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Temporomandibular Joint (TMJ) Disorders (TMJD)

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Disclaimer

Carefully check state regulations and/or the member contract.
Each benefit plan, summary plan description or contract defines which services are covered, which services are excluded, and which services are subject to dollar caps or other limitations, conditions or exclusions. Members and their providers have the responsibility for consulting the member's benefit plan, summary plan description or contract to determine if there are any exclusions or other benefit limitations applicable to this service or supply. **If there is a discrepancy between a Medical Policy and a member's benefit plan, summary plan description or contract, the benefit plan, summary plan description or contract will govern.**

Legislative Mandates

EXCEPTION: For HCSC members residing in the state of Louisiana, R.S. 22:1055 requires coverage for diagnostic, therapeutic, or surgical procedures related to the temporomandibular joint (TMJ) and associated musculature and neurological conditions. Coverage may be subject to the same conditions, limitations, precertification, prior authorization, or referral procedures that apply to coverage for diagnostic, therapeutic, or surgical procedures involving other bones or joints of the human skeleton.

EXCEPTION: For Illinois only: Illinois Public Act 103-0123 (IL HB 1384) Coverage for Reconstructive Services requires the following policies amended, delivered, issued, or renewed on or after January 1, 2025 (Individual and family PPO/HMO/POS; Student; Group [Small Group; Mid-Market; Large Group Fully Insured PPO/HMO/POS] or Medicaid), to provide coverage for medically necessary services that are intended to restore physical appearance on structures of the body damaged by trauma.

EXCEPTION: For HCSC members residing in the state of Arkansas, § 23-79-150 relating to musculoskeletal disorders of the face, neck, or head, requires coverage, when such coverage is elected

by the group policyholder, for the medical treatment of musculoskeletal disorders affecting any bone or joint in the face, neck, or head, including temporomandibular joint disorder and craniomandibular disorder. Treatment shall include both surgical and nonsurgical procedures. This coverage shall be provided for medically necessary diagnosis and treatment of these conditions whether they are the result of accident, trauma, congenital defect, developmental defect, or pathology. This applies to the following: Fully Insured Group, Student, Small Group, Mid-Market, Large Group, HMO, EPO, PPO, POS. Unless indicated by the group, this mandate or coverage will not apply to ASO groups.

Coverage

NOTE 1: Each benefit plan or contract defines which services are covered, which are excluded, and which are subject to dollar caps or other limits. Members and their providers will need to consult the member's benefit plan or contract to determine if there are any exclusions or other benefit limitations applicable to this service or supply.

This medical policy does NOT address Gender Reassignment Services (Transgender Services). This medical policy IS NOT TO BE USED for Gender Reassignment Services. Refer to SUR717.001, Gender Assignment Surgery and Gender Reassignment Surgery with Related Services.

NOTE 2: The Coverage section is organized on the basis of diagnostic procedures, non-surgical treatment, and surgical treatment for temporomandibular joint (TMJ) disorders (TMJD, also known as TMD).

Diagnostic Procedures

Diagnostic procedures **may be considered medically necessary** when the individual has persistent symptoms of TMJD, including, but not limited to:

- Pain localized in the TMJ, the muscles of mastication, and/or the periauricular area, which may or may not be aggravated by chewing, jaw function, and/or mandibular movement (such as yawning);
- Noise in the TMJ with movement (e.g., clicking, grating, crepitus, and/or popping) that is accompanied by pain and/or decreased mobility, and is frequently audible by ear or can be heard with a stethoscope;
- Headache, jaw ache, and/or facial pain, often in combination with neck, shoulder or back pain;
- Limited and/or asymmetric mandibular movement;
- Locking of the jaw;
- Catching of the jaw on movement;
- Point tenderness on TMJ palpation;
- Signs of oral parafunction, such as bruxism (tooth grinding), e.g., abnormal occlusal wear.

For individuals who meet the above criteria, the diagnostic procedures that **may be considered medically necessary** in diagnosing TMJ include:

- Comprehensive physical examination with detailed history, which includes palpation of the myofascial muscles and jaw joint, measurements to assess any limitation of mouth opening, assessment of any noise in the jaw joint;
- Transcranial and lateral skull x-rays, tomography, and arthrography;
- Computerized tomography (CT) or magnetic resonance imaging (MRI). Generally, CT scans and MRIs are only needed for pre-surgical evaluation;
- Cephalograms;
- Orthopantogram;
- Submentovertex x-rays; and/or
- Diagnostic arthroscopy, only if:
  - Non-operative techniques have failed to adequately provide diagnostic information; AND
  - The individual meets the criteria for surgery (listed below under Treatment—Surgical).

The following **are considered not medically necessary** to diagnose TMJ disorders:
- Routine blood studies and hormone studies;
- Study models of the teeth.

The following diagnostic procedures **are considered experimental, investigational, and/or unproven** in diagnosing TMJ disorders:
- Electromyography (EMG), including dynamic surface EMG;
- Kinesiology;
- Thermography;
- Neuromuscular junction testing;
- Somatosensory testing;
- Ultrasound imaging/sonogram;
- Intra-oral tracing or gothic arch tracing, intended to demonstrate deviations in the positioning of the jaws that are associated with TMJ dysfunction;
- Muscle testing (other than testing included in the physician's physical examination);
- Range of motion measurements (other than measurements included in the physician's physical examination);
- Soft tissue x-rays of the neck;
- Bone and joint imaging;
- Computerized joint sonography;
- Joint sounds analysis;
- Joint survey;
- Joint vibration analysis;
- Joint motion analysis; and
- Motion x-rays, digital motion x-rays.

Treatment-Non-Surgical

The following non-surgical treatments of TMJD **may be considered medically necessary** for individuals who have persistent symptoms (see list under Diagnostic Procedures above) and have been diagnosed with TMJD:

- Physical therapy;
- Injection of joint spaces with local anesthetics or corticosteroids;
- Intra-oral reversible prosthetic devices and/or maxillomandibular (occlusal) appliances (encompassing fabrication, insertion, and adjustment); and/or
- Study models of the teeth when done in preparation for a covered splint or appliance, or when needed as preparation for a covered surgical procedure.

The following non-surgical treatments **are considered not medically necessary** for treatment of TMJ disorders:

- Facebow transfer;
- Orthodontics;
- Study models of the teeth when done in preparation for orthodontics;
- Interdental fixation;
- Dental restorations, dental prostheses;
- Trigger point injections.

The following non-surgical treatments **are considered experimental, investigational, and/or unproven** for treatment of TMJ disorders:

- Electrogalvanic stimulation;
- Iontophoresis;
- Biofeedback;
- Ultrasound;
- Any methods used to alter the vertical dimensions and/or change the occlusal or jaw relationship, including orthodontic services;
- Transcutaneous electrical nerve stimulation (TENS);
- Percutaneous electrical nerve stimulation (PENS);
- Platelet concentrates;
- Dextrose prolotherapy;
- Hyaluronic acid;
- Acupuncture; and/or
- Botulinum toxin A.

Treatment-Surgical

Surgical procedures performed on the temporomandibular joint **may be considered medically necessary** for individuals who have documented evidence of:

- Severe trauma; OR
- Pathology of the TMJ that has not responded to non-surgical, conservative, reversible treatment modalities, usually on long-term, chronic basis; AND
  - Continuous and/or repetitive episodes of pain and mechanical signs; AND/OR
  - Significant clinical disability and/or loss in quality of life; AND/OR
  - Evidence of progression of disease by history and/or imaging studies.

