Occlusion & TMJ to TMD & Orofacial Pain

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Occlusion & TMJ to TMD & Orofacial Pain

- History
  - Occlusion
  - TMJ
- Current TMD
  - Guidelines
  - Patient Care
  - Research
- Current OFP
  - Acute v. Chronic Pain
  - Neuroplasticity
  - Comorbidity
  - Neuropathic Pain
HISTORICAL TMJ MODEL
Dental to Medical Approach Part 2

❖ Ancient Egyptians; 500BC - Manipulation (Hippocrates)
❖ Early Surgeons; 1800s-1930s - (Annandale 1887, Disc Repos; Lanz, Pringle 1918, Wakeley 1900, Discectomy)
❖ Otolaryngologists; 1934 - Occlusion (Costen)
❖ Recent Oral & Maxillofacial Surgeon; 1970s -Present Farrar, McCarty, Wilkes, Dolwick, Piper, Wolford, Arnett
❖ Imaging Studies; 1960s to present - Ricketts, Updegrave, Wienberg, Hatcher, Arthrograms, Tomography, MRI, CBCT, FMRI, Brain Neural Imaging, Biophotonics
❖ ADA President’s Conference on TMD 1982
❖ AAOP founded 1975; TMD Guidelines 1990, 1993
HISTORICAL TMJ MODEL
Dental Mechanical (Occlusion) Approach Part 1

- Gnathology, 1920s -2000+s
- Scandinavian Oral Physiology Studies, 1950s -80s
- Intraoral Appliances 1950s - present
- Equilibrationists, 1950s-1980s -
- Prosthodontic Treatment Concepts, 1950s -present
- Neuromuscular Occlusion, 1960s - present

A majority of the mentors/educators in the past have inferred, if not claimed, that technical occlusal approaches successfully treat TMD
HISTORICAL OCCLUSION / TMD MODEL
Dental vs. Medical Approach

**DENTAL**
- Technically Based
- Procedure Based
- Testimonial Based
- Individual Clinician
- Treatment (Cure)

**MEDICAL**
- Diagnostically Based
- Problem Based
- Evidence Based
- Multidisciplinary team
- Management
DIFFICULTIES with ESTABLISHING EVIDENCE-BASED TMD GUIDELINES

- Number of Confounding Variables
- Lack of Knowledge Regarding Natural Hx
- Possible Number of Contributing Factors
- Multitude of Conditions with Similar Symptoms
- Frequency of Multiple Diagnoses (Co-morbidity)
- Difficult Rigors of Ethical Scientific Methods (RCTs)
- Lack of Science Transfer & Critical Thinking* 

*NIH TMD Technology Assessment Conf. JADA 1996;127:1602
*ADA Parameters for TMD. JADA; Feb, 1997 Suppl 1s-32s
TMD Definitions

TMD is a Collection of Disorders: NOT A SYNDROME

- Musculoskeletal Disorders Affecting the Jaw
  - Temporomandibular Joint
  - Masticatory Musculature

(NOT A SYNDROME)

TMD Definitions

TMD/OFP EPIDEMIOLOGY

- TMD Pain Is Most Common Chronic OFP Pain
- Similar to Back Pain - Intensity, Persist. & Psych. Impact
- TMD Rare in Children Prior to Puberty; Peak age 35-45
- TMD Not Common in Aging Population
- Incidence (Rate of New Cases) 2% - 3% / Yr
- 4:1 up to 6:1 Female to Male Patients Seeking Treatment

AAOP TMD Guidelines, Quintessence; 1990, ’93, ’96, ’08, ’13
Lipton JA et.al., JADA 1993;124:115-121
Common Related Complaints
Influenced By Jaw Function

- Jaw, Face, Ear & Head Pain
- Limited Opening, Catching / Locking
- Joint Clicking, Popping or Grating

Common Comorbidities
Common Mechanisms

- Global Headache
- Migraine / Variant HA
- Cervicogenic HA
- Upper Quarter Pain
- Tinnitus
- Global Muscle Pain (FM)
- Fat Fullness
- Disease
- Bowel Syd
- Psychosis, Vertigo
- Otic Pain
- Sleep Deprivation
- Chronic Fatigue Synd.
- Poor Adaptation to Stress (Poor Copers)

AAOP TMD Guidelines, Quintessence, 1990, ’93,’96, 08, ’13
Lim PF, Maixner W, Khan AA  JADA 2011; 142:1365
Current Concepts Re: Etiology of TMD

