Hawaii Dental Association Annual Meeting, 2017

DIAGNOSIS AND MANAGEMENT OF TMDs, TMJ DYSFUNCTION AND OROFACIAL PAIN IN 2017

AND

SPLINT THERAPY: INDICATIONS AND COMPLICATIONS IN RESTORATIVE DENTISTRY

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Why should general dentists and specialists have a better understanding of pain, temporomandibular dysfunction, and Splint Therapy?

General Dentists and Specialists:
- Clenching, bruxing may result in muscle soreness and myofascial pain which:
- May result in limited mouth opening
- Inability to make accurate interocclusal records causing multiple crown adjustments
- Produces transient interferences and malocclusions. Be careful with this one.
- Post tx. Muscle and TM joint soreness and dysfunction
- Occlusal instability- feels like bite changes
- Causes remakes and “do overs,” with loss of patient confidence and even lawsuits.

Specialty Practices: Endo, Perio
Limited mouth opening will make molar endo and perio. surgery very difficult and painful for the patient.
- Perio. Secondary occlusal traumatism with continued occlusal traumatism & mobility
- Endo: has resulted in Tx. of the wrong tooth
- Endo. Unnecessary redos.
- Post- op pain & dysfunction may result in angry patients and loss of referrals.
- Lawsuits

Pain Management: 101
- What should you know about Orofacial Pain and TMDs in 2017?
- You should know when to treat & when to refer. “Hold them or fold them”
- You should understand basic human anatomy and clinical neurology
- You should know the difference between pain caused by:
  - Muscle problems, TM Joint problems, Neuropathic pain problems (CNS)
  - Muscle problems: stages of muscle dysfunction, what is myofascial pain?
  - Localized TMJ arthritis(OA) and arthritis caused by systemic disorders (RA)
  - Other medical disorders that affect the TM Joints; e.g. Auto-immune etc.
You should understand basic pharmacology: dose dependent and medication specific rules when using NSAIDs, muscle relaxants and use of vapo-coolants in pain management. ("Don’t use Endo-Ice")

Tooth pain: Pulpal involvement, hyperocclusion, cracked tooth, cracked root, referred tooth pain.

Pain Management: 101
Pain Disorders are classified as classified as either Physical or Psychological

Orofacial Pain: Axis I
- Axis I problems are the Physical Disorders which include:
  - Vascular
  - Neurogenic
  - Neuro-Musculoskeletal Disorders:
  - TMDs, Musculoskeletal pain, Internal derangements of the TMJ and inflammatory disorders that affect the TMJs are in this category.
  - Neuropathic Pain and the Centrally Mediated pains

Orofacial Pain: Axis II
Axis II problems are the Psychological disorders which include personality Disorders:
Depression, Anxiety, Bi-polar disorders are the 3 most commonly seen disorders by dentists.

Classification of Temporomandibular Disorders (TMDs), Physical Disorders

Masticatory Muscle Disorders
1. Protective Co-Contraction
2. Local Muscle Soreness
3. Myofascial Pain
4. Myospasm
5. Chronic Centrally Mediated Myalgia

Temporomandibular Joint Disorders:
Inflammation and Derangements of the Condyle-Disc Complex
- a. Inflammation, synovitis
- b. Normal TMJ Arthrokinematics
- b. Disc Displacement with Reduction
- c. Disc Displacement without Reduction
- d. Adhesions
- e. Deviation in Form
- f. Subluxation
- g. Spontaneous Dislocation

When Two People Meet: The Patient Interview

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The two most important Keys to Diagnosis are to "Listen" to the patient and "Observe" the patient and the casts carefully

Rule # 1: "Pay Attention" and "Listen" to the Patient!

The following Model for the “Differential Diagnosis of Head and Neck Pain” was developed and modified at the UCSD Medical Center and USC School of Dentistry by Dr. Tanaka with valuable help from the UCSD faculty and the CRF Research Team. UCSD Faculty: W. Wiederholt MD, T. Davidson MD, M. Weisman MD, J. Harris MD, PhD; CRF Research Team: David Hancock, DDS, Jose Luis Ozawa, DDS, Larry Yoshioka, DDS, David Lurye, DDS

Pain & Dysfunction may originate from one or a combination of the following: *The key question is, what medication reduces or eliminates the pain?

