A Medical Case Study:

Craniofacial Pain & Temporomandibular Joint Disorders

PATRICIA A. RICHARD, M.D., D.M.D.
Board Certified Medical Doctor and Dentist
Board Certified Diplomate, Pain Management
What is TMJ?

The temporomandibular joint is the jaw joint system. It is the most complex joint in the body. The reason: it moves in multiple directions.

The lower jawbone, called the mandible, is connected to the skull by the temporomandibular joints. The temporomandibular joints have discs above them. The discs are made of fibrocartilage. When injured, the fibrocartilage has no capacity to heal. It serves as a buffer, protecting the base of the skull from the forces of chewing and other movements of the mandible.

Migraine Headaches

There is a complex distribution of nerves and blood vessels throughout the face and in and around the jaw joint system, brain and spine in the neck. When the disc or jaw joints are displaced, these delicate blood vessels and nerves can be affected: pinching nerves and blood vessels causing radiating pain that can even expand into the facial area. When the blood vessels are intermittently pinched, the patient can develop vascular headaches commonly called migraine headaches.

Ear Problems

There are structures connecting the disc of the temporomandibular joint with the inner bones of the middle ear. Specifically, the malleus ossicle of the middle ear connects directly through the disco malleolar ligament to the temporomandibular joint disc. The mal-alignment of the upper portion of the jaw bone, the mandibular condyle, can obstruct the flow of fluids in the Eustachian tube of the ear, causing the patient to experience symptoms such as muffled ears, ringing in the ears, and pain. The nerves in the facial area connect directly to the nerves in the cervical spine and brain. The cervical spine is the medical term for the bones and nerves in the neck. As a result, patients often have neck pain as well.

Locked Jaw

When the discs of the temporomandibular joints get displaced, that is, moved forward or inward medially or posteriorly, the patient may develop clicking and difficulty chewing. A patient can develop a locked jaw either in a closed, semi-open, or fully open position, unable to fully move sideways. With a locked jaw, the patient is unable to normally open and close his or her mouth.

Mandibular Condyle — When the mandibular condyle is dislocated, it compresses the nerves and the blood vessels causing pain and migraine headaches. The pain pattern can radiate into the temples, behind the eyes, into the forehead, the sinuses and the lower jaw, as well as into the neck.

Using subanesthetic doses of Lidocaine to the sphenopalatine ganglion often can break the vicious pain cycle. This may be accomplished with nasal applicators or blunt injection into the area without a needle.
General Symptoms

There are many symptoms associated with temporomandibular joint disorders. And they include the following:

- headaches
- jaw pain
- facial pain
- ear pain
- clicking in the jaw joints
- difficulty opening and closing the mouth
- pain on chewing
- a sense of one’s teeth not fitting together properly
- ringing in the ears
- muffled ears
- clenching of the jaw
- grinding or bruxism of the teeth
- neck pain and dizziness

Patients who have worn down teeth from a history of grinding their teeth, (bruxism) are predisposed to the development of temporomandibular joint disorders.

Patients with any type of arthritis, including Lyme disease, have a problem with this joint (the TMJ) as well. Migraine patients have constriction of the vessels to the TMJ and develop TMJ problems.

Understanding how the structures of the face and jaw connect to the brain, eyes, ears, neck, heart and lungs is critical to correctly treating patients.

Diagnosis

The doctor conducts a physical examination of the anatomy in the head and neck, ears, eyes of the brain, cardiovascular, respiratory and back and spine area. Then focus is made on examining the muscles responsible for opening and closing the mouth. Both the facial muscles, called the extraoral muscles, and the muscles inside of the mouth, the intraoral muscles, are examined.

Facial Nerve — The facial nerve arises from the brain and innervates the muscles of facial expression. Injury to this area, can cause palsy – paralysis or weakness of the muscles. Irritation of the facial nerve causes disturbances to the otic ganglion which supplies the structures of the ear. Furthermore, compression of the facial nerve secondary to disorders of the temporomandibular joint can cause persistent spasm of these facial muscles. When the muscles go into spasm, they tighten and further compress nerves. A vicious pain cycle is set up. Additionally, when the muscles go into spasm, they compress the blood vessels that run through, causing migraines. As a result, the blood flow is diminished and the tissues suffer from oxygen deprivation. This further hinders the muscles and the nerves from recovering.

