Toe to Head: A Collaborative Approach to Releasing Tongue and Jaw Tension

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Assessment Maneuvers

1. Beginning on a medium pitch, do a lip trill as high as possible. Highest note _______
2. Repeat as above and go as low as possible. Lowest note __________

3. Place the tip of your tongue on the roof of your mouth toward soft palate. Beginning on a medium pitch, sing a tone (might be an ng) as high possible. Highest note___
4. Repeat as above and go as low as possible. Lowest note __________

5. Hum to your highest note. _______
6. Hum to your lowest note._______
Take the gauze and gently hold the tip of your tongue and sing ah at any pitch. Does your tongue want to pull back? Y/N______
Repeat the gauze exercise but now place the gauze on both sides of the tongue and sing ah at any pitch. Does it feel that the tongue shifts to one side versus the other?
Muscles of the Floor of the Mouth

- Mandible
- Mylohyoid
- Digastric (Anterior belly, Posterior belly)
- Hyoid bone
- Sternocleidomastoid (cut)
- Omohyoid (Superior belly, Inferior belly)
- Clavicle
- Cut heads of sternocleidomastoid
- Sternohyoid
- Sternum
- Mylohyoid (cut and reflected)
- Geniohyoid
- Stylohyoid
- Thyrohyoid
- Thyroid cartilages of larynx
- Cricothyroid
- Sternothyroid
- Clavicular head
- Sternal head

(a) Anterior view
<table>
<thead>
<tr>
<th>Muscle</th>
<th>Origin</th>
<th>Insertion</th>
<th>Action</th>
<th>Innervation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sternocleidomastoid</td>
<td>Sternum and clavicle</td>
<td>Mastoid process of temporal bone</td>
<td>Rotation of head; flexes neck</td>
<td>Accessory n.</td>
</tr>
<tr>
<td>Digastric</td>
<td>Inferior border of mandible and mastoid process of temporal bone</td>
<td>Hyoid bone</td>
<td>Opens mouth; elevates hyoid bone</td>
<td>Trigeminal n. (ant. belly); facial n. (post. belly)</td>
</tr>
<tr>
<td>Mylohyoid</td>
<td>Inferior border of mandible</td>
<td>Body of hyoid bone and median raphe</td>
<td>Elevates hyoid bone and floor of mouth</td>
<td>Spinal n. (C1)</td>
</tr>
<tr>
<td>Geniohyoid</td>
<td>Medial surface of mandible at chin</td>
<td>Body of hyoid bone</td>
<td>Elevates hyoid bone</td>
<td></td>
</tr>
<tr>
<td>Stylohyoid</td>
<td>Styloid process of temporal bone</td>
<td>Body of hyoid bone</td>
<td>Elevates and retracts tongue</td>
<td>Facial n.</td>
</tr>
<tr>
<td>Sternohyoid</td>
<td>Manubrium</td>
<td>Body of hyoid bone</td>
<td>Depresses hyoid bone</td>
<td>Spinal nn. (C1-C3)</td>
</tr>
<tr>
<td>Sternothyroid</td>
<td>Manubrium</td>
<td>Thyroid cartilage</td>
<td>Depresses thyroid cartilage</td>
<td>Spinal nn. (C1-C3)</td>
</tr>
<tr>
<td>Thyrohyoid</td>
<td>Thyroid cartilage</td>
<td>Great cornu of hyoid bone</td>
<td>Depresses hyoid bone; elevates larynx</td>
<td>Spinal nn. (C1-C3)</td>
</tr>
<tr>
<td>Omohyoid</td>
<td>Superior border of scapula</td>
<td>Body of hyoid bone</td>
<td>Depresses hyoid bone</td>
<td>Spinal nn. (C1-C3)</td>
</tr>
</tbody>
</table>

digastric: L. di, two; Gk. gaster, belly
mylohyoid: Gk. mylos, akin to: hyoeides, pertaining to hyoid bone
omohyoid: Gk. omos, shoulder
Skeletal Relationships

- If the TMJ is malpositioned, the first two vertebrae in the neck will also undergo torsion and rotation to compensate.

