Functional Occlusion

From TMJ to Smile Design

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with 1269 illustrations

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Functional Occlusion:

for TMJ

Smil Design

As the years pass, the values that really matter come into sharper focus. It is to these great incentives in my life that I dedicate this book.

To My God

The designer of the masticatory system who programmed a complete set of instructions into every living cell using the alphabet of DNA. It is only because an element of love was integrated into that design that the masticatory system is also the organ of speech, expression, and beauty that is reflected in our smiles.

To My Family

To Jodie, my helper, supporter, best friend, and mom to our four wonderful children, Mark, Anne, Kelly, and Cary. I can't imagine how I could have the contentment I enjoy without such a loving family. This dedication also extends to the future of eight very special grandchildren.

To My Profession

Especially to those in it whose primary motivation is to care enough about every patient that they continue to study and improve their knowledge and skills. It is for those true professionals that this book was written.

For ord

The form, function, and pathofunction of the dynamic masticatory system comprises one of the most fascinating, basic, and important areas of study in dentistry. The explosion of technological and procedural advances coupled with improved materials and the general public's awareness of the importance of quality oral health and its role in quality overall health herald a new age in dentistry. Additionally, the amalgamation of evolving science with the art of dentistry has fostered a true clinician-scientist model of dental practice in the quest to provide "complete dentistry" for patients. The goals of complete dentistry include optimal oral health, anatomic harmony, functional harmony, orthopedic stability, and natural esthetics. It is clear that to achieve these goals, today's dentist must become a physician of the masticatory system and beyond. Over the years, Dr. Dawson has advocated such a concept. Importantly, the keys to predictable treatment outcomes that have been espoused in his prior works stress that enhanced form (esthetics) does not have to come at the sacrifice of optimal function. In this book, he brings to the forefront basic principles of complete dentistry that can be applied to every dental discipline regardless of the practitioner's level of education and expertise.

Diagnosis is the key to successful treatment outcomes. Unless one understands the system in health, it will be difficult at best to accurately recognize pathology and to develop a case-specific, principle-centered plan of care. Dr. Dawson has done a masterful job of organizing the book in an easy-to-follow, logical flow, beginning with the complete examination. Each chapter is organized in a manner that will enhance one's understanding of how the interrelated components of the entire masticatory system function in health. With the aid of excellent drawings and photographs, the reader can attain a clear understanding of important anatomic relationships and gain a greater appreciation for basic orthopedic principles. The text clearly explains how pathology/dysfunction of one component may impact on the entire system.

The sequelae related to maladaptive occlusion are multifaceted. Compromise may occur at one or more of the occlusal interfaces to include: the tooth to tooth interface, the tooth to supporting structure interface, the neuromuscular interface, and/or the temporomandibular joint (TMJ) interface. It is well understood that the primary manner in which orthopedic systems are compromised is due to mechanical stress or overload. Once disequilibrium develops in the masticatory system the patient may develop one or more of a number of pathologic conditions representative of temporomandibular disorders (TMDs). To develop an individualized treatment plan the practitioner must be specific regarding the diagnosis, recognizing that TMD represents a number of arthrogenous and myogenous conditions. The symptoms associated with these conditions frequently provide a complex diagnostic dilemma for the dentist and physician. Even when the causative factors are apparent, implementation of appropriate therapeutic measures may be difficult. Important additions to this text are:

1. A scheme for the classification of occlusion
2. A classification system for TMJ pathology
3. Detailed discussion of myogenous forms of TMD
4. Diagnosis-specific treatment based on detailed assessment of all aspects of the stomatognathic system
5. Recognition of other potential causes, co-morbid conditions, maintaining factors as related or unrelated to TMD
6. A review of imaging of the TMJs in health and pathologic states

By providing these means of individualizing diagnosis, the reader is provided with important anatomic, physiologic, and neurologic perspectives that will certainly enhance problem-solving skills.

A highlight of the book is a detailed discussion of cases representative of commonly presenting restorative challenges. Each of these is presented with a detailed description of the problem list, appropriate diagnostics, and treatment considerations. Importantly, the potential pitfalls that might arise in the treatment of these cases are discussed. Postoperative care is delineated on a case-specific basis. Dr. Dawson has also provided objective measures that delineate specific criteria for success.

Dr. Dawson once said "If you are going to quote me, date me." It is clear that this text is the crowning jewel of a true pioneer in dentistry and clearly illustrates his commitment to being a perpetual student. Rare is the individual who excels at teaching a subject and writing about the subject, and who can perform to the level of excellence promoted by his teachings/writings. In this book he shares the wisdom, knowledge, and skill he has acquired during his illustrious career. He is to be commended for the logical sequencing of chapters, the detailed discussion of each concept in conformity with our present-day knowledge, and the reader-friendly style. This text will surely serve as an important reference to those who desire to better recognize orthopedic instability, develop and implement a treatment plan that will re-establish orthopedic stability, and help their patients attain and maintain their stomatognathic system in maximum comfort, function, health, and esthetics.

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Preface

There is a primary tenet that embraces the entire subject of occlusion from the TMJs to smile design. It is that the teeth are but one part of the masticatory system, and if the teeth are not in equilibrium with all the other parts of the total system, something is likely to break down. This means that to be a truly competent "teeth doctor" one must be a "masticatory system doctor." No specialty in dentistry can be effectively practiced at the highest level of competence without an understanding of how the teeth relate to the rest of the masticatory system, including the TMJs.

A reader of this text should have the following expectations:

- A clear picture of how the masticatory system functions in maintainable harmony.
- A detailed understanding of how to tell what is wrong when any part of the system is not functioning in complete comfort and long-term stability.
- A specific process for developing a complete treatment plan for every type of occlusal disorder from the simplest to the most complex.
- An understandable proficiency in diagnosis and treatment of orofacial pain, including management of TMDs. Every dentist should know this.
- Elimination of all guesswork in design of the most functional and esthetically pleasing smiles regardless of the initial starting condition.
- Reliable background information regarding how to analyze touted clinical concepts and procedures that violate principles of functional harmony and that can lead to problems of instability, discomfort, dysfunction, or patient dissatisfaction.

Dr. L.D. Pankey wrote that only 2% of dentists ever reach the status of "master." A master dentist can interview, diagnose, plan treatment, and motivate patients to proceed with a comprehensive treatment plan ... but most important of all *he or she can execute the services needed with a very high level ofpredictive success.*

The primary motivation for writing this text was to provide a framework by which any dentist could develop into a master dentist. In my role as a restorative dentist, I have had the opportunity to treat thousands of complex occlusal problems and TMJ disorders. As a passionate student of the literature I have had the opportunity to evaluate research efforts for more than 50 years to see if the literature was true to clinical reality. In many cases it has opened new doors to our understanding, whereas in too much of the literature, conclusions have been based on false presumptions. The most prevalent misconceptions in the literature have been in the discipline of occlusion and the relationship of occlusion to the TMJs and orofacial pain. It is my goal to clarify those misconceptions and show dentists that there need not be a big mystery about the cause or treatment of TMDs. This mindset is absolutely required if one is to be successful in treating problems of occlusion because all occlusal analysis starts at the TMJs. Not a single type of TMD cannot be understood and specifically classified today; it can be done by general practitioners and it must be done by any dentist who aspires to the level of master dentist. In this age of the "esthetic revolution" and the "extreme makeover," failure to relate "smile design" to the rest of the factors that control occlusal stability is an invitation to ultimate disharmony that can in time result in dysfunction and breakdown at the weakest part of the systerri. Most often that weakest part is the teeth or the TMJs, or both.

