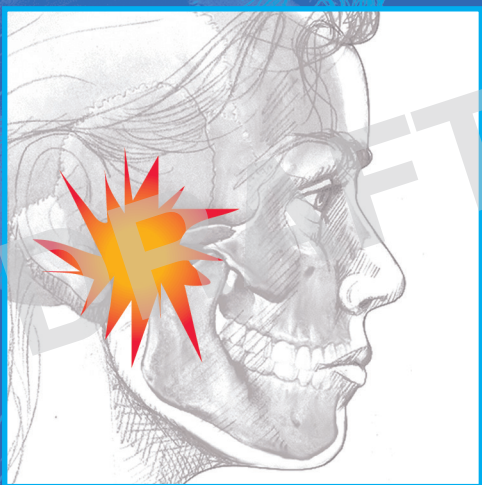


# TEMPOROMANDIBULAR DISORDERS



**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES**  
**National Institutes of Health**

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## **TEMPOROMANDIBULAR DISORDERS**

Temporomandibular joint and muscle disorders, commonly called “TMDs,” are a group of conditions that cause pain and dysfunction in the jaw joint and the muscles that control jaw movement. We don’t know for certain how many people have TMDs, but some estimates suggest that over 10 million Americans are affected. The condition appears to be more common in women than men.

For most people, pain in the area of the jaw joint or muscles does not signal a serious problem. Generally, discomfort from these conditions is temporary, often occurring in cycles. The pain eventually goes away with little or no treatment. Some people, however, develop significant, long-term symptoms.

If you have questions about TMDs, you are not alone. Researchers, too, are looking for answers to what causes these conditions and what the best treatments are. Until we have scientific evidence for safe and effective treatments, it’s important to avoid, when possible, procedures that can cause permanent changes in your bite or jaw. This booklet provides information you should know if you have been told by a dentist or physician that you have a temporomandibular disorder.



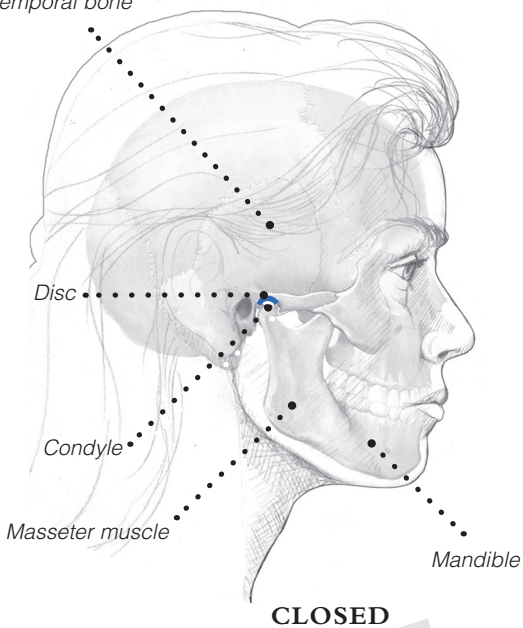
## WHAT IS THE TEMPOROMANDIBULAR JOINT?

The temporomandibular joint connects the lower jaw, called the mandible, to the bone at the side of the head—the temporal bone. If you place your fingers just in front of your ears and open your mouth, you can feel the joints. Because these joints are flexible, the jaw can move smoothly up and down and side to side, enabling us to talk, chew and yawn. Muscles attached to and surrounding the jaw joint control its position and movement.

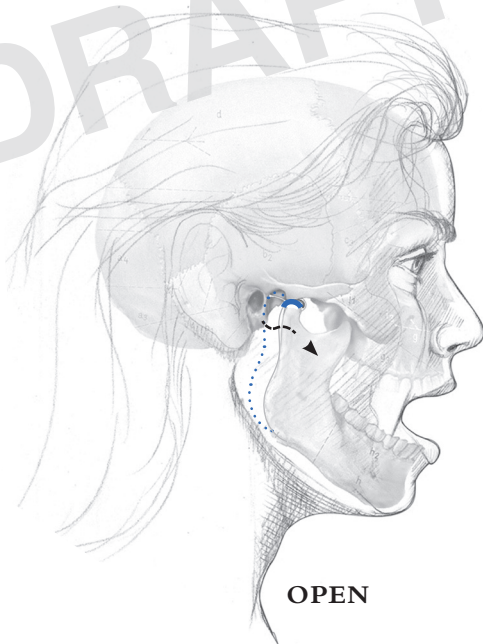
When we open our mouths, the rounded ends of the lower jaw joint, called condyles, glide along the joint socket of the temporal bone. The condyles slide back to their original position when we close our mouths. To keep this motion smooth, a soft disc lies between the condyle and the temporal bone. This disc absorbs shocks to the jaw joint from chewing and other movements.