- Biomechanically the first three vertebrae in the neck move in the same direction as the last three vertebrae in the lumbar (lowest) part of the spine.

- If the first two vertebrae are malpositioned, it will force a compensatory change all the way down the spine.
“For every inch of Forward Head Posture, it can increase the weight of the head on the spine by an additional 10 pounds.” - Kapandji, Physiology of Joints, Vol. 3
Orthotics

- Misalignment of the feet leads to asymmetry up the chain and can cause wear and tear anywhere along the route.
Posture Score Card

**Head:**
The head should be centered

**Shoulders:**
The shoulders should be level

**Hips:**
The hips should be level

**Neck:**
The head should be balanced on the spine

**Lower back:**
There should be a normal curve

**Shoes:**
The pattern of wear should be the same on each shoe

- 0 to 9 - Extremely poor
- 10 to 19 - Very Poor
- 20 to 29 - Poor
- 30 to 39 - In Transition

- 40 to 49 - Good
- 50 to 59 - Near Optimal
- 60 - Optimal

**Your Total Posture Score**

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**Poor Posture can affect your entire health and well-being:**

If your score is under 50 - we strongly suggest a complete postural evaluation by a wellness chiropractor in order to prevent unnecessary wear of your spine and joints (arthritis).

If your score is above 50 - your posture is near optimal - we strongly suggest a neurospinal evaluation by a wellness chiropractor to detect any areas of interference on your nervous system related by your posture.

A well-aligned spine is your first step toward optimal health!
The Variety of Symptoms Dentists Diagnose as TMJD

**Head Pain, Headache**
1. Forehead
2. Temples
3. "Migraine" type
4. Sinus type
5. Shooting pain up back of head
6. Scalp too painful to touch

**Ears**
1. Hissing, buzzing, or ringing
2. Decreasing hearing
3. Ear pain or ear ache w/o infection
4. Clogged, "itchy" ears
5. Vertigo, dizziness

**Eyes**
1. Pain behind eyes
2. Bloodshot eyes
3. May bulge out
4. Sensitive to sunlight

**Mouth**
1. Discomfort
2. Limited opening of mouth
3. Inability to open smoothly
4. Jaw deviates to one side when opening
5. Locks shut or open
6. Can't find bite

**Teeth**
1. Clenching and/or grinding at night
2. Looseness and soreness of back teeth

**Jaw Problems**
1. Clicking, popping jaw joints
2. Grating sounds
3. Pain in cheek muscles
4. Uncontrollable jaw and/or tongue movements

**Neck Problems**
1. Lack of mobility, stiffness
2. Neck pain
3. Tired, sore muscles
4. Shoulder aches and backaches
5. Arm and finger numbness and/or pain

**Throat**
1. Swallowing difficulties
2. Laryngitis
3. Sore throat with no infection
4. Voice irregularities or changes
5. Frequent coughing or constant clearing of throat
6. Feeling of foreign object in throat constantly
Temporomandibular Joint

One of the most complex and used joints in the body.

...but subject to the most complex vector forces (red arrows) due to masticatory muscular parafunction.
TMJ musculature
masseter
temporalis
lateral pterygoid
medial pterygoid
digastric
JAW/NECK MUSCLES

Muscles of Mastication

Supporting Muscles of Mastication

Trapezius Muscle

Sternocleidomastoid Muscle

Temporalis Muscle

Lateral Pterygoid Muscle

Masseter Muscle

Digastric Muscles

#72988261
Normal Structure  

Collapsed Structure
Rate Your Pain Level

- Pressing my temples .................................................. [0] [1] [2] [3] [4]
- Pressing my jaw joints .................................................. [0] [1] [2] [3] [4]
- Pressing my jaw muscles ................................................. [0] [1] [2] [3] [4]
- Pressing the muscles under the sides of my jaw ............... [0] [1] [2] [3] [4]
- Pressing in my ears ....................................................... [0] [1] [2] [3] [4]
- Pressing the back of my neck ......................................... [0] [1] [2] [3] [4]
- Pressing the sides of my neck .......................................... [0] [1] [2] [3] [4]

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"Can you describe your symptoms."
TMJ MOBILITY

- 40 mm of opening
- 10 mm of protrusion
- 10 mm of lateral excursion
There is a 4:1 ratio opening: lateral excursion and protrusion. Normal/Functional opening is 36-42 mm
I THINK I MIGHT HAVE TMJ!

