

The Great Occlusion Fiasco

The time has come to open a dialogue on occlusion. As a subject, it has persisted to be incomprehensible, making its role in dental practice uncertain, and vague at best. Syrop,¹ in an article for *Inside Dentistry* confirms that frustration and confusion have reigned over this complicated topic for over 100 years. In the American Equilibration Society's (AES) publication *Contact*,² editor Dr Michael Melkers asked six international AES members, "What did you learn about occlusion in your dental school?" These are a few of the compiled statements that he received in reply, verifying that "occlusion confusion" is truly a global problem:

- Occlusion means confusion and it is hard to understand.
- There are so many theories with no explanation.
- The majority of dentists prefer to stay away from occlusion or temporomandibular disorders diagnostics.
- I feel the UK suffers from a lack of basic training in occlusion.
- After graduation, most dentists do not worry about occlusion, as it was not emphasized in school.

Occlusion is a puzzle that has to be solved if we are to understand its role in dental practice and its relationship, if any, in the etiology of temporomandibular joint (TMJ) disorders. What is it about this subject that makes it incoherent? The purpose of this commentary is to discuss the reasons that have contributed to this enigma and to recommend guidelines that will result in a healthy masticatory system.

DEFINING OCCLUSION

Undoubtedly the biggest source of confusion is the word itself. From the Latin *occludere*, to "occlude" means to become closed, whether it is a door, an artery, a heart valve, or teeth. However, over the years there has been a movement to broaden the definition,³ ie, to make it a synonym for the masticatory system. The idea may have been well intended, but the result was confusion, as we now have two definitions of the word. The double meaning now makes vital questions such as, "What is the role of occlusion in the etiology of TMJ disorders?" impossible to answer. Are we asking if it is possible that the way teeth touch each other in closure could have an untoward effect on the TMJ, or do we want to know if the masticatory system itself could be malfunctioning? Finally, this system already has two names, masticatory and stomatognathic. Why do we need a third? Restorative dentists need to limit their definition of occlusion to the closure of teeth and focus on the system itself. By understanding the essentials of a normal

functioning system, we can better recognize and manage when it is dysfunctioning.

NORMAL FUNCTION OF THE SYSTEM

The trajectory of the mandible in function, no matter whether it is mastication, speech, or swallowing, is always vertical in a narrow teardrop path varying just 5 to 6 mm from midline.⁴ However, there is a large percentage of dentists who are focused on making their patients function in horizontal excursions contrary to normal function. This inclination started in 1880 when a German anatomist, F. Graf von Spee,⁵ published a paper explaining that the best way to chew food is for the mandible to go into prolonged grinding lateral strokes. He even suggested negating (shortening) the cuspids to prolong or lengthen the stroke. The question no one asked was, "Why, when we do not eat in such a manner?" I suspect that if we exhumed von Spee's remains and examined his teeth, we would observe that his teeth were worn down from bruxism, and he was forced to grind his food laterally. Curiously, the idea caught on and adjusting patients' teeth in lateral excursions was in vogue. However, there is a problem: This is not normal function; this is parafunction or grinding, bruxism or the horizontal component of dental compression syndrome (DCS).⁶ In my opinion, the acceptance of lateral excursions actually encouraged patients to grind, resulting in severe damage. Concerned dentists attempted to minimize these forces by distributing them over the posterior teeth. It was termed "group function."⁷ Later, D'Amico⁸ suggested that these lateral forces should be borne by the cuspids alone rather than the posterior teeth. It was termed "cuspid rise" or "canine guidance."⁸ The most current concept is termed "anterior guidance,"⁹ the idea being that if a patient is grinding his or her teeth, the lower anterior teeth will strike the uppers, which will open and protect the posterior teeth. With all due respect, none of this makes any sense. While there may be a few exceptions, people only grind their teeth while sleeping and for that, a guard will suffice.

