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Corresponding Author: Dr. Charles S. Greene,

Corresponding Author's Institution: UIC College of Dentistry, M/C 835

First Author: Charles S Greene, DDS

Order of Authors: Charles S Greene, DDS; John Stockstill, DDS, MS; Donald Rinchuse, DMD, MS, MDS, PhD; Sanjivan Kandasamy, BDSc, BScDent, DocClinDent, MOrthRCS, MRACDS

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In a previous paper, the authors reported the results of a survey of all American and Canadian orthodontic postgraduate programs to determine how the topics of occlusion, temporomandibular joint and temporomandibular disorders were currently being taught. Based on the finding of considerable diversity among those programs, we decided to write a TMD curriculum proposal which would be compatible with and satisfy the current curriculum guidelines for postgraduate orthodontic programs. These guidelines arise from a combination of the ADA/CODA published requirements and the July, 2010 American Board of Orthodontics (ABO) written guide for the Phase II examination. The proposed curriculum, which is based on the latest scientific evidence in the TMD field, provides program directors with a template for covering these subjects thoroughly. At the same time, they can focus on all of the related orthodontic issues, so that their future graduates will be prepared to deal with patients who either present with or later develop TMD problems.

*Title Page

Orthodontics and Temporomandibular Disorders: A Curriculum Proposal for Postgraduate Programs

Charles S. Greene, DDS **
Clinical Professor, Department of Orthodontics, UIC College of Dentistry, Chicago, IL.

John Stockstill, DDS, MS
Associate Professor and Director of Orthodontic Research, Department of Orthodontics, MCG School of Dentistry, Augusta, GA.

Donald Rinchuse, DMD, MS, MDS, PhD
Professor and Graduate Orthodontic Program Director, Seton Hill University, Greensburg, PA.

Sanjivan Kandasamy, BDSc, BScDent, DocClinDent, MOrthRCS, MRACDS
Clinical Senior Lecturer, Dental School, The University of Western Australia, Nedlands, Australia and Adjunct Assistant Professor in Orthodontics, Centre for Advanced Dental Education - St. Louis University, St. Louis, MO.

** Corresponding Author
Charles S. Greene, DDS
Department of Orthodontics
UIC College of Dentistry
801 South Paulina – M/C 841
Chicago, IL 60612-7211
Phone 312-996-7138
FAX 312-996-0873
cgreene@uic.edu

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ABSTRACT

In a previous paper, the authors reported the results of a survey of all American and Canadian orthodontic postgraduate programs to determine how the topics of occlusion, temporomandibular joint and temporomandibular disorders were currently being taught. Based on the finding of considerable diversity among those programs, we decided to write a TMD curriculum proposal which would be compatible with and satisfy the current curriculum guidelines for postgraduate orthodontic programs. These guidelines arise from a combination of the ADA/CODA published requirements and the July, 2010 American Board of Orthodontics (ABO) written guide for the Phase II examination. The proposed curriculum, which is based on the latest scientific evidence in the TMD field, provides program directors with a template for covering these subjects thoroughly. At the same time, they can focus on all of the related orthodontic issues, so that their future graduates will be prepared to deal with patients who either present with or later develop TMD problems.

Introduction

We have previously published the results of our survey of American and Canadian orthodontic graduate programs, in which we asked the program directors about their didactic and clinical teaching of temporomandibular joint- related topics.[1] Their responses indicated that didactic and clinical exposures to the topics of occlusion, the TMJ, and temporomandibular disorders (TMDs) were being presented in many different ways. Some programs were devoting a lot of time to these issues, and their teaching generally was consonant with current scientific evidence. However, others were either insufficiently covering these topics or they were presenting outdated concepts, especially in regard to possible relationships between orthodontic treatment and

TMDs. At the end of our article, we recommended that every orthodontic graduate program should try to align their teaching in this area with the currently available scientific evidence.[1]

We recognize that each orthodontic postgraduate program is separate and free to control its own curriculum, but all of them must satisfy the requirements established by official accrediting agencies such as the ADA Council on Dental Accreditation (CODA). We also know that many aspects of the orthodontic curriculum are based on standards established by the American Association of Orthodontists (AAO) and/or the American Board of Orthodontics (ABO). Therefore, we decided to present a proposal for designing a curriculum that covers the topic of TMDs and orthodontics in a manner targeted specifically at future practicing orthodontists, in the hope that teaching programs will find it helpful. In addition, we believe that the official orthodontic associations may find it useful when revising or expanding present standards for evaluating and accrediting advanced education programs in orthodontics. [2]