Dentists who ignore the TMJs can never be competent in smile design or in diagnosing or treating occlusions. Dentists who ignore occlusion can never be competent in diagnosing or treating problems of the TMJs. Dentists who ignore the relationship of the occlusion to the position and condition of the TMJs can only guess at diagnosing a myriad of problems that are seen in every general practice ... problems such as excessive tooth wear, sore teeth, fractured restorations, loose teeth, masticatory muscle pain, and a variety of other orofacial pain problems. But understanding what it takes to keep the total masticatory system in harmony has positive consequences beyond achieving the goal of a peaceful neuromusculature. It is the absolute key to determining many of the most important decisions regarding esthetics and tooth alignment, including the *precise* positioning and contour of anterior teeth.

My goal is to take the guesswork out of everything the dental team must do to be successful in clinical practice. If you will study the pages that follow, and commit to the time-tested principles, you will eliminate the number one source of frustration and burnout in dental practice: a lack of predictability. Achieving that *high level ofpredicable success* that Dr. Pankey wrote about is not pie in the sky. It is the ultimate goal of the master dentist, and it is my fervent passion to help you achieve it.

It is easy to misinterpret clinical results because just relieving symptoms may not mean a problem has been corrected. We have learned through long-term observation that symptoms may sometimes be relieved at the expense of permitting worse problems to progress.

I have tried to expose my own clinical observations to the test of time as well as the invited scrutiny of a wide variety of special expertise. At the Dawson Center for Advanced Dental Study we have developed a multidisciplinary "think tank" to evaluate not only our own concepts but also the concepts of anyone with an opposing viewpoint. For more than 25 years we have been inviting an international array of clinicians, re-

searchers, and specialists of many different persuasions to meet with us for the purpose of evaluating all the pros and cons of their ideas plus our own. In addition, all our treatment results are open for inspection to our entire practicing faculty, and criticism of results is invited. Many notable advancements have resulted from this effort and it has had a profound effect on the development of quality controls that start at the examination and carry through all phases of treatment through dentist-laboratory controls to post-op maintenance. These advancements in principles and clinical protocols are presented in this text.

One of the most notable results from this "think tank" environment is the formulation of specific, measurable *criteria for success* (see Chapter 47). I recommend an early reading of this chapter. It will enable you to start your study of this text with the end in mind.

Acknowledgments

I am grateful that there have been so many great minds in our profession who were willing to share so generously. I was particularly blessed to have come into the profession at a time when great changes were taking place. The journey has been one of constant excitement.

My eyes were opened to the importance of occlusion by Dr. Sigurd Ramfjord early in my practice years and we continued a close relationship until his death. Through Sig, I met and developed a wonderful friendship with Dr. Henry Beyron, from Sweden, considered by many to be the "father of occlusion." He was always a strong supporter of my recommended changes in centric relation and anterior guidance and he was a great encourager as well as a thoughtful critic.

One of the greatest influences in my life was Dr. L.D. Pankey. I was so fortunate in meeting him during my first year in practice and he soon became my role model and one of my closest friends. Through L.D. I was introduced to Drs. Clyde Schuyler, John Anderson, Henry Tanner, Harold Wirth, and many other super stars of that era who invited me to be a part of their excitement in elevating the status of dentistry. Dr. Pankey was a leaders' leader. His contributions to restorative dentistry, occlusion, and practice management were mixed with a philosophy of life that still affects the way I live. I am truly grateful. The L.D. Pankey Institute stands as tangible proof that many others feel the same gratitude that I do.

Dr. Clyde Schuyler gave dentistry the first sound principles of occlusion, and many of the thoughts and concepts in this book started with seeds that were sown by Dr. Clyde. I was privileged to have him as a friend, and his visits to my office that extended into long evenings are treasured memories.

Early in my career, I spent uncountable hours in learning about gnathology, particularly from Dr. Charles Stuart but also with Drs. Peter K. Thomas, Harvey Paine, Earnest Granger, and others. Dr. Niles Guichet and I developed a close personal relationship along with Dr. Frank Celenza that endures to this day. I am grateful to them for all the times we spent gelling our own conclusions about so many facets of occlusion.

On many occasions, arriving at the best treatment plan involves varying degrees of orthodontics. My mentor in my early years was Dr. Clair McCreay and I still use the many concepts I learned from him plus all the additional help received from Dr. Gerry Francatti.

Regarding analysis and treatment of TMJ disorders, all of dentistry should be grateful for the contributions of Dr. Mark Piper. Mark is a brilliant surgeon and the best diagnostician I have known. His innovative approaches to repair complex TMJ deformations is only one facet of his genius. His classification system is the gold standard for TMJ disorders and it is a privilege to present it in this text. Mark's expertise is tremendously enhanced by his thorough understanding and adherence to the principles of occlusion explained in this text. l.have enjoyed his friendship and a close working relationship that has been the stimulus for many "think tank" discussions. I have looked through his microscope during his impeccable surgeries and I can testify to the integrity of his reporting of exceptional results.

Dr. Parker Mahan deserves special acknowledgment for all he has contributed to the profession and to my understanding of anatomy, physiology, neurology, and pharmacology in a clinical context. He has been one of my closest friends and a treasured ally. His contributions in diagnosis and treatment of orofacial pain are recognized internationally.

A special measure of appreciation goes to Vernon (Buddy) Shafer, CDT for his constant support and for his contributions to the doctor-technician interface. He has been a dynamo, incorporating solid principles of complete dentistry into the laboratory, and his influence has affected countless dentists as well as technicians.

Lee Culp, CDT has also been a resource of tremendous value to me and to the profession. A master teacher and innovator, Lee is one of the most respected leaders in all of dentistry. I am grateful for all the updated information he provides to me, and I thank him for the special contribution he makes to this text.

