OSPTA would like to thank Ms. Kelly Hohn, PT for her contribution to this newsletter.

In the month of September, OSPTA relocated the Washington office to 1146 West Chestnut Street and opened an office in Waynesburg at 160 Green Plaza.

DAY AND EVENING HOURS ARE AVAILABLE AT BOTH LOCATIONS

OSPTA would like to remind everyone that home health visits can be performed through OSPTA@Home.

Available services are:
- Physical Therapy
- Occupational Therapy
- Speech Therapy
- Nursing
- Home Health Aides
- Social Services

The Temporomandibular Joint, or TMJ as it is commonly called, is a unique joint in the human body because it is actually a pair of hanging hinges that suspend the lower jaw, or mandible, and enable daily crucial tasks such as eating and speech. When one side experiences pathology, the other side is also affected because motion of the lower jaw requires both TMJ joints to simultaneously operate. The TMJ participates in forceful activities such as chewing and biting, as well as finesse activities such as speech and swallowing that require fine control.

Anatomy

The TMJ is comprised of two paired joints divided by an articular disk. The superior joint is a gliding joint between the articular eminence of the temporal bone and the superior surface of the articular disk. It has its own synovial lining. The inferior joint is a hinge type joint comprised of the anterior portion of the condyle of the mandible and the inferior surface of the articular disk. It also has its own synovial lining. The entire TMJ is also encased in a fibrocartilage lining which has the advantage of the ability to repair itself and remodel, where articular cartilage found at joints such as the hip and knee cannot heal (Figure 1).

The articular disk lies between the upper and lower portions of the TMJ. It is concave in shape on each side and functions to both accept the force of joint compression and maintain congruency of the two bony convex surfaces. Its position is maintained via attachment to the joint capsule anteriorly, the poles of the condyle medially and laterally, and a complex attachment posteriorly to the bilaminar retrodiskal pad. At this point two tissue bands attach: one is elastic in nature which allows the disk to move forward and assist in repositioning, and a second is inelastic in nature which prevents excessive forward translation of the disk at the anterior and posterior aspects allowing for translation of the disk which is crucial to joint movement and function.

Biomechanics

The biomechanics of the TMJ are twofold: initially with jaw opening the lower joint operates when the condyle of the mandible rotates anteriorly on the articular disk creating 11-25mm of jaw opening, then the upper joint acts as the disk and condyle translate anteriorly as a unit against the articular eminence allowing the remaining 15-25mm of opening of the mouth. Full opening range of the jaw is considered to be 40 to 50mm or the width of 2-3 fingers. Closing the jaw is a reverse of the opening process with the upper joint initiating the movement and the lower completing. Full functional TMJ closure is considered to be the meeting of the upper incisors to permit chewing.

The TMJ is also capable of jutting forward or protrusion. This is a pure sliding or translation forward of the disk/condyle complex along the articular eminence. Normal range of motion for protrusion is 9mm. Further movement is halted by the posterior attachments of the disk as they stretch up to 6-9mm. Return of the jaw to resting from this position is called retrusion. It is also a pure translation where all points of the mandible...
move posteriorly along the articular eminence of the temporal bone. Normal repositioning past neutral is 5mm.

Finally, the TMJ is also capable of lateral motion, referred to as lateral deviation. Normal range of motion is 8mm to either side. Functional range of motion is considered to be movement past the width of one central incisor.

Function

The TMJ is one of the most frequently used joints in the body, participating in and permitting such activities as chewing, talking, eating, and swallowing. TMJ dysfunction can be debilitating and even life-threatening in severe cases when eating is hindered or too painful to be sufficient. Fortunately, the joint is well-designed for high-frequency use. The fibrocartilage coating of the articular surface allows remodeling and repair of any injury or damage to the cartilage, which does not occur in other joints. The muscles present are very powerful, yet have a great degree of control. The disk’s biconcave shape allows congruity of 2 convex bony surfaces and greater joint stability, as well as a self-centering mechanism for the disk to help prevent joint derangement.

TMJ joint dynamics are quite complex and involve the cooperative action of multiple bilateral muscles (Figure 2). As previously mentioned, there are five main motions of which the TMJ is capable: depression (opening), elevation (closing), protrusion (putting forward), retraction (pulling lower jaw backward), and lateral deviation (side to side motion). Depression is attained primarily by the diaphragmatic muscle, and assisted by the inferior portion of the lateral pterygoid, and gravity. Elevation is accomplished primarily by the temporalis then the masseter, medial pterygoid, and the superior portion of the lateral pterygoid. Protrusion is performed primarily by the bilateral actions of the masseter, medial pterygoids, and lateral pterygoids. Retraction occurs by the bilateral action of the posterior fibers of the temporals, the digastric and the suprathyroid. Finally, lateral deviation is accomplished by the contralateral medial pterygoid, contralateral lateral pterygoid, and ipsilateral temporals.

Dysfunction

The TMJ joint is quite complex and susceptible to not only injury but also dysfunction. Some common dysfunctions of the TMJ joint are disk derangements, osteoarthritis, and muscle imbalance.

