TEMPOROMANDIBULAR JOINT: MASTICATION

What do we need our TMJ for? (Function?)

Clarification of Terminology

- **TMJ** = Temporomandibular Joint
- **TMJD** = Temporomandibular Joint Dysfunction

- The vast majority of people have a TMJ
- Not everyone has TMJD

Osteology

- **Bones of the Skull and Face:**
  - Frontal
  - Parietal
  - Occipital
  - Temporal
  - Sphenoid
  - Zygomatic
  - Mandible
  - Maxilla
  - Nasal
Osteology of the TMJ

- The TMJ is located _________ to the ear
- The TMJ is an articulation between the articular fossa of the _________ bone of the skull & the condyle of the mandible

Osteology continued...

- **The skull has 2 parts:**
  - The bones of the large cranial cavity, which encase the brain
  - The bones of the face
- The TMJ is an articulation between one facial bone (**the mandible**) and one cranial bone (**the temporal bone**)

Osteology continued...

- **The Mandible:**
  - Shaped kind-of like a horseshoe
  - Often referred to as “the jaw”
  - Articulates with the temporal bone on each side of the face forming **TWO IDENTICAL** joints on either side of the face
Osteology continued…

**The Temporal Bone:**
- Where is it?
- Articular fossa
- Mastoid process
- Articular Tubercle
- External auditory meatus
- Styloid process
- Zygomatic process

Lippert, p199

Osteology continued…

**The Hyoid Bone:**
- Horseshoe shaped bone
- Lies just superior to the thyroid cartilage at the level of C3
- It has NO BONEY ARTICULATION!!!
- It is suspended from the styloid process of the temporal bone by the stylohyoid ligament
- Main Function: attachment site for tongue muscles and muscles that open/close the jaw

Lippert, p201
Osteology continued...

- **Thyroid Cartilage:**
  - The largest of the 9 cartilages of the larynx
  - Commonly called the "Adam’s apple"
  - More prominent in males
  - Lies just inferior to the hyoid bone at the level of C3 – C4

Lippert, p201

TMJ Structure

- Synovial Joint with a Hinge-like shape (not a pure hinge joint because it allows some gliding motion)
- **Consists of:**
  - 2 bones
  - A disk that divides the joint into 2 spaces
  - A joint capsule
  - 4 ligaments
  - 4 main muscles that create 5 motions

Lippert, p197

TMJ Movement

- **Osteokinematics:**
  - Depression
  - Elevation
  - Lateral deviation
  - Protrusion
  - Retrusion

Lippert, p198
TMJ Movement continued...

**Arthrokinematics:**
- **Depression:** involves two motions. First, the mandibular condyle rotates anteriorly on the disk. Second, the condyle and the disk both glide anteriorly and inferiorly over the articular tubercle of the temporal bone.
- **Elevation:** the reverse action of depression.
- **Protrusion and Retrusion:** no rotation occurs, the mandible moves either anteriorly or posteriorly in the transverse plane. The mandibular condyle and disk move as one unit against the articular fossa of the temporal bone.
- **Lateral deviation:** occurs in the transverse plane. To move the mandible to the left, the left condyle rotates around a vertical axis and the right condyle glides anteriorly. The opposite occurs to deviate to the right.

Lippert, p202

**Resting position of the mandible:**
- The condyle of the mandible is seated in the mandibular fossa of the temporal bone.
- The lips are closed and the teeth are several millimeters apart.

Lippert, p198
This would be maintained by low levels of activity of the temporalis muscles

You should be able to open your mouth enough to fit 2-3 finger widths between the front upper and lower teeth.

Lippert, p198

**TMJ Supporting Structures**

- Articular Disk
- Joint Capsule
- Four ligaments
  - The Lateral Ligament (aka temporomandibular ligament)
  - Sphenomandibular Ligament
  - Stylemandibular Ligament
  - Stylohyoid Ligament

Lippert, p201

**TMJ Myology**

- The four **PRIME MOVERS** of the TMJ are (all of which are innervated by the Trigeminal Nerve, CN 5):
  - Temporals
  - Masseter
  - Medial Pterygoid
  - Lateral Pterygoid

Unless otherwise stated, the action of these muscles is considered to be BILATERAL and occurs at each joint (right and left) simultaneously.

Lippert, p203
### Temporalis

**Location**
- Origin: Temporal Fossa
- Insetion: Coronoid Process and ramus of mandible

**Action**
- **Bilateral:** elevation of the mandible (closing the mouth), retraction of the mandible
- **Unilateral:** ipsilateral lateral deviation

**Innervation**
- Trigeminal nerve (Cranial n. V)

Palpate it on yourself!

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### Masseter

**Location**
- Between the zygomatic arch of the temporal bone and the mandible

**Action**
- **Bilateral:** elevation of the mandible (closing the mouth)
- **Unilateral:** ipsilateral lateral deviation

**Innervation**
- Trigeminal nerve (Cranial n. V)

Palpate it on yourself!

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### Medial Pterygoids

**Location**
- Internal angle of ramus of mandible

**Action**
- **Bilateral:** elevation of the mandible (closing the mouth) & protrusion of the mandible
- **Unilateral:** contralateral lateral deviation

**Innervation**
- Trigeminal nerve (Cranial n. V)

Palpate it on yourself!
TMJ Myology

Lateral Pterygoids

<table>
<thead>
<tr>
<th>Location</th>
<th>Inside the mouth near the condyle of the mandible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td><strong>Bilateral</strong>: depression of the mandible &amp; Protrusion of the mandible; <strong>Unilateral</strong>: contralateral lateral deviation</td>
</tr>
<tr>
<td>Innervation</td>
<td>Trigeminal nerve (Cranial n. V)</td>
</tr>
</tbody>
</table>

Lippert, p205

TMJ Myology continued...

- The muscles that **ASSIST** with TMJ movement are:

<table>
<thead>
<tr>
<th>Suprahyoid Muscles</th>
<th>Infrahyoid Muscles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mylohyoid</td>
<td>Sternohyoid</td>
</tr>
<tr>
<td>Geniohyoid</td>
<td>Sternothyroid</td>
</tr>
<tr>
<td>Stylohyoid</td>
<td>Thyrohyoid</td>
</tr>
<tr>
<td>Digastric</td>
<td>Omohyoid</td>
</tr>
</tbody>
</table>

Lippert, p205-206

Common Pathology

- Temporomandibular Joint Dysfunction (TMJD)
References