The Clinician's Index of Occlusal Disease: Definition, Recognition, and Management

Observations, more than books, experience rather than persons, are the prime educators — A. B. Alcott. Observations of occlusal force on related dental structures have led clinicians to various conclusions. Malocclusion as a co-factor with inflammation in advanced periodontal disease is recognized by most therapists, and some attempt is usually made during treatment to minimize its effect. More recently, occlusal disharmony has been specifically implicated in a significant percentage of temporomandibular joint dysfunctions. Dentists have also observed, with chagrin, the wear of occluding tooth surfaces due to parafunctional activity. Stallard stated that he preferred the term parakinesia to parafunction, explaining its meaning to be "wild motion." The term occlusal disease is not new in dentistry. It was contemporaneously introduced in the 1930s. The roots of its definition are as follows.

Disease defined

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Dorland's Medical Dictionary defines disease as: "any deviation from ... the normal structure or function of any part, organ, or system ... of the body that is manifested by a characteristic set of symptoms and signs and whose etiology, pathology, and prognosis may be known or unknown."

Stedman's Medical Dictionary states the following in defining disease: "...a pathologic entity, characterized usually by at least two of these criteria: a recognized etiologic agent (or agents), an identifiable group of signs and symptoms, or consistent anatomical alterations."

Dental disease, then, may be described as a permanent alteration in, or loss of, function of those parts generally cared for by dentists. Specifically, these include the teeth, periodontal tissues, and associated dental structures. In the case of teeth, dentistry has historically recognized the permanent destruction caused by dental caries through the breakdown and subsequent loss of tooth structure. We have also observed the annihilation, in some cases, of the dentition, caused by overuse-abuse, referred to as bruxism or bruxomania.
**Bruxism**

Because of the marvelous adaptive capacity of the stomatognathic system, most people with malocclusion can adjust their functional activity without serious repercussion. However, parafunctional* activity (manifested as bruxism) is another matter. It is in response to this abuse that the body's adaptive mechanism can break down and fail. McMorris has stated that emotional or psychological stress when combined with malocclusion leads to periods of parafunctional activity (ie, bruxism or clenching). Further, he states that "parafunctional activity results in much greater forces over a larger period of time than do functional activities. Such activities as bruxism and clenching can result in forces that exceed the gnathic system's ability to resist."

Bruxism has been carefully described by Shafer et al.: "Bruxism is the habitual grinding of the teeth either during sleep or as an unconscious habit during the waking hours. This term is generally applied both to the clenching habit, during which pressure is exerted on the teeth and periodontium by the actual grinding or clamping of the teeth, and also to the repeated tapping of the teeth."

They discuss the etiology, dividing it into local factors, systemic factors, physiological factors, and occupations. They touch briefly on clinical features, concluding with treatment and prognosis, labeling it, in fact, a disease entity: "...if the disease is left untreated severe periodontal and/or temporomandibular disturbances may result." Interestingly, the incidence of bruxism, a disease entity, has been reported between 5% and near 100% of the population.6,7

**Historical/cultural background**

There is biblical evidence of bruxism, as mentioned in Psalm 102. Later, during the time of Christ, Matthew records no less than five prophetic incidences where gnashing of teeth will accompany judgment.1 We note, then, that self-abuse of the dentition has been known for thousands of years. Curiously, the gnashing described in Old Testament times appears to be more blatant aggression. In the Christian era it seems to be related to frustration, stress, tension, and the vicissitudes of life.

Other than those cultures where the dentition is purposefully used as a tool, there is very little in the way of abrasive material in our modern diet. The exception, in modern culture, is the habitual tobacco chewer. In the main, dental occlusal abrasion in our culture comes from bruxism. The causes of bruxism have been elaborated and speculated upon for some time; however, it is not the purpose of this article to develop a causal theory.

Contemporary attitudes

Dentistry has avoided dealing seriously with a problem that pervades the fields of periodontics and restorative dentistry, as well as long-term dental health maintenance: occlusal disease. To date, an attitude of "if it works, don't fix it" has prevailed. If an individual has an occlusal prematurity when closing in a centric-related position and does not feel pain or exhibit periodontal breakdown or functional impairment, and if their occlusal wear patterns are not particularly esthetic, we have said "let well enough alone." Further because there has not been a clear index for stages of occlusal wear, we have often avoided this problem in its inception and early development and have reserved treatment only for advanced stages of wear. Occlusal disease, however, is a potential crippler just as is any other disease process. Unchecked disease ultimately culminates in the impairment or destruction of functioning body parts, and the disease process in the dental apparatus may have far-reaching ramifications in total bodily function.