I have called on a number of special clinicians to provide the most current clinical updates for this text. Dr. Glenn DuPont, senior partner in my former practice, has been a tremendous resource and contributor. As Director of Faculty at the Dawson Center, he has developed an exceptional "hands-on" curriculum for teaching some of the most important concepts and techniques. He is a meticulous restorative dentist who excels in functional esthetics, so his contributions are much appreciated. Dr. DeWitt Wilkerson has also been a great source of current information and is a contributor to the text. Witt has taught thousands of dentists the fundamentals of occlusion and how to achieve a perfect centric relation. He directs classes at the Dawson Center that always achieve rave critiques. I treasure his friendship and his many contributions to the profession. I am also particularly proud of Dr. John Cranham, who has developed an international reputation as a clinician. I appreciate his continued support of our teaching efforts as well as his loyal friendship. Special thanks also for notable contributions to furthering the goals expressed in the text go to Dr. Jeff Scott, Dr. Michael Sesemann, Dr. Ken Grundset, and Dr. Kim Daxon. Many thanks also to technicians Rick Sonntag, CDT, Nancy Franceschi, CDT, Karl Wundermann, CDT, and Harold Yates for their continuing source of current technologic expertise. Robert Jackson, MDT has also been a

steady source of support in many different ways. I would be remiss if I did not acknowledge Dr. Pete Roach for all the past great years of sharing ideas as my partner in practice. They were joyful years.

This text is in large part a compilation of the principles and procedures I have taught to more than 30,000 dentists and technicians at seminars and in classroom sessions at the Dawson Center for Advanced Dental Study. lowe a huge debt of gratitude to the very special staff that makes the curriculum run so efficiently and in such a happy, warm manner. A special thanks to Joan Forest, the Executive Director, for her outstanding leadership. Deep appreciation also to Sallie Bussey, Mary Lynn Coppins, Jody Booth, Greg Sitek, and to my special assistant, Esther McCrackin. I also have the joy of working with my daughter Anne Dawson, who for 20 years has been a major source of help as my Seminar Coordinator. Dee Mortellaro was also an indispensable help in preparing the manuscript.

And finally, a very appreciative "thank you" to the excellent editorial staff at ElsevierlMosby publishers. Julie Nebel has been great to work with and I have been grateful for the help from Publisher Penny Rudolph and Senior Editor John Dolan, as well as artist Don O'Connor. Thanks to all of you.

Peter E. Dawson, DDS

Con nts

Functional Occlusion:
From TMJ
Smile Design

PART I

Functional Harmony

Chapter 1

Th Concept of Compl t ntistry

PRINCIPLE

The ultimate goal for every patient should be maintainable health for the total masticatory system.

COMPLETE DENTISTRY

The defining philosophy that underlies an honest.concern for patients can be summarized in one word: *complete.*

Embracing the concept of complete dentistry always puts the patient first. It says that every patient is entitled to a complete examination and a clear understanding of every problem that should be treated. It recognizes that almost every dental disorder is, in all probability, a *progressive* disorder that will cause increased problems if not detected and treated in a reasonable time frame.

It is axiomatic that patients cannot perceive a need for treatment if they do not clearly understand what problems are present. That is the primary purpose of the complete examination. But think about this: patients cannot make a truly informed decision about treatment unless they also understand the *implications* of not treating each problem within a reasonable time frame. Practitioners cannot reliably predict implications if they don't have a working knowledge of the total masticatory system, which includes the interrelationships of the teeth, the temporomandibular joints (TMJs), the muscles, and the supporting tissues, in addition to a clear picture of the causes and effects of occlusal disease.

Examining With an "Implication Mindset"

A key question in every complete dental examination is fundamental to the integrity of the doctor-patient relationship: *"Are all the components of the masticatory system maintainably healthy?"* This requires analysis to determine the implications of not treating any parts that are disordered or diseased. Answering these questions is the foundational basis for the complete examination. It is also the guiding principle for formulating what treatment should be started, what could be deferred, and what may not be required to save teeth but might be desired for improved esthetics.

Understanding the short- and long-term implications of each type of dental disorder is the basis for establishing priorities of treatment and is the essential information that is used to establish "phased" treatment for patients who cannot proceed right away with an extensive treatment plan in its entirety.

Types of Implications

Every dentist needs to develop a clear picture of what a stable, maintainably healthy masticatory system looks like ... not just teeth, but all parts of the system. In a complete examination, each part of the system should be analyzed to see if there are any signs or symptoms that indicate disease, disorder, or dysfunction. If any departure from health is noted in any structure, the key to both diagnosis and treatment recommendations will be directly related to the implications of not treating that disorder in a timely manner. Those implications can be classified into three types:

hnmediate lmpllcatlons. These consist of problems that are in an active stage of progressive disease or deformation, or disorders that are a causative factor for pain or discomfort. If disorders in this category are not treated as priority, the implication is that delaying treatment will result in a greater, more complex problem, or an increase of pain, or will require more extensive, more complicated, or more expensive solutions with a possibility that delayed treatment results will not be as good as what could be achieved with immediate attention. Such decisions cannot rely only on what a patient perceives as "wants." It requires searching for signs, of which patients are often not aware, because signs of damage typically occur before symptoms are noticed.

Deferrable Implications, These consist of problems that will need to be treated but could be deferred without causing more complex problems, and delaying treatment for a reasonable time period would not result in a less successful treatment outcome. Some problems with immediate implications can be made deferrable by conservative intervention that stops or slows the progression of the disorder so it can be effectively treated at a later time.

lmpllcatlons for optional treatment, These are indications for treatment that would be nice to have but are not problems that will lead to progressive damage if left untreated. Cosmetic restorations that are done solely for the purpose of improving esthetics fall into this category. Careful observation for signs of stability versus instability is a critical part of the decision process before informing a patient that treatment is not necessary for long-term health. This does not imply that treatment done solely for esthetics is inappropriate, and experience has shown that being honest with patients about what is optional versus what is necessary will rarely deter a patient from accepting esthetic treatment for improving appearance.

GOALS FOR COMPLETE DE

A dental examination is complete if it identifies all factors that are capable of causing or contributing to deterioration of oral health or function. It is *incomplete* if it does not expose every sign of active deterioration within the masticatory system. A complete examination does not rely solely on symptoms because signs almost always precede symptoms. It is the responsibility of the examiner to observe signs of deterioration before they cause symptoms. In doing so, it is possible to develop treatment plans that are aimed at optimum maintainability of the teeth and their supporting structures. Seven specific goals should be the objective for patient care:

1. Freedom from disease in all masticatory system structures
2. Maintainably healthy periodontium
3. Stable TMJs
4. Stable occlusion

5. Maintainably healthy teeth
6. Comfortable function
7. Optimum esthetics

The establishment of these goals is the foundation for complete dentistry. If a goal is clear enough, it can be visualized and in fact *must* be visualized. A good rule is to avoid starting any treatment until the desired result can be clearly visualized. Until the practitioner has a clear picture of how each type of tissue looks and acts when it is optimally healthy, there will be no frame of reference for knowing whether treatment is needed or if it is successful when rendered. Clearly defined goals give purpose to treatment planning and make it possible to be highly objective. When the goals listed above are fulfilled, the consequence will be fulfillment of a further goal that is essential for long-term stability and comfort. That is the goal of a *peaceful neuromusculature.*

When the entire masticatory system is healthy and there is harmony of form and function, and the relationships are stable, the treatment can be said to be *complete.* Furthermore, esthetic requirements, including the highest level of functional smile design, can also be fulfilled because all of the guidelines for a naturally beautiful smile are dependent on the same harmony of form that is necessary for harmony of function.

