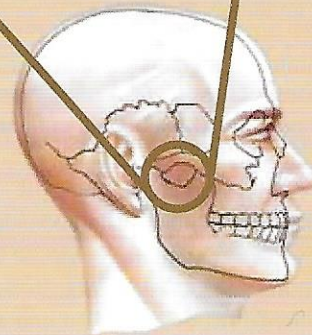
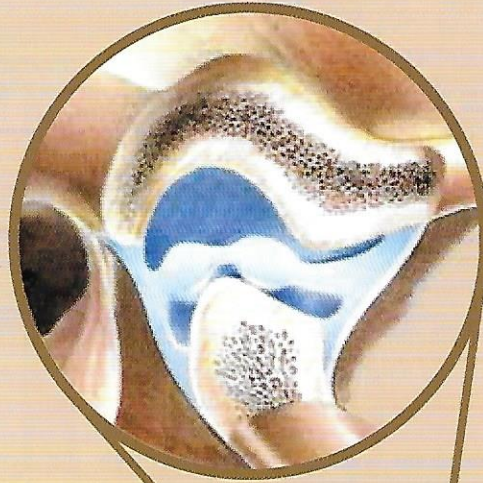


# TMJ

## Temporomandibular Joint (Jaw Joint)



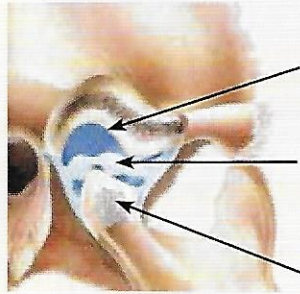
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# TMJ — Mandibular Movement

The temporomandibular joint (TMJ) derives its name from the two bones comprising the joint. The temporal bone of the cranium and the mandible fit together to form a hinge-like jaw joint. Between the two bones is an articular disc.

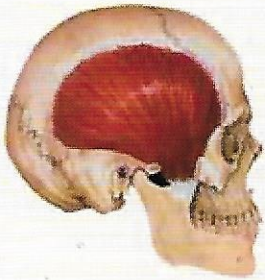


## TMJ

*Fossa*  
*Disc — the disc is pulled down to show the space between the disc and fossa*  
*Mandibular condyle*

Although the TMJ is classified as a hinge-type joint, its action is much more complex. Opening and closing the jaw is a simple hinge action while side-to-side jaw movement requires a sliding action of the joint. Chewing food requires a combination of these movements. It is accomplished by complex interaction of four pairs of muscles known as the muscles of mastication. You can observe how well nerves control the muscles to function together. Open your mouth wide to one side and snap the jaw closed. Even with this rapid movement the muscles guide the closure so the teeth fit together perfectly, regardless of the position from which the movement started.

The muscles of mastication are highly organized and very strong. Some of the muscles are closers and others open the jaw, but all are organized with each other.



*Temporalis muscle.*  
*This jaw-closing muscle pulls on the mandible in different directions because of the many angles of its fibers.*

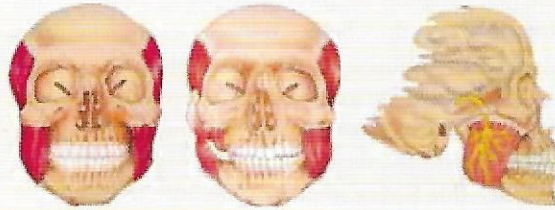


*Masseter muscle. A very strong jaw-closing muscle that pulls on cranial bones.*

*Internal pterygoid muscle. Closes the jaw and moves it sideways. It also pulls on an important bone of cranial motion.*



*External pterygoid muscle. This muscle has two bellies. It functions in jaw opening and closing.*



*A. B. C.*  
 Examples of how mandibular function integrates with the teeth and cranium.

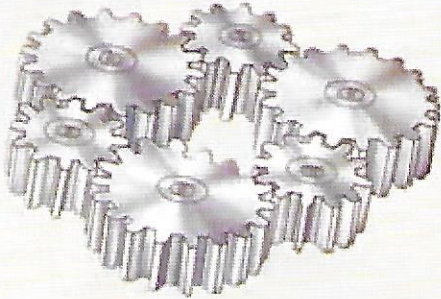
A). The right muscles are pulling harder, creating strain on the teeth and cranium. B). There is malocclusion where the teeth are hitting first on the right, creating strain on the teeth, jaw, and cranium. C). Subtle entrapment of cranial nerve V causes an imbalance in the muscles of mastication affecting occlusion and strain on cranial motion.

All of these conditions cause and/or perpetuate TMJ dysfunction and cranial faults.

# TMJ — Part of a Comp

Although one may think of the two temporomandibular joints only as the joints between the jaw and the head, they are actually a small functioning part in a complex of activity.

The TMJ works within a closed kinematic chain. The concept of a closed kinematic chain is illustrated by a series of gears. When one gear rotates, all of the gears in the chain must rotate. The TMJ is like one gear in the chain.