The temporomandibular joint is different from the body's other joints. The combination of hinge and sliding motions makes this joint among the most complicated in the body. Also, the tissues that make up the temporomandibular joint differ from other load-bearing joints, like the knee or hip. Because of its complex movement and unique makeup, the jaw joint and its controlling muscles can pose a tremendous challenge to both patients and health care providers when problems arise.

*Temporal muscle covering  
temporal bone*



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## WHAT ARE TEMPOROMANDIBULAR DISORDERS?

Disorders of the jaw joint and chewing muscles—and how people respond to them—vary widely. Researchers generally agree that the conditions fall into three main categories:

- 1** Myalgia or myofascial pain involves discomfort or pain in the muscles that control jaw function.
- 2** Intra-articular disorders are a group of biomechanical disorders involving the disc-condyle complex, such as a displaced disc, dislocated jaw, or degenerative joint disease that causes deterioration of the disc and/or changes in the condyle.
- 3** Arthralgia refers to inflammation and pain in the temporomandibular joint.

A person may have one or more of these disorders at the same time. Some people have other health problems that co-exist with TMDs such as chronic fatigue syndrome, sleep disturbances, anxiety, depression, or chronic pain in other parts of the body, as well as fibromyalgia, a painful condition that affects muscles and other soft tissues throughout the body. Some of these co-existing conditions may share common symptoms, which suggest they may share similar underlying mechanisms of disease. However, it is not known whether they have a common cause.

How jaw joint and muscle disorders progress is not clear. Symptoms worsen and ease over time, but what causes these changes is not known. Most people have relatively mild forms of the disorder. Their symptoms improve significantly, or disappear spontaneously, within weeks or months. For others, the condition causes long-term, persistent, and debilitating pain.



## **WHAT CAUSES TEMPOROMANDIBULAR DISORDERS?**

Trauma to the jaw or temporomandibular joint plays a role in some TMDs. However, for many people symptoms seem to start without obvious reason and are more common in women than in men. Scientists are investigating the potential role of female hormones, and genetic and environmental factors in the development of TMDs.

Research does not support the popular belief that a bad bite or orthodontic braces can trigger TMDs. There is no scientific proof that sounds alone—such as clicking—in the jaw joint leads to serious problems. In fact, jaw sounds are common in the general population. Jaw noises alone, without pain or limited jaw movement, do not indicate a temporomandibular disorder and do not warrant treatment.



## WHAT ARE THE SIGNS AND SYMPTOMS?

A variety of symptoms may be linked to TMDs. Pain, particularly in the chewing muscles and/or jaw joint, is the most common symptom. Other likely symptoms include:

- radiating pain in the face, jaw, or neck
- jaw muscle stiffness
- limited movement or locking of the jaw
- painful clicking, popping or grating in the jaw joint when opening or closing the mouth
- a change in the way the upper and lower teeth fit together
- headache or pain in neck and shoulder muscles



## **HOW ARE TEMPOROMANDIBULAR DISORDERS DIAGNOSED?**

There is no widely accepted, standard test now available to correctly diagnose temporomandibular disorders. Because the exact causes and symptoms are not clear, identifying these disorders can be difficult and confusing. Currently, health care providers note the patient's description of symptoms, take a detailed medical and dental history, review oral habits and psychological stressors, and examine problem areas, including the head, neck, face, and jaw. Imaging studies may also be recommended.

You may want to consult your doctor to rule out other known causes of pain. Facial pain can be a symptom of many conditions, such as sinus or ear infections, various types of headaches, and facial neuralgias (nerve-related facial pain). Ruling out these problems helps in identifying TMDs.