Clinical Neurology for Dental Specialists
Neurologic Examination of the Patient in Pain; Cranial Nerve Examination
Examination of the 12 Cranial Nerves: Sensory & Motor Function & Pneumonics (Tanaka T)

When Two People Meet: The Patient Interview
Listen and consider the following:
- Neuro-musculoskeletal Pain: Myofascial Pain & Myalgia (75-80% of Pts.)
- "Tension Type HA (TTH), formerly called “Muscle Contraction HA”

Stages of Muscle Dysfunction and Myofascial Pain:
(1) Sustained muscle contraction,
(2) Myalgia, (Local muscle soreness),
(3) Myofascial Pain (can refer to other distant sites),
(4) Muscle spasm with tetanic contractions, #4 rarely seen by dentists

“Stretch and Spray” for Endo, Perio, Restorative, Implant Procedures
“Be careful and do not spray the vapocoolant in the eyes or ears.” Ethyl-Chloride, Gebauer Co.

How do Muscle Disorders affect the occlusion?
(Summary below by Tanaka.) See Okeson 6th ed. CV Mosby
(A) Sustained muscle contraction: resulting from clenching, bruxing
(B) Protective muscle co-contraction: formerly “muscle splinting,” may result in limited mouth opening and minor changes in the occlusion.
(C) Local muscle soreness: Pt. feels discomfort and or pain in the affected muscles, occlusal changes noted, “confusion about the “bite” from one day to the next. Limited mouth opening with “soft end-feel.”

(D) Myofacial pain: muscle pain at rest and when chewing, limited mouth opening with soft end-feel, occlusal changes noted with confusion about the “bite.” **Muscles may shorten more on one side than the other side.**

**Pain can be referred to another site near the affected muscles.**

**“Do not equilibrate the teeth during any of these stages.”**

**Palpation of SCM & Lymph Nodes:**

- Palpate the facial muscles with light pressure and only if you can hold the muscle fibers between your fingers.
- SCM: Be careful to hold fibers between your fingers.
- Don’t press **firmly** on the carotid bifurcation (triangle), you may release the plaque.
- Palpation of SCM & Lymph Nodes in individuals older than 40 should be done with gentle pressure on the bifurcation.
- Some of the plaque in the Carotid Artery becomes calcified & is hard as gravel in the late stages.
- **Vigorous palpation may dislodge the plaque.**

**“Convergence” (Central Excitatory Effect)**

**Central Sensitization and Centrally Mediated Pain:**

Continuous bombardment of painful sensory input to the higher centers may lead to a sensitization of the higher centers, resulting in a pain that now originates in the higher centers but continues to be felt in the original site. An example, is an endodontically treated tooth that continues to illicit pain even after successful endodontic treatment.

- **Analgesics, NSAIDs and narcotics will not relieve the pain**
- **Neuroleptic drugs - Neurontin, Tegretol will usually relieve the pain, but do not prescribe either drug without first taking a thorough health history. There are contra-indications and side effects in some patients.**

**Neurogenic or Psychogenic Pain? Slide Series**

**Take a careful Patient History:**

**History: Chief Complaints**, Patient has a 3 yr. history of “Persistent pain” in the upper left edentulous ridge.

**Pain onset:** Pain started as a sharp, shooting pain in the upper left 2nd molar and has not been relieved by endodontic treatments or extraction of #15,14, & 13.

**Psychogenic Pain and Dysfunction:**

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Patient who self adjusted his own crowns with wet and dry sandpaper. slide

"I've had so many occlusal adjustments that I finally went to Home Depot and bought some wet and dry sand paper and cut out some horse show shaped pieces and decided to just chew until it felt good myself."

“Don’t assume that the pain is “Psychogenic” because you can’t make the diagnosis.”

Pain description: Will vary between patients and between appts. & may be inconsistent. Pt. may not be aware of the above.

**If the diagnosis cannot be confirmed, do not initiate reversible treatments, avoid occlusal adjustments.

Dentists should have a common understanding of:
1. Medicine and the other Specialties in Dentistry,
2. How diseases and physical disorders affect the ability to treat dental disorders,
3. How are pain and occlusion involved in all of these?