GENDER, AGE, GENETIC (COMT Gene Variants) RISK FACTORS

ARTICULAR
- Developmental/Acquired
- Trauma - (Parafunction??)
  Free Radicals, Metaloproteases,
- Metabolic - (Hormonal)
  Relaxin Relaxin & Beta-estradiol Affects
- Neurogenic Inflammation
  Cytokines, Neuropeptides, Prostaglandins
- Pathophysiologic - (Disease)

Systematic Reviews Part I & II: (Medline, Cochrane)
Evidence Lacking to Suggest Static Occlusion Factors Cause TMD

Raphael KG et al, J Orofac Pain 2013;27:21-31
Current Concepts Re: Etiology of TMD

GENDER, AGE, GENETIC (COMT Gene Variants) RISK FACTORS

MUSCULAR

- **Peripheral Sensitization**
  - Ischemia w Prolonged Contract.
  - Tissue Injury Inflamm
    \[\uparrow\text{NGF, SP, Glutamate, Histamine, CGRP}\]

- **Central Sensitization**
  - Sympath. Hemodynamic (Stress)
  - Descending Modulatory NT
    \[\downarrow\text{Seratonin, NA, Endogen. Opiates}\]

Systematic Reviews Part I & II: (Medline, Cochrane)
*Evidence Lacking to Suggest Static Occlusion Factors Cause TMD*

BRUXISM: An Exaggerated Form of Oromotor Activity Assoc. with Sleep
Brainstem & Reticular Micro-arousals which Occur 6-14/hr (Stages 1 & 2)
EEG, EMG, Heart Rate ↑ w/o Return to Consciousness

Total Time Clench/Grinding 50 seconds (1% Sleep Time)
Extreme Bruxism: TMD Pts = Subjects
Rhythmic Mast. Ms., TMD Pts = Subjects
Sleep Apnea - Stage 2 & REM

3-5 Non-REM to REM Cycles q 90 (70-110) min

Al-Ani MZ et al. Cochrane Collaboration Cochrane Reviews 2007
Lavigne GL et.al., J Oral Rehabil 2008;35:476-494
Raphael KG et.al., JADA 2012;143:1223-1231
Diurnal (Awake) Bruxism

- Prolonged (Up to 30+ min), Low-level Awake Tensing /Clenching of Jaw Causes Delayed Pain Than Brief Sleep Bruxism Events
- EMG Levels Specific Areas Depending on Jaw Position
- Management: Aware Oral Habits, Relaxation & Coping Strategies

Palla S. 5th International Conference OFP & TMD Brazil 2009
Suggested TMD Management Model

Risk Management
(Diagnostic Process/
Necessary Records)

Acute TMD Mgt
(Localized Musculo-
skeletal Disorders)

Chronic Pain Mgt
(Global Pain/
Co-morbidities)
Suggested TMD Management Model

Risk Management (Diagnostic Process/ Necessary Records)
TMD Diagnostic Process

- Screening Questionnaire & Exam
- Comprehensive History & Exam
- Hard & Soft Tissue Imaging
- Physical Therapy Evaluation
- Additional Diagnostic Tests
- Additional Consultations
  - PCP & Approp. DDS Specialists
  - Neurologist
  - Otolaryngologist
  - Rheumatologist / Orthopedist
  - Psychologist / Psychiatrist
  - Pain Management Specialist
Suggested TMD Management Model

Acute TMD Mgt (Localized Musculo-skeletal Disorders)
ARTICULAR
• Devel./ Acquired Disord.
• Disc Disorders
• Inflammatory Disorders
• Degenerative Disorders
• TMJ Dislocation
• Ankylosis
• Fracture

MUSCULAR
• Myalgia
• Myofascial Pain
• Tendinitis
• Myosplasm (Trismus)
• Myositis
• Myofibrotic Contracture
• Neoplasia

TMD: Disc Derangement Disorders

- Disc Displace. w Reduction
  - Asymptomatic
  - Symptomatic
- Disc Displace. w/o Reduction
  - Acute
  - Chronic

SUMMARY of DISC STUDIES

- Disc position is highly variable (50+% of pop. / 33% of subjects)
- Not essential to “recapture / “normalize” disc position
- Interoccl. appl. rarely “recaptures” the disc
- Occlusal tx, especially equilibration, rarely indicated
- Successful mgt based on physical rehab, not surgery

TMD: Inflam. & Degen. Disorders

- Inflammatory Disorders
  - Synovitis/Capsulitis
  - Polyarthritides
- Non-inflammatory Dis.
  (Localized Osteoarthritis)
  - Active
  - Stable

PROGRESSION of OA

- DDw/oR to Osteoarthritis - nearly 100%
- Osteoarthritis
  - Follows a Natural Course
  - Reduction of Symptoms - 3+ Mos.
  - Stable Bony Changes - 2-4 Yrs.

