Temporomandibular Disorders

Temporomandibular disorders (TMDs) encompass a group of musculoskeletal and neuromuscular conditions that involve the temporomandibular joints (TMJs), the masticatory muscles and all associated tissues.

The signs and symptoms associated with these disorders are diverse, and may include difficulties with chewing, speaking and other orofacial functions.

They also are frequently associated with acute or persistent pain, and the patients often suffer from other painful disorders (comorbidities).

The chronic forms of TMD pain may lead to absence from or impairment of work or social interactions, resulting in an overall reduction in the quality of life.
Main complaints
Preauricular pain, right and left TMJs clicking sounds, headache, malocclusion, missing posterior teeth

T.C. 40 ys

Sharp pain, at the left and right preauricular regions; during click sound, during chewing and opening movements

Pain Localization

Headache
- localization: temporal region, bilaterally
- frequency: often (2-3 times/week)
- intensity: moderate-high (5-7 VAS)
- decreases with rest and increases with jaw movements

T.C. 40 ys

Vertical range of motion
Unassisted opening without pain
41 mm
Maximum unassisted opening
46 mm
Maximum assisted opening
49 mm
Vertical incisor overlap
3 mm

Jaw excursions
Right lateral excursion
5 mm
Protrusion
3 mm
Left lateral excursion
2 mm

Muscle Palpation

Joint Palpation

Joint Sounds

Click sound at right and left TMJs during chewing, opening, closing and lateral movements
**Diagnostic tests**

MRI

Not necessary

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**Working diagnoses**

1° Myofascial pain (Ia)
2° Arthralgia (IIa)
3° Disc displacement with reduction at right and left TMJs (IIb)
4° Headache attributed to TMD (IIIa)
5° Loss of occlusal support
6° Malocclusion

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**Treatment protocol**

1. Counseling and selfcontrol
2. Home exercises
   
   Pain → disappeared
   Click → reduced frequency

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**Outline**

- TMD diagnosis
- Condylar position and TMD risk
- Occlusal interference and TMD risk
- Red Flags and TMD risk

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**Treatment outcome**

T.C. 40 yrs

T.C. 40 yrs

T.C. 42 yrs

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T.C. 40 yrs
11 cases in which disturbance of mandibular joint function was considered the chief etiologic factor of abnormal ear and head conditions.

The condyles should be seated superior and anterior in the fossae against the articular disks and the distal slope of the articular eminence, and centered transversely.

The centricity of the condyles in the glenoid fossae involves a range, and eccentricity does not necessarily indicate TMD. Therefore, the analysis of articulated casts will not be diagnostic of TMD per se.

Condylar position assessed by magnetic resonance imaging after various bite position registrations

**Objective**: to evaluate the reliability and validity of 3 bite registrations in relation to condylar position in the glenoid fossae using magnetic resonance imaging in a symptom-free population.

**Methods**: 9 patients were selected from a large group of symptom-free patients who underwent magnetic resonance imaging and positional registrations. Three bite registrations were made: Centric Occlusion, Centric Relation, and Roth Power Centric Relation.

**Results**: A comparison of condylar position in the glenoid fossae using magnetic resonance imaging showed significant differences between the 3 bite registrations. The analysis of articulated casts will not be diagnostic of TMD per se.
• The differences between the 3 bite positions were small and, more importantly, highly variable.
• Variability in the findings between the bite registrations appear to reflect the lack of accuracy and predictability.
• Based on the findings that we are not positioning the condyles in specific positions in the fossae with various bite registrations, the clinical significance followed by the routine practice of condylar positioning must be questioned.