In addition, surgical procedures performed on the jaw (i.e., orthognathic surgery) **may be considered medically necessary** when:

- The individual has met the above criteria; AND
- Documentation is provided that proves a positive relationship between the individual's long-term symptoms and a malocclusion and/or discrepancy in jaw alignment.

Surgical procedures that **may be considered medically necessary** for the treatment of TMJ that meet the above criteria include, but are not limited to:

- Orthognathic surgery, including, but not limited to:
  - LeFort I, midface reconstruction;
  - Mandibular reconstruction, with or without bone graft and/or internal rigid fixation; segmental osteotomy.
- Arthrocentesis;
- Injections of the joint other than arthrocentesis;
- Manipulation for reduction of fracture or dislocation, with documentation and/or confirmation of dislocation or fracture (**NOTE 3:** This does NOT include periodic manipulation or adjustments that are done routinely with splint therapy);
- Arthroscopic procedures, including, but not limited to:
  - Arthrocentesis;
  - Arthrolysis;
  - Debridement;
  - Disc manipulation/repositioning/fixation/release;
  - Abrasion arthroplasty; or
- Open surgical procedures, including, but not limited to:
  - Disc arthroplasty (repositioning, recontouring, fixation discopexy);
  - Condylectomy;
  - Meniscectomy (disc removal) without replacement, temporary alloplastic implant, or reconstruction with autogenous tissue graft;
  - Osseous recontouring (mandibular condyle, glenoid fossa, articular eminence);
  - Arthroplasty for ankylosis;
  - Joint reconstruction, with autogenous costochondral graft or prosthesis;
  - Open reduction, internal fixation of condylar fracture/dislocation;
  - Excision of tumor or bony hypertrophy/hyperplasia;
  - Mandibular/condylar repositioning (condylotomy and/or osteotomy);
  - Coronoidectomy, mandibular coronoidectomy;
  - Myotomy.

Genioplasty, with or without sliding osteotomy, **is considered cosmetic.**

Oral devices utilized to prevent TMJ disorders **are considered experimental, investigational and/or unproven.**

Policy Guidelines

None.

Description

Temporomandibular joint disorder (TMJD) refers to a group of disorders characterized by pain in the temporomandibular joint and surrounding tissues. Initial conservative therapy is generally recommended; there are also a variety of nonsurgical and surgical treatment possibilities for patients whose symptoms persist.

The temporomandibular joints (TMJ) are located on either side of the face, just in front of the ears, and are formed by the mandibular condyle of the lower jaw fitting into the mandibular fossa of the temporal bone of the skull. These two bones are separated from direct contact by a fibrous disc, sometimes referred to as a meniscus, which functions as a moving shock absorber and stabilizer between the condyle and fossa. The articulating surfaces of the TMJ are lined with dense fibrous connective tissue that has a greater ability to repair itself than the hyaline cartilage that lines most other synovial joints. The TMJ provides both hinging and sliding movement by way of a group of skeletal muscles referred to as the muscles of mastication (chewing). These muscles allow functional behaviors such as swallowing, talking, and mastication, as well as non-functional (parafunctional) behaviors defined as bruxism, which is clenching of the teeth, associated with forceful lateral or protrusive jaw movements, resulting in rubbing, gritting, or grinding together of the teeth, usually during sleep. (1)

Temporomandibular disorders (TMD) or temporomandibular joint disorders (TMJD) encompass a cluster of related disorders in the masticatory system that has many common symptoms. An estimated 75% of the U.S. population has experienced one of more symptoms of TMJD; approximately 3.6%-7% of the U.S. population will require professional treatment. TMJD usually involves more than one symptom and rarely has a single cause; most TMJD symptoms are temporary and require little or no professional intervention. The most common symptom is pain or discomfort in or around the ear, jaw joint, and/or muscles of the jaw, face, temples, and neck. Pain may arise suddenly, or progress over months to years with intermittent frequency and intensity. Other symptoms include clicking, popping, grating (crepitus), locking, limited or deviant jaw opening, chewing difficulties, and headache. (1, 2)

There are two basic types of TMJD; myogenous and arthrogenous. Myogenous TMJD is muscle-related, and usually results from overwork, fatigue or tension of the jaw and supporting muscles. Arthrogenous TMJD is joint-related and usually results from inflammation, disease, or degeneration of the hard or soft tissues within the TMJ; most commonly capsulitis, synovitis, disc dislocation (internal derangement), or degenerative arthritis. Bruxism and head/neck muscle tension, while not scientifically proven causes of TMJD, may perpetuate TMJD symptoms and may need to be controlled to manage TMJD. Although dental malocclusion has historically been viewed as a cause of TMJD, recent research studies do not confirm that conclusion. Scientific studies have indicated a higher level of anxiety and emotional stress in

TMJD patients but have not established whether anxiety and depression were the cause of, or were caused by, TMJD.

TMJD evaluation may include a comprehensive history of all symptoms, including dental and psychological history; a comprehensive physical examination of the TMJ's, cervical spine, jaw/head/neck muscles, neurological-neurovascular structures, teeth, gums, and oral hard and soft tissues; a psychological evaluation, including a brief interview and testing when indicated; additional tests as indicated, including but not limited to X-rays and diagnostic imaging. (1, 2)

Since there is no known cure for TMJD, management of symptoms is similar to management of other orthopedic or rheumatologic disorders. The goals of TMJD management include decrease in pain, decrease in adverse loading or pressure on the jaw joints, restoration of jaw function and normal daily activities. Because signs and symptoms of TMJD may be temporary and self-limiting, special effort should be made to avoid aggressive or nonreversible therapy such as surgery, extensive dental or orthodontic treatment. Conservative management techniques, such as behavior modification, physical therapy, medication, jaw exercise, and orthotics have proven to be safe and effective in the majority of cases. Most patients achieve good long-term relief with conservative (reversible) therapy; scientific research demonstrates that 50% to over 90% of TMJD patients treated conservatively have few or no ongoing symptoms of TMJD. (1)

Behavior modification is often necessary because maladaptive behavior and persistent habits, such as tooth clenching or nail biting, may play a significant role in aggravating and perpetuating TMJD symptoms. Also, psychological or emotional conflicts can be an integral component in TMJD and chronic pain behavior, and referral to a mental health professional in conjunction with reversible physical treatment may be indicated. Physical therapy exercises and mobilization techniques can help to maintain normal muscle and joint function, improve range of motion, and increase muscle strength and coordination. Occlusal therapy, including occlusal adjustment, orthodontic treatment, restorative dentistry, and orthognathic surgery has little support in scientific literature for routine use in treatment of TMJD and is rarely necessary; generally, irreversible occlusal changes should be discouraged. (1) Oral orthopedic appliances, such as splints, orthotics, night guards, etc. are routinely used for TMJD management. These are designed to redistribute the occlusal forces, reduce mobility of teeth, and reduce bruxism. TMJ arthrocentesis lubricates the joint surfaces and reduces inflammation. Corticosteroids or anti-inflammatory agents may be injected into the joint following arthrocentesis, and gentle manipulation may be performed to improve jaw range of motion.

