitioner decides to incorporate occlusal concepts into practice that not only the dentist, but also the related staff persons become motivated and educated about occlusion. Have staff persons take pragmatic occlusion courses with you. Have in-service education sessions on what you expect staff to do relative to occlusal procedures.

What Has Occlusion Done to My Practice Over Many Years?

I was poorly educated in occlusion in dental school. In fact, I avoided becoming involved with it for many years after graduation.

Gradually, I became interested out of necessity from what I saw with my occlusal failures. I took courses, some of which actually taught me something. I started to charge patients for occlusal procedures. Success in occlusal techniques slowly became evident. Income from occlusion concepts became acceptable and comparable with some other procedures. Eventually, occlusion became a routine part of my practice. I suggest that it can be the same for you.

Conclusions on Occlusion

In my opinion, the profession is in major chaos relative to occlusion. I suggest returning to the concepts that are present in the healthy natural dentition and that are easily identified by each of us. Complete dependence on any single occlusal theory, articulator, device, or concept is, in my opinion, foolish and potentially dangerous.

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