Today, more than ever, and more judiciously than ever, we must examine and assess each patient's occlusion. What with the apparent epidemic of TMJ problems surfacing, even the occlusion of primary dentitions should be observed and monitored. The childhood dentition often appears worn well beyond its years by the time of exfoliation.10 This may be the point developmentally when an individual begins a lifetime of habitual grinding, often resulting in the loss of part or all of the dentition and in functional impairment.

* Functional activity can be described as those tooth contacts made during normal chewing of food (tobacco gum chewing not included) and those contacts made during swallowing. All other contacts may be considered parafunctional.
Disease as defined in Webster is: "loss of parts or function." Occlusal disease, then, is the loss of the anatomical parts of occluding tooth surfaces, which ultimately results in functional impairment, pain, or both. Bruxism is the cause, occlusal disease the result.

Because occlusal disease was seemingly not a clear entity but was often intimately related to other para-dental problems, dentistry was reticent to label it as such. However, it is in fact a disease entity that stands alone. Its developmental stages will be described subsequently.

**Pathogenesis of inciso-occlusal wear with normo-occlusion**

Incisal wear may be manifested primarily as a result of lateral parafunctional movements, as a result of protrusive parafunctional movements alone, or as a combination of both the lateral and protrusive movements. In the pathogenesis of attrition (see Figs 7a to h), because the canine is longer, it receives the heaviest and earliest lateral and laterotrusive wear. Its position at the corner of the arch and its elongated crown and root presuppose this. The central incisor follows suit and then the lateral incisor, with their decreasing length and mass. Thereafter, the first premolar and the first molar will probably come into lateral play.

If the parafunctional activity is essentially protrusive-retrusive in nature, then the central incisors will exhibit the initial wear, followed by the lateral incisors and canines. Any combination of protrusive-retrusive, laterotrusive, and pure lateral activity is possible. The most common attrition observed clinically is laterotrusive. This attrition is often more noticeable on the maxillary teeth because of our chairside perspective and because these teeth are larger and facial to the mandibular teeth. Further, the mandibular four incisors usually erupt with their incisal edges in one harmonious plane, hence attrition is less obvious. However, the chipped mandibular incisor may be a manifestation of progressing occlusal disease. When there has been enough abrasion of the incisal edge to expose the dentin, the thin enamel wall becomes vulnerable.

**Some variables affecting attrition**

Certainly, any number of variables are possible in arch form, tooth position, tooth length, and so on. Thus exists the potential tooth wear pattern variability. For example, if the canine becomes positioned labially and is crowded out of full eruption, then it is effectively shortened and will come into lateral play later (Fig 1). This is surely less than ideal because the length of time it can accept attrition is greatly diminished. The lack of ideal anterior tooth arrangement is more easily visualized when the permanent canine is not present; for example, when adults retain their primary canines it is obvious that the longer permanent lateral incisor and premolars will come into functional (or worse, parafunctional) activity prematurely.

In similar fashion, lingually posed maxillary canines (Fig 2a) will allow premature lateral activity on the adjacent teeth. In this instance there will be an additional nonworking contact on the canine when the opposite side is in function (Fig 2b). Further, because there is no fixed centric stop on this lingually posed tooth, it will tend to continue its eruption. This only compounds an already unsatisfactory arrangement.

In the case of a Class II division 1 jaw relationship, where maxillary canines occlude laterally in part or completely with the mandibular lateral incisors, the lesser tooth will exhibit very early signs of occlusal disease (Figs 3a to 3c).
Fig 1  Canine malposition in a 39-year-old man. The maxillary canines show essentially no wear because of their labial position. Note the wear of the other incisors, which are accepting more contact in parafinction.

Fig 2a  Lingually positioned maxillary canine in centric occlusion.

Fig 2b  Patient in left lateral movement (opposite-side working contact). Note facial surface of maxillary canine in contact with the mandibular premolar. Instead of the canine acting as part of the incisal guidance, it becomes a nonworking interference.

Fig 2c  Patient in left lateral movement.

Fig 3a  Moderate occlusal disease—stage II. A 52-year-old woman in centric occlusal position, right side view.