Neuro-Musculoskeletal Pain:
- Muscle disorders, local muscle soreness, Myofascial Pain & Myalgia
- This group is 75-80% of all patients
- Tension Type HA (TTH) 80% of Headaches
- Progression of muscle disorders that progress from clenching, bruxing, oral habits
- Protective muscle co-contraction (limited range)
- Local muscle soreness
- Myofascial Pain and pain referral to other sites
- Muscle spasm (rare)

Palpation of the Muscles of Mastication: Temporalis, Masseter, Medial Pterygoid, Digastric: anterior and posterior fibers

Anatomy and Function of the Temporomandibular Joint
- The dumbell shaped disc should move with the condyle because of the shape of the disc?
- What causes TMJs to click? (Tanaka, et al)
- Normal Mouth opening is 40-45mm and equal to two fingers between the incisors.
- 3 Fingers is equal to 55-65mm opening which is a hypermobile opening.
- Is there an ideal condylar position in the fossa? (NO)
- Stages of Disc Displacement (Jeff Okeson)
- Late stages of disc displacement (Jeff Okeson)
- Hypermobility: 50-65 mm

TMJ Clicking:
- Does “clicking” mean that the disc is displaced?
Use a stethoscope to listen for TMJ sounds, “forget the Toys.”

40%+ of opening clicks at 30-35mm occur as the condyle passes over the crest of the articular eminence. *Tanaka etal, manuscript in progress.*

This is a “late opening click,” and you will hear an “early closing click” almost immediately as the mouth starts to close back over the crest of the eminence.

A displaced disc will usually click anywhere on opening but will almost always have a late closing click when the teeth are almost touching.

**The Joint Loading Test:**

Ask the Patient before the Joint Loading Test if they are experiencing any TM Joint discomfort eating, chewing, singing, or talking?

If no, gently load the TMJs as in making a CR record, then ask the patient to open and close to 20mm several times.

If no discomfort, this is most likely no joint problem and dental procedures and you may continue with the dental procedure.

**TMJ Remodeling:**

*Oral habits and tooth wear related to osseous remodeling of the TMJ* (Tanaka, APS 2015 Annual Meeting)

*Joint Loading Test and Centric Relation Records* (*Tanaka, manuscript in progress*)

The status of the TM joints should be determined before making CR Records and before initiating all dental procedures.

**The Joint Loading Test:**

- Using the Bi-manual Dawson Technique, gently seat the condyles into the fossae.
- If the TMJs are able to accommodate the pressure, continue to seat the condyles into the fossae and then ask the pt. to open and close 10-15mm in a hinge motion.
- If the Pt. remains comfortable, you may continue the exam.
- If the TMJs are uncomfortable with even gentle pressure, one should consider reappointing the patient and referring the Pt. back to the referring dentist.

**What is the Relationship between Occlusion and TMD Symptoms and how can the clinician interpret and use these studies?**

Okeson reviewed the findings of 78 epidemiologic studies that investigated the relationship between occlusal factors and TMD symptoms. *Pub Med search from 1979 - 2008*

**Are TMDs caused by Occlusal Interferences?**

The answer depends upon:

**1. How far the patient has to move the mandible to fit the teeth together, and…**

2. Is this amount within the “adaptive range” of the patient?

3. “Is the patient able to tolerate the range of adaptation,” e.g. .5m or 2.1mm?

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4. What is the physical and psychological condition of the patient?
5. Does the patient clench or brux?

**Tanaka Summary:**

**The first question should be:** What is causing the occlusal interference instead of: How am I going to treat the occlusal interference?

*It is critical therefore, that the clinician understand the terminology when discussing temporomandibular disorders and occlusion.*

*The presence or degree of the CR-MIP slide is not as important as what the individual does with the slide.*

*If the individual does not engage in oral habits, (clenching, bruxing), they will rarely experience TMD signs and symptoms.* *(Exceptions may include trauma & systemic diseases.)*

**Muscle Dysfunction and The Adaptive Centric Position**

“70% of muscle dysfunction occurs because of sustained contraction and or emotional stress, *not the slide from CR to MIP.*”

**Stages: (Okeson; Mahan et al)**

1. Sustained contraction (clenching/bruxing)
2. Local muscle soreness
3. Myofascial pain – muscles are painful at rest and with movement.
   - Painful muscles can refer pain to adjacent sites.
   - Painful muscles can cause transient, altered tooth contacts on closure, seen as interferences and malocclusion.