I. What is currently required?

It is quite striking that the ADA-CODA guidelines for Accreditation Standards for Advanced Specialty Education Programs in Orthodontics and Dentofacial Orthopedics [3] deal with the topic of Occlusion/ TMD in eight words: "Manage patients with functional occlusal and temporomandibular disorders (Standard 4-3.4g)." This is a required Proficiency rather than a Familiarity, which means that an orthodontic graduate should somehow become proficient at doing something clinically about these conditions, rather than simply knowing about them or recognizing the symptoms prior to any orthodontic intervention. It is hard to imagine a less specific directive coming from any accrediting body, and indeed this may explain a lot of the diversity in what really is happening across various programs.

On the other hand, the World Federation of Orthodontics ** has put forth a much more specific list of topics to be covered in dealing with these issues [4]:

- Occlusion and temporomandibular disorders (TMD)
- Anatomy and function
- General TMJ concepts
- Normal occlusion and function
- Differential diagnosis of TMD
- TMD in children, adolescents and adults
- Management philosophies

However, this is a very broad and vague type of list which does not even mention orthodontics or the real-life dilemmas of orthodontic practitioners. We believe it is possible to narrow the focus of teaching in this area so that the issues are being discussed at a higher (graduate) level, with special emphasis on the needs of a clinical orthodontist in terms of essential diagnostic and management proficiency.

**** The World Federation of Orthodontist Guidelines for Postgraduate Orthodontic Education: Occlusion and TMJ. On page 165, occlusion and temporomandibular disorders and the specific areas that need to be addressed in the curriculum are listed in Appendix 2: Educational Topics. One more mention of occlusion and TMD in the WFO document is on page 166, Appendix 2, Educational Topics (Continued), under Special Orthodontic Subjects: TMD and orthodontics.**

II. Recommended Curriculum for a TMD Course

A list of suggested topics to be covered in a one-semester TMD course is presented in Table I, along with a brief list of issues to be discussed under each topic. This proposed course outline is based on the collective experiences of the four authors as they have taught generations of orthodontic residents about TMJ issues for several decades. Specific concepts and detailed content proposals are not presented here, because we believe that program directors and faculty should have the freedom to make such choices within the overall context of their programs. However, we do recommend that an evidence-based and problem-based approach to this contentious field is the best strategy to follow. As part of that approach, we believe the following three points should be made clear throughout the didactic course as well as during the clinical exposure in every program:

1. Orthodontic treatment will not prevent children or adult patients from developing a TMD problem later in life [5-7];
2. Orthodontic treatment will not generally cause either children or adult patients to develop TMD problems later in life [8-12]. However, if TMD symptoms arise during orthodontic treatment, they may be due to various forces or appliances which exceed the adaptive capacity of an individual patient, and appropriate responses will be required [13-15];
3. Orthodontic treatment is neither a first-line nor a second-line therapy for symptomatic TMD patients, regardless of how their occlusion appears at presentation [5, 6, 10-12, 15, 16-18].

The literature supporting these three statements is abundant in the orthodontic field as well as in the wider TMD field. Therefore, these statements should be regarded as fundamental knowledge in 21st century orthodontics, and they should be discussed with graduate students by contrasting them to older belief systems in the orthodontic profession. Readers of this article as well as all graduate orthodontic students should especially look at the most recent review of this literature by Michelotti and Iodice [15], which includes an outstanding Table summarizing 24 papers on "Studies published between 1989 and November 2009 that examined the relationship between orthodontic treatment and TMD."

In addition, it is important to stress throughout the TMD course that, in the modern orofacial pain community, these disorders are currently being studied and managed within a medical orthopedic framework; this represents a significant departure from a traditional dental model [19]. In addition, TMD patients today are being managed within a biopsychosocial paradigm, and

some of them (especially chronic patients) have significant psychosocial issues which must also be dealt with [20, 21]. Finally, many of the chronic TMD patients have been found to be suffering from various co-morbid pain conditions (fibromyalgia, irritable bowel syndrome, interstitial cystitis, etc.), and these conditions impact both the diagnosis and management of chronic TMD problems [22, 23].