Masticatory Muscle Disorders

- **MYALGIA / MYOFASCIAL PAIN**: Regional Dull Ache / Localized Tender Areas, Taut Bands, and Referred Pain to Distant Sites

- **TENDINITIS**: Tendinous Inflammation 2° to Repetitive Strain, Direct Trauma or Injury

- **MYOSPASM (Trismus)**: Acute, Sudden, Involuntary, Tonic Contraction of Muscle
Hyperirritable areas within taut bands of skeletal muscle or fascia, that are painful on compression and give rise to characteristic referred pain, tenderness & autonomic phenomena.

R de Leeuw, GD Glasser, OFP Guidelines, 5th ed. p1-23, Quintessence, Chicago, 2013
MASSETER & TEMPORALIS MUSCLES
Acute Musculoskeletal TMD/OFP Management Model

NIDCR Policy Statement 2013

**Management Goals**
- Relieve Pain
- Promote Healing
- Restore Functional ROM
- Optimize Masticatory Function
- Return to Previous Level of ADL

**Management Philosophy**
- Diagnostically Driven
- Problem-Based
- Goal Oriented

**Patient Education**

**Symptomatic Care**

**Behavior Modification**

**Pharmacotherapy**

**Physical Rehabilitation (Orthoses/Splints)**
Acute Musculoskeletal TMD/OFP Management Model

ORTHOSIS INDICATIONS

(When Symptoms Increase During Sleep: Waking Pain)
- Change Force Distribution Across Articular Tissues
- Tooth Sensitivity on Waking
- Protect Teeth/Restorations
- Test Jaw/Occlusal Stability
Systematic Reviews: Stab Splint Therapy Compared to Other Treatments for TMD

- Electronic Data Search 1966-2003:
  - No Statistically Signif. Diff. Compared to Other **Active Txs**; (Exercise Better for Disc Displacement)

  *Al-Ani MZ et al. Cochrane Collaboration Cochrane Reviews 2007*

- Occlusal Splints for Treatment of Bruxism
  - Comparison of Various Splints: Hard, Soft & Non-Occl Splints; Equal Efficacy for All 3 Appliances


- Systematic Review of Electronic Data Search, 1966-2006
  - 10 RCTs in 2 Meta Analyses Comparing Hard Stabl. Appl. to Other Appl. & to Non-occl. Appl & No Tx
  - Modest Efficacy w Stab. Splint to Non-occl. Splint & No Tx

  *Fricton J et. al., J Orofac Pain 2010;24:237-254*
Nociceptive Trigeminal Inhibition Suppression System Not Supported By Bruxism Studies
Clenching & Grinding Unchanged w Both Appliances
No Relevant Differences in Signs & Symptoms

Magnusson T et. al., Swed Dent J 2004;28:11-20

RCT of 40 Pts Comparing Stabilization Splints w NTI
No Statistically Significant Difference over 3 mos.


Decrease in Postural EMG Activity was Short Lasting w Both Appliances;
But EMG Not Related to Clin. Outcome

Bad-Hansen L et al,, Jr Oral Rehabil 2007;34:105-111

NTI RISKS:
1. Super-eruption of Posterior Teeth
2. Intrusion of Anterior Teeth
3. Increased Mobility/Sensitivity of Ant. Teeth
4. Irreversible Alteration of Condylar Position Resulting in an Unacceptable Occlusion
Acute Musculoskeletal TMD/OFP Management Model

Patient Education

Symptomatic Care

Behavior Modification

Pharmacotherapy

Physical Rehabilitation (Orthoses/Splints)

MANAGEMENT PHILOSOPHY
Diagnostically Driven
Problem-Based
Goal Oriented

MANAGEMENT GOALS
Relieve Pain
Promote Healing
Restore Functional ROM
Optimize Masticatory Function
Return to Previous Level of ADL

NIDCR Policy Statement 2013
“It ain’t what we don’t know that gets us into trouble. It’s what we do know that ain’t so”

Jr Clin Epidemiology 1991