**Do not adjust occlusion in the presence of pain if you suspect the pain is related to one or more of the following:**

- Systemic disorders, Trauma & Genetic Disorders
- Central (CNS) - Cerebral Palsy- sustained clenching; Bruxing
- Movement Disorders- Parkinsons, Huntingtons Disease, Tardive / Orofacial Dyskinesia from anti-psychotic meds. (Thorazine, Artane)
- Systemic disease – RA, inflammatory disease that alters the occlusion and destabilizes the occlusion.

**Occlusal Forces and Muscle Dysfunction:**

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The response to occlusal loading forces is dependent on 3 basic factors:

**Time, Direction, and Load**

Other contributing factors are:
- Facial type, (e.g. Brachyfacial, Dolicofacial), Gender, and Patient Age

**What are the current etiologies and treatments for TMDs?**

1. **Muscle Disorders:** current therapies include splint therapy, muscle relaxants (Flexeril), NSAIDs, behavioral factors.
2. **Muscle disorders, myofacial pain**. Orthotics (splints) of varying types are effective for different reasons, behavioral Tx, *(ref. Dao et al J Pain, 1994)*
3. **Muscle and Joint disorders:** current therapies include splint therapy, muscle relaxants (Flexeril), NSAIDs behavioral therapy, physical therapy, exercise, and limited use of mild anti-depressants (Elavil & other OTC non-prescription medications).
4. **Orthodontics and or orthognathic surgery:** *McLaughlin, Arnett, Facial and Dental Planning for Orthodontists and Oral Surgeons*
5. **Possible airway and sleep disorders:** *Park, Lavigne, Dement, Cruz*

**What are current treatments for TM Joint disorders?**

(Local, Systemic & Auto-immune joint disorders involving inflammation and active remodeling)

1. Current therapies include: splint therapy, muscle relaxants (Flexeril), NSAIDs (Ibuprofen, Naproxin sodium, Enbrel, Tetracyclines).
2. Splints may be used to provide a stable temporary base for the changing occlusion, not as a specific therapeutic treatment for inflammation.

**References for Occlusal/ Inter-proximal Forces, and Crowding of Mandibular Incisors:**

- Gibbs, Lundeen, Mahan - diurnal forces
- Nishigawa – nocturnal forces
- Kasahara – Interproximal contacts when biting
- Bando, Yamagawa – Interproximal forces
- Duygu etal- Bite force & influential factors on bite force measurements Lit Rev:
  - Abstract: Maximum voluntary bite force is an indicator of the functional state of the masticatory system and the level of maximum bite force results from the combined action of the jaw elevator muscles modified by jaw biomechanics and reflex mechanisms. The measurement of bite force can provide useful data for the evaluation of jaw muscle function and activity. *Eur J Dent April 4(2):223-232. USC*

**Diurnal and Nocturnal Occlusal Forces** *(Tanaka, manuscript in progress)*

- 85 lbs. – max. diurnal bite force – anterior teeth
- 185 lbs – max. diurnal bite force- posterior teeth

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95-200 lbs – nocturnal forces – anterior teeth
290-400+ lbs. – nocturnal force – posterior teeth
2x-3x+ -nocturnal forces are greater

58 lbs – Chewing forces
68 lbs - Swallowing forces

Research:

Female, age 28, anterior parafunctional habits with minimal wear.
Gold castings by Katherine Tanaka, DDS
RVTucker.org  (Cast Gold Study Clubs)

Study of 300 y/o early man skulls & occlusion, occlusal wear & cervical notches (NCCLs), and TMJs Tanaka T, Hancock D, Tanaka K, Tanaka M, 2004; 2010

Are Abfractions caused by tooth bending forces or toothpaste?
A study of 294 dried specimens, 150-300 years of age.
TTT, KT, Hancock, MT, 2004 and 2012

Occlusal Therapies:

- Occlusal Adjustment, Occlusal Equilibration, and Minor Occlusal Adjustments are frequently necessary when inserting crowns with occlusal coverage and require no special guidelines.
- The occlusion should be worked out before the milling.
- Usually consider adjusting the distal buccal cusps of the max. 1st and 2nd molars in a “working” movement. 6 Keys to Occlusion, Andrews
- Consider adding composite to the lingual of the max. canines for canine guidance,
- Complete Occlusal Equilibration is not indicated very often by GPs but should follow the BULL Rule.
- Pre-equil. a set of mounted casts before any adjustments.
- Don’t schedule equil. Appt. at 8:00am for nocturnal clenchers and bruxers.
- Make a splint over the final seated crowns to protect the teeth and restorations.