Surgical treatment can be effective for specific disorders but should only be considered after reasonable reversible treatment techniques have failed. TMJ surgical procedures include closed techniques (arthroscopy) and open techniques (arthrotomy). Arthroscopy may be effective in treatment of conditions caused by displaced discs, fibrous adhesions, and arthritis. However, recent studies suggest that TMJ arthrocentesis may be as effective as arthroscopic surgery. Arthrotomy may be indicated for severe fibrous adhesion removal, ankylosis, tumor removal, chronic dislocation, painful non-reducing disc dislocation, and severe osteoarthritis that has not been responsive to reversible treatment.

Patient self-care techniques may be helpful. (1) These include:

- Limited jaw opening; and
- Avoidance of:
  - Heavy chewing (e.g., gum, bagel, tough meat);
  - Teeth grinding and clenching;
  - Wide yawning or singing;
  - Poor sleeping posture;
  - Cheek biting;
  - Tongue thrusting;
  - Chewing on fingernails or non-food items, and/or
  - Playing musical instruments that stress, retrude or strain the jaw.

The American Academy of Orofacial Pain strongly cautions against treatments designed to permanently change the bite or to reposition the jaw with orthodontics or reconstruction. The TMJ Association, Ltd is a national non-profit organization whose mission is to improve the diagnosis, care and treatment of patients affected by TMJD through fostering research, education, and prevention of TMJ problems. On their informational web site, the TMJ Association notes that TMJ implants to replace all, or part of the jaw joint have failed in a large number of patients who then experience serious complications that require further treatment and often additional surgeries. The following list is excerpted from the TMJ Association's list of symptoms that are frequently reported by TMJ implant patients, which the Association specifies may or may not be related to jaw implants: (2)

- Resorption or degeneration at the end of the jawbone (the condyle) and the part of the skull where the jawbone is inserted (the fossa); the mandibular bone, or jaw, described as "melting" or "soft"; skull penetration (holes in the skull);
- Disfigurement or deformity of the face;
- Pain and dysfunction in the facial muscles;
- Weakness and/or diminished muscle strength;
- Lack of coordination;
- Visual disturbances, including reading problems, snow blindness, blurred vision, blindness;
- Memory loss, confusion, inability to think clearly;
- Seizures and/or blackouts;
- Swollen lymph nodes/glands (e.g., neck, behind ears, under arms, groin);
- Abnormalities of the parotid glands (the salivary glands, located below and in front of each ear); and/or swallowing difficulties.

Regulatory Status

In March 2023, the U.S. Food and Drug Administration (FDA) issued a safety communication regarding evaluation of safety concerns with certain dental devices used on adults which states the following: (3)

"Safety concerns with the use of certain dental devices that are fixed (non-removable) palatal expanders used on adults to remodel the jaw or to treat conditions.

The devices of concern include:

- Anterior Growth Guidance Appliance (AGGA) and Fixed Anterior Growth Guidance Appliance (FAGGA),
- Anterior Remodeling Appliance (ARA) and Fixed Anterior Remodeling Appliance (FARA),
- Osseo-Restoration Appliance (ORA) and Fixed Osseo-Restoration Appliance (FORA), and
- Any other similar device types.

The FDA is aware of these devices being used to treat conditions such as obstructive sleep apnea (OSA) and temporomandibular joint disorder (TMD) of the jaw, and to remodel the jaw in adults. However, the safety and effectiveness of these devices intended for these uses have not been established, and these devices are not cleared or approved by the FDA."

Rationale

The medical policy was originally created in 1990 and has been updated periodically. The most recent update was performed through April 2024.

Medical policies assess the clinical evidence to determine whether the use of a technology improves the net health outcome. Broadly defined, health outcomes are length of life, quality of life, and ability to function, including benefits and harms. Every clinical condition has specific outcomes that are important to patients and to managing the course of that condition. Validated outcome measures are necessary to ascertain whether a condition improves or worsens; and whether the magnitude of that change is clinically significant. The net health outcome is a balance of benefits and harms.

To assess whether the evidence is sufficient to draw conclusions about the net health outcome of a technology, 2 domains are examined: the relevance and the quality and credibility. To be relevant, studies must represent one or more intended clinical use of the technology in the intended population and compare an effective and appropriate alternative at a comparable intensity. For some conditions, the alternative will be supportive care or surveillance. The quality and credibility of the evidence depend on study design and conduct, minimizing bias and confounding that can generate incorrect findings. The randomized controlled trial (RCT) is preferred to assess efficacy; however, in some circumstances, nonrandomized studies may be adequate. RCTs are rarely large enough or long enough to capture less common adverse events and long-term effects. Other types of studies can be used for these purposes and to assess generalizability to broader clinical populations and settings of clinical practice.

For treatment of temporomandibular joint disorders (TMJD), literature searches have focused on studies comparing novel treatments with conservative interventions and/or placebo controls (rather than no-treatment control groups) and reporting pain reduction and/or functional outcome improvements (e.g., jaw movement).

Diagnosis of Temporomandibular Joint Disorder

TMJD (also known as temporomandibular joint syndrome) refers to a cluster of problems associated with the temporomandibular joint and musculoskeletal structures. The etiology of TMJD remains unclear and is believed to be multifactorial. TMJD is often divided into 2 main categories: articular disorders (e.g., ankylosis, congenital or developmental disorders, disc derangement disorders, fractures, inflammatory disorders, osteoarthritis, joint dislocation) and masticatory muscle disorders (e.g., myofascial pain, myofibrotic contracture, myospasm, neoplasia).

The purpose of specific diagnostic tests in individual who have suspected TMJD is to provide an option that is an alternative to or an improvement on existing diagnostic approaches, such as a comprehensive history and physical exam and alternative diagnostic tests.

Systematic Reviews

Ultrasound

Almeida et al. (2019) evaluated the diagnostic efficacy of ultrasound to assess TMJDs such as disc displacement (DD), joint effusion (JE), and condylar changes, with 3D imaging as the reference standard. (4) The authors identified 28 studies with a total of 2829 joints. Combined sensitivities of ultrasound for diagnosing DD, JE, and condylar changes all fell within the "acceptable" range as defined by the authors. "Excellent" combined specificity was reported for ultrasound to diagnose JE, but specificity for DD was in the "acceptable" range, and condylar changes specificity fell below acceptable. Heterogeneity across studies was high (I^2 range, 83.35 to 96.12), as were the ranges of sensitivity and specificity seen across studies. The variation in the sensitivity and specificity across the 3 pathologies could be related to the diagnostic parameters used to detect the TMJD, or it could be due to the different transducer frequencies used, probe design, examination methods, and skill of the sonographers and image readers. Considering the limitations and cost of MRI, the lower cost, accessibility, and non-invasive and non-ionizing radiation of ultrasound make it a good screening method, especially for DD and JE. Future studies should be conducted to determine if dynamic 3D ultrasound with high-resolution transducer increases the reliability of the examination.

A literature review by Manfredini et al. (2009) included 20 studies evaluating ultrasound for diagnosing TMJDs; all studies evaluated DD, and several also considered osteoarthrosis and/or joint effusion. (5) The reported sensitivity of ultrasound to detect DD, compared with the reference standard (MRI in most studies), ranged from 31% to 100%, and the specificity ranged from 30% to 100%. Reviewers stated that even when changes in ultrasound technology over time were taken into account, study findings were contradictory. The reviewers noted unexplained differences between studies conducted by the same group of researchers. Reviewers concluded that additional advances are needed to standardize the ultrasound assessment of TMJD before it can be considered an accurate diagnostic tool.