## HOW ARE TEMPOROMANDIBULAR DISORDERS TREATED?

Because more studies are needed on the safety and effectiveness of most treatments for jaw joint and muscle disorders, experts strongly recommend using the most conservative, reversible treatments possible. Conservative treatments do not invade the tissues of the face, jaw, or joint, or involve surgery. Reversible treatments do not cause permanent changes in the structure or position of the jaw or teeth. Even when temporomandibular disorders have become persistent, most patients still do not need aggressive types of treatment.

### **Conservative Treatments**

Because many jaw joint and muscle problems are temporary, simple treatment may be all that is necessary to relieve discomfort.

#### *Self-Care Practices*

There are steps you can take that may be helpful in easing symptoms, such as:

- eating soft foods,
- applying ice packs,
- avoiding extreme and repetitive jaw movements (such as wide yawning, loud singing, and gum chewing),
- learning techniques for relaxing and reducing stress,
- practicing gentle jaw stretching and relaxing exercises that may help increase jaw movement. Your health care provider or a physical therapist can recommend exercises if appropriate for your particular condition.



### *Pain Medications*

For many people with temporomandibular disorders, short-term use of over-the-counter pain medicines or nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen, may provide temporary relief from jaw discomfort. When necessary, your dentist or physician can prescribe stronger anti-inflammatory medications, muscle relaxants, or anti-depressants to help ease symptoms.

### *Bite Splints*

Your physician or dentist may recommend an oral appliance, also called a bite splint or bite guard, which is a plastic guard that fits over the upper or lower teeth. Splints are a widely used treatment for TMDs because they may relieve jaw muscle tension or oral habits such as clenching. Studies of their effectiveness in providing pain relief, however, have been inconclusive. If a bite splint is recommended, it should not cause permanent changes in the bite. If a splint causes or increases pain, or affects your bite, stop using it and see your health care provider. The conservative, reversible treatments described are useful for relief of temporary pain—they are not cures for TMDs. If symptoms continue over time, come back often, or worsen, tell your doctor.

### *Botox*

Botox® (botulinum toxin type A) is a drug made from the same bacterium that causes food poisoning. Used in small doses, Botox injections can actually help alleviate some health problems and have been approved by the Food and Drug Administration (FDA) for certain disorders. However, Botox is currently not approved by the FDA for use in TMDs. Results from recent clinical studies are inconclusive regarding the effectiveness of Botox for treatment of chronic TMDs.

### **Irreversible Treatments**

Irreversible treatments that have not been proven to be effective—and may make the problem worse—include orthodontics to change the bite; crown and bridge work to balance the bite; grinding down teeth to bring the bite into balance, called “occlusal adjustment”; and repositioning splints, also called orthotics, which permanently alter the bite.

### *Surgery*

Other types of treatments, such as surgical procedures, invade the tissues. Surgical treatments are controversial, often irreversible, and should be avoided where possible.

There have been no long-term clinical trials to study the safety and effectiveness of surgical treatments for TMDs. Nor are there standards to identify people who would most likely benefit from surgery. Failure to respond to conservative treatments, for example, does not automatically mean that surgery is necessary.



If surgery is recommended, be sure to have the doctor explain to you, in words you can understand, the reason for the treatment, the risks involved, and other types of treatment that may be available.

### *Implants*

Surgical replacement of jaw joints with artificial implants may cause severe pain and permanent jaw damage. Some of these devices may fail to function properly or may break apart in the jaw over time. If you have already had temporomandibular joint surgery, be very cautious about considering additional operations. Persons undergoing multiple surgeries on the jaw joint generally have a poor outlook for normal, pain-free joint function. Before undergoing any surgery on the jaw joint, it is extremely important to get other independent opinions and to fully understand the risks.

The U.S. Food and Drug Administration (FDA) monitors the safety and effectiveness of medical devices implanted in the body, including artificial jaw joint implants. Patients and their health care providers can report serious problems with implants to the FDA through MedWatch at [www.fda.gov/medwatch](http://www.fda.gov/medwatch) or telephone toll-free at 1-800-332-1088.

## **IF YOU THINK YOU HAVE A TEMPOROMANDIBULAR DISORDER ...**

Remember that for most people, discomfort from TMDs will eventually go away on its own. Simple self-care practices are often effective in easing symptoms. If treatment is needed, it should be based on a reasonable diagnosis, be conservative and reversible, and be customized to your special needs. Avoid treatments that can cause permanent changes in the bite or jaw. If irreversible treatments are recommended, be sure to get a reliable, independent second opinion.