### Table 1: Distribution of condyle position in the 4 groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Anterior</th>
<th>Centric</th>
<th>Posterior</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normalized joint</td>
<td>71 (4.5%)</td>
<td>37 (8.6%)</td>
<td>4 (2.5%)</td>
<td>112 (7.1%)</td>
</tr>
<tr>
<td>Normalized mandibular</td>
<td>24 (13.8%)</td>
<td>37 (8.6%)</td>
<td>4 (2.5%)</td>
<td>65 (4.0%)</td>
</tr>
<tr>
<td>Symptomatic condylar</td>
<td>13 (8.2%)</td>
<td>39 (23.0%)</td>
<td>4 (2.5%)</td>
<td>56 (3.4%)</td>
</tr>
<tr>
<td>Symptomatic normal</td>
<td>13 (8.2%)</td>
<td>39 (23.0%)</td>
<td>4 (2.5%)</td>
<td>56 (3.4%)</td>
</tr>
</tbody>
</table>

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**CONCLUSION...**

Great overlap

Wide distribution

Condyle position per se is not diagnostic and would fail any useful prediction values

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Interestingly...

No association between condylar position and signs and symptoms of TMD was found

### Table 6: Chi-Square Test for Comparison of Presence of Bilateral Condylar Displacement (Interior and Distoal Direction on Left and Right Sides)

<table>
<thead>
<tr>
<th>Bi-Directional Condylar Displacement</th>
<th>Asymptomatic</th>
<th>Symptomatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence</td>
<td>7 (20.0%)</td>
<td>17 (51.4%)</td>
</tr>
<tr>
<td>Absence</td>
<td>28 (80.0%)</td>
<td>16 (48.6%)</td>
</tr>
<tr>
<td>Total</td>
<td>35 (100%)</td>
<td>35 (100%)</td>
</tr>
</tbody>
</table>

*P = .002*

Condylar retroversion found in volunteer normal joints by using the Condylar Position Indicator (CPI)

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**Mandibular dysfunction and incisor relationship: A theoretical explanation for the clicking joint.** Berry DC, Watkinson AC Br Dent J, 1978

Deep bite / Class II 2
The extraction – non extraction dilemma as it relates to TMD
RP McLaughlin, JC Bennett. Angle Orthod, 1995

Excessive anterior interferences resulting in possible posterior condyle displacement are the result of treatment mechanics

Condylar position and maxillary first premolar extraction
Anthony A. Gianelly, DMD, MD, Marco Guizetti, DMD; and Joseph Sibbitt, DDS, MPH
Boston, Mass.
Condyler position in 11 patients whose Class II treatment (TMJ with maxillary first premolar extraction and arch expansion) included extraction of the mandibular four premolars and 17 mandibular patients who were treated with similar procedures but without the extraction were compared. Condyler position was determined radiographically, and the posterior condyle was considered 1 degree anterior to the 12 o'clock position, and there were no statistical differences between the groups. In addition, no statistical correlation was found when the 12 o'clock position, maximal occlusion, and mandibular incisor inclination were correlated with condylar position. Thus, as determined in this study, condylar position was not related to the mandibular incisors' inclination, mandibular incisor inclination, or maximal occlusion.

Table I. Condyler A-P ratio to depict condylar position

<table>
<thead>
<tr>
<th>Group N = 17</th>
<th>Position</th>
<th>Central</th>
<th>A-P</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>0.31</td>
<td>0.25</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Diff.</td>
<td>0.06</td>
<td>0.32</td>
<td>NS</td>
<td></td>
</tr>
</tbody>
</table>

Average condylar position is not different in the two groups

Condyler position and Class II deep-bite, no-overjet malocclusions
Anthony A. Gianelly, DMD, MD, James C. Petres, DMD, and Joseph Sibbitt, DDS, MPH
Boston, Mass.

Table II. Condyler A-P ratio to depict condylar position in subjects with and without Class II deep-bite, no-overjet malocclusions

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Central</th>
<th>A-P</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>0.0</td>
<td>0.32</td>
<td>NS</td>
</tr>
<tr>
<td>Deep bite</td>
<td>1.02</td>
<td>0.27</td>
<td>NS</td>
</tr>
</tbody>
</table>

Average condylar position was concentric in both Class II 2 group and control group

CONCLUSION

There is no evidence that asymptomatic TM joints with posterior positioned condyles are at risk for disc displacement derangements.

There is no evidence that centric condylar position means “healthy” TM joint.

There is no evidence that centric condylar position limits risk when treating patients with TMD.