Surface Electromyography

A review on surface electromyography by Klasser et al. (2006) found a lack of literature on the accuracy of this method of diagnosis, compared with a criterion standard (i.e., comprehensive clinical examination and history-taking). (6) Reviewers concluded there was insufficient

evidence that electromyography can accurately distinguish people with facial pain from those without pain, but that the technique may be useful in a research setting.

Joint Vibration Analysis

Sharma et al. (2013) published a systematic review on joint vibration analysis for diagnosis of TMJDs. (7) Reviewers identified 15 studies that evaluated the reliability and/or diagnostic accuracy of joint vibration analysis compared with a reference standard. Methodologic limitations were identified in all studies and included the absence of well-defined diagnostic criteria, use of a non-validated system for classifying disease progression, variability within studies in the reference standard used, and lack of blinding. In the 14 studies reporting on diagnostic accuracy, there was a wide range of reported values, with sensitivity ranging from 50%to 100% and specificity ranging from 59% to 100%.

Section Summary: Diagnosis of Temporomandibular Joint Disorder (TMJD)

Current evidence is insufficient or imprecise to support the use of ultrasound, surface electromyography, or joint vibration analysis to diagnose TMJD.

Orthotics and Pharmacologic Treatment of Temporomandibular Joint Disorder

Systematic Reviews

List and Axelsson (2010) published a review of systematic reviews on treatments for TMJD published through August 2009. (8) They identified 30 reviews; there were 23 qualitative systematic reviews and 7 meta-analyses. Eighteen of the systematic reviews included only RCTs, three only included case-control studies, and nine included a mix of RCTs and case series. TMJDs were defined inconsistently in the primary studies and systematic reviews, and several reviews addressed the related diagnoses of bruxism, disc replacements, and myofascial pain. Twenty-nine of the systematic reviews had pain intensity or pain reduction as the primary outcome measure, and 25 reported clinical outcome measures such as jaw movement or jaw tenderness on palpation. Reviewers divided the treatments into 5 categories (some studies were included in >1 category). These categories and the main findings are listed in Table 1.

Table 1. Categories of Treatment

Categories	Number of Articles	Findings
Occlusal appliances, occlusal adjustment, and orthodontic treatment	10	Six systematic reviews did not find significant benefit vs other treatment, 4 found no benefit vs a placebo device, and 3 found occlusal therapy was better than no treatment.
Physical treatments including acupuncture, TENS, exercise, and mobilization	8	Four reviews found no significant benefit of acupuncture over other treatments, 1 found no difference between acupuncture and placebo treatment, and 3 found acupuncture was better than no treatment. One review found active exercise and postural training were effective for treating TMJD-related pain.

Pharmacologic treatment	7	Treatments found to be superior to placebo were analgesics (2 reviews), clonazepam or diazepam (3 reviews), antidepressants (4 reviews), and hyaluronate (1 review). One review found effects of hyaluronate and corticosteroids to be similar.
Maxillofacial surgery	4	Three reviews evaluated surgery for patients with disc displacements and 1 addressed orthognathic surgery in patients with TMJD. Reviews of surgical treatments generally included lower-level evidence (e.g., case series), and did not always compare surgery with a control condition. One review of patients with disc displacements with reduction reported similar treatment effects for arthrocentesis, arthroscopy, and discectomy, and another review in patients in disc displacement without reduction found similar effects of arthrocentesis, arthroscopy, and physical therapy (used as a control intervention). Due to the lack of high-quality controlled studies, conclusions could not be drawn about intervention equivalence.
Behavioral therapy and multimodal treatments	6	Two reviews found biofeedback to be better than active control or no treatment, 1 review found a combination of biofeedback and CBT to be better than no treatment, and 2 found a combination of biofeedback and relaxation to be better than no treatment. One review found the effects of biofeedback and relaxation to be similar.

Adapted from List and Axelsson (2010) (8)
CBT: cognitive-behavioral therapy; TENS: transcutaneous electrical nerve stimulation; TMJD: temporomandibular joint disorders.

Overall, reviewers concluded that there was insufficient evidence that electrophysical modalities and surgery would be effective for treating TMJD. They found some evidence that occlusal appliances, acupuncture, behavioral therapy, jaw exercises, postural training, and some medications could be effective at reducing pain for patients with TMJDs. However, reviewers noted that most of the systematic reviews examined included primary studies with considerable variation in methodologic quality and, thus, it was not possible to draw definitive conclusions about the effectiveness of any of the treatments.

Yao et al. (2023) published a systematic review and network meta-analysis of therapies for TMJD-associated chronic pain. (9) A total of 153 trials (N=8713) evaluating 59 interventions (or combinations of interventions) were included. Three interventions were considered to be most effective for pain relief based on moderate certainty evidence: manual trigger point therapy, cognitive behavioral therapy with biofeedback or relaxation, and therapist-assisted jaw mobilization. Four interventions were considered to probably improve physical function: supervised jaw exercises/stretching, manipulation, acupuncture, and supervised jaw exercise/mobilization. The certainty of evidence for orthotics and all included pharmacologic

treatments was considered low to very low. This network meta-analysis served as the evidence base for 2023 clinical practice guidelines.

Intraoral Devices or Appliances

Fricton et al. (2010) reported on a systematic review of RCTs on the intraoral treatment of TMJDs and identified 47 publications on 44 trials. (10) Intraoral appliances included soft and hard stabilization appliances, anterior positioning appliances, anterior bite appliances, and soft resilient appliances. Studies compared 2 types of devices or compared 1 device with different treatments (e.g., acupuncture or biofeedback). None of the studies evaluated the use of 1 device during the day and a different device during the night. The primary outcome of the meta-analysis was pain reduction. The pain was measured differently in the studies, and reviewers defined a successful outcome as at least a 50% reduction in pain on a self-report scale or at least an "improved" status when the pain was measured by the subjective report of status. Ten RCTs were included in 2 meta-analyses; the others were excluded because they did not measure pain, there were not at least 2 studies using similar devices or control groups, or data were not usable for pooled analysis. A pooled analysis of 7 RCTs (n=385) that evaluated hard stabilization appliances and use of palatal non-occluding appliances as a control found a significantly greater reduction in pain with hard appliances (odds ratio, 2.45; 95% confidence interval [CI], 1.56 to 3.86; p<.001). A pooled analysis of 3 studies (n=216) did not find a statistically significant effect of hard appliances compared with a no-treatment control group (odds ratio, 2.14; 95% CI, 0.80 to 5.75; p=.12).

Ivorra-Carbonell et al. (2016) reported on a systematic review of functional advancement devices for TMJD, which included systematic reviews, meta-analyses, RCTs, case-control studies, and cohort studies, assessed using PRISMA methodology. (11) Reviewers included 21 articles evaluating some advancement device, considered of medium or high quality by CONSORT criteria. Results were summarized descriptively; reviewers concluded that, after treatment with mandibular advancement, the condyle was in a "more advanced position."