THE MORPHOLOGY OF TEETH AND BALANCED OCCLUSION

How could it be that after all this time, the dental profession does not agree on the most ideal design of teeth? Biological materials and structures are designed for specific functions. The purpose of teeth is to cut food; the sharper the teeth the more efficient the process. So how is it that we have a choice of 7 different designs for denture patients who have a diminished mastication force of over 60%, and expect that patient to eat efficiently? It seems the concept was developed when it was observed that lateral excursions caused the opposite side to lift so balancing was conceived for prevention. Unfortunately, the

teeth turned out flat. Posterior denture teeth should mimic our original dentition, 33°, and patients should be instructed to masticate vertically.

CENTRIC OCCLUSION, CENTRIC RELATION, AND THE INTRA-INCLINE SPACE

Not without controversy is the position of the mandible upon closure. "Centric occlusion" (CO), as defined by the *Glossary of Prosthodontic Terms*,⁹ is the occlusion of opposing teeth when the mandible is in centric relation (CR); however, the glossary gives 7 different interpretations of CR. What are we to make of this? Dawson explains that ideally the condyles should be in the anterior superior position of the glenoid fossae because this is the best place to withstand the compressive forces of DCS.¹⁰ Not infrequently, however, the condyle has slipped from its preferred CR position, and CO is now forward of CR when they should be identical. Current thinking now directs us to finesse the mandible/condyles back to position and somehow fortify the occlusion to maintain that position. This makes no sense because the muscles of mastication should be relaxed a majority of the time. The questions that should be asked are, "Why did the mandible/condyles leave their preferred position in the first place?" and "Why can they not return by themselves upon swallowing?" A reasonable explanation is that when one examines the cross section of a young patient's secondary dentition in occlusion before there is wear or restorations, there are 3 things worthy of noting: First, that the morphology is sharp and the buccal cusps of the mandibular teeth occlude with the central fossae of the maxillary teeth. Second, the generous space between the incline planes, called the "intra incline space," which is vital to the comfort and efficiency of the masticatory system.¹¹ It allows easy access to, and exit from, occlusion, and it prevents off-loading when clenching occurs. Thirdly, it allows the mandible freedom for anterior-posterior movement during postural changes. When grinding does occur 2 things happen: (1) the most posterior teeth flatten and (2) the mandible moves forward due to the anterior component of force displacing the condyle. Since the attrition has eliminated the intra incline space, the condyle is now unable to return to its preferred position. Reshaping the functional cusps will solve this problem.

OCCLUSION AND THE TMJ

There is a disturbing idea growing in popularity that the way teeth touch each other in closure has nothing to do with disorders of the TMJ,¹² yet the design of the dentition allows the condyles to have to work in harmony for normal function. It is generally accepted that DCS can cause TMJ disorders. The question that should be asked is whether occlusion—the way teeth touch each other in closure—could initiate DCS? To deny the possibility implies that a crown of any size or dimension placed in a comfortable patient's mouth would have no

untoward consequence. Common sense denies that conclusion.

MAXIMIZING THE LONGEVITY OF IMPLANT RESTORATIONS

It is not unusual after a lecture on implant reconstruction to have the presenter declare that the completed case was protected with "implant protected occlusion."¹³ This is a variation of the prosthetic concept of "mutually protected articulation,"⁹ which explains that the posterior teeth protect the anterior teeth during clenching, and the anterior teeth protect the posterior dentition in all mandibular excursive movements. This is a false concept. Allowing certain teeth to incur damage in order to protect other teeth only results in redirecting the damage site. The best protection is achieved when implant patients monitor themselves to control clenching while awake and wear a comfortable guard while sleeping.

SUMMARY

The fiasco over occlusion has been a major distraction from the more serious problem of DCS. We have a unique problem on our hands that is in part stress related and in part engineering. Biological body parts, with the exception of anomalies, are perfectly designed for the task they should perform. It is our responsibility to preserve the original design of nature's dentition with its occlusal relationship and to help our patients to manage stress related problems.

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