"TOO MUCH JAW"?
Self Evaluation of TMJ

- Look at alignment at rest
- Look for deviation with opening
- Look for deviation with protrusion
- Look for mobility difference between right and left
- Feel for even bite
It's a rather interesting phenomenon. Every time I press this lever, that post-graduate student breathes a sigh of relief.
Core Stabilizers

- Multifidus
- Sacrum
- Transversus abdominis
- Pubic symphysis
Scapular Stabilization
Dangers of Forward Head Posture

The Domino Effect

1. The head moves forward shifting the Center of Gravity.

2. To compensate, the upper body drifts backward.

3. To compensate for the upper body shift, the hips tilt forward.

So, the forward head position can be the cause of not only head/neck problems, but also mid-back and low back problems.
Upper Crossed Syndrome

When our head is allowed to come forward and our shoulders protract (droop forward), we put a great deal of stress on the musculature at the back of the neck. As the head drops forward, we do not look at the ground, we look out in front of us and the skull extends where it meets the neck. This engages the muscles just below the skull (the suboccipital musculature), which become overactive. The deep neck flexors weaken and destabilize the neck.
Therapeutic Exercises

- Improve muscular coordination
- Increase muscular strength
- Postural exercises
- Active Range of Motion exercises
- Muscles of mastication
- Cervical spine muscle
- General mobility
HIGH CERVICAL MOBILITY
Upper Lip Stretch

- ***Slow and Controlled Movements***
- Put tongue up in between the teeth and upper lip
- Roll upper lip down over tongue
- Protrude jaw forward to meet the upper lip so lips touch
- Hold for 6 seconds, 6 repetitions, 2-3x a day

Peacock as an Activity

- Place both hands on the chest (sternum) Bring chest forward into hands
- ** Do not push hands into chest**
- Hold for 6 seconds. Relax; 6 repetitions, several times a day

Peacock as a Resistance

- Place both hands on the chest (sternum) . Bring chest forward into hands. Push hands down into chest creating resistance
- Hold for 6 seconds. Relax; 6 repetitions, several times a day
Internal Mouth Stretches

- Putty
- Ping Pong Ball
- Manually
Resisted stretching

**Mandibular Opening**
1. Open to widest point
2. Place both thumbs inside mouth on molar surface
3. Resist light closure for 6 seconds
4. Relax 6 seconds
5. Open further, repeat 5 times

**Lateral Mandibular movement**
1. Mouth slightly open
2. Move mandible laterally
3. Resist medial movement for 6 seconds
4. Relax for 6 seconds
5. Laterally deviate further, repeat for 3 to 5 times
HOME EXERCISES FOR TONGUE AND JAW MOBILITY

- **Exercise 1:** Place Nuk Brush between the center of teeth, and move:
  - Up&Down - 6 repetitions, 2-3x a day
  - Side to Side - 6 repetitions, 2-3x/day

- **Exercise 2:** Place Nuk Brush on tongue
  - Move brush side to side using tongue
  - 6 repetitions, 2-3x a day

- **Exercise 3:** Place Nuk Brush in between the (RIGHT/LEFT) molars and bite down
  - Turn head to the (RIGHT/LEFT) side
  - Hold for 6 seconds, 6 repetitions, 2-3x a day
Manual Therapy

• Massage
• Joint Mobilization
• Muscle stretching (passive and active)
• Myofascial release
• Manual traction
• Trigger points
• Relaxation techniques
Techniques: Control of Jaw Muscles

Begin with proper resting position of the Jaw placing tongue on roof of the mouth. Practice control while elevating and depressing the mandible throughout the first half of the ROM.