Because there is no certified specialty for TMDs in either dentistry or medicine, finding the right care can be difficult. Look for a health care provider who understands musculoskeletal disorders (affecting muscle, bone and joints) and who is trained in treating orofacial pain conditions. Pain clinics in hospitals and universities may be a good source of advice, particularly when pain continues over time and interferes with daily life. Complex cases, often marked by prolonged, persistent and severe pain; jaw dysfunction; co-existing conditions; and diminished quality of life, likely require a team of experts from various fields, such as neurology, rheumatology, pain management and others, to diagnose and treat this condition.



## RESEARCH

The National Institute of Dental and Craniofacial Research (NIDCR), part of the National Institutes of Health (NIH), leads the federal research effort on TMDs. Here are some highlights of NIDCR research in this area:

### **The Orofacial Pain: Prospective Evaluation and Risk Assessment (OPPERA) study**

In this landmark study launched in 2005, NIDCR-funded scientists tracked nearly 3,000 healthy adults over several years to identify risk factors that contribute to the development of TMD. In the second phase of the study, the researchers followed participants who were diagnosed with TMD to determine why some went on to develop a chronic form of the condition. Scientists identified several pain-related clinical symptoms and designed a mathematical model that strongly predicts greater risk of progressing from acute to chronic TMD. These predictive clinical signs and symptoms may help clinicians identify the most at-risk patients and take steps to prevent or provide earlier treatment for chronic painful TMD. Researchers are continuing to analyze data from this study, including looking for genes associated with TMD risk, identifying potential biomarkers of the condition, and investigating other pain conditions that overlap with TMD.



## Pain Studies

NIDCR scientists are conducting a wide range of pain studies to better understand the pain process, including:

- Understanding the causes of facial pain in TMD disorders and what biological pathways it may have in common with other pain conditions, such as headache and widespread muscle pain;
- Establishing why craniofacial pain is often more severe and emotionally draining than pain in other areas of the body;
- Pinpointing factors that lead to chronic or persistent jaw joint and muscle pain;
- Determining the genetic factors that contribute to pain and how patients respond to and manage pain;
- Advancing the discovery and validation of biomarkers for pain research and treatment;
- Exploring differences between men and women in how they respond to pain and pain medications;
- Examining the effects of stressors, such as noise, cold, and physical stress, on pain symptoms in patients with TMD disorders to learn how lifestyle adjustments can decrease pain;
- Clarifying pain mechanisms and new biological targets for treatment of pain;
- Identifying medications, or combinations of medications and conservative treatments (as described on page 9), that will provide effective chronic pain relief; and
- Identifying factors contributing to TMD treatment adherence and evaluating the effect of different treatments on pain intensity and jaw function.



## **TMD Tissue Repair**

NIDCR-supported researchers are using regenerative medicine techniques to develop strategies for regrowing or replacing tissues damaged by TMD. Scientists are:

- studying stem cells that may be used to regenerate and repair cartilage;
- developing delivery techniques for stem-cell based therapies;
- creating and improving animal models for studying and testing temporomandibular joint tissue regeneration; and
- improving current implant devices and developing safer, more life-like materials for use in repairing or replacing damaged joints, discs and chewing muscles.

## **National Academy of Sciences Consensus Report**

NIDCR sponsored the development of a consensus report on temporomandibular disorders by the National Academy of Sciences (NAS). The NAS expert committee assessed the current state of knowledge about TMDs, safety and efficacy of treatments, and burden and costs associated with TMD. The report provides recommendations for enhancing research, training, and education to enable development of effective, evidence-based therapies. For more information, visit the NAS web page Temporomandibular Disorders (TMD): From Research Discoveries to Clinical Treatment at <https://www.nationalacademies.org/our-work/temporomandibular-disorders-tmd-from-research-discoveries-to-clinical-treatment>.

## **HOPE FOR THE FUTURE**

The challenges posed by TMD span the research spectrum, from causes to diagnosis to treatment and prevention. Researchers throughout the health sciences are working to gain a better understanding of TMD by studying the mechanisms of the disorder, the progression from acute to chronic disease, new methods of diagnosis, and how best to offer personalized treatment. The ultimate goal of such research is to improve the quality of life for those with this painful disorder.

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