The most important muscles to examine are the masseter muscles, which are in the cheek, the temporalis muscles, on the side in the temple area, the internal and external pterygoid muscles, which are intraoral. These attach to the condyle, the upper portion of the jawbone and directly to the disc on each side. Additionally, the tensor veli palatini muscles, inside of the mouth, needs to be examined.
The Ear
Spasm of the tensor veli palatini muscle causes a muffled sound in the ears and can cause ear pain. The tensor veli palatini muscle allows the Eustachian tube, connecting the middle ear to the back of the throat, to remain open for drainage. The Eustachian tube is responsible for maintaining pressure within the ear and ventilating the portion of the ear that connects with the back of the throat. Displacement of the upper portion of the jawbone, the mandibular condyle, can impinge on the Eustachian tube preventing ventilation of the inner portion of the ear. As a result, patients often feel ear pain and muffled hearing. This may be mistaken for an ear infection. Further, when fluid builds up in the middle ear as a result of an abnormal jaw joint position, bacteria from the back of the throat can travel up the Eustachian tube and colonize this fluid. Basically, the bacteria of the mouth can go into the ear and the patient can develop an ear infection. These patients not only require antibiotics, but treatment to properly align the temporomandibular joints.

The Teeth
Evaluation of the dentition-teeth is also quite important. Some patients have a deep overbite, recognized quite easily when the upper teeth overlap the lower teeth. This problem is clear when the patient's upper teeth cover most of the lower teeth — hence the term, overbite. Likewise, an overjet is the horizontal overlap of the teeth whereby the upper arch protrudes far more forward than the teeth of the lower arch.

There is a significant correlation between overbite and, sometimes overjet, with the development of temporomandibular joint symptoms.

The longer the patient's plane of occlusion is disharmonious, the more chronic the patient's problem. That is, there is a normal pattern of opening and closing. With ongoing dental deformities from missing teeth and/or malocclusion, there also occurs a remodeling of the bone of the upper portion of the jaw. That is, there is a remodeling of the condyle of the temporomandibular joint and facial arthritis develops. The condyle is the portion of the jaw joint that articulates with the skull.

The patient's incisor-to-incisor opening is measured, as well. The incisors are at the front on the upper and the lower arch. The ideal opening is 48-50mm. However, a patient needs to open 40 mm in order to eat food from a fork. Normally, one should be able to open straight up and down without the jaw deflecting to either the left or the right side.

The doctor also assesses the patient's ability to move their jaw to the left or to the right (these are called lateral excursions). The normal lateral excursion is 10-12 mm.

The Discs
Examination of the temporomandibular joints is essential. The joint is examined with the doctors fingers placed gently into the
Brain

In TMJ displacement the TMJ disc is pulled forward and compresses the nerves causing pain in all areas of the trigeminal nerve.

Any injury to the neck causes headaches.

Any shifting of the jawbone compresses the nerves and arteries. Artery compression leads to migraines.

Blood Supply & Anatomy of the Temporomandibular Joint

Dislocation of the temporomandibular joint compresses the blood flow to the facial area. It sets up a vicious cycle where the nerves are battling against the compression caused by the jaw dislocation in attempt to open the blood vessels allowing for blood flow. However, because of the imbalance of the system, the patient develops constriction of the arteries causing the onset of migraine headaches. Many patients who are treated for jaw dislocation report that their migraines have been cleared as well.

Eye Pain.

Intranasal treatment to the sphenopalatine ganglion (SPG) will stop the vicious pain cycle.
Of course, every case is approached individually. Nevertheless, patients often require a craniomandibular repositioning orthotic to realign their jaw. This is a customized plastic device that slips gently over the teeth. Many patients have what is clinically called a windup type pain syndrome with disorders of the sensory nerves, nerves responsible for sensation, as well as problems with neurotransmission, longstanding irritation of the complex nerves in the facial area, responsible for abnormal neuropeptid generation. These are chemicals made by the body that enhance the vicious pain cycle. Once the nerves and tissue are chronically irritated, the patient develops a vicious pain cycle whereby the abnormal neuropeptids cause the nerve cells to process pain at lower thresholds. It takes less and less to cause greater pain — eventually, in some patients, even light touch produces pain and the pain spreads because nerve cells that normally do not process pain become “recruited” to become additional pain processing nerve cells. A series of injections can be helpful in interrupting this process.