Randhawa et al. (2016) published a systematic review of noninvasive interventions for TMJDs, which included RCTs with at least 30 individuals per treatment arm, cohort studies with at least 100 patients per exposed group, and case-control interventions. (12) Reviewers identified 31 studies for appraisal, of which 7 RCTs described in 8 publications had a low risk of bias and were assessed further. Most RCTs evaluated interventions outside the scope of our review, including cognitive-behavioral therapy and self-care management. Three RCTs evaluated occlusal devices for TMJDs of variable duration and generally reported no significant improvements with occlusal devices regarding pain, mouth opening, or other outcomes.

Stabilization Splints – Systematic Reviews

Ebrahim et al. (2012) identified 11 RCTs comparing splint therapy for TMJDs with minimal or no therapy. (13) Nine of the 11 studies used stabilization splints, 1 used soft splints, and 1 used an anterior repositioning appliance. Reviewers used the GRADE system to rate study quality. Nine studies did not report whether allocation was concealed, and 6 studies did not report masking outcome assessors. Length of follow-up in the studies ranged from 6 to 52 weeks. A pooled

analysis of study findings found that splint therapy was significantly associated with a reduction in reported pain compared with minimal or no intervention (standardized mean difference [SMD], -0.93; 95% CI, -1.33 to -0.53). Using a 100-millimeter visual analog scale (VAS) to measure pain, splint therapy was associated with an 11.5 mm lower mean VAS score (95% CI, 16.5 to -6.6 mm). There were no statistically significant differences between groups in quality of life or depression scores.

Zhang et al. (2016) identified 13 publications from 11 studies (N=538) evaluating splint therapy for TMJDs. (14) Risk of bias was high for 2 or more domains for all studies. Splint therapy group patients had greater improvements in pain control than control patients (mean difference, 2.02; 95% CI, 1.55 to 2.49; I^2=0.558).

A systemic review of 37 RCTs by Riley et al. (2020) revealed a lack of evidence that splints reduce pain (SMD, -0.18; 95% CI, -0.42 to 0.06) when all subtypes of TMJD were pooled into 1 global TMJD group. (15) The result was based on 13 trials (N=1076). The included trials used different splint types and varied in outcome measures used, and the evidence was rated as of low-certainty.

Al-Moraissi et al. (2020) performed a network meta-analysis of 48 RCTs to determine the effectiveness of various occlusal splints for TMJD. (16) Compared with controls, an anterior repositioning splint (low quality evidence), counseling with a hard stabilization splint (low quality evidence), mini-anterior splint (very low quality evidence), and hard stabilization splint (low quality evidence) decreased pain in patients with arthrogenous TMJD. Compared with controls, a mini-anterior splint (very low quality evidence), soft stabilization splint (very low quality evidence), counseling therapy alone (moderate quality evidence), and counseling with hard stabilization splint (moderate quality evidence) decreased pain intensity in patients with myogenous TMJDs.

Zhang et al. (2021) conducted a systematic review and meta-analysis of 6 RCTs (N=498) that compared exercise therapy and occlusal splint therapy for painful TMJD. (17) The analysis found similar efficacy between the 2 treatments for the major outcomes of interest: pain reduction (SMD, -0.29; 95% CI, -0.62 to 0.04; p=.08; I^2=51%) and maximum mouth opening range (SMD, 0.12; 95% CI, -0.24 to 0.48; p=.51; I^2=40%).

Stabilization Splints – Randomized Controlled Trials (RCT)
An RCT by Alajbeg et al. (2020) enrolled 34 patients with chronic TMJD who received a stabilization splint or placebo splint. (18) At 3-month follow up, patients receiving a stabilization splint experienced improvement in pain intensity (p=.009), depressive symptoms (p=.011), and oxidant/antioxidant ratio (p=.018) compared with placebo. The number of disability days and pain-free mouth opening were similar between the 2 groups at 3 months. At 6 months (post-treatment follow up period), stabilization splints significantly reduced the number of disability days compared to placebo (p=.023).

An RCT by Melo et al. (2020) compared an occlusal splint, manual therapy, counseling, and the combination of an occlusal splint and counseling for managing pain and anxiety in 89 patients with TMJD. (19) After 1 month, all interventions reduced pain and anxiety compared with baseline, with all 4 groups showing similar changes.

Ram et al. (2021) conducted an RCT (N=160) that compared the effect of muscle energy technique, occlusal splint therapy, and their combination. (20) All participants (including a control group) received education on self-management and counseling. At 3 months, all groups experienced reduction in pain compared to baseline ($p<.001$ for all treatments vs. placebo), but there was no difference between treatments. At the same timepoint, mouth opening was only significantly improved from baseline in patients who received muscle energy technique and combination therapy.

Stabilization Splints – Observational Study

An observational study by Tonlorenzi et al. (2019) assessed 21 patients with TMJD, specifically myofascial pain, to determine the effectiveness of wearing a "high" oral splint (vs. a "low" oral splint) for 3 months while sleeping. (21) Results showed a significant increase of the interocclusal distance as measured by kinesiograph (from 0.64 ± 0.53 mm to 1.42 ± 0.76 mm; $p <.001$), accompanied by a reduction in pain intensity in oral and extraoral regions after the 3 months.

Pharmacologic Treatment – Systematic Reviews

Häggman-Henrikson et al. (2017) published a systematic review that included 41 RCTs assessing various pharmacologic regimens for pain from TMJDs or burning mouth syndrome; of these, 13 were selected for a network meta-analysis. (22) Nine studies evaluated temporomandibular muscular pain, which appeared to decrease more with cyclobenzaprine than with placebo, although no specific statistics were reported. Pain reduction was also favorable for botulinum toxin and Ping-On ointment in the meta-analysis; other descriptive analyses showed a reduction of pain with nonsteroidal anti-inflammatory drugs and melatonin tablets when compared to placebo.

Mena et al. (2020) reported a systematic review and meta-analysis of 9 RCTs comparing topical products to placebo or control interventions for managing pain from TMJD. (23) Topical nonsteroidal anti-inflammatory drugs showed similar outcomes to placebo. In 1 study, Theraflex-TMJ cream (methyl salicylate as active ingredient) significantly decreased pain scores at 10 days ($p=.003$) and at follow-up ($p=.027$) compared to placebo. In 1 study, Ping On ointment (18% peppermint oil, 20% menthol) reduced pain at 4 weeks of application ($p<.001$) but not after 7 days of use ($p=.136$). In another study, cannabidiol ointment improved pain intensity compared to placebo ($p<.001$). Overall, the authors concluded that evidence is of low quality due to a small number of studies and biases within the included studies.

Machado et al. (2020) evaluated the effectiveness of botulinum toxin type A (BTX-A) for TMJD in a systematic review and meta-analysis of 12 RCTs. (24) At month 1, BTX-A reduced pain more effectively compared with placebo (mean difference, -1.74 points; 95% CI, -2.94 to -0.54; 3 RCTs

[n=60]). But at months 3 and 6, BTX-A reduced pain to a similar level as placebo. The authors concluded that the quality of evidence is low, and the results do not support the use of BTX-A for managing pain due to TMJD.

