Disclosure:

I have nothing to report.

Outline and objectives:

- What are temporomandibular disorders (TMD)?
- What is a TMD headache?
- What is bruxism?
- How do all these relate to each other, or do they?
What are Temporomandibular Disorders?

“A collective term embracing a number of clinical problems that involve the masticatory musculature, the TMJ and associated structures or both.”


Musculoskeletal pain disorders of the masticatory system.

Classification of Temporomandibular Disorders

I. Masticatory Muscle Disorders
  1. Protective Co-contraction
  2. Local Muscle Soreness
  3. Myofascial Pain
  4. Myospasms
  5. Chronic Granuloma
   Mediated Myalgia

II. Temporomandibular Joint Disorders
  1. Derangements of the Condyle-Disc Complex
    a. Disc Displacement with Reduction
    b. Disc Displacement without Reduction
  2. Structural Incompatibilities
    a. Adhesions / Adherences
    b. Deviation in Form
    c. Subluxation
    d. Spontaneous Dislocation
  3. Inflammatory Disorders
    a. Synovitis
    b. Capsulitis
    c. Retrotroititis
    d. Arthritis

III. Chronic Mandibular Hypomobility
  1. Ankylosis
  2. Muscle Contracture
  3. Coronoid Impedance

IV. Growth Disorders
  1. Congenital /Developmental
    a. Agenesis
    b. Hypoplasia
    c. Hyperplasia
    d. Neoplasia
  2. Congenital/Developmental
    Muscle Disorders

Role of Bruxism and Temporomandibular Disorders in Headache

Outline and objectives:

- What are temporomandibular disorders (TMD)?
- What is a TMD headache?
- What is bruxism?
- How do all these relate to each other, or do they?
- Management considerations for bruxism.
What are TMD Headaches?

The ICHD-3

11.7 Headache attributed to temporomandibular disorder (TMD)

Headache caused by a disorder involving structures in the temporomandibular region.

What are TMD Headaches?

C. Evidence of causation demonstrated by at least two of the following:
   1. The headache has developed in temporal relation to the onset of the TMD
   2. Either or both of the following:
      a) The headache has significantly worsened in parallel with progression of the TMD
      b) The headache has significantly improved or resolved in parallel with improvement in or resolution of the TMD
   3. The headache is produced or exacerbated by active jaw movements, passive movements through the range of motion of the jaw and/or provocative maneuvers applied to temporomandibular structures such as pressure on the TMJ and surrounding muscles of mastication
   4. The headache, when unilateral, is ipsilateral to the side of the TMD

D. Not better accounted for by another ICHD-3 diagnosis.

Role of Bruxism and Temporomandibular Disorders in Headache

Outline and objectives:

• What are temporomandibular disorders (TMD)?
• What is a TMD headache?
• What is bruxism?
• How do all these relate to each other, or do they?
• Management considerations for bruxism.

What is bruxism?

• A diurnal or nocturnal parafunctional activity including clenching, bracing, gnashing and grinding of the teeth.

- The American Academy of Orofacial Pain

Sleep Bruxism (SB)
(International Classification of Sleep Disorders)

ICSD-1 (1991): classified as a parasomnia

ICSD-2 (2005): re-classified as a sleep related movement disorder
Sleep Bruxism (SB)
(International Classification of Sleep Disorders)

Parasomnias
• Sleep walking
• Sleep terrors
• REM sleep behavior disorders
• Nightmare disorder
• Sleep related eating disorders
• Exploding head syndrome

Sleep Movement Disorders
• Sleep related bruxism
• Restless legs syndrome (RLS)
• Periodic limb movement disorder (PLMD)
• Sleep related leg cramps

Rhythmic Masticatory Muscle Activity (RMMA)

Characteristic EMG pattern used to diagnose SB

Rhythmic bursts of electrical masticatory muscle activity
Tonic = clenching
Phasic = grinding

Pathophysiology of Bruxism

Exact mechanism unknown:
- Peripheral factors

Exact mechanism unknown:
- Central factors

Rhythmic Masticatory Muscle Activity (RMMA)

Phasic muscle contractions more common than tonic or mixed episodes in SB patients

Small percentage of patients may exceed maximal force
Protective reflexes are decreased
Pathophysiology of Bruxism

Exact mechanism unknown:
Central factors
Sleep stage transition / arousals

Autonomic nervous system
Sympathetic
Parasympathetic

Other factors associated with Bruxism

- Emotional stress
- Genetics
- Medical conditions
  - Cerebral palsy
  - Epilepsy
  - Parkinson’s
  - Tourette’s
  - Autism
  - Intellectual disability,
  - Post anoxic brain injury
  - Traumatic brain injury

Bruxism physiology and pathology

G. J. Lavigne JOR 2008

Rugh J et al. 1975
Other factors associated with Bruxism

- Emotional stress
- Genetics
- Medical conditions
- Medications
- Alcohol
- Caffeine

Other factors associated with Bruxism

- Emotional stress
- Genetics
- Medical conditions
- Medications
- Alcohol
- Caffeine
- Nicotine