In the analysis of any oral diagnosis, each of the above goals should be evaluated for fulfillment. This evaluation will fall short unless the *reasons* for form and function relationships are understood along with the cause-and-effect nature of health versus disease. This type of analysis eliminates dependency on empiric treatment or making patients fit averages. There are many stable healthy dentitions that do not fit the averages, that are not Class I occlusions, and that violate customary guidelines for normalcy. Attempts to "correct" these dentitions often end in failure, and existing harmony of form and function may be disturbed by the treatment. Such mistakes can be prevented, and a high degree of predictability can be developed if the goals of treatment are based on a foundation of "why" rather than "how."

There is an understandable reason for every position, contour, and alignment of every part of the gnathostomatic system. There is always a reason for every incisal edge position, every labial contour, every lingual contour, and every cusp tip position. There is always a reason why some teeth get loose, and others wear away. There is a reason why TMJs hurt, why masticatory muscles become tender, and why teeth get sensitive. There is a reason why certain occlusions remain stable and others do not. Treating the effect without treating the cause is rarely a satisfactory outcome, and is almost never necessary.

Every diagnostic or treatment decision should be made on the basis of understanding the reasons for the problem, and the reasons for the treatment. All treatment should be consistent with the goal of providing *and maintaining* the highest degree of oral health possible for each patient. Total elimination of all causative factors to the point of complete reversal of deterioration is not always possible. The problems of some patients are too severe, or have gone on too long to expect a complete return to ideal health. But the degree to which we can eliminate the *causes* of deterioration will directly relate to our degree of success in changing unhealthy mouths to healthy ones.

Causes of Deterioration

Dental disease rarely results from a single entity. It is almost always the result of a combination of factors. The same causative insult can produce a variety of responses because of differences in host resistance. The response can also be altered by variations in intensity or duration of the insult, sometimes to such an extent that a completely different set of symptoms may result from increased intensity of the same causative factor.

Because similar symptoms may result from different causes, and a variety of symptoms may result from the same causative factor, treating *symptoms* alone is generally shortsighted therapy. It is always advantageous to determine the cause of both signs and symptoms. If the causative insult can be completely eliminated (such as occlusal overload on a painful, loose tooth with a "high" restoration), the normal adaptive response of the body should activate a return to comfort and reduced hypermobility when the overload on the tooth is eliminated. Of course it may still be necessary to repair damaged tissues, but this can then be done with a greater chance of a long-term successful treatment outcome.

Much of the confusion about cause-and-effect relationships results from failure to differentiate between *causative* factors and *contributing* factors. A contributing factor does not by itself cause disease. Rather it lowers the resistance of the host to the causative factor, or increases the intensity of function or tension. Contributing factors may lower host resistance biochemically or increase intensity biomechanically. The resistance may be lowered in a specific tissue or in an entire system. Generally the weakest link breaks down. The greatest susceptibility to disease occurs when a causative factor is present in a host with increased stress and lowered resistance. Both causative and contributing factors must be considered when deciding on a path of treatment, but the most effective approach is to give the highest priority to *direct* causative factors. Attempts at increasing host resistance and decreasing stress levels should be kept in proper perspective as adjunctive therapy.

Let's use a simple illustration to show how a single direct causative factor can produce a variety of signs and symptoms, depending on variations in how different patients respond:

In a healthy patient with a perfect dentition, note the variety of responses that can occur if a single high restoration with deflective incline interference is'placed on a second molar. There are many different ways that patients might respond to the same, specific causative factor (Figure 1-1):

1. The tooth may become sensitive to hot or cold, or it may ache
2. The tooth may become tender to biting on it
3. The tooth may become loose

FIGURE 1-1 A deflective incline interference on a second molar can be the primary causative factor that results in many different signs and symptoms in the masticatory system.

4. The tooth may wear excessively
5. The mandible may be deflected around the interference into other teeth that become loosened
6. Other teeth can be abraded as the mandible is deflected forward
7. Other teeth can become sore as they are traumatized at the end of the slide
8. Forced deviation of the mandible can cause masticatory muscles to become painfully hyperactive, or even become spastic
9. Trismus may result from the spastic musculature
10. Muscle tension headaches may develop
11. The combination of sore teeth, sore muscles, and headaches may cause stress and tension
12. Constant tension and stress may lead to depression
13. The combination of the uncoordinated musculature and the deflected mandible may contribute to a condyle/disk derangement
14. Eventual displacement of the disk by uncoordinated masticatory muscle hyperactivity may initiate painful compression of retrodiskal tissues
15. Degenerative arthritic changes in the TMJ may follow disk displacement and subsequent perforation of the retrodiskal tissues
16. All of the above
17. None of the above

All of the signs and symptoms listed above can be a direct result of the same *causative* factor, the occlusal interference on the second molar. None of the *contributing* factors that altered the response actually *caused* the problem. If the causative insult (the deflective occlusal contact) had been corrected before irreversible damage occurred, all symptoms would have disappeared without any changes being made in host resistance or emotional stress levels.

Host resistance is not the only variable. Variations in intensity of function can dramatically alter the response. The same type of occlusal interference may go completely unnoticed by a very relaxed patient who has no tendency to clench or brux. The mouth breather or the person who sleeps with the mouth open will have fewer, if any, of the above symptoms because no stress or tooth damage results in the absence of tooth contact. The same person under duress may begin to clench or brux, activating the muscles into occlusal overload and an avoidance pattern that produces symptoms in the teeth, muscles, and possibly the joints.

Despite the complexity of the multicausality concept, it is still possible to simplify our approach to diagnosis and treatment planning if we understand how the masticatory system was designed to function. In the chapters that follow, you will learn how all parts of the system are interrelated in a functional design that is so logical, it will be apparent when there is destructive disequilibrium. By knowing how the system works, it will be obvious what is wrong when it isn't working properly, causing stressful forces to build up within the system. It is not possible to completely eliminate stress, but treatment planning should always be directed at reducing stress to a level that is not destructive. Ensuring that the total system is in equilibrium is a goal of complete dentistry.

It is a very popular concept to blame *emotional* stress for many of the disorders that are, in fact, caused by structural disequilibrium. None of the patient responses listed above would have occurred if the deflective incline on the "high" tooth were not present, regardless of the patient's emotional state. This is not to say that emotional stress cannot result in pain or discomfort. What is important is that it is possible and practical to isolate structural causes for pain or dysfunction and correct those causative factors. If treatment is limited to covering up symptoms with medications, the structural disharmony is allowed to continue its progressive deformation of teeth, joints, or supporting tissues. Experience has also shown that when pain or dysfunction is eliminated, emotional stress is relieved in many patients. It appears that psychosocial stress is often a result of, rather than a cause of, orofacial pain.