Pharmacologic Treatment – Randomized Controlled Trials (RCTs)
In their multicenter, double-blind RCT, Isacsson et al. (2019) assessed the pain reduction efficacy of a single-dose, intra-articular injection of methylprednisolone (1 mL) to the temporomandibular joint. (25) A total of 54 patients with unilateral TMJD were randomized to receive either the methylprednisolone (n=27) or saline (n=27). Pain levels at maximum jaw opening were recorded on a VAS (1 to 100) before the injections and 4weeks after. The per-protocol analysis showed VAS scores for the methylprednisolone group decreased from a mean of 61.0 (95% CI, 50.0 to 70.7) to 33.9 (95% CI, 21.6 to 46.2); the saline group VAS score decreased from a mean of 59.6 (95% CI, 50.7 to 65.9) to 33.9 (95% CI, 23.8 to 43.9). The differences in these scores were statistically insignificant (p=.81). In addition, the methylprednisolone group experienced twice as many adverse events as the saline group.

Tchiveileva et al. (2020) evaluated the efficacy of propranolol hydrochloride extended-release versus placebo in reducing pain from TMJD. (26) Two hundred patients with chronic TMJD were randomized to receive either 10 weeks of the drug (n=100) or placebo (n=99). The primary outcome was change in the Weekly Mean Pain Index after 9 weeks of treatment (index range, 0 to 100; higher score, worse outcome). The least-squares mean of the propranolol group was -13.9 (95% CI, -17.4 to -10.5); for the placebo group it was -12.1 (95% CI, -15.5 to -8.7), a nonsignificant difference (p =.41).

Section Summary: Orthotics and Pharmacologic Treatment
Evidence evaluating the use of orthotics in the treatment of TMJD, while sometimes conflicting and inconclusive, suggests that use of orthotics may reduce TMJD pain. One systematic review of intraoral appliances (44 studies) and meta-analyses of subsets of these studies found a significant benefit of intraoral appliances compared with control interventions. Several studies, meta-analyses, and systematic reviews exploring the effectiveness of stabilization splints on TMJD pain revealed conflicting results. Overall, the evidence shows that stabilizing splints may improve pain and positively impact depressive and anxiety symptoms. The evidence related to pharmacologic treatment varies because individual studies, systematic reviews, and meta-analyses lack consistency in evaluating specific agents. Some systematic reviews have found a significant benefit of several pharmacologic treatments (e.g., analgesics, muscle relaxants, and anti-inflammatory medications [vs. placebo]), but other studies showed a lack of benefit with agents such as methylprednisolone and BTX-A.

Other Nonsurgical Therapies
Acupuncture – Systematic Reviews
A systematic review and meta-analysis by Jung et al. (2011) identified 7 sham-controlled randomized trials evaluating acupuncture for treating TMJD. (27) The studies included a total of 141 patients. Sample sizes of individual studies ranged from 7 to 28 patients. Four studies used a single acupuncture session, and the other 3 used 6 to 12 sessions. All 7 studies reported a

change in pain intensity as assessed by VAS. In 6 of the studies, pain intensity was measured immediately after treatment; the seventh measured pain after 16 weeks. A pooled analysis of findings from 5 studies (n=107) found a statistically significant reduction in pain intensity, as measured by VAS. The pooled weighted mean difference in pain intensity was -13.63 (95% CI, -21.16 to-6.10; p<.001). A pooled subgroup analysis of 4 studies (n=89) found acupuncture to be superior to a nonpenetrating sham acupuncture (weighted mean difference, -13.73; 95% CI, -21.78 to -5.67; p<.001). A pooled analysis of 2 studies (n=18) did not find a significant difference in efficacy between acupuncture and a penetrating sham acupuncture (weighted mean difference, -12.95; 95% CI, -34.05 to 8.15; p=.23). The latter analysis might have been underpowered. Reviewers noted that previous studies had found that a 24.2-mm change in pain assessed by a 100-mm VAS represents a clinically significant difference and that only 2 of the selected studies had a change of 24.2 mm or more.

Liu et al. (2021) conducted a systematic review and meta-analysis of 10 RCTs (N=670) that used warm needle acupuncture for the treatment of TMJD. (28) In this analysis, acupuncture was more effective than several other treatments (including acupuncture alone, drug therapy, and ultrasonic therapy) in achieving an effective rate (relative risk [RR], 1.20; 95% CI, 1.06 to 1.35; p=.003; I^2=71%) and cure rate (RR, 1.82; 95% CI, 1.46 to 2.28; p<.00001; I^2=8%).

Park et al. (2023) included 22 RCTs (N=471) in a meta-analysis evaluating acupuncture for adults with TMJD. (29) The effective rate was improved with acupuncture (RR, 1.19; 95% CI, 1.12 to 1.27; p<.00001; I^2=66%) compared with active controls (e.g., physical therapy, pharmacologic therapy, splinting). However, pain (mean difference, -0.41; 95% CI, -0.91 to 0.10; p=.12; I^2 =40%) and maximum mouth opening (mean difference, 1.05; 95% CI, -2.36 to 4.46; p=.55; I^2 not assessed as information based on 1 trial) were not different between groups. The quality of evidence was low to very low.

Hyaluronic Acid (HA) Injection – Systematic Reviews

Several systematic reviews of studies have assessed the use of HA for treating TMJDs. Three reviews without meta-analysis found benefits to the use of HA. The review by Manfredini et al. (2010) included 19 papers that dealt with HA to treat either temporomandibular joint DD or inflammatory-degenerative disorders. Eight of the studies were RCTs. All studies reported decreased pain levels, and positive outcomes were maintained over the varying follow-up periods (range, 15 days to 24 months). The better outcomes with HA were shown only against placebo saline injections, but outcomes were similar to those seen with corticosteroid injections or oral appliances. (30) Results of a review of 9 RCTs by Machado et al. (2012) showed that intra-articular injections with corticosteroids and HA were effective in controlling TMJD in the short and medium terms. In addition, results indicated that in the short-term, intra-articular injections with only HA had similar results to injections with corticosteroids; however, in the long-term, HA was more effective. (31) From the 8 studies included in their systematic review, Goiato et al. (2016) found that intra-articular injections of HA used in temporomandibular joint arthrocentesis are beneficial, but other drugs, such as corticosteroids and non-steroidal anti-inflammatory drug injections are also satisfactory options. (32)

Liu et al. (2017) conducted a systematic review and meta-analysis of RCTs or cohort studies that compared temporomandibular osteoarthritis outcomes in patients treated with intra-articular corticosteroid, hyaluronate, or placebo injection. (33) All 8 selected studies were RCTs; of these, 3 contained data on hyaluronate injection. Compared to placebo, corticosteroid injections prompted a significant decrease in long-term (i.e., ≥6 months post-procedure) pain (3 studies; mean difference, -0.74; 95% CI, -1.34 to -0.13; p=.02; I^2 =0%). However, in a pooled analysis of 2 studies (both of which included pretreatment arthrocentesis), long-term maximal mouth opening was increased for placebo more than for corticosteroid injection (mean difference, -2.06; 95% CI, -2.76 to -1.36; p<.001; I^2 =28%). Only 2 studies were available for comparing corticosteroid with hyaluronate injections, which precluded strong analysis. Short-term pain and mouth opening measures did not significantly differ between any of the injection groups, nor did the incidence of adverse events. The meta-analysis was limited by the small sample sizes of included trials, as well as by the variety of corticosteroid types used. Reviewers concluded that corticosteroid injection following arthrocentesis may be effective for relief of long-term joint pain but may be less effective for improving mouth opening.