Disk derangement usually occurs in three stages. Stage 1 consists of an occasional click which may or may not be audible and mild pain if any pain at all. The click signifies anterior disc displacement. Stage 2 consists of a reciprocal click; first click is early in jaw opening; second click is late in closing. The click on opening signifies the slipping of the condyle under the displaced disk; on closing it signifies the condyle slipping posteriorly from under the disk toward the retrodiskal lamina. During this stage the pain is moderate. Stage 3 also consists of a reciprocal click; the first click is late in opening; the second click is early in closing. During this phase the pain is moderate to severe and the patient may experience locking episodes.

Osteoarthritis of the TMJ is found in approximately 80-90 percent of people over age of 60. It is usually unilateral in affection, with RA being bilateral in nature, and primarily due to repeated microtrauma to the TMJ area, especially trauma that causes impact between the 2 articular surfaces of the joint. An example would be loss of posterior teeth causing a decrease in the resting joint space and then compression with joint movement. Symptoms of OA in the TMJ include pain-free rotation between the condyle and disk but pain with translation between the disk and articular eminence which manifests clinically as a decrease in willingness to open the mouth beyond 11.5mm. Patients usually see decreasing pain over approximately 8 months with return of function with 1-3 years. Anatomical changes also seen with TMJ osteoarthritis are flattening of the condyle, flattening of the articular eminence, and growth of the joint. Advanced OA of the TMJ can actually result in perforation of the disk and lipping around the articular surfaces.

Physical Therapy Evaluation

A thorough history is taken by the physical therapist including questions regarding pain level, mechanism of injury, location of pain, any previous treatment, what makes symptoms better or worse, sleep disturbances, latex allergy, past history of neck pain, any clicking or popping, smoking, headaches, dizziness, gum chewing, bruxing or grinding the teeth during sleep, recent dental work, bite changes, locking of jaw, difficulty or pain with eating, etc.

The physical examination includes inspection of posture, muscle development of jaw and neck, dentition, and resting space of the jaw. Next the jaw is observed during active opening and closing for any deviations. A deviation in a “C curve” indicates a tight capsule ipsilateral to curve direction. However, a deviation in an “S curve” indicates weakness in the lateral pterygoids. Noted is the presence or absence of any dental work, braces, dentures, etc. Also observed is the resting position of teeth for any overbite or crossbite. Active range of motion (AROM) is then measured using a tape measure or by marking a tongue depressor. Measured are depression/elevation, protrusion/retrusion, and lateral deviation. Any gross, functional measurements can also be taken. Passive range of motion (PROM) measurements are done only if AROM is limited by pain. This can distinguish difference between tight structures and disk displacement. A normal end-feel is tissue stretch or capsular in nature. Auscultation via stethoscope may also be performed to evaluate for crepitus or clicking.

After ROM is measured, strength is then assessed via isometric manual muscle testing of all planes of motion of the jaw: depression, elevation, protrusion, and lateral deviation. This step may be deferred if a patient is in a great deal of pain or if the jaw itself is locked or unstable. Muscle testing should also be performed for tongue protrusion, retraction, lateral deviation.

A manual assessment for joint mobility should then be performed including distraction, anterior glide, and medial glide. Palpation for tenderness is performed both externally and intraorally using a gloved hand. Internally the masseter and pterygoids can be palpated; and externally the TMJ, thyroid cartilage, and temporals.

It is also important for the therapist to evaluate the cervical spine and upper body posture and correct any problems found. The TMJ shares many musculotendinous attachments with the cervical spine; therefore, leaving this untreated could result in incomplete rehabilitation of the TMJ pain, especially if the TMJ issue is secondary to a primary cervical problem. Some examples could include whiplash injury, cervical fracture, and any cervical surgery.

Physical Therapy Management

The primary goal in TMJ treatment is to treat the pain. Modalities currently used in TMJ rehab include moist heat, ultrasound, laser, infrared, phonophoresis, and cryotherapy. For example, for acute TMJ pain, the therapist may use laser followed by a gentle intraoral massage, then ice and phonophoresis. For subacute TMJ pain, moist heat and ultrasound may be followed by massage and stretching. In the chronic stage, the therapist may use deep heat followed by aggressive massage and mobilization. It is important to educate the patient about eating habits to avoid unnecessary pain. For example avoiding chewy, thick food and chewing gum can significantly reduce pain, inflammation, and further trauma to the area.

Once the pain is controlled, the second goal is to either stabilize or mobilize the joint, to restore normal ROM and joint mobility. This is accomplished via various manual techniques including: caudal glides (motion is pulling mandible inferior to distract or open the TMJ), ventral glide (pull forward), and lat/med glides (with mouth slightly open, glide mandible medially). The patient can and should also be instructed in home self-mobilization techniques as well, for maximum recovery of motion.

Active motion is also used to re-establish TMJ movement. Examples of active ROM exercises include: to increase rotary motion, place tongue on palate and open/close mouth; to increase protrusion/retrusion, open 1cm & protrude/retrude.