Patients lose their teeth in two ways: either the teeth break down, or the supporting structures break down. As simplistic as it may sound, if we exclude neoplastic disorders and specific pathological conditions, almost every deteriorating effect on the teeth or supporting structures is a direct result of one or both of two causative factors:

1. Stress from microtrauma or physical injury (macrotrauma)
2. Microorganisms including gingival diseases of specific bacterial, viral, or fungal origin

Stress from microtrauma results from repeated occlusal overload. Diagnosis and treatment of occlusal disharmony will be discussed in detail throughout the remaining chapters. As factors of occlusal overload are better understood and the destructive evidence of occlusal disease is better recognized, there is sometimes a tendency to downplay other equally important causes of deterioration. The role of microorganisms must always be given a high priority in every dental examination and treatment protocol.

The Role of Microorganisms

There is no doubt that the elimination of bacterial plaque and the thorough cleaning of gingival sulci are essential for maintenance of oral health. Acidic microbial waste products not only cause caries through decalcification of the tooth surface, but they are inflammatory to soft tissues and destructive to the bony support. Dentistry cannot be called "complete" if it fails to address the elimination of this important causative factor.

> Any condition that prevents thorough cleaning of any tooth surface or any portion of the sulcus should be considered a causative factor that can lead to loss of teeth.

There is no such thing as a "healthy" mouth that has long-standing deposits of bacterial plaque. As long as organized masses of microorganisms are present, progressive breakdown of the supporting tissues is almost inevitable. The only variable is the *rate* of deterioration, which may vary from patient to patient or even from tooth to tooth in the same mouth. The tissue response to the noxious products of the microbial colonies depends both on the general resistance of the host and the resistance of the specific areas that are being subjected to the microbial toxins.

Even in a dentition that is uniformly coated with plaque, the destructive effects may not be uniform. Periodontal destruction around some teeth may be severe, whereas other teeth may retain all or most of their bony support. Since the intensity of the microbial attack is about the same around all teeth, there must be a tooth by tooth difference in resistance to the microbial toxins. The difference in resistance from one tooth to the next is often directly related to differences in intensity of occlusal stress. It is a common clinical finding that the degree of bone breakdown is in direct proportion to the intensity and direction of occlusal overload on each tooth.

Although there does appear to be a clinical relationship between occlusal stress and the amount of microbial damage, occlusal stress is not a necessary factor in periodontal damage. Severe periodontal disease can occur in an environment of occlusal perfection. It is important to understand that even the best occlusal treatment cannot prevent deterioration of supporting structures if inflammation is present. Occlusal therapy without control of plaque is incomplete dentistry. On the other hand, soft-tissue management, even with exceptional control of plaque, falls short of the long-term maintainability that can be achieved when excessive occlusal forces are reduced.

Short-term improvements can be misleading. The dramatic results that can be achieved by *either* occlusal therapy or plaque elimination can be impressive, but years of careful observation almost always present a different picture of progressive breakdown if either treatment approach is ignored when a combination of periodontal and occlusal factors is present.

A concentrated mouth hygiene program may transform bleeding, edematous gingiva into healthy-appearing tissue. In addition, occlusal correction may greatly improve the comfort of the teeth, and even eliminate hypermobility. But such noticeable improvement can be misleading if, underneath the healthy-looking tissue, an untreated intrabony lesion remains. No matter how healthy the gingiva appears, deterioration of the alveolar bone and periodontal structures will continue if the entire sulcus is not cleanable. The healthy appearance on the outside merely produces a false sense of security while deterioration continues at the depth of the lesion.

No matter how thorough the plaque control, even if combined with perfected occlusal therapy, it is incomplete dentistry if there remain deep lesions that are capable of continued deterioration.

Occlusal Trauma and Pocket Formation

Despite the extreme mobility patterns that can be caused by occlusal disharmony, it is doubtful that occlusal trauma can cause an increase in pocket depth unless inflammation is present within the sulcus. If the gingival attachment is intact, and there is a sufficient level of supporting bone remaining, even severely mobile teeth can usually be returned to normal firmness and health by correcting the occlusion. With meticulous hygiene to keep the sulcus free of plaque, inflammation can be prevented. Lindhe and Nyman[1] have shown rather conclusively that occlusal trauma of the jiggling type, even with greatly reduced periodontal support, will not cause further destruction of the attachment apparatus once the plaque-induced periodontitis has been eliminated. However, the combination of plaque-induced periodontitis and occlusal trauma causes a more progressive loss of connective tissue attachment than in nontraumatized teeth.'

Recent clinical observations and scientific data have given added credibility to the relationship of occlusal overloads to periodontal damage.' Comparative studies to determine if there is an association between occlusal trauma and periodontitis" show that there appears to be a definite link. Teeth with a combination of functional mobility and widened periodontal ligament space were found to have deeper probing depth, more clinical attachment loss, and less radiographic bone support than nonmobile teeth. While this relationship between occlusally induced tooth hypermobility and increased levels of periodontitis has been a common clinical finding for years, the actual mechanism for the bone loss was not fully understood. Recent investigations have provided an explanation.

Interleukin-l beta is a potent stimulator of bone resorption and a known key mediator involved in periodontal disease. It has now been determined that interleukin-l beta is

produced by human periodontal ligament cells *in response to mechanical stress.*[5] It has also been shown that older periodontal ligament cells produce an increased amount of interleukin-l beta in response to mechanical force, and may well be positively related to the acceleration of alveolar bone resorption."

Some authorities have argued that occlusal factors play *no* role in periodontal breakdown because inflammation is the essential causative factor for increased pocket depth. This opinion presents a limited viewpoint of what causes periodontal disease. A total picture of periodontal health, and the goal of complete dentistry, involves *all* of the structures that support the teeth, not just the gingival attachment. The way in which bone is destroyed can be learned from careful clinical observation. The reason why teeth in hyperfunction loosen is because the bone around the roots breaks down. The bone breakdown follows a specific pattern in which bone resorption directly relates to the direction of compressive forces by the root against the bone. The pressure stimulation results in thrombosis, hemorrhage, and destruction of collagen in concert with the activation of interleukins that have been shown to convert fibroblasts into osteoclasts. The osteoclastic activity, in tum, destroys bone in direct proportion to the intensity and direction of the pressures exerted. This means then, that intra-alveolar bone breakdown follows a pattern that is definitely related to occlusal stress patterns.' Careful clinical observation repeatedly confirms this relationship, which can occur even when the gingival attachment apparatus is intact.

If the occlusion is corrected to negate directional overloads on the teeth before inflammation or injury deepens the sulcus to create a communication through the gingival attachment into the area of bone resorption, osteoblastic activity will repair the osteoclastic destruction and bone will fill back in to its original level. The loose tooth will tighten and can return to normal health and function.