III. TMD and Orthodontics – Special Interest Topics for Orthodontists

In addition to the TMD course topics presented in Table I, it would be desirable to follow that course with a series of focused discussions about TMD issues that arise in orthodontic practice. These discussions should be conducted within a problem-based learning (PBL) format, so that the residents could search for relevant materials and be prepared for an open dialogue between themselves and their instructors. There are a number of TMD and occlusion issues that frequently arise within most orthodontic programs as well as in outside practice, and the residents should be prepared to deal with them when they do occur. To develop critical thinking skills, a debate format could be used to address many of the issues related to orthodontics, functional occlusion, condyle position, and TMD. A list of suggested topics is presented below:

A. Specific orthodontic concerns and issues

1. How has the orthodontic literature changed over the years in regard to TMD – orthodontic relationships? The evolution of thinking about the relationship between these topics parallels what has happened in the other disciplines that comprise the dental profession. A review of these historical concepts within the orthodontic field will help the new graduates appreciate the spectrum of professional opinions they will encounter as they enter practice.
2. The topic of occlusal hyper-awareness (also known as phantom bite) has generally been neglected in orthodontic training programs. A recently published paper [24] reported the results of a survey of practicing U.S. orthodontists about their experiences with patients complaining of occlusal awareness and discomfort. The responses to that survey indicated that most orthodontists were either unaware of this condition, or they were uncertain about how to deal with such patients. Many of these patients have either already had orthodontic treatment, or are requesting it as a solution for their problem.

Appropriate responses to these situations can be very complicated, and dealing with such problems may produce a significant amount of anxiety in both patients and dentists.

3. The TMD course described in Table I includes the topic of screening prospective orthodontic patients for TMD signs and symptoms. However, some additional time is required to have in-depth discussions about how to react to positive findings from those screenings. This should include topics such as:
    a. What constitutes a minor finding vs a major TMD sign and/or symptom?
    b. Who should manage the TMD problem if it requires treatment?
    c. What are the cautions suggested for the orthodontic management of such patients?
4. How should orthodontists react to and deal with TMD problems which arise during their treatment? Who is responsible for managing these situations? When is it appropriate to resume orthodontic treatment? What if the TMD situation cannot be resolved completely?
5. How should orthodontists react to post-treatment TMD complaints from their completed patients? Does it matter if these complaints arise during the immediate post-treatment period vs several years later? What is the orthodontist's responsibility for providing or seeking appropriate care for these patients?

B. <u>Interactions between orthodontists and general dentists – TMD and occlusion issues</u>

1. How should an orthodontist respond to a patient referred by a familiar referring dentist, specifically for treatment of a TMD problem? Assume that the linkage between the patient's occlusion and the symptoms has already been proclaimed by the dentist.
2. Same as #1, but assume that the referring dentist is new to the practice.
3. A finished orthodontic patient is sent back to the original referring dentist. However, this dentist does not like the occlusal result produced, and makes negative comments to the patient (and parents, if a child) about this outcome. Possibilities include:
    a. The critique was based only on personal opinion, but no specific occlusal philosophy was cited by the dentist
    b. A more specific critique was offered, based on a specific occlusal theory.
    c. The criticism is based on the dentist's recent involvement with a major occlusion "Institute", which has convinced him that only certain very specific occlusal

outcomes are acceptable, and that only special occlusally-aware orthodontists can render a successful outcome.

d. The patient is told that future TMJ/occlusal problems will occur if this situation is not corrected.
e. The patient is advised to seek a second opinion from a different orthodontist, rather than returning to you.

4. Same as #3, except the patient is seeing a new dentist who did not make the initial orthodontic referral.

All of the above negative scenarios could be discussed under three different assumptions:

1) The general dentist is the one who makes the negative phone call to the orthodontist.
2) The patients (or parents) make the negative phone call to the dentist.
3) The "special occlusally-aware orthodontist" makes the phone call to the treating or original orthodontist to discuss the "inappropriately finished" case.

IV. How does the proposed TMD course fit into current curriculum requirements?

The TMD course outline presented in this article, as well as the suggested discussion topics, would appear to be very timely in terms of current curriculum guidelines for postgraduate orthodontic programs. These guidelines arise from a combination of the ADA/CODA published requirements and the July, 2010 American Board of Orthodontics (ABO) written guide for the Phase II examination [3,4]. While there is a fair amount of flexibility among postgraduate programs for designing their specific curricula, those guidelines have a major impact on what needs to be covered in every program. The pertinent sections of the ABO written guidelines are as follows:

- There are a total of 27 subject areas that are listed for study. Specifically, topic #19 - Principles of Occlusion, and topic #26 - Temporomandibular Disorders, are found on page 3.
- Under the section on "Test Specifications" that lists the percentage of questions taken from each discipline, 5% of the questions are on the topic of "Occlusion" and 4% of the questions are on the topic of "Temporomandibular Disorders."