Fig 3b  Patient in right lateral excursion. Note interdigitization of anterior teeth.

Fig 3c  Teeth are separated—note severe wear on the mandibular lateral incisor. Because of tooth positioning, this lateral incisor took the earliest and heaviest wear. A case for orthodontics and proper canine apposition is noted here.
We understand, then, that tooth position, crown length, and size are keys in the overall scheme of wear potential. We will not be fooled by minor alterations in tooth position and jaw form if we understand typical wear evolution and adapt it to the alternate situation.

There also exists a group of people in whom bruxism extends beyond the boundaries of edge-to-edge occlusion. Such bruxism is manifested in matching facets of maxillary and mandibular teeth with the mandible moved beyond the confines of the maxilla. This may be referred to as a brux-braced position or unconfined bruxism (Fig 4).

Obviously, occlusal disease can also be described at the individual tooth level. However, the premise of this article is that the effect of bruxism on the entire dentition is the best way to measure occlusal disease.

Pathogenesis of occlusal wear in Angle Class II and III dentitions

The emphasis in describing occlusal disease progression has been on that of the Angle Class I or so-called normo-occlusion. The attrition in the anterior segment usually develops before the posterior segment simply because overlapping anterior teeth contact first in eccentric mandibular movement. Conversely, when the anterior guidance is missing, as in some Class II division 1 dentitions, or does not disocclude the mandibular posterior teeth as in Class III dentitions, then different wear scenarios develop. Usually, there is some incisal wear on the anterior teeth of Class II division 1 cases because of their ultimate contact in protrusion-retrusion. The posterior segments commonly develop group function early on (Figs 5a and b), a latent development in the Class I occlusion.

Attrition in the Class III dentition is usually noted quite early anteriorly and posteriorly. Because the anterior teeth do not free the posterior teeth eccentrically, and because there is no fixed stop for centric closure, they take heavy abuse in the occlusal disease scenario (Figs 6a and b). Also, the incisal edges will slip past each other, with centric closure, in a protrusive direction both functionally and parafunctionally (Figs 6c and d). This contact results in rapid chipping of these edges (Fig 6e). The Class III occlusal scheme is classic in this demonstration of the effects of inadequate anterior protection. A pseudo-Class IIIII occlusion responds in much the same way as the Class III. Therefore, orthognathic surgery is an adjunct in Angle Class II and Class III patients. Although it is possible for these orthodontic malocclusions to function adequately without occlusal disease for a lifetime, they are best treated early to avoid predisposition to the disease.
Fig 6a (left) Angle Class III case. A 65-year-old man with porphy open mouth, exposing the entire dentition.

Fig 6b (right) Centric relation: a nearly end-to-end relationship.

Fig 6c Centric occlusion or complete closure.

Fig 6d (left) Lateral view of complete closure.

Fig 6e (right) Mirror view of worn lingual surfaces.
Developmental stages of occlusal wear

The severely worn dentition requiring occlusal reconstruction (a Class III restorative case**) is easily recognized. But what of its earlier stages? Just as the parameters of periodontal disease (ie, gingivitis and periodontitis), dental caries (ie, enamel caries, dentinal caries, and caries involving pulp), and TMJ pathosis (ie, acute, chronic, and debilitating TMJ disease) are recognized and defined, so must the stages of occlusal/incisal wear be recognized and defined. Preventive and restorative treatments require it.

Using the classic or ideal Angle Class I relation as the norm, we can describe stages of wear as follows (see Figs 7a to h and clinical examples in Figs 8 to 18):

Stages of wear

Development Stage:
Newly erupted dentition

Non-disease Stage:
Adaptive state

Stage I:
Early occlusal disease

Stage II:
Moderate occlusal disease

Stage III:
Advanced occlusal disease

Stage IV:
Total occlusal destruction

**Newly erupted anterior dentition**

The newly erupted anterior dentition can be considered fully erupted when occlusal contact is made with the opposing dentition. At this time the mmamelons are present (Fig 8a).

Albeit, there may be future passive eruption. It is from this point, however, that we can begin to describe the change (Figs 8b to g).

Adaptive wear

The term adaptive wear may be used to include those minimally worn anterior teeth from the time of eruption through the loss of mmamelons. This includes the initial and natural shaping of the incisal edges of anterior teeth in enamel only (Figs 9a to c).

Conversely, when mmamelons persist into adulthood (ie, anterior open bite), it may be desirable for esthetic reasons to selectively reshape them.