Radiographic Examination
The doctor will evaluate the patient and determine which testing is most appropriate for the patient — and the timing of the test. For example, some patients may require transcranial radiographs of the temporomandibular joints. There are x-rays that are analyzed, millimeter-by-millimeter, with computerized equipment. Some patients may require tomographic radiographic studies. Some patients require MRIs of the temporomandibular joint to access the position of the disc. The final diagnosis is made by the doctor after examination and interpretation of the diagnostic studies.
SAMPLE CASE STUDIES

Case #1: A 53-year-old man with a 15-year history of pain in front of the ear and in the inner ear, ocular migraines and clicking of his TM joints, bruxism and facial tightness was referred by his dentist for treatment. His ear pain was incapacitating. It interfered with use of a telephone, eating and even sleeping.

During the 15-year period, he sought the help of multiple doctors without relief. After only 6 visits with Dr. Patricia Richard, the hyperirritability of his nerves was controlled. He was treated with an appliance to realign his jaw and given nerve blocks to treat the nociceptive component of his pain for longstanding nerve irritation. Because the nerves control the muscles and the flow of blood through the blood vessels, the nerve blocks together with his other regimen of treatment, cured him after only 6 visits. He was able to return to his family dentist and resume his routine dental care.

Case #2: A 32-year-old female referred to Dr. Patricia Richard by an ears, nose and throat specialist because of the following symptoms: progressive headaches, ear pain, subtle dizziness, locking of her jaw and frequent ear infections from persistent jaw displacement. She had a very complex case. An MRI of her temporomandibular joints showed internal derangement, that is, slipped discs.

Her medical records were quite extensive including electrodiagnostic tests to define how her visual, auditory and cranial facial sensory nerve pathways function. She was treated with a nerve block and titrated neuro stimulation to the peripheral components of the vagus nerve that connects to the trigeminal nerve and the superior cervical ganglion.

Dr. Richard treated her with a neuromuscular appliance to realign her jaw. In 9 visits, she was cured of her symptoms — the slipped discs of her temporomandibular joints were back in the proper position. She was subsequently returned to her family physician and her family dentist for her routine dental care. Her case was put into remission. Her treatment plan included follow-up care every 2 months for 6 months and then 2-4 times a year to prevent flare-up.

Case #3: A 28-year-old man was referred by both his medical doctor and his dentist for an injury to his jaw caused by an airbag explosion during an auto accident. The rapidly expanding airbag compressed the trigeminal nerve system of the face, responsible for sensation and the jaw.

The temporomandibular joints were displaced. He developed slipped discs of the temporomandibular joints. When he opened his mouth, his opening was less than normal. His jaw deflected to the side on opening because the slipped discs obstructed the normal path. The upper portion of the jaw, the mandibular condyle, was impeded because the disc was moved forward and the upper jawbone could not glide over the obstruction.

After treatment with a neuromuscular appliance and a series of nerve blocks and injections into the areas of hyperirritability, his jaw opening normalized. He was so grateful, he referred friends with sports related injuries.
There are both medical, as well as, dental causes of temporomandibular joint disorders. As a medical doctor and a dentist, Dr. Richard’s practice focuses on the medical, as well as, the dental causes of temporomandibular joint disorders.

Any condition in the body including Lyme arthritis, can affect the jaw joint system. Any inflammatory disorder, such as systemic arthritis, can affect the temporomandibular joint causing a mal-alignment and compression of both blood vessels and nerves passing through this very intricate area. Patients who play the violin and similar instruments can develop not only abnormalities in cervical bones, but also compression of the structures surrounding the temporomandibular joint.

Resume: Dr. Patricia A. Richard

- University of Connecticut School of Dental Medicine, D.M.D.
- Hahnemann Medical College, Drexel University, M.D.
- Fellow, Craniofacial Disorders, University of Connecticut
- Consultant, New York University Dental School, postgraduate, Craniomandibular Pain Program, TMJ Trauma and Internal Medicine
- Postgraduate medical residency training, Internal Medicine & Surgery
- Senior Federal Aviation Administration Aviation Medical Examiner
- Board Certified, Pain Management
- Board Certified, Medical Acupuncture
- Scientific Presentations: 6th International Symposium of TMJ Arthroscopy; American Academy of Pain Management

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