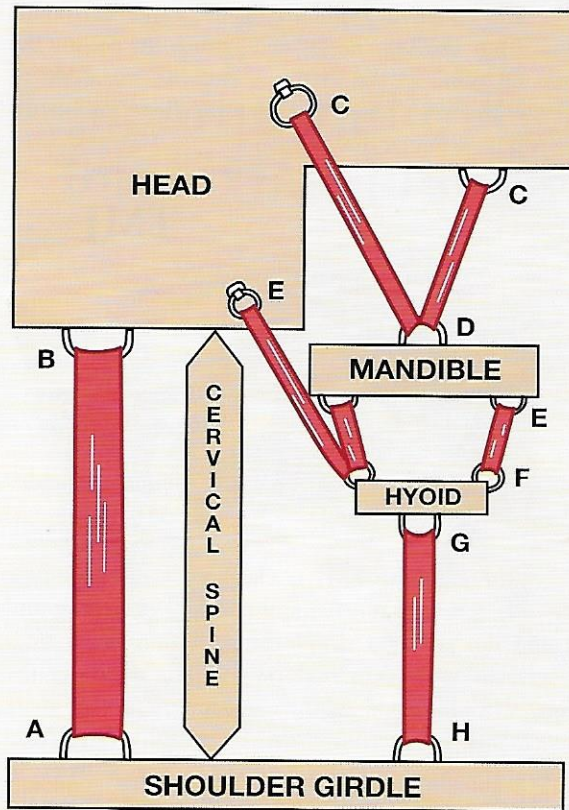


*Closed kinematic chain. All parts are involved when one part moves.*

The closed kinematic chain of the head, neck, and shoulder girdle was well illustrated in 1949 in a dental program by the University of Illinois. This simplified graphic helps to understand why it is necessary to evaluate the entire complex.

The TMJ joins the jaw with the lower portion of the skull. The teeth of the mandible must fit together properly with the teeth of the skull for balance to be present. This is very important because the teeth are brought together by powerful muscles (C-D in the illustration). Imbalance between the upper and lower teeth or an imbalance of muscular pull may cause strain that results in TMJ dysfunction and/or cranial faults. Cranial faults relate to cranial bone movement that is another part of the closed kinematic chain within the illustrated chain.

Additional muscles connect the head and jaw with the hyoid bone (E-F), which is the only bone in the body that has no connection to another bone. Below the hyoid are muscles connecting it to the shoulder girdle and shoulder blade (G-H).

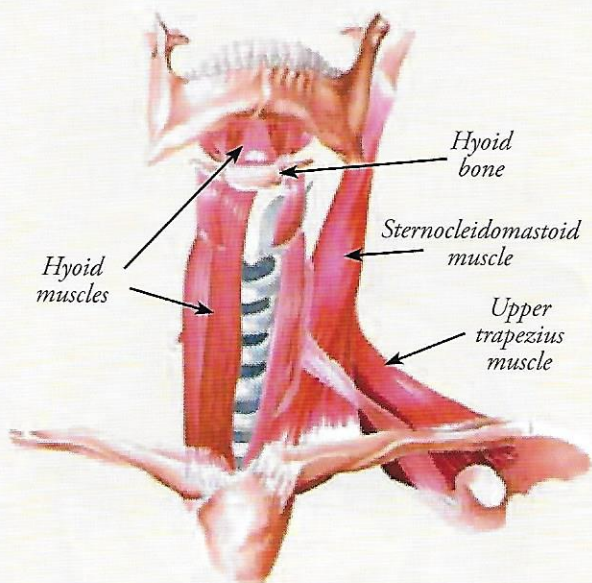


*Interaction of the jaw within a complex of muscles and structures. From Current Advances in Dentistry, University of Illinois, 1949.*

With chewing or talking the muscles connecting the jaw to the head contract and relax. Simultaneously the hyoid muscles must relax and contract in concert with the jaw opening and closing muscles. If it were not so, the head would be bobbing up and down as the jaw moves. Unfortunately the muscles do not always contract and relax with proper timing. Electromyographic studies have shown that in TMJ and/or cranial dysfunction jaw opening and closing muscles may be firing at the same time, thus fighting each other. One side may be contracting harder than the other, causing strain.

All the muscles in the closed kinematic chain

# lex — Part of the Body



*Illustrated are the larger superficial muscles of the front of the neck. There are many deeper muscles associated with the spine.*

communicate with each other through the nervous system. The muscles in the back of the neck must organize with the muscles in the front. When tilting the head to look up, the muscles in back of the neck contract and the nerves signal the front muscles to relax. These actions and signals become more complex when forward and backward head motion is combined with head rotation.

The cervical spine is depicted in the closed kinematic chain diagram as a rigid pole. When the seven vertebrae that compose that pole, along with the numerous small and large associated spinal muscles, are placed into the equation one sees there are many ways nerve signaling controls the motion organization of the closed kinematic chain.

## Examination

The TMJ examination includes evaluating the dental occlusion, the joint including its articulating disc, and mandibular motion by the muscles of mastication. Often the other areas of the closed kinematic chain are overlooked. TMJ dysfunction can be caused or

perpetuated by disturbance in any of the muscles of the closed kinematic chain.

The muscle organization within the chain is examined in applied kinesiology by having jaw motion evaluated in opening, closing, and teeth clenching. It may also be evaluated with swallowing, talking, and tested with the head and neck in different positions. It may even be necessary to test jaw function when standing or after walking.

When dysfunction is observed, the muscles that are activated in the offending activity are evaluated. Correction may be needed to the muscle or to the nerve that controls the motion. A type of nerve involvement may be subtle entrapment of the trigeminal nerve (V) by a cranial fault. Cranial nerve V controls the muscles of mastication. Hyoid muscles are controlled by cranial and spinal nerves, so either cranial faults or spinal dysfunction could cause problems.

Because the body works as an integrated whole, remote dysfunction is often the cause of TMJ problems. The entire body is made up of closed kinematic chains. The main message of this discussion is that TMJ problems can be caused by dysfunction in any area of the closed kinematic chain. Further, TMJ dysfunction is not limited to jaw pain. Because of resulting cranial faults, many health problems can develop.