Hyaluronic Acid Injections – Randomized Controlled Trials
Most published RCTs evaluating HA for treating TMJDs have had small sample sizes, short follow-up times, and/or lacked blinding. Representative RCTs with larger sample sizes and stronger methodology are described next.

Gorrela et al. (2017) reported on the efficacy of injecting sodium hyaluronate in patients with TMJDs. (34) The trial comprised 62 individuals with the disorder; some members (n=31) of the trial were treated with arthrocentesis, and some members (n=31) were treated by a combination of arthrocentesis and an injection of sodium hyaluronate. Follow-up was observed at 1 week, 2 weeks, 1 month, 3 months, and at 6 months. Using a VAS, patients were asked to measure pain from 1 to 10. Pain decreased significantly for patients in both treatment groups (p<.001) at the 1-week and the 6-month follow-up; however, patients who were injected with sodium hyaluronate reported a significantly stronger decrease in pain at the 6-month follow-up (p<.001). Pre-operative mean VAS pain scores for patients who received injection started at 6.0; by the 6-month follow-up, the mean VAS pain score was 0.23. Preoperative mean pain scores for patients who received arthrocentesis alone started at 6.77; by the 6-month follow-up, the mean pain score was 1.71. While not an overwhelmingly significant difference, the trialists concluded that adding an injection of sodium hyaluronate to arthrocentesis treatment can significantly decrease the pain felt by patients with TMJD.

A study by Manfredini et al. (2012) in Italy randomized 72 patients with TMJD to 1 of 6 treatment groups: 1) single-session arthrocentesis alone; 2) single-session arthrocentesis plus corticosteroid; 3) single-session arthrocentesis plus low-molecular-weight HA; 4) single-session arthrocentesis plus high-molecular-weight HA; 5) 5 weekly arthrocenteses plus low-molecular-weight HA; or 6) 5 weekly single-needle arthrocenteses plus low-molecular-weight HA. (35) Sixty (83%) of 72 participants completed the study, with between 9 and 12 patients per treatment group. In a per-protocol analysis, there were no significant differences among groups on any of the outcome variables at the 3-month follow-up. For example, the percentage change

in pain at rest ranged from -29.1% in the group receiving 5 weekly single-needle arthrocentesis plus low-molecular-weight HA injections to -38.4% in the group receiving a single-session of arthrocentesis alone. Trial limitations included the small number of patients in each treatment group and the substantial number of dropouts in the absence of an intention-to-treat analysis.

A study by Bjornland et al. (2007) in Norway evaluated 40 patients with osteoarthritis of the TMJ in a double-blind RCT. (36) Patients received 2 injections, 14 days apart, of sodium hyaluronate or corticosteroids. The pain was assessed using a VAS ranging from 0 to 100. Patients were followed for 6 months (assessed at 14 days, 1 month, and 6 months). There was a statistically significant reduction in pain within each group at all follow-up points. At the 6-month follow-up, pain intensity (mean VAS score) was 14 in the HA group and 31 in the corticosteroid group; the between-group difference was statistically significant (p<.001). The number of patients who were pain-free at 6 months was 7 (35%) of 20 in the HA group and 6 (30%) of 20 in the corticosteroid group (p-value not reported).

Bertolami et al. (1993) published a double-blind placebo-controlled trial that evaluated 121 patients with TMJD. (37) Patients had a confirmed diagnosis of degenerative joint disease, reducing displaced disc or nonreducing displaced disc, failure of other nonsurgical treatments, and severe dysfunction. Patients received a single injection of sodium hyaluronate or saline and were followed for 6 months. Eighty patients were randomized to the hyaluronate group and 41 to the placebo group. This included 57 patients in the degenerative joint disease group, 50 patients in the reducing displaced disc group, and 14 patients in the nonreducing displaced disc group. Fourteen (12%) of 121 patients were excluded from the analysis because they did not meet eligibility criteria. Seven outcomes were assessed, including 3 measures of dysfunction, 2 measures of patient perception of improvement, and 2 measures of change in noise. No significant differences in outcomes were seen for the degenerative joint disease group. In the nonreducing displaced disc group, there were significant between-group differences through 1-month, favoring the HA group. The number of patients in the nonreducing displaced disc group who completed follow-up after 1 month was insufficient to draw meaningful conclusions about efficacy. The most consistent between-group differences in the reducing displaced disc group were for the 2 measures of patient perception of improvement and 1 of the noise variables. There were fewer between-group differences in dysfunction measures.

Hyaluronic Acid vs. Platelet-Rich Plasma – Systematic Reviews

Li et al. (2023) conducted a systematic review and meta-analysis comparing platelet-rich plasma with adjunctive HA as in arthrocentesis. (38) The analysis of 7 RCTs (N=243) failed to find differences between groups in maximum mouth opening at 1 month (mean difference, 0.21; 95% CI, -1.29 to 1.70), 3 months (mean difference, 0.92; 95% CI, -2.96 to 4.80), or 6 months (mean difference, -0.05; 95% CI, -2.08 to 1.97). Pain scores were similar between groups through 6 months (mean difference, 0.06; 95% CI, -0.92 to 1.04). The analysis is limited by high heterogeneity (I^2 ≥81%), small sample sizes of the individual trials, and lack of placebo comparator.

Xu et al. (2023) conducted a network meta-analysis of 12 RCTs comparing HA, platelet-rich plasma, and platelet-rich fibrin with or without arthrocentesis in patients (N=421) with TMJD. (39) Platelet-rich plasma was determined to be the most effective agent for pain through 6 months; however, it was only significantly better than placebo (mean difference, -1.17; 95% CI, -1.82 to -0.51) and not other active treatments. For the outcome of maximum mouth opening, platelet-rich fibrin was significantly better than platelet-rich plasma (mean difference, -11.01; 95% CI, -16.17 to -5.86), HA (mean difference, 8.72; 95% CI, 3.64 to 13.80), and placebo (mean difference, 11.12; 95% CI, 6.45 to 15.79) at 6 months. Although there was low risk of bias, limitations of the analysis included inconsistency and imprecision.

Al-Hamed et al. (2021) compared platelet concentrates with HA or saline/Ringer's solution for treating patients with temporomandibular osteoarthritis in a systematic review and meta-analysis of 9 RCTs (N=407). (40) Compared with HA, platelet concentrates decreased pain VAS scores by -1.11 (95% CI, -1.62 to -0.60; p<.0001) at 3 months and by -0.57 (95% CI, -1.55 to 0.41; p=.26) at 12 months. Compared with saline, platelet concentrates decreased pain VAS scores by -1.33 (95% CI, -2.61 to -0.06; p=.04) at 3 months and -2.71 (95% CI, -4.69 to -0.72; p=.008) at 12 months. For maximum mouth opening, platelet concentrates had similar outcomes compared with HA and improved outcomes compared with saline at 3 months (2.9 mm; 95% CI,1.47to 4.3; p<.0001) and 6 months (1.69 mm; 95% CI, 0.13 to 3.25; p=.03).

