TEMPOROMANDIBULAR JOINT

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

Lippert, p197
Osteology

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

Lippert, p198
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 cranium 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

Lippert, p198
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 BONY 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
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
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
During opening of the mouth, the condyles of the mandible move forward along the articular disc.

This is a smooth movement unless the opening is excessive.

Repeated excessive opening can cause trauma to the area and potential disc injury.
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.
Resting position of the mandible:

- 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.

What motion is she performing with her mandible?

Lippert, p198
TMJ Supporting Structures

• **Articular Disk**
• **Joint Capsule**
• **Four ligaments**
  • The Lateral Ligament (aka temporomandibular ligament)
  • Sphenomandibular Ligament
  • Stylomandibular Ligament
  • Stylohyoid Ligament

Lippert, p201
The four **PRIME MOVERS** of the TMJ are (all of which are innervated by the Trigeminal Nerve, CN 5):

- Temporalis
- 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.
Please identify the following muscle:

<table>
<thead>
<tr>
<th>Temporalis</th>
</tr>
</thead>
</table>
| **Location** | **Origin**: Temporal Fossa  
**Insertion**: Coronoid Process and ramus of mandible |
| **Action** | **Bilateral**: elevation of the mandible (closing the mouth), retrusion of the mandible  
**Unilateral**: ipsilateral lateral deviation |
| **Innervation** | Trigmeninal nerve (Cranial n. V) |

Palpate it on yourself!

Lippert, p204
Please identify the following muscle:

**Masseter**

<table>
<thead>
<tr>
<th>Location</th>
<th>Between the zygomatic arch of the temporal bone and the mandible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td><strong>Bilateral</strong>: elevation of the mandible (closing the mouth) <strong>Unilateral</strong>: ipsilateral lateral deviation</td>
</tr>
<tr>
<td>Innervation</td>
<td>Trigmeninal nerve (Cranial n. V)</td>
</tr>
</tbody>
</table>

Palpate it on yourself!

Lippert, p204
Please identify the following muscles:

<table>
<thead>
<tr>
<th><strong>Medial Pterygoids</strong> <em>(the p is silent)</em></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
<td>Internal angle of ramus of mandible</td>
</tr>
</tbody>
</table>
| **Action** | **Bilateral**: elevation of the mandible (closing the mouth) & protrusion of the mandible  
**Unilateral**: contralateral lateral deviation |
| **Innervation** | Trigmeninal nerve (Cranial n. V) |

Lippert, p204
Please identify the following muscles:

<table>
<thead>
<tr>
<th>Lateral Pterygoids</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
</tr>
<tr>
<td><strong>Action</strong></td>
</tr>
<tr>
<td><strong>Innervation</strong></td>
</tr>
</tbody>
</table>

Lippert, p205
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