Keeping the tongue on the roof of the mouth, open the mouth while trying to keep the chin in the midline. Use a mirror for visual reinforcement.

If the jaw deviates to one side, practice lateral deviation to the opposite side without creating pain or excessive motion.
Mirror Neurons
You see a stranger stub her toe and you immediately flinch in sympathy, or you notice a friend wrinkle up his face in disgust while tasting some food and suddenly your own stomach recoils at the thought of eating. This ability to instinctively and immediately understand what other people are experiencing has long baffled neuroscientists, but recent research now suggests a fascinating explanation: brain cells called mirror neurons.
What is Neuroplasticity?

- The capability of the brain (or the CNS) to reorganize by forming new neural connections throughout life.
- The ability for the brain to reorganize itself to compensate for injury and disease.
- Allows for adjustment of activities in response to new situations or to changes in the environment.
- Creating new pathways that allow it to adapt; in effect, a rewiring of the brain.
- 70% of synaptic connections change every day.
Body Parts Compete for Brain Representation

- There is a need for the brain to use experience to initiate a new synaptic connection between neurons.
- The more a body part is used, the bigger its area of representation in the brain which correlates with improved function.
- The opposite effect also occurs. The more a body part is not used, the more the learned behavior of non-function occurs.

- Developing muscle memory in vocal exercises is imperative for developing healthy posture while singing and with time you will not have to really ‘think’ about what you are doing.
Changing Faulty Patterns
Mirror Exercises: Home Program
Mirror book therapy is a technique adapted by Barth and Stezar to enhance the recruitment of mirror neurons. In mirror book therapy, a bi-fold mirror is used to twice reflect the unaffected half of a patient’s face, such that the patient sees a full face. The patient then proceeds to perform jaw and cervical exercises. By seeing the exercises in a symmetric manner, increased activity of motor command pathways and pathways from the stronger region are utilized to supplement the weaker region.
Preventing TMD

Avoid
• Large bites
• Excessive chewing
• Removing food from teeth with tongue
• Chewy food

Do
• Relaxation techniques
• Reduce tension
• Maintain good posture
LOOK AT YOUR POSTURE... OTHERS DO

Correct Posture  Hollow Back  Flat Pelvis  Slumping Posture  Military Posture  Round Shoulders

Correct  High Shoulder  High Hip  Head Tilt  Severe Scoliosis
Putting It All Together
Questions???
Dental Occlusion and Body Posture: a surface EMG study

Properly aligning the malocclusion of the mouth using acrylic wafer, there was a reduction of sEMG values in all the muscles that was tested. The reduction of neuromuscular firing indicates that the muscles are more or less in a relaxed non stress state in continuously realigning paired muscles (SCM, erector spinae and soleous).


Bergamini M¹, Pierleoni F, Gizdulich A, Bergamini C.
Changes in head position due to occlusal supporting zone loss during clenching

When the occlusal supporting zones are lost or inadequate the head equilibrium is lost due to lost proprioceptive feedback from the masticatory muscles and periodontal membrane.

When these supporting zones are either lost or inadequate, there is a likely possibility for the neck musculature to compensate, thereby affecting the posture in increment and in increasing manner.

Cranio. 2003 Apr;21(2):89-98.
Yoshino G¹, Higashi K, Nakamura T.
Correlation between occlusion and cervical posture in patients with bruxism

There was a higher malocclusion in subjects who also suffer from temporomandibular disorder. There was also a prevalence of in the anteriorazation of the head with subjects who has malocclusion. Malocclusion is predominant with subjects with bruxism.