If the occlusal correction is delayed, our clinical experience has shown that in time, the sulcus depth very often deepens to eventually communicate with the bone loss area to form a deeper intrabony lesion. Understand that the increase in pocket depth requires inflammation or injury to penetrate the gingival attachment, so it theoretically can be prevented on selective patients who are willing to follow meticulous hygiene procedures under increased professional supervision. Although possible, successful maintenance on an overloaded, hypermobile tooth is unpredictable at best.

Bone resorption often is worst in furcation areas that are hardest to clean and where communication with the sulcus or pocket is most likely to occur. Once there is any breakthrough between the sulcus and the area of bone breakdown, the pocket is immediately deepened to the extent of the total intra-alveolar defect. More intensive periodontal treatment is then required, but even with that, the bone level will not be returned to its original contour. That opportunity is lost whenever occlusal correction is delayed too long.

The repair of intraosseous defects is more predictable when the teeth are firm. From almost every viewpoint of treatment, it is more difficult to keep the supporting tissues healthy around a loose tooth than it is around a firm one. Occlusal stress must be considered as a primary cause of supporting structure breakdown around the teeth. Correction of misdirected or excessive forces against the teeth is one of the essential considerations in maintaining optimum health of a dentition, and it also has the added benefit of making the patient more comfortable.

Anatomic Harmony

The most common shortcoming in analyzing or treating occlusal relationships is failure to consider *all* parts of the masticatory system. We are prone to many mistakes if our understanding of occlusion is limited solely to occlusal contacts. The teeth are just *part* of the total system, and frankly there is no way to evaluate occlusal relationships until we have ascertained that the temporomandibular articulation is in harmony. There is no such thing as a perfect occlusion with a displaced TMJ. That means both the position and the condition of the TMJs must be considered in relation to the maximum intercuspation of the teeth. The peaceful function of the masticatory musculature depends on a harmonious relationship between the occlusion and the TMJs, so this relationship is always of critical concern in diagnosis and treatment planning. There will always be some price to pay when any part of the masticatory system is at war with muscle. That includes the lips, tongue, and cheek musculature.

Harmony of form is a prerequisite for harmony of function, and it is necessary to have a working knowledge of how the two interrelate. Every aspect of each tooth's position and contour can be determined on the basis of its harmony with functional requirements. As examples, the upper anterior teeth must relate to the closing path of the lower lip as it moves up to seal contact with the upper lip during every swallow. The upper incisal edges must relate to a consistent alignment with the lower lip contour for proper phonetics. The upper lingual contours must relate to the functional pathways of the lower anterior teeth as they move along a repetitious pattern referred to as the *envelope offunction.* Both upper and lower anterior teeth are subject to positioning within a zone of neutrality between the outward forces of the tongue versus the inward forces of the lips. There are other functional relationships that must be understood to achieve consistently predictable results in occlusal treatment, but the important point to grasp at this time is that every part of the masticatory system has an understandable reason for its position, contour, and alignment. Learning these reasons will take the guesswork out of everything from smile design to treatment of orofacial pain. Not knowing these interrelationships reduces too many diagnosis and treatment decisions to guesswork.

If any anatomic component is not in harmony with the rest of the masticatory system, some part or all of the system must adapt to regain equilibrium. Adaptive changes should be evaluated as responses to imbalance. Such adaptation is not always a problem. Whether the system's attempts at cor-

recting imbalance are beneficial or destructive is dependent on the response of the altered tissue or part. Astute diagnosticians must know the norm and must be able to determine when an imbalance exists and whether the tissue or parts have successfully adapted to the altered balance.

There are many so-called "physiologic malocclusions" that are stable and function well. They do so because the cumulative effects of different dynamic factors produce a stable result, even though it does not fit the Class I stereotype of a classically correct occlusion. When we get into the section on treatment planning of different types of occlusal problems, it will be apparent how important it is to understand the dynamics of functional and anatomic harmony. It is not possible to adequately evaluate cause and effect influences in the dentition or the TMJs without knowledge of functional interdependencies, because if we don't know what *causes* a malrelationship we will probably fail in our treatment. We may subject our patients to unnecessary overtreatment or inadequate undertreatment if we attempt to treat signs or symptoms without knowing what caused them.

Teeth do not simply move out of alignment, become loose, or wear away without a specific underlying cause (or causes). The primary cause may be at the beginning of a chain reaction that is started by a structural disharmony. Regardless of how and when the process was initiated, treatment will not be successful unless all currently active causes for disharmony or deformation are corrected.

The goal of functional harmony is a peaceful neuromuscular system. The masticatory system is capable of high-capacity demands. The system must be free to function to its anatomic limit without mechanical interference, but must not be restricted to function solely at that limit. It must function to the limit when required. It must be at peace when functional demands are reduced. Achieving such functional harmony in an environment of optimally healthy teeth, joints, periodontium, and musculature, and in combination with the best possible esthetic result, is the essence of complete dentistry.

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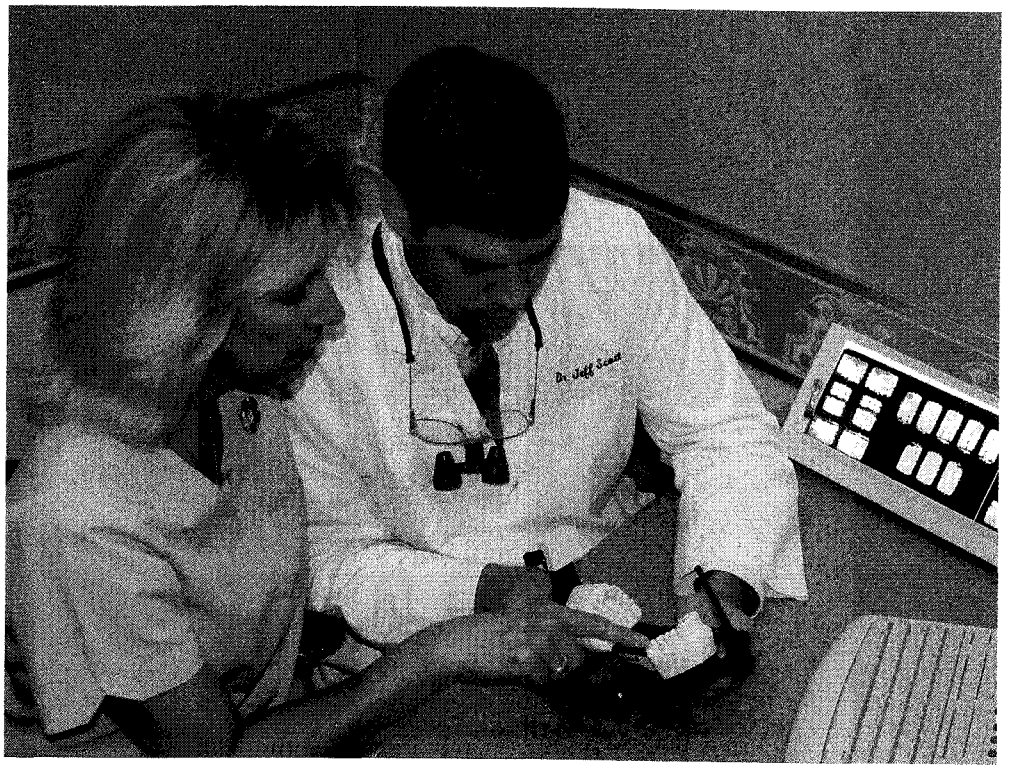
Chapter 2

Perspectives on Occlusi n an " veryday Dentistr "



PRINCIPLE

Whether general practitioner or specialist, practicing without a comprehensive understanding of occlusal principles exacts a costly penalty in missed diagnoses, unpredictable treatment results, and lost production time.