Outline

TMD diagnosis
Condylar position and TMD risk
Occlusal interference and TMD risk
Red Flags and TMD risk

Occlusal interferences
Natural dentition Restorative dentistry
Orthodontic treatment
In animal models, artificial occlusal alterations can result in disorders or damage of TMJs, masticatory muscles, and the nervous system. Long term mechanistic nociception is related not only to peripheral sensitization of nociceptive neurons but also to central sensitization.

However...

Results from animal studies cannot be directly extrapolated to humans.

...however sometimes

Pain in right masseter and TMJ region
Artificial interferences seem to play a different role in responses in subjects with an earlier TMD history compared to those without.

No differences in number of activity periods during active interference.

Different adaptation to occlusal changes.

Hypervigilance

Perceptual Amplification

Effects of occlusal interference in patients with muscle pain

Michelotti et al., in preparation

TMD subjects showed higher number of events with higher intensity compared to healthy subjects.

Aim

Effects of Experimental Occlusal Interferences in Individuals Reporting Different Levels of Wake-Time Parafunctions

Oral Behaviour Checklist

Michelotti et al. JOP 2012

Exclusion criteria:

1. Dental prosthesis
2. Orthodontic treatment
3. One or more missing teeth with the exception of third molars
4. Neurological disorder
5. Assumption of drugs affecting the Central Nervous System
During AIC occlusal discomfort, headache and spontaneous pain were higher in Parafnctional Subjects.

### Outline

- **TMD diagnosis**
  - Condylar position and TMD risk
  - Occlusal interference and TMD risk
- **Red Flags and TMD risk**
Main complaints
• Facial pain
• Limited jaw movement
• Headache

P. A. 45 ys

Facial Pain from 1 year (24h/24h; 7days/7days). The tongue is affected too. Started after the prosthodontic rehabilitation. She changed many prosthetic manufactory but the pain is always present.
• Headache (bilateral)
• Cervical and back pain

Working diagnoses
1° Myofacial Pain with referrals
2° Headache attributed to TMD
3° Cervical Pain

Psychological Evaluation
Graded Chronic Pain Scale
Psychological Evaluation Axis II

Depression and non specific physical symptoms

Treatment protocol

1° Counseling
2° Physiotherapy
3° Prosthetic rehabilitation
4° Psychiatric Consultation

Flag areas that might be associated with history taking

- Chronicity
- Functional limitation
- Discrepancy in findings
- Overuse of medication
- Inappropriate behaviour
- Inappropriate expectations
- Inappropriate responsiveness to prior treatment
- Identify red-flags from self-report screener

Recommendations on rehabilitation of TMDs
Cairns B, Lai T, Michelotti A, Ohrbach R, Svensson P

P.A. 45ys

Treatment outcome

Pain disappeared

TMD

DURING

ORTHODONTICS

CLINICAL CASE

M.S. 24 ys
**Orthodontic treatment**  M.S. 24 yrs

- Images of orthodontic treatment

**Surgery**  M.S. 25 yrs

- Images of surgery

**Two months later…**  M.S. 25 yrs

**Main complaint**

- Bilateral facial pain. Severe pain on both sides in the masseter and temporal regions.
- Pain increases during mandibular movements, chewing and yawning, so that he could eat only soft meals.
- Headache, bilateral, localized at temples. Present everyday, worse in the evening. Stress increases headache.

**DIAGNOSIS**

- Myofascial pain
- Headache attributed to TMD

**THERAPY**  3 months

1) Counseling
2) Physiotherapy
3) Drugs

- Images of therapy for 3 weeks
M.S. 25 ys

During class II elastics
Main complaint
• Preauricular pain on right
• Limited jaw movement
• Pain during jaw movement

A.M. 16 ys

Symptom free
Forsus instead of elastics for class II correction

CLINICAL CASE

A.M. 16 ys

Therapy
• Suspend class II elastics
• Distraction of the right TMJ
• Coordination exercise of the jaw opening
• Home regimen physiotherapy

Take Home Message

Michelotti and Iodice, JOR 2010