There is a fine line between adaptive wear and early occlusal disease. In an individual’s sixth or seventh decade he or she might exhibit some wear anteriorly, consistent with a lifetime of normal functional activity, yet still be in a near optimum state. On the other hand, a teenager exhibiting the same wear would be highly suspect of early occlusal disease.

Stages of occlusal disease

Figures 7c to h show the four basic stages of occlusal disease and how they can be recognized. In stage III, the advanced stage of occlusal disease (Figs 15c and 16d), the dentin is usually worn more deeply than the enamel. Because dentin is considerably softer, it is therefore less resistant to abrasion than enamel. This abrasion will occur with normal function and oral hygiene procedures. Further, the unsupported enamel, created by the more rapidly wearing dentin, is most vulnerable to chipping and breakage. It is obvious that once considerable dentin is exposed, the occlusal disease process becomes more acute.

Destruction of the occluding surfaces of the dentition cannot be considered part of the aging process, because there are notable examples of nearly ideal occlusal surfaces within the ever-increasing population of senior citizens. Conversely, exceptional examples of occlusal disease are evident in those in their second and third decade.
Fig 7a  Mamelons present; cusps unworn. See Fig 8a for a clinical example.

Fig 7b  Absence of mamelons. All lateral excursions on the canines only. Protrusive excursions on the central incisors only. See Figs 9a to c for clinical examples.

Fig 7c  Group function in the anterior region. Generally, enamel only is involved. See Figs 8b to g and 10a and b for clinical examples.

Fig 7d  Lingual abrasion from gritting and clenching with restricted movement. May be coupled with more advanced disease. See Fig 11 for a clinical example.
Stage I: Early Occlusal Disease
Division 3: Aberrant Incisional destruction

Fig 7e Use of hair pins, pipe stems, glasses, and pencils to elicit wear patterns. Usually not generalized. See Fig 12 for a clinical example.

Stage II: Moderate Occlusal Disease

Fig 7f Anterior-posterior group function. Some dentin involvement. See Figs 13a and b and 14a to c for clinical examples.

Stage III: Advanced Occlusal Disease

Fig 7g Posterior working and nonworking group function. Dentin heavily involved and abraded below enamel level. See Figs 15a to d and 16a to e for clinical examples.

Stage IV: Total Occlusal Destruction

Fig 7h Unsupported enamel grossly chipped or broken. Loss of significant crown form. Contact areas may be open. Ghost image reveals extent of disease process. See Figs 17a and b for clinical examples.

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Fig 8a  Eruption—early occlusal disease, stage I. View of patient in 1972 at age 13 years. Note mamelons on the maxillary central incisors with incomplete eruption of the permanent dentition.

Fig 8b  In 1987 at age 28, the patient shows a complete dentition in centric relation occlusion.

Fig 8c  The patient is in a right lateral excursive movement with interdigitating facets. The anterior teeth are in group function. Note the first premolars are nearly in contact (1987).

Fig 8d  Close-up view of the mandibular right canine and adjacent teeth. Note heavy wear, through the enamel, on the canine (1987).

Fig 8e  View of the patient in left lateral excursion shows a pattern similar to the right side (1987).

Fig 8f  With the teeth slightly separated, in left lateral movement, opposing wear facets are visible (1987).

Fig 8g  The anterior teeth are separated to show opposing wear facets of all anterior teeth (1987).

Fig 9a

Fig 9b View of patient in right lateral position.

Fig 9c View of patient in left lateral excursion. Note that the canines in both lateral movements are the singular contacting teeth.

Fig 9d

Early occlusal disease—stage I, Anterior view of teeth in centric occlusion in a 35-year-old woman.

Fig 10a

Fig 10b Patient in left lateral excursion showing anterior group function and associated facets.

Fig 11 Early occlusal disease—stage I, division 2. View of the maxillary anterior teeth in a 68-year-old woman, lingual surface, showing facetting associated with gritting-clenching movement.

Fig 11b

Early occlusal disease—stage I, division 3. Note advanced wear on incisors of a 41-year-old woman. Canines in this case are still fully functional.

Fig 12

Fig 13a Moderate occlusal disease—stage II. Right lateral view of a 37-year-old man showing anterior and posterior group function.

Fig 13b Left lateral view of same patient with anterior and posterior group function.

Fig 13c

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Fig 14a  Moderate occlusal disease—stage II. Anterior view of a 31-year-old man in centric occlusion.