OCCLUSAL PRINCIPLES AT EVERY LEVEL OF PRACTICE

At every level of general practice, a dentist routinely faces problems of sore teeth, excessive wear, loose teeth, temporomandibular joint (TMJ) disorders, and orofacial pain. Patients want correct answers. They want to know if they need orthodontic treatment, or an occlusal splint, or why a joint clicks, or why anterior veneers chip or crack. A dentist who does not have a working knowledge of occlusal principles must resort to guesswork and time-wasting trial-and-error attempts to solve problems that could be confidently solved by understanding cause-and-effect responses to occlusal disharmony. Even achieving predictable function and beauty of smile design is dependent on incorporation of sound occlusal principles. Those principles are not just for complete mouth prosthetics. When principles of occlusal harmony are understood, the entire approach to examination, treatment, and problem solving takes on a new perspective. It is a perspective that pays huge dividends of predictability and increased productiyity, regardless of the type of practice.

There are good reasons why general practitioners should learn principles of occlusal harmony, and develop skills required to recognize and treat typical problems associated with occlusal disharmony. Descriptions of some of the benefits follow.

Patient Comfort

Many problems of discomfort are related to occlusal disharmony.[1-3] Teeth that are sensitive to hot or cold after a restoration is placed are frequently symptomatic because of a deflective incline interference or a vertical overload from a new restoration. Indiscriminate grinding to relieve the interfering tooth can trigger new and bigger problems in other teeth and/or the masticatory musculature, and even the TMJs. Not understanding occlusal principles is a barrier to solving such everyday problems, and it puts a practitioner in jeopardy of actually causing problems that are sometimes worse than the original complaint.

Restoration Longevity

Cracks, fractures, and excessive wear on restorations are all signs of occlusal disharmony. Such problems are rare in perfected occlusions.

Occlusal Stability

Post-treatment shifting of teeth, opening up of contacts, or creating unesthetic misalignment are common problems of occlusal mistakes. The use of long-term retainers to maintain post-orthodontic tooth alignment could be dramatically reduced if occlusal principles were better understood. Fremitus is almost always an early sign of a correctable occlusal disharmony.

More Accurate Treatment Planning

Most of the problems that lead to compromised treatment results could be avoided if requirements for occlusal stability were adhered to in the treatment planning stage. *Programmed treatment planning* (see Chapter 29) is based on selection of the best treatment options for fulfilling each requirement. Successful treatment planning pays huge dividends regardless of the type or level of practice.

Improved Esthetics

The very best, most naturally beautiful esthetics does not require guesswork if the relationship between anatomic harmony and functional harmony is understood. The best smile design is automatically achieved when the anterior teeth are in harmony with all of the guidelines for occlusal function and stability. Furthermore, these guidelines provide a precise framework for a step-by-step process.

Increased Productivity

Just imagine how much more productive a practitioner can be if all restorations could be placed without need for "grinding in" high or uncomfortable occlusions, or remaking restorations that are not correctable. How much time could be put to better use than trying to reshape anterior restorations that are too thick on the lingual. How much wasted time could be saved if incisal edges weren't too far out, too long, too short? These are the typical everyday problems that must be faced if principles of occlusal harmony are not understood and used to plan and execute treatment.

It is unrealistic to expect that *every* restoration could be placed without any need for some occlusal correction. But it should be unnecessary to do more than minimal corrections if the rules for occlusal harmony are faithfully practiced.

Decreased Stress

From interviews with more than 200 dentists, it appears that a major cause of burnout is a *lack of predictability* when attempting to satisfy the needs and desires of patients. This lack of predictability is especially noted in restorative and prosthodontic treatment and in attempts to solve issues of discomfort. When time is being wasted attempting to solve a bite problem by trial and error, the next patient is kept waiting, and an already full schedule gets further jammed up because of "working in" patients to redo or rework dentistry that isn't quite comfortable. The result is increased stress on the entire office team. Some of these problems are caused by inadequate quality- control procedures, including dentist-technician communication shortcomings. But the major cause of unacceptable treatment results is failure to visualize a clear correct goal for the treatment. This is usually accompanied by inadequate treatment planning. The problem is that unless the requirements for occlusal harmony are understood, there can't be a clear vision for a de-

sired end result ... and without a clearly defined goal, trying to arrive at a logical treatment sequence is folly. It is a problem that can only be solved by a clear understanding of requirements for a stable, comfortable, maintainably healthy masticatory system.

RELEVANCE OF OCCLUSION TO "EVERYDAY DENTISTRY"

Even though an understanding of occlusal principles has value to every level of dental practice, there is a pervasive misconception that concepts of dental occlusion are not relevant to "everyday dentistry." It is important to understand how such a viewpoint was ever germinated, and why it has influenced so many dentists and educators to regard principles of occlusal harmony with skepticism.

To a large extent, a negative viewpoint regarding the importance of occlusion has been by misguided assumptions that disorders of the TMJs and muscles represent the only focus for occlusion in dentistry.' A negative view of the occlusion-TMJ relationship has permeated the teaching of occlusion and has resulted in a profuse amount of literature that downplays the .role of occlusal rherapy?" in general practice. A conceptual belief that occlusion is unimportant or is too difficult to teach at the dental school level has influenced a whole cadre of dentists who are ill equipped to properly diagnose or treat a broad spectrum of occlusal problems that are routinely faced in every dental practice." The failure to embrace sound occlusal principles has also led to a plethora of fringe-type treatment modalities, unnecessary overtreatment, and denials of responsibility for problems that are a direct result of occlusal mismanagement.

The disparagement of occlusion as an important part of daily practice has become so pervasive that the National Institutes of Health (NIH) and the National Institute of Dental and Craniofacial Research (NIDCR) published a pamphlet'? to advise the public that occlusal adjustment or any other irreversible occlusal treatment for temporomandibular disorders (TMDs) is "of little value and may make the problem worse." Further admonitions that "recent research disputes the view that a bad bite (malocclusion) can trigger TMD" provokes distrust of all forms of occlusal therapy. A profuse amount of seriously flawed literature supports this viewpoint and denounces all alterations of occlusions as an unacceptable choice of treatment.

