Splint Therapy & Occlusal Adjustments*
July 15, 2008

Dent 6919
TMD and Orofacial Pain

*based on Dr. Anderson’s lecture in 2007
Principles: Occlusal Stability

• Reduced potential for tooth movement with full coverage
• Increased potential for tooth movement with partial coverage
• Reduced potential for tooth movement with part-time use regimen
Principles: Jaw Position Stability

- Reduced potential for jaw position change with passive appliance
- Reduced potential for jaw position change with part-time use regimen
Effects: Mechanism(s) unknown

- Effect on bruxism and behaviors
- Protects teeth
- Alter occlusal relationships
- Alter jaw position
- Nonspecific or placebo effect
Non-specific effects

• Several non-specific effects: Placebo/Nocebo effects, Pygmalion effect, Hawthorne effect

• Hawthorne effect describes a temporary change to behavior or performance in response to a change in the environmental conditions, with the response being typically an improvement.

Jaw pain intensity 1 month after treatment start
(Frahn und John, Dtsch Zahnärztli Zeitschr (German Dental Journal) 1996):
Control (monitoring)
Physical therapy
Stabilization appliance
Hawthorne Effect

• The term gets its name from a factory called the Hawthorne Works,[4] where a series of experiments on factory workers were carried out between 1924 and 1932.

• Many types of experiments were conducted, but the initial purpose was to study the effects of lighting on worker productivity. Researchers found that productivity almost always increased after a change in illumination but later returned to normal levels. This effect was observed for minute increases in illumination. Over time changes in illumination had no measurable effect probably due to regression brought on by the increased stress. (http://en.wikipedia.org/wiki/Hawthorne_effect)
Flat Plane Occlusal Splint or Stabilization Appliance

- Most commonly used appliance
- Maxillary or mandibular appliance
- Classic CR position or to closure from postural jaw rest position
Occlusal Design:

- **Intercuspal occlusion:**
  Opposing centric cusps and canines contact flat occlusal surface

- **Excursive guidance:**
  Shallow anterior guidance with protrusion and shallow canine guidance with lateral movement
Traditional fabrication of a stabilization appliance
Stabilization splint
Jaw Position

Guided Position “CR”
greater repeatability

OR

Closure from postural rest position: if GP aggravates pain or mechanical sx
**Maxillary Appliance**

- **Advantages:**
  - Most occlusal stability
  - Facilitates adjustment of excursive guidance

- **Disadvantages:**
  - Esthetics
  - Speech
  - Difficult w increased horizontal OJ or anterior open bite
  - Difficult w irregular occlusal plane
Mandibular Appliance

• **Advantages:**
  – Improved esthetics
  – Speech less problem
  – Easier to use full time

• **Disadvantages:**
  – More difficult excursive guidance design
  – Poor occlusal stability if maxillary anteriors periodontally involved
  – Difficult w irregular occlusal plane
Application is dependent on DIAGNOSIS!
Applications in TMD Management

- Sleep Bruxism and day time clenching
- Myofascial Pain/ Myalgia
- TM joint disc displacement w and w/o reduction
- TM joint arthralgia or osteoarthritis
- TMD-related ear pain
- Tension-type Headaches
- Dental pain from bruxism (reversible pulpitis or peri-radicular pain)
Stabilization Appliance: The Evidence

- Myalgia/MFP: effective
- Tension-type Headache: effective
- TMJ DD and Arthralgia: effective
- Dental Attrition: effective

The evidence in the therapy of TMD is good but not overwhelming.
Levels of evidence

Box 1  An example of the “hierarchy of evidence”\textsuperscript{17,18}

1. Systematic reviews and meta-analyses
2. Randomised controlled trials with definitive results
3. Randomised controlled trials with non-definitive results
4. Cohort studies
5. Case-control studies
6. Cross sectional surveys
7. Case reports

M Petticrew, H Roberts: J Epidemiol Community Health 2003
Systematic review


Aim: Whether the evidence is sufficient to judge occlusal appliances as being efficacious for the management of localized masticatory myalgia, arthralgia or both.

Methods: 4 placebo-controlled studies, several randomized wait-list controlled studies and several random-assignment treatment-comparison studies.