- There are 86 required reading articles (primary sources), with five being related to occlusion/TMD issues:
    - Huang G. Occlusal adjustment for treating and preventing temporomandibular disorders. Am J Orthod Dentofacial Orthop 2004;126(2):138-9.
    - Kim MR, Graber TM, Viana MA. Orthodontic and temporomandibular disorder: a meta-analysis. Am J Orthod Dentofacial Orthop 2002;121:438-46.
    - Andrews LF. The six keys to normal occlusion. AJO 1972;62:296-309.
    - English JD, Buschang PH, Throckmorton GS. Does malocclusion affect masticatory performance? Angle Orthod Feb 2002;72(1):21-7.
    - McNamara JA, Seligman DA, Okeson JA. Occlusion, orthodontic treatment and temporomandibular disorders: a review. J Orofacial Pain 1995;9(1):73-115.

In addition, the ABO recommends 23 textbooks related to different areas of orthodontics; book #6 in the listing is the only one focusing primarily on the topic of temporomandibular disorders (Okeson J. "Management of Temporomandibular Disorders and Occlusion" 6th ed., Mosby, 2008).

CONCLUSION

The main intention of the authors in writing this paper was to fill a gap in postgraduate orthodontic programs, as revealed in our recent survey that was published in this journal [1.] Clearly, when over half of the programs in the USA are found to either not cover TMD topics very well or to present somewhat outdated and even questionable material, there is a need for improvement. It is in the best interests of the new graduates and their future patients, and thus for the orthodontic specialty as a whole, if there are evidence-based guidelines for those involved in the teaching of these subjects. Also, because the topics of TMD and occlusion continue to be a source of controversy in the orthodontic profession, there is a need for new graduates to understand the historical and present elements of that controversy in order to communicate with all their colleagues. Finally, while the main focus of orthodontic practice remains the diagnosis and management of malocclusions, modern orthodontists must deal with the inevitable fact that

TMD issues will arise in their practices; will they be properly prepared to provide appropriate evidence-based care for those patients?

REFERENCES

1. Stockstill, J., Greene, C., Kandasamy, S., Campbell, D., and Rinchuse, D.: Survey or orthodontic residency programs: Teaching about occlusion, temporomandibular joints, and temporomandibular disorders in postgraduate curricula. Am J Orthod Dentofacial Orthop, 2011;139:17-23.
2. Owens, S., Dykhouse, V., Moffitt, A., Grubb, J., Greco, P., English, J. Briss, B., Jamieson, S., and Riolo, M.: The new American Board of Orthodontics certification process: further clarification. Am J Orthod Dentofacial Orthop, 2005;128(4):541-544.
3. Accreditation Standards for Advanced Specialty Education Programs in Orthodontics and Dentofacial Orthopedics. Commission on Dental Accreditation, American Dental Association, 2008. ADA - CODA Standard 4, under Clinical Sciences, Exhibit 11.1, Clinical Proficiencies, 54g.
4. The American Board of Orthodontic Written Examination Guide; Edition- July 2010; www.americanboardortho.com
5. McNamara JA, Seligman DA, Okeson JA. Occlusion, orthodontic treatment, and temporomandibular disorders: a review. J Orofacial Pain 1995;9:73-90.
6. McNamara JA Jr, Turp JC. Orthodontic treatment and temporomandibular disorders: is there a relationship? Part 1: clinical studies. J Orofac Orthop 1997;58:74–89.
7. Reynders RM. Orthodontics and temporomandibular disorders: a review of the literature (1966–1988). Am J Orthod Dentofacial Orthop 1990;97:463–471.
8. Dibbets JM, van der Weele LT. Long-term effects of orthodontic treatment, including extraction, on signs and symptoms attributed to CMD. Eur J Orthod 1992;14:16–20.
9. Rinchuse DJ. Does orthodontics cause TMJ disorders? Orthod Rev 1987;1:11.
10. Luther F. TMD and occlusion part I. Damned if we do? Occlusion: the interface of dentistry and orthodontics. Br Dent J 2007;13:202–209.
11. Luther F. TMD and occlusion part II. Damned if we don't? Functional occlusal problems: TMD epidemiology in a wider context. Br Dent J 2007;13:210–216.
12. Kim MR, Graber TM, Viana MA. Orthodontics and temporomandibular disorder: a meta-analysis. Am J Orthod Dentofacial Orthop 2002;121:438–446.
13. Okeson, J. Orthodontic therapy and the patient with temporomandibular disorder, in Orthodontics: Current Principle and Techniques, Graber, T. (editor), 4th edition, pp. 331-344, 2005 Elsevier, Inc.
14. Greene CS. Etiology of temporomandibular disorders. Semin Orthod 1995;1:222–228
15. Michelotti A, Iodice G. Review Article: The role of orthodontics in temporomandibular disorders. Journal of Oral Rehabilitation 2010 37; 411–429. [NOTE: See Table 1].