Limiting judgment of occlusal principles on such a narrow focus as its effect on "TMD" distorts the true value of occlusal harmony as a realistic treatment goal for many different problems, in addition to its indisputable value in treating *certain types* of TMDs,II including masticatory muscle pain, by far the most common type of TMD.

The NIH admonishment that occlusal treatment "is of little value and may make a TMD problem worse" may be true if it refers to *inappropriate* occlusal changes that are representative of the lowest common denominator of treatment. But such a negative view of occlusal treatment is a misrepresentation of what knowledgeable clinicians consider appropriate treatment for specifically diagnosed disorders.

Trying to arrive at sensible answers about the importance of occlusion in daily practice requires some insight into evaluation of the literature. With the growing dependence on "evidence-based" reporting, the rules for judging research studies and even clinically based opinions have made it easier to evaluate differing dogmas.[12] Evidence-based research on occlusion may not provide final answers to every question, but it points out when there are serious enough flaws in any research study to invalidate its conclusions. Since so much of the negative literature proposes a nonrelationship of occlusion to "TMD," an analysis of that literature is in order.

When the NIH position states that "research refutes the view that a bad bite (malocclusion) can trigger TMD," the statement fails the test for a scientifically accurate conclusion. A truly scientific study must ask, *"What kind of TMD?"* TMD is not a single disorder. It is not even a single multifactorial disorder.

TMD is an all-inclusive term that includes many different types of disorders, any of which may be multifactorial. A cardinal rule for evidence-based research requires *homogeneity* of the disorder being studied. This means that for a proper study of the relationship between occlusion and TMD, the specific type of TMD must be isolated and defined. An evaluation of the literature illustrates that this is rarely done.'>" This error creates a glaring source of misinformation because there are many different disorders of the masticatory system that are typically included in the TMD category. These different disorders have many different etiologies, require different treatment strategies, and can result in different treatment outcomes. A proper choice of treatment demands specific classification of the type and stage of the disorder to be treated before treatment is selected. Any reported clinical studies that use the term *TMD* without specifically classifying the exact type of TMD being studied are too seriously flawed to be considered valid. This error is found almost universally throughout the literature on both sides of the occlusion-TMD debate.

Scientific analysis also demands a much-improved explanation that more clearly defines "a bad bite" and requires characterization of "malocclusion" in more descriptive terms.":'? The use of *Angle's Classification of Malocclusion*[18] to describe arch-to-arch relationships or to define "malocclusion" is perhaps the most consistent and serious flaw in the literature that disparages the idea of a relationship between occlusion and TMD. The cause of confusion is self-evident because Angle's classification does not relate maximum occlusal contact to either the position or condition of the TMJs. Use of a classification system that ignores any relationship between occlusion and the TMJs can hardly be considered an analytical model for studying the relationship between occlusion and the TMJs. A search of the literature confirms that this serious flaw has been consistent in a profuse amount of reported studies that are cited to discredit the value of occlusal harmony as a treatment objective.

Ruling out all rationales for occlusal changes in patients with TMD is an indefensible position in light of extensive clinical experience with conservative occlusal treatment that is close to 100 percent predictable when performedby properly skilled clinicians on properly selected patients. There is extensive clinical evidence to support the relationship between deflective occlusal interferences and masticatory muscle symptoms. There is also a proven scientific rationale for establishing occlusal harmony with the TMJs. The rationales for treatment are practical, learnable, and appropriate for general practitioners as well as specialists. Attempting to restore an occlusion, correct a bite problem, or even to reshape a high restoration without knowing the precisely correct maxillo-mandibular relationship, can be a time-wasting, frustrating, and unnecessary experience.

Diagnosis of Orofacia n in General Practice

The dentist of today must become a physician of the total masticatory system. A frequent focus of head, neck, and orofacial pain is within structures that comprise the masticatory system. Analysis of such pain requires a working knowledge of masticatory system structure and function, including the intraoral and collateral effects of dysfunction. The variety and vagaries of pain from dental origins are complex enough, but interrelationships between the TMJs, the teeth, and the masticatory musculature require special expertise to evaluate the diversity of signs and symptoms that can result from structural disorder within the system.

Dentists are the only health professionals who are trained (or should be) to diagnose problems of the teeth or to understand *masticatory system function* as a baseline for relating orofacial symptoms to variations of dysfunction. This means that the general dentist practitioner is regularly put into the position of "gatekeeper," responsible for determining if a dental or masticatory system disorder is or is not a factor in head, neck, or orofacial pain. Physicians and other health professionals who do not have the training to determine if a dental or masticatory system disorder is or is not a factor in head, neck, or orofacial pain must be able to rely on this expertise. Dentists must accept this responsibility and must develop the competence to fulfill it.

Pain from dental origins can combine with sources of pain from outside the masticatory system to produce confusing patterns of symptoms, so unraveling specific sources of overlapping or referred pain sometimes requires expertise from different specialists. For such a multidisciplinary effort to succeed, each specialist must separate out potentials for pain in the specific structures that fall within his or her specialty. This puts a serious responsibility on the dentist to be a reliable resource, capable of determining whether all of the pain, some of the pain, or none of the pain has its source within masticatory system structures. This is why it is so important for dentists to be able to *rule out* masticatory system structures as sources of pain, and to develop sufficient expertise to select appropriate medical specialists for evaluation of signs or symptoms that are not within dentistry's field of expertise.

It is a serious mistake for any dentist to minimize the importance of understanding the interrelationships of the teeth with the rest of the masticatory system structures. It is impossible to understand occlusion without understanding the relationship of the teeth to the TMJs, the musculature, and the functional patterns of jaw movement. It is equally impossible to have a realistic understanding of orofacial pain or TMD without a total masticatory system perspective. Failure to understand these perspectives is the primary reason why treatment of so many TMD pain patients is limited to medications for controlling *symptoms* while ignoring *signs* of progressive structural damage. Dentistry can do better than that.

Accepting the role of the dentist as a "masticatory system physician" puts the practitioner on a higher level of observation. Looking for signs of structural deformation while the cause of the problem is still correctable will enlighten any dentist to needs that too often go undiagnosed. The destructive factor, that in the opinion of many clinicians, causes more damage, more lost teeth, more discomfort, and more need for extensive dentistry than any other causative factor is *occlusal disease.'?* Every practitioner should be able to recognize it, treat it, and when detected early enough, prevent it from destroying a dentition. Any dentist who does not feel competent to render adequate treatment should, at the very least, be able to recognize occlusal disease in its various forms. Patients should be informed of the problem and should be referred when a need for treatment is evident.

Occlusal disease can be detected in many forms. The next chapter describes its signs and symptoms.

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