Fig 14b  View of patient in right lateral movement showing group function of anterior teeth and first premolars.

Fig 14c  Patient in left lateral movement incorporating group function and showing significant wear facets on the lateral incisor and canine.

Fig 15a  Advanced occlusal disease—stage III. Anterior view of a 65-year-old man in centric occlusion.
Fig 15b  Patient in right lateral excursion with anterior and posterior group function.

Fig 15c  View of mandibular dentition showing severe wear into the dentin anteriorly and posteriorly, incorporating non-functioning-side cuspal wear.

Fig 15d  Patient making protrusive movement that shows clearance of posterior teeth in this position.
Fig 16a. **Advanced occlusal disease — stage III.** View of a 55-year-old patient in centric occlusion. Note anterior fixed prosthesis.

Fig 16b. Patient in left lateral excursion (group function).

Fig 16c. Patient in right lateral excursion (group function).

Fig 16d (left) View of mandibular anterior teeth, showing heavy wear through the enamel contributed to by the abrasive quality of the porcelain prosthesis.

Fig 16e (above) Close-up view of mandibular right canine and adjacent teeth. Note heavy faceting.
Fig 17a. **Total occlusal destruction—stage IV.** A 38-year-old man with total occlusal destruction, shown in centric occlusion.

Fig 17b. Patient in open position to show entire dentition and associated facets. Complete annihilation of more than one half of the clinical crowns.
The anterior teeth: An indicator of occlusal disease

Incisal guidance or anterior disocclusion is the major design factor of occlusal mechanics in retarding occlusal disease. That is, depending on the quality and quantity of the incisal guidance, the posterior teeth are protected from lateral interference. Therefore, we may use the anterior teeth as an indicator of occlusal disease.

There are at least two different, but ultimately related, types of wear patterns that can develop. First, if the teeth are kept tightly clenched, making minimal eccentric gritting or rubbing movements, then the mandibular anterior teeth will wear incisofacially and the maxillary anterior teeth will wear within the lingual concavity. As attrition occurs, the incisal guidance is compromised, ultimately allowing posterior contact on both the working and nonworking sides. The incisal edges will finally become involved as they approximate each other more during parafunction.

Second, if a person's grinding motion takes on a larger area of mandibular movement, the incisal edges will wear primarily as they move past each other, and a chipped or faceted incisal edge wear pattern develops. The importance of both these different wear pattern scenarios is the alteration in incisal guidance and the ultimate involvement of the posterior teeth in eccentric mandibular movements.

Observe the maxillary lateral incisor

The maxillary lateral incisor is usually the single best tooth to examine for signs of early occlusal disease (providing there is relatively good anterior alignment). Although the canine is the first to contact in lateral movement, its wear is related to the vertical overlap of the anterior teeth (or lack of same) and the amount of parafunctional movement employed. In like manner, the central incisor carries the initial protrusive-retractive load, and with bruxing wear the adjacent incisors come into play. When the lateral incisor exhibits wear, we know that the main oppositional teeth to eccentric movement have played out their initial usage (no matter how long or short a time this has been). The occlusal disease saga has then begun, with anterior group function evident.
Group function

Anterior group function can be thought of as the counterpart to posterior group function. It is usually the precursor of posterior group function and is indicative of a partially worn, less than ideal occlusal scheme.

Anterior group function is exemplary of a partially worn occlusion. Although force is distributed over more teeth and more tooth surfaces, it is not as ideal or desirable as fewer teeth contacting in eccentric movements. More contact is not necessarily better. 13, 14 While group function distributes force, it may aid in the reinforcement of parafunctional activity.

In an otherwise healthy dentition that reveals early group functional wear, gross changes cannot realistically be projected either chronologically or quantitatively. However, it is incumbent on the practitioner to make note of the attrition and to so inform the patient. If it is possible, through minor occlusal adjustment, to return the patient to singular eccentric anterior tooth contact, then this is preferred. Of course, the more youthful the patient, the more serious the attrition should be considered. Certainly, autosuggestion and nocturnal occlusal guard protection are indicated.

The functional outer aspect as described by Abrams and Coshel is a contrived group function. This may fit nicely into the Class IV (periodontal prosthesis) restorative treatment plan, but it is not necessarily desirable for the other restorative classes. In like manner, the “functionally generated path” (actually parafunctionally generated path) fits the description of stage II or moderate occlusal disease and is therefore less ideal than restoring the patient to the adaptive state.