Once normal ROM is established, the TMJ rehab program should emphasis stabilize the joint over time. Stress on the TMJ can be reduced by avoiding behaviors that are abusive to the TMJ and cervical spine. Behavior changes that are abusive to the TMJ and cervical spine (e.g., chewing gum, extensive jaw clenching) may exacerbate symptoms. For example, for chronic TMJ pain, the therapist may recommend the use of a splint to help prevent further damage to the TMJ.

Physical therapy can help decrease your pain and improve your function. If you suffer from TMJ pathology, please contact OSPTA at one of our locations below to determine if TMJ rehab is appropriate for you.

Conclusion

Finally, patient education is also a key in successful TMJ rehab. Patients should be educated how to avoid behaviors that are abusive to the TMJ and cervical spine. Maintenance of pain-free TMJ function depends on compliance of the patient with a comprehensive home exercise program and sensible awareness of any postures, activities, or behaviors that cause trauma to the area.

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**Function**

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It is also important for the therapist to evaluate the cervical spine and upper body posture and correct any problems found. The TMJ shares many musculoskeletal attachments with the cervical spine; therefore, leaving this untreated could result in incomplete rehabilitation of the TMJ pain, especially if the TMJ issue is secondary to a primary cervical problem. Some examples could include whiplash injury, cervical fracture, and any cervical surgery.

**Physical Therapy Management**

The primary goal in TMJ treatment is to treat the pain. Modalities currently used in TMJ rehab include moist heat, ultrasound, laser, infrared, iontophoresis, phonophoresis, and cold application. For example, for acute TMJ pain, the therapist may use laser followed by a gentle intraoral massage, then ice and iontophoresis. For subacute TMJ pain, moist heat and ultrasound may be followed by massage and stretching. In the chronic stage the therapist may use deep heat followed by aggressive massage and mobilization. It is important to educate the patient about eating habits to avoid unnecessary pain. For example avoiding chewy, thick food and chewing gum can significantly reduce pain, inflammation, and further trauma to the area.

Once the pain is controlled, the second goal is to either stabilize or mobilize the joint, to restore normal ROM and joint mobility. This is accomplished via various manual techniques including: caudal glides (motion is pulling m a n d i b l e inferior to distract or open the TMJ), ventral glide (pull forward), and lat/med glides (with mouth slightly open, glide m a n d i b l e medially). The patient can and should also be instructed in home self-mobilization techniques as well, for maximum recovery of motion.

Active motion is also used to re-establish TMJ movement. Examples of active ROM exercises include: to increase rotary motion, place tongue on palate and open/close mouth; to increase protrusion/retrusion, open 1cm & protrude/retrude.

Once normal ROM is established, the TMJ rehab program should emphasize strength and balance of the supportive areas in area. Strength programs can begin with isometric exercise using the patients or therapist’s hand for resistance, and then progress to more dynamic exercise such as therapeutic chewing with tongue manipulation of the food as directed by the therapist to target specific weak directions. Thicker or stiffer foods such as gums may be utilized at this point to gradually increase resistance so to challenge and improve strength of the tongue and TMJ musculature. Warm drinks may be used prior to exercise to improve blood flow and joint excursion, and cool or cold drinks may be used after exercise along with external ice to decrease post-exercise pain and inflammation. It should be noted that a comprehensive home exercise program is crucial to success.

**Conclusion**

Finally, patient education is also a key in successful TMJ rehab. Patients should be educated how to avoid behaviors that are abusive to the TMJ and cervical spine regions. Maintenance of pain-free TMJ function depends on compliance of the patient with a comprehensive home exercise program and sensible awareness of any postures, activities, or behaviors that cause trauma to the area. If you suffer from TMJ pathology, please contact OSPTA at one of our locations below to determine if physical therapy can help decrease your pain and improve your function.
The Temporomandibular Joint, or TMJ as it is commonly called, is a unique joint in the human body because it is actually a pair of hanging hinges that suspend the lower jaw, or mandible, and enable daily crucial tasks such as eating and speech. When one side experiences pathology, the other side is also affected because motion of the lower jaw requires both TMJ joints to simultaneously operate. The TMJ participates in forceful activities such as chewing and biting, as well as fine activities such as speech and swallowing that require fine control.

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The TMJ capsule is very vascular and has an extensive nerve supply which promotes healing but also can be a reason for TMJ pathology to be quite painful. The capsule is irregularly shaped and also attaches to the articular disk at the anterior and posterior aspects allowing for translation of the disk which is crucial to joint movement and function.

Biomechanics

The biomechanics of the TMJ are twofold: initially with the condyle of the mandible rotating anteriorly on the articular disk creating 11-25mm of jaw opening, then the upper joint acts as the disk and condyle translate anteriorly as a unit against the articular eminence allowing the remaining 15-25mm of opening of the mouth. Full opening range of the jaw is considered to be 40 to 50mm or the width of 2-3 fingers. Closing the jaw is a reverse of the opening process with the upper joint initiating the movement and the lower completing. Full functional TMJ closure is considered to be the meeting of the upper incisors to permit chewing.

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