Cesar GM¹, Tosato Jde P, Biasotto-Gonzalez DA.
Event-related functional MRI investigation of vocal pitch variation

Voice production involves precise, coordinated movements of the intrinsic and extrinsic laryngeal musculature. A component of normal voice production is the modification of pitch. The underlying neural networks associated with these complex processes remains poorly characterized. However, several investigators are currently utilizing neuroimaging techniques to more clearly delineate these networks associated with phonation. The current study sought to identify the central cortical mechanism(s) associated with pitch variation during voice production using event-related functional MRI (fMRI). A single-trial design was employed consisting of three voice production tasks (low, comfortable, and high pitch) to contrast brain activity during the generation of varying frequencies. For whole brain analysis, volumes of activation within regions activated during each task were measured. Bilateral activations were shown in the cerebellum, superior temporal gyrus, insula, precentral gyrus, postcentral gyrus, inferior parietal lobe, and post-cingulate gyrus. In the left hemisphere, activations in the medial and middle frontal gyri were also observed. Regions active during high pitch production when compared to comfortable pitch were evident in the bilateral cerebellum, left inferior frontal gyrus, left cingulate gyrus, and left posterior cingulate. During low pitch generation, activations were present in the inferior frontal gyrus, insula, putamen, and cingulate gyrus in the left hemisphere. The inferior frontal gyrus in the right hemisphere produced greater activity than the area of the left hemisphere during high and low pitch generation. These results suggest that a single-trial design is sensitive enough to begin to delineate a widespread network of activations in both hemispheres associated with vocal pitch variation.
Professional musicians with craniomandibular dysfunctions treated with oral splints.
Steinmetz A1, Ridder PH, Methfessel G, Muche B.

Craniomandibular dysfunction (CMD) symptoms occur frequently in violin/viola and wind players and can be associated with pain in the neck, shoulders and arm. In the current study, the effect of oral splint treatment of CMD on reducing pain and symptoms especially in these areas was investigated. Thirty (30) musicians undergoing CMD treatment with oral splints participated in this study. They completed a questionnaire that addressed CMD symptoms, localization of pain, and subjective changes in symptoms. Pain in the shoulder and/or upper extremity was the most frequent symptom reported by 83% of subjects, followed by neck pain (80%) and pain in the teeth/TMJ regions (63%). Treatment with oral splints contributed to a significant decrease in neck pain in 91%, teeth/TMJ pain in 83%, and shoulder and upper extremity pain in 76% of the musicians. Eighty percent (80%) of the patients reported improvement of their predominant symptoms. CMD can be a potential cause for pain in the neck, shoulders, and upper extremities of musicians. It is paramount that musicians with musculoskeletal problems be examined for CMD symptoms. Treatment with oral splints seems to be valuable. Further prospective, randomized controlled studies are necessary to confirm efficacy of oral splint treatment in CMD-associated pain and problems in the neck, shoulder, and the upper extremities in musicians.
The relationship between forward head posture and temporomandibular disorders.

The statistical measurements of shoulder, ear and C7 revealed the subjects who were suffering TMD shows that their head is positioned more forward compared with the control group.

Lee WY¹, Okeson JP, Lindroth J.
Body posture evaluations in subjects with internal temporomandibular joint derangement

Researchers came up with the following results:

- TMD have more frequency of lifter shoulders than healthy individual.
- TMD presented more deviations in the antero internal hip chain.

Previous history suggest that any alterations in one joint, cascades to alteration on the next joint. The posture analysis shows muscle chain change, thus affecting the global posture.


*Munhoz WC¹, Marques AP.*
Changes in head position due to occlusal supporting zone loss during clenching

When the occlusal supporting zones are lost or inadequate, the head equilibrium is lost due to lost proprioceptive feedback from the masticatory muscles and periodontal membrane.

When these supporting zones are either lost or inadequate, there is a likely possibility for the neck musculature to compensate, thereby affecting the posture in increment and in increasing manner.

*Cranio.* 2003 Apr;21(2):89-98. Yoshino G¹, Higashi K, Nakamura T.
Professional musician with craniomandibular dysfunction treated with oral splints

CMD is a potential cause for pain in the neck, shoulder and UE in professional musicians. The current study shows that in treating the CMD, there is a significant decrease in pain in all the areas previously mentioned. A noted decrease of neck pain in 91% of the subjects and issues on TMJ and teeth also decreased in 83% of the subjects.

*Steinmetz A¹, Ridder PH, Methfessel G, Muche B.*
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