In summary, we must note that although group function is not ideal, within limits and under control it may be a manageable compromise.

Can occlusal disease be treated or reversed?

Occlusal disease is comparable to periodontitis in that it is generally not reversible (an exception for periodontitis might be osseous grafting). Occlusal disease, however, like periodontitis, is often maintainable. It does lend itself to treatment and when restorative dentistry is utilized it becomes, in that sense, reversible.

When anterior guidance is severely compromised but the anterior teeth do not require restorative dentistry for reason of decay or replacement, then we may elect to accept the existing anterior guidance. In this case, the posterior teeth, if not already in group function, are approaching it. It may be possible, by narrowing the occlusal table and cusps (either by odontoplasty or restorative dentistry when otherwise indicated), to improve the effect of the existing anterior guidance.

Suggested treatment modalities have included the use of a variety of occlusal guard appliances, orthodontics, selective grinding, occlusal reconstruction, physical therapy, sleep posture counseling, biofeedback, psychotherapy and prescription drugs, or a combination of the above. They may successfully thwart the destructive forces of bruxism and quell occlusal disease. Therefore, before embarking on extensive restorative dentistry, it might be wise to employ a psychologist or relaxation therapist. Patients who desire extensive dentistry should take control of their conscious (daytime) bruxism through established techniques. At night an occlusal guard may be used to dispel the subconscious control.
Occlusal adjustment

A number of espoused methods of occlusal adjustment by selective grinding are currently being touted. Nevertheless, in my opinion most contemporary occlusionists hold to these basic concepts:

1. Occlusal correction, in any form, should not be attempted if the TMJ is functionally impaired.\(^{17}\)
2. There should be harmony of centric relation with centric occlusion.
3. Nonworking contacts must be eliminated.
4. Anterior disocclusion should be maximized.

In addition, it is important to round and polish chipped or otherwise worn incisal edges if they are not to be restored.

Neither enamel nor previous restorative dentistry are sacrosanct during procedures of occlusal modification. Nonetheless, correction must be approached cautiously with understanding and planning. Creating occlusal awareness, or worse, an occlusal neurosis, is surely to be avoided.

Selective grinding is normally a compromise; therefore, technique alone is not the key.\(^{16,18-21}\) The result is a harmonizing of anterior and posterior occlusion with the TMJ parts assembled naturally and with quiet coordinated musculature.\(^{22}\)

A compromised occlusal adjustment for patients with an Angle Class I\(^{1}\) division 1 jaw relationship, where coupling of the anterior teeth cannot be achieved, is often acceptable. This class will allow for the achievement of a coincidence of centric jaw relationship with centric occlusion. However, if the canines do not contact primarily in lateral excursion, then group function of the posterior teeth is usually the best alternative. Also, nonworking contacts can be eliminated while retaining centric holding contacts by redirecting cuspal escape grooves. Close attention to protrusive-retusive interference must be paid in adjusting the Class II division 1 case because of lack of anterior disocclusion. Smooth bilateral posterior contact is the best compromise.

The Class III jaw relationship poses another problem. Unless the mandible can be stopped in a centric related position (even if anterior teeth are end to end), then the progression of occlusal disease is predictable. Short of a provisional removable appliance, comprehensive restorative dentistry (ie, orthodontics, orthognathic surgery, and occlusal reconstruction) is usually necessary. A normal lifetime positive prognosis for an untreated Class III occlusion is guarded at best.

The knowledge and technical ability to implement selective grinding in routine practice should be in the repertoire of every newly graduated dental student and every practicing restorative dentist. Certainly it is the mechanical foundation for all restorative dentistry from the simple to the complex. Practicing adjustment of mounted casts and then on patients prior to comprehensive restorative dentistry is an excellent way to achieve technical competence.

It is unrealistic to conceive that any alteration in the dentition by way of restorative dentistry can duplicate exactly the occlusal scheme presented by the patient before treatment. What we can conceive is that, if we have optimized the occlusion before final restorative dentistry, restorations can be made to conform to that scheme, provided that the patient is a Class I or II\(^{11}\) restorative case. If the patient is Class III or IV restorative, then occlusal adjustment is unnecessary before treatment.