References:

1. Incisor display at rest, a function of aging, Vig RG, Brundo GC JPD 39:502-504, 1978; Sackstein M 2008 Int J Pros
2. The mean positional changes of the maxilla during adult life, for both sexes combined: Behrents RG 1984

“How will continued growth alter the anterior guidance, e.g. overbite & over-jet?”

Aging and Oral Habits
1. The overjet will decrease from age 37-77

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2. The mandibula incisors will move lingually.
3. The maxillary incisors will move downward

_Aging and Oral Habits_

1. A constricted anterior envelope will develop with increasing age
2. Wear will be seen at the linguval of the max.incisors. & labial of mand. incisors.
3. Retrusive forces may lead to TMDs

_Aging and Oral Habits_

1. The initial contact on closing will be more incisal with max. teeth
2. The incisal contact at full closure may be more lingual, resulting in retrusive forces on the mandible
3. HAs and neckaches (TMDs are frequently seen. Rec Tx: Orthodontic Tx.

_Review of Guidelines relating age and oral habits_

- Overbite increases
- Overjet decreases

_Chewing envelope decreases_

- HAs may be related to the occlusion
- Clinical signs: Fremitus, TMD (HAs, neckaches)
- Rec. Txs: Splint Tx, Ortho, P.T., Chiro.

_Questions for the attending doctors and staff:_

1. Could the tooth be in hyperocclusion? Explain what you would do and with what instruments and materials to rule out hyperocclusion? ____________________________
2. The endodontist feels that he has more years of experience and that he wants to do the occlusal adjustment of the treated (endo) tooth. It is a tooth that you just placed a EMax crown on 3 months ago. What do you do? ____________________________
3. What are the clinical signs of occlusal trauma? ____________________________
4. Trauma to the periodontium from functional and parafunctional forces causing damage to the attachment apparatus by exceeding it’s reparative and adaptive capacities is referred to as, ____________________________?
5. What is “primary occlusal traumatism?”
6. What is “secondary occlusal trauma?”

_Patient Interview & Pain Classification:_

1. The 2 most important things the Dr. should do during the initial patient interview? ____________________________
2. What are the 2 classifications of Orofacial pain? _Axis 1 ____, _Axis 2 _______
3. Myofascial pain is included in which category? _Axis 1/? Axis 2 ____?_
4. Depression and anxiety disorders are included in which category? __________
5. TM Joint arthritis is in which category? __________
6. Dr. Tanaka’s Dental-Medical Pain Model, 4 basic origins of pain were described, what are the first three?
1. __________, 2. __________, 3. __________?

Pain Differential Diagnosis from Pt. Interview
1. Pain described as sharp, shooting and burning is ________?
2. If dental pain from a tooth with deep caries is described as throbbing, beating & constant, what is the dental diagnosis? ________?
3. Pain described as dull, achy, sore and tight from the masseter muscle is in which ________?
4. Headaches that make the Pt. sick and nauseous, and light bothers them are ________?

Differential Diagnosis of Pain:
1. Is it possible for a patient to feel pain in tooth #3 when tooth #30 requires endodontic treatment? Yes ___, No __? Explain?
2. Is it possible for a patient to feel pain in tooth #19 when tooth #30 requires endodontic treatment?
3. Endo.Tx was completed 2 & 5 weeks ago but the same pain continues, No hyperocclusion or x-ray signs. Give possible reasons for the continued pain?
   ________________________________
4. What are your Tx. Recommendations for the Patient in Ques.3? __________

Pain Management with Meds. & Splints
1. OTC medications will relieve pain of which category? _____?
2. Will OTC medications relieve pain described as sharp, shooting and stabbing?
   Yes ____, No ____? Explain __________________________?
3. Will splints relieve pain described as sharp, shooting and stabbing?
   Yes ____, No ____? Explain
4. Will splints relieve pain from muscles described as dull, achy, sore and tight?
   Yes ____, No ____? Explain __________________________

Perform a clinical examination of the 12 Cranial Nerves:

Describe which cranial nerves have Sensory & and or Motor Function?
______________________________________.

"THANK YOU FOR YOUR KIND ATTENTION."
I HOPE YOU HAVE A HAPPY AND HEALTHY 2017.

IF YOU HAVE FURTHER QUESTIONS, PLEASE SEND ME AN EMAIL AT:
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SINCERELY,
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