16. National Institutes of Health Technology Assessment Conference Statement. Management of temporomandibular disorders. J Am Dent Assoc 1996;127:1595-606.

17. Macfarlane T, Kenealy P, Kingdon A, Mohlin B, Pilley R, Richmond S et al. Twenty-year cohort study of health gain from orthodontic treatment: temporomandibular disorders. Am J Orthod Dentofacial Orthop 2009;135:692.

18. List T, Axelsson S. Management of TMD: evidence from systematic reviews and meta-analyses. J Oral Rehabil 2010;37:430–451.

19. Greene CS, Laskin DM. Temporomandibular disorders: moving from a dentally based to a medically based model. J Dent Res 79: 1736-1739, 2000.

20. Velly AM, Look JO, Carlson C, Lenton PA, Kang W, Holcroft CA, Fricton JR. The effect of catastrophizing and depression on chronic pain--a prospective cohort study of temporomandibular muscle and joint pain disorders. Pain 2011 Oct;152:2377-83.

21. Dworkin SF, Sherman J, Ohrbach R, et al. Reliability, validity and clinical utility of RDC/TMD Axis II scales: Depression, non-specific physical symptoms and graded chronic pain. J Orofac Pain 2002;16:207–220.

22. Plesh O, Adams SH, Gansky SA. Temporomandibular Joint and muscle disorder-type pain and comorbid pains in a national US sample. J Orofac Pain. 2011;25(3):190-8.

23. Diatchenko L, Slade GD, Nackley AG, Bhalang K, Sigurdsson A, Belfer I, et al. Genetic basis for individual variations in pain perception and the development of a chronic pain condition. Hum Mol Genet 2005;14:135–143.

24. Ligas BB, Galang MTS, BeGole EA, Evans CA, Klasser GD, Greene CS. Phantom bite: a survey of US orthodontists. Orthodontics 2011; 12: 38-47.

25. The President's Conference on the Examination, Diagnosis and Management of Temporomandibular Disorders. (Laskin, D. et al eds.), Chicago, American Dental Association, 1983.

26. Roistacher, S., Olsen, F., and Tanenbaum, D.: Teaching the Management of Chronic Face Pain. J Dent Educ 1986; 50(12):734-735.

27. Gonty, A.: Teaching a Comprehensive Orofacial pain Course in the Dental Curriculum. J Dent Educ 1990; 54(6):319-322.

28. Mohl, N. et al: Curriculum Guidelines for the Development of Predoctoral Programs in Temporomandibular Disorders and Orofacial Pain. J Dent Educ 1992; 56(9): 646-649.

29. Mohl, N. et al: Curriculum Guidelines for the Development of Postdoctoral Programs in Temporomandibular Disorders and Orofacial Pain. J Den Educ 1992;56(9): 650-658.

30. Curriculum guidelines for occlusion. Section on Dental Anatomy and Occlusion of the American Association of Dental Schools. J Dent Educ 1993; 57(5):384-387.

31. Curriculum guidelines for orthodontics. AADS Section on Orthodontics and the Council on Orthodontic Education of the American Association of Orthodontists. J Dent Educ September 1993; 57(9):707-710.

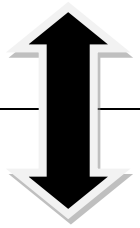
32. Mohl, N. et al: The Third Educational Conference to Develop the Curriculum in Temporomandibular Disorders and Orofacial Pain: Introduction. J Orofac Pain, 2002; 16(3):173-175.
33. Glaros, A.: Teaching evidence-based approaches to orofacial pain. J Orofac Pain, 2002; 16(2):89.
34. Sessle, B.: Orofacial pain: an educational focus. J Orofac Pain 2002; 16(3): 169.
35. Fricton, J.: Development of orofacial pain programs in dental schools. J Orofac Pain, 2002; 16(3):191-197.
36. Gonzalez, Y. and Mohl, N.: Care of patients with temporomandibular disorders: an educational challenge. J Orofac Pain, 2002; 16(3):200-206.
37. Nilner, M.: Educational Committee, European Academy of Craniomandibular Disorders. Curriculum guidelines for orofacial pain and temporomandibular disorders. Eur J Dent Educ 2001; 5(3):136-138.
38. Nilner, M., Steenks, M., DeBoever, J., Ciancaglini, R., Kononen, M., and Orthlieb, J.: Guidelines for curriculum of undergraduate and postgraduate education in orofacial pain and temporomandibular disorders in Europe. J Orofac Pain 2003; 17(4):359-362.