Should one patient exhibit a barely perceptible slide from centric relation to centric occlusion and another exhibit a gross slide, their correction is equally important before restorative dentistry. Occlusal adjustment is no longer an elective procedure but is a mandatory one for patients requiring restorations and those in treatment for TMJ dysfunctions or those whose dentitions show signs of occlusal trauma. Occlusal adjustment is essential for all who do not display the basic requirements already stated.
Integrated restorative and occlusal therapy

From the Interdisciplinary Classification of Restorative Dentistry, we note the basis of integrating occlusal therapy with restorative treatment. In Class I (operative dentistry) and Class II (crown and bridge), the occlusion is accepted as satisfactory or is adjusted accordingly. Individual restorations or bridges are made to comply occlusally with the accepted or newly adjusted occlusion. In both Classes I and II it is important to establish the extent of an individual’s occlusal health or disease before attempting restorative dentistry. If, for example, intracoronal restorations are contemplated, it is certain that unprotected cusps must be spared lateral stress by adequate protective anterior guidance.

The occlusion of a Class III case (occlusal reconstruction) is re-created completely by restorative dentistry, within the limitations of tooth position. As a practical matter it is not always possible or prudent to restore a patient with minimal incisal guidance or a stage II (moderate occlusal disease) or even a stage II (advanced occlusal disease) to a newly created incisal guidance. Providing occlusal adjustment has been completed, and only minimal restorations are required, compliance with the existing occlusal disease stage may be made. However, stage IV (total occlusal destruction) mandates occlusal reconstruction, i.e., the Class III restorative case.

Treatment of the Class IV restorative case (periodontal prosthesis) precludes complete occlusal change. The end result, however, is focused principally on distributing lateral forces across the splinted dentition. When the Class IV case is complicated with secondary occlusal traumatism, splinting in some form becomes a necessity before preliminary occlusal, periodontal, and restorative dentistry are attempted. The finalized occlusal scheme of a Class IV case is, for mechanical purposes, one of group function and has been previously described.11

What with the escalation of implant usage, we can state simply that the implant, when successfully osseointegrated, acts as a tooth analog. Therefore, the restorative classification does not change. Great care must be incorporated in treatment planning and execution for dental implant patients if blatant occlusal disease is present. Certainly, we do not want to tip the balance negatively in this state.

Finally, manifest occlusal disease should be a "red flag" for possible failure of porcelain facings, bonded veneers that are contemplated, cement failure in crown-and-bridge procedures, and root fracture in endodontically treated teeth. It may be the single most negative factor in the failure of advanced restorative dentistry (Classes II, III, and IV).

We cannot state unequivocably that eliminating occlusal disharmony will stop bruxism. However, clinical observation has shown that occlusal correction can, along with redirecting thought patterns, help to minimize destructive wear on the teeth during waking hours. During sleep, an occlusal guard is, for the contemporary practitioner, a workable adjunct to maintenance. Naturally, centric relation coincident with centric occlusion on the occlusal guard must correspond with that along with disocclusion of the posterior teeth in eccentric movement. Reade et al.,23 when discussing TM disorders, made a statement that is valid also for occlusal disease treatment: "Had patients been afforded treatment early—before the onset of a prolonged painful incapacitating problem, they might have been spared much pain, psychological, sociological disturbance and expense."
Concluding thoughts

It is surely advisable for the practitioner to inform any patient who exhibits signs of occlusal disease. This is particularly important to emphasize with younger people. They should be told of the hazards of ignoring the signs of occlusal disease and also informed of possible treatment modes. Further, teeth that are esthetically acceptable at a social level may, in fact, exhibit moderate to advanced occlusal disease. They should be evaluated from the standpoint of attrition and not merely esthetics. An interesting exercise in detecting and identifying occlusal disease may be performed by perusing popular magazines; what currently seems to be an esthetically acceptable or even a beautiful dentition may be a manifestation of frank occlusal disease.

Finally, what part the psyche plays as an instigator or perpetrator in the syndrome of bruxism and occlusal disease may never be completely understood. While researchers and therapists study and debate these causes, posing possible ancillary treatment modes, the clinician must deal daily with patients exhibiting occlusal disease. A significant percentage of the adult population shows frank signs of occlusal disease just as they do periodontal disease and dental caries. However, more meaningful epidemiologic studies of occlusal disease are needed to enhance and heighten awareness.

Occlusal disease has been defined, should be recognized, and can be managed. Using the clinical index presented will be helpful in understanding and communicating patient occlusal states.24

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