Other factors associated with Bruxism

- Emotional stress
- Genetics
- Medical conditions
- Medications
- Alcohol
- Caffeine
- Nicotine
- Recreational drugs

Prevalence of Bruxism

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children</td>
<td>14-20%</td>
</tr>
<tr>
<td>Adolescent</td>
<td>13%</td>
</tr>
<tr>
<td>Adult</td>
<td>8%</td>
</tr>
<tr>
<td>&gt;60 years old</td>
<td>3%</td>
</tr>
</tbody>
</table>

Lifetime prevalence is 85-90%

Feu, J of Orthodontics, 2014
Outline and objectives:
- What are temporomandibular disorders (TMD)?
- What is a TMD headache?
- What is bruxism?
- How do all these relate to each other, or do they?
- Management considerations for bruxism.

Prevalence of Bruxism
- Identification is problematic
  - Self report
  - Witnessed report
  - Dentist report
  - Clinical tooth wear
  - PSG w/ EMG
  - PSG w/ EMG & AV – “gold standard”
- Varies over time

Common clinical complaints associated with Bruxism
- History
  - Self awareness
  - Witnessed tooth grinding or tapping
  - Jaw discomfort, fatigue
  - Generalized tooth sensitivity to cold
  - Morning headache

Common clinical findings associated with Bruxism
- Examination
  - Tooth wear
  - Masseter muscle hypertrophy
  - Masticatory muscle tenderness to palpation
  - TMJ tender to palpation

Common clinical findings associated with Bruxism
- Examination
  - Other findings
    - Scalloped tongue
    - Mucosal ridging
    - Radiographic
      mandibular angle hypertrophy

Role of Bruxism and Temporomandibular Disorders in Headache

Rhythmic Masticatory Muscle Activity (RMMA)
- What is the relationship between RMMA and pain?
- There is a problem.
- Who is bruxing?
- Who has pain?
Rhythmic Masticatory Muscle Activity (RMMA)

Who is bruxing?

- Lavigne et al, 2008

There is no strong association between tooth wear and current bruxism.
There is no strong association between the magnitude of tooth wear and increased RMMA.

Self-report of bruxism:
55% of TMD patients report they brux
only 15% of controls report they brux

Who is bruxing?

9.5% of TMD patients showed bruxism
10.9% of the controls showed bruxism
(RMMA index of 1.7 events per 1.5 hours)
- no statically significant difference -

- Lavigne et al, 2016

Self-reported bruxers (cut off 4 episodes of RMMA an hour)
Low frequency bruxers had more RMMA pain than the high frequency bruxers.


Who has pain?

Clenching (non functioning tooth contacts / jaw bracing)
35% in TMD and 9% of controls
52% of TMD

There is a higher EMG background tone for the TMD pain patients than controls.

Early morning muscle fatigue and temporal headache are correlated to RMMA.

Role of Bruxism and Temporomandibular Disorders in Headache

Outline and objectives:
- What are temporomandibular disorders (TMD)?
- What is a TMD headache?
- What is bruxism?
- How do all these relate to each other, or do they?

Management considerations for bruxism.
- Sleep related bruxism
  a. assess present medications
  b. occlusal appliances
types, negative feedback
Management considerations for Bruxism

• Sleep related bruxism
  a. assess present medications
  b. occlusal appliances
  types, negative feedback

• Day time clenching
  Cognitive awareness and behavioral modification

• Botox
  a. pain
  b. muscle hypertrophy

References

<table>
<thead>
<tr>
<th>Study</th>
<th>Type of study</th>
<th>Number of patients</th>
<th>Type of condition</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moore et al. (1994)</td>
<td>Controlled clinical trial</td>
<td>1 patient</td>
<td>Masseteric hypertrophy</td>
<td>Significant pain reduction</td>
</tr>
<tr>
<td>Rijsdijk et al. (1998)</td>
<td>Case report</td>
<td>2 patients</td>
<td>Masseteric hypertrophy</td>
<td>Significant pain reduction in one patient</td>
</tr>
<tr>
<td>Mandel et al. (1999)</td>
<td>Case report</td>
<td>1 patient</td>
<td>Masseteric hypertrophy</td>
<td>Significant reduction in muscle size</td>
</tr>
<tr>
<td>Freund et al. (1999)</td>
<td>Open study</td>
<td>15 patients</td>
<td>Masseteric hypertrophy</td>
<td>Significant improvement in jaw opening and reduction in pain intensity</td>
</tr>
</tbody>
</table>

Muscle Hypertrophy

1 reference in the Cochrane database

TMD headache
Management considerations for Bruxism

TMD headache
Hallmarks of TMD symptoms:
- Masseter or Temporalis pain
- Preauricular pain
- Pain increased with jaw function
- Clicking or locking of the TMJ
- Inability to open the mouth completely
- A recent shift in the bite
- Headaches that are increased by jaw function

These symptoms may suggest a referral.

Thank you for your kind attention.

Jeffrey P Okeson, DMD

Questions?