Table

TABLE I – Proposed Curriculum Topics for TMD Course

SUBJECT TITLES	TOPICS TO BE COVERED
Anatomy, physiology and pathophysiology of the TMJ complex	Structural and functional anatomy of TMJ components Ideal vs functional condyle / fossa / disk relationships Internal derangements of the TMJ disk Mandibular movements and chewing kinematics
Neurophysiology of Pain	Normal pain conduction -Nociceptive -Inflammatory -Neuropathic -Musculoskeletal Neuroplasticity Referred and heterotopic pain Chronic pain
History and Examination Procedures For Orofacial Pain and TMD Symptoms	How to examine an orofacial pain patient How to take a pain history How to carry out a TMJ and masticatory muscle history and examination including palpation How to carry out a static and functional occlusal examination How to establish correct differential diagnosis
Etiology of TM Disorders	Arthrogenous vs muscular disorders Specific vs non-specific onset history Multi-factorial and biopsychosocial concepts Idiopathic etiology – impact on treatment
Occlusion, condyle position (CR), and TM Disorders	Theories and concepts of functional occlusion: historical review and current status Is there a relationship between occlusion and TMD? Is there a relationship between condyle position and TMD?
Masticatory Muscle Disorders – Diagnosis and Pathophysiology	Myofascial pain Myositis Myospasm Local and centrally maintained myalgias Myofibrotic contracture Cervicogenic pain

SUBJECT TITLES	TOPICS TO BE COVERED
TM Joint Disorders – Diagnosis and Pathophysiology	TMJ disk derangements Inflammatory TMJ disorders Non-inflammatory TMJ disorders Traumatic joint injuries Growth disorders (hyperplastic and deficiency problems)
Psychosocial Issues in TMD/OFP	Stress as an etiologic factor Anxiety and depression Chronic pain issues The biopsychosocial model – impact on TX
Bruxism – Current Concepts	Old theories -Occlusal interferences -Psychological stress Current concepts -Sleep parasomnias -Minor correlation with muscular pain Management with oral appliances
Oral Appliance Therapy	Types of oral appliances What oral appliances can and cannot do History of OA therapy relative to failed and successful outcomes Evolution of OA therapy – current concepts When/When not to use OA's in TMD treatment
Orthodontics and TMD	History of orthodontics as related to concepts of static / functional occlusion and TMD Does orthodontics cause TMD? Does orthodontics prevent TMD? Does orthodontics cure or mitigate TMD?
Screening Orthodontic Patients for TMDs	Standardized Screening questionnaire Standardized Psychosocial evaluation Standardized Clinical exam including history and physical examination Comprehensive examination (imaging as needed) -DDS/PT/MD referrals as needed

SUBJECT TITLES	TOPICS TO BE COVERED
Treatment of TM Joint/ Disk Disorders  AND Treatment of Myogenous TMD Problems	Patient education and self-management Pharmacological therapy -Analgesics -NSAIDS -Corticosteroids -Muscle relaxants -Antidepressants Cognitive behavioral intervention Physical therapy -Physical exercise and manipulation -Physical agents and modalities -Home care exercises Orthopedic appliance therapy (see above) Occlusal management Surgical interventions -Arthrocentesis -Arthroscopy -Discectomy -Total joint replacement
CASE DISCUSSIONS Problem-based format with preliminary diagnosis, treatment recommendations, and eventual final outcome	Your patient presents with TMD prior to orthodontic treatment Your patient develops TMD during orthodontic treatment Your patient develops TMD post-orthodontic treatment New patient presents with TMD and specific referral for orthodontic TX as solution New patient presents after splint TX by dentist, now needs permanent occlusal change to maintain new jaw relationships

LEGEND: This Table is based on TMD curriculum concepts and guidelines published in a large number of papers over the past 20 years. [25-38]

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