Conclusion: Considering all of the available data (pro and con), the authors conclude that the use of occlusal appliances in managing localized masticatory myalgia, arthralgia or both is sufficiently supported by evidence in the literature.
Soft Vinyl Mouthguard

- Original research not as effective as hard, more recent investigation suggests otherwise
- Useful with pediatric patients
- Simple fabrication
- Reduced cost
- Some patients find more comfortable
Soft Vinyl Mouthguard

- Reduced durability
- Increased porosity, less hygienic
- Some find less comfortable and exhibit increased bruxism
- Anecdotally, effective with bruxism induced dental pain
- Reports of occlusal change, although research has not substantiated
Soft Vinyl Mouthguard: The Evidence

• Myalgia (n=30): greater effect than palliative tx and no tx (Wright et al., 1995)

• TMD (MFP, ID w red, OA, arthralgia) (n=23): as effective as hard stabilization appliance (Pettengill, et al., 1998)

• TMD (MFP, ID w red) (n=200): as effective as hard stabilization appliance or self-care, counseling (Truelove et al., 2006)
Mandibular Orthopedic Positioning Appliance
Active Occlusal Design

- Anterior reverse incline guides jaw into predetermined position
- Posterior cuspal imprints
- Incisal edge-to-edge position eliminates TMJ disc displacement click, with increased joint comfort
Application

- **Original application (early 1980s):** Full-time use in attempt to “recapture disc” and “heal” joint
- **Current application:** Use in attempt to alter joint loading. Particularly effective for a.m. intermittent “closed lock”
Mandibular Orthopedic Positioning Appliance

- **Contraindication:**
  - Protrusive jaw position aggravates pain and/or mechanical joint symptoms

- **Disadvantages:**
  - Bulky, difficult to wear, although most adapt to qhs wear easily
  - Transient occlusal change on awakening usually lasting no more than 2 hrs
  - **About 10% patients experience occlusal changes, MONITOR OCCLUSION!!!
NTI-tss
(Nociceptive Trigeminal Inhibition- tension suppression system)
NTI-tss
(Nociceptive Trigeminal Inhibition- tension suppression system)
NTI-tss

Advantages:

- Packaging and corporate support
- Ease of clinical application
- Patient comfort
- Anecdotal evidence that anterior only contact more effective with heavy clenchers
NTI-tss: The Evidence

**Magnusson T, et al. (2004)**
- RTC, n=30, blinded
- Stabilization appl vs. NTI
- Follow-up at 3 & 6 mo
- 1 drop from each group
- For all measures, subjective and clinical the stabilization results more favorable than NTI
- 1 NTI subject occlusal change at 6 months

**Jokstad, et al. (2005)**
- RTC, n=40, blinded
- Stabilization appl vs. NTI
- Follow-up at 2, 6 wks & 3 mo
- 1 drop from NTI and 1 exclusion from NTI group
- Clinical measures, no difference
**NTI-tss: The Evidence**

**Occlusal Change:**
- 1 NTI subject occlusal change @ 6 months (Magnusson, *et al.*, 2004)
- 2 incidents reported to FDA Manufacturer and User Facility Device Experience Database (MAUDE) ([http://www.fda.gov/cdrh/mdr](http://www.fda.gov/cdrh/mdr))
- Local clinical community experience with occlusal change is not rare and can be irreversible

**Swallowing and/or Aspiration**
- 1 incident reported in Norwegian literature (Fleten & Gjerdet, 2004)
- 1 patient reported fear of swallowing (FDA MAUDE)
- 3 incidents of swallowing/aspiration (FDA MAUDE)
- Local clinical community experience, none of which I am aware.
Occlusal adjustment


**Aim:** This article summarizes the published experimental studies on occlusal adjustments and temporomandibular disorders.

**Methods:** 11 research experiments targeting bruxism, TMD, headaches, chronic cervical pain.

**Conclusion:** The experimental evidence reviewed was neither convincing nor powerful enough to support the performance of occlusal therapy as a general method for treating a nonacute temporomandibular disorder, bruxism, or headache.
Occlusal therapy: Much controversy surrounds the use of occlusal therapy. Based on available information, however, occlusal adjustments that permanently alter a patient’s occlusion should be avoided.

Second International Conference on Evidence-based Dentistry, 2006: Temporomandibular disorders – still controversies?! “Occlusal therapy... should be avoided. This statement is still current today.”