Hyaluronic Acid vs. Platelet-Rich Plasma – Randomized Controlled Trials
Liu et al. (2023) randomized 70 patients with temporomandibular joint osteoarthritis to HA or platelet-rich plasma at a single center in China. (41) The HA group received 2 treatments given 2 weeks apart while the platelet-rich plasma group received a single injection. Numerous VAS scores including maximum VAS, mean VAS, sleeping VAS, and opening VAS were compared between groups; however, the only significant difference between groups was greater improvement on VAS opening at 1 month with platelet-rich plasma (VAS improvement, 2.42 vs 1.00; p=.037). Maximum mouth opening was greater with platelet-rich plasma at 1 month (4.39 vs 1.28; p=.005), 3 months (7.03 vs 2.38; p=.004), and 6 months (9.12 vs 3.72; p=.002). The study is limited by lack of blinding of the patient and treatment administrator.

Dasukil et al. (2022) conducted a double-blind RCT in 90 patients undergoing arthrocentesis for temporomandibular osteoarthritis. (42) Patients were randomized to 2 doses of platelet-rich plasma, HA alone, or control upon completion of arthrocentesis. The groups had similar VAS scores with the exception of platelet-rich plasma recipients having significantly improved pain at 6 months vs control (1.7 vs 3.3; p<.001). Mouth opening was significantly improved with platelet-rich plasma at all timepoints compared with control. Hyaluronic acid significantly improved mouth opening at 6 months compared with control. No significant differences between HA and platelet-rich plasma were found.

In their randomized trial, Gokçe Kuyuk et al. (2019) compared platelet-rich plasma, HA, and intra-articular corticosteroids to treat patients with temporomandibular joint pain and those diagnosed with temporomandibular osteoarthritis. (43) Patients were evaluated in 2 groups: those who felt pain on lateral palpation (n=31) and those who felt pain on posterior palpation

(n=43). The patients were then randomized to receive either platelet-rich plasma, HA, or corticosteroids. Temporomandibular joint pain (using a 5-point VAS), the presence of crepitation, loss of function, and loss of strength were assessed before treatment and monthly for 3 months following treatment. For patients who had lateral temporomandibular joint pain, statistically significant VAS score changes were seen in the platelet-rich plasma and HA groups ($p<.0028$ for both groups). In terms of crepitation, function, and strength, some changes were observed in the platelet-rich plasma, HA, and corticosteroids groups, but they were not statistically significant ($p>.0028$). For patients with posterior temporomandibular joint pain, the VAS scores showed significant improvements for platelet-rich plasma, HA, and corticosteroids ($p<.0028$ for all groups). Some improvements were found in crepitation, function, and strength, but they were not significant. Overall, all 3 treatments significantly improved palpation pain, but the greatest improvement was with platelet-rich plasma.

Hyaluronic Acid Plus Platelet-Rich Plasma – Randomized Controlled Trials
Hegab et al. (2023) conducted a single center, single-blind RCT in 90 patients undergoing arthrocentesis for temporomandibular osteoarthritis. (44) Patients were randomized to platelet-rich plasma alone, HA alone, or the combination of HA and platelet-rich plasma upon completion of arthrocentesis. Combination treatment generally had significantly greater maximum mouth opening than single-agent treatment throughout 12 months post-operative with the exception of similar outcomes between platelet-rich plasma and combination at 12 months (41.4 mm vs 41.9 mm). Significantly lower VAS scores were found in patients treated with combination treatment than either single agent therapy. VAS scores were lower with HA than platelet-rich plasma at 1, 3, and 6 months, but at 12 months, platelet-rich plasma resulted in lower VAS versus HA. The small sample size, lack of blinding, and lack of placebo group are notable limitations of this study.

Prolotherapy – Systematic Reviews
Sit et al. (2021) conducted a systematic review and meta-analysis of 5 RCTs that compared the efficacy of hypertonic dextrose prolotherapy injections to placebo in patients with TMJD. (45) The primary outcome, pain intensity as measured by VAS, was improved with dextrose prolotherapy compared to placebo at 12 weeks (3 studies, n=89; SMD, -0.76; 95% CI, -1.19 to -0.32; I^2 =0%). No differences were seen between treatments in maximum mouth opening or temporomandibular joint dysfunction.

Prolotherapy – Randomized Controlled Trials
Haggag et al. (2022) conducted an RCT comparing the efficacy of 25% dextrose prolotherapy injections to saline solution injections in 30 patients with bilateral disc displacement (N=60 joints) due to TMJD. (46) Outcomes measured included pain intensity (measured by VAS), maximum mouth opening, and joint sounds. Patients were evaluated at 1 week after each injection, and 3 months and 6 months after the last injection. The average number of dextrose injections per session for each patient was 3.4. Patients who received dextrose injections had significantly lower pain at 1 week after the fourth injection ($p=.015$), 3 months after the last injection ($p<.001$), and 6 months after the last injection ($p<.001$) compared to those who received saline injections. Additionally, maximum mouth opening was significantly greater in

those who received dextrose injections at 1 week post each injection (post-injection 1 p=.002; post-injection 2 p=.001; post-injection 3 p=.005; post-injection 4 p=.041), 3 months after the last injection (p<.001), and 6 months after the last injection (p<.001) compared to those in the saline group. There was no significant difference in joint sounds at any timepoint between groups. Patients in the dextrose group reported higher satisfaction scores at 6 months compared to patients receiving saline injections (p<.001).

Section Summary: Nonsurgical Therapies

The evidence on acupuncture is limited by the small number of studies, small sample sizes, and in most studies, efficacy assessment only immediately posttreatment. The evidence on the use of HA to treat TMJD is inconclusive, given the methodologic issues with the systematic reviews and RCTs conducted (e.g., small sample sizes) and better surgical options. Limited evidence suggests that platelet concentrates and dextrose prolotherapy may improve TMJD pain. No reliable evidence is available for biofeedback, TENS, or orthodontic services for TMJD.

Surgical Techniques

Systematic Reviews

In a systematic review, Vos et al (2013) identified 3 RCTs (N=222) that compared the efficacy of lavage of the temporomandibular joint (i.e., arthrocentesis or arthroscopy) with nonsurgical temporomandibular joint treatment. (47) Although reviewers assessed the quality of the studies to be adequate, only one stated that allocation to treatment group was concealed; 2 did not explicitly state use of an intention-to-treat analysis. The 2 primary outcomes considered were change in pain and maximal mouth opening at 6 months compared to baseline. The pain was measured by VAS. Pooled analysis of data from the 3 trials found a statistically significant reduction in pain at 6 months with surgery plus lavage versus nonsurgical therapy (SMD, -1.07; 95%CI, -1.38 to -0.76). There was no statistically significant difference in the efficacy between the 2 treatments for the other outcome variable, maximal mouth opening (SMD, 0.05; 95% CI, -0.33 to 0.23).

In a network meta-analysis, Al-Moraissi et al. (2020) compared different treatment options (placebo/control; muscle exercises and occlusal splint therapy; splint therapy alone; intraarticular injection of HA or corticosteroid; arthrocentesis with or without HA, corticosteroid, and platelet-rich plasma; arthroscopy with or without HA and platelet-rich plasma; open joint surgery; physiotherapy) for arthrogenous TMJD in 36 RCTs for reducing pain and 33 RCTs for improving maximum mouth opening. (48) For short-term follow up of at most 5 months, injections of HA (SMD, -2.8; 95% CI, -3.7 to -1.8) and corticosteroids (SMD, -2.11; 95% CI, -2.9 to-1.2) achieved greater pain control compared with placebo/control. For follow up of at least 6 months and longer, arthroscopy with platelet-rich plasma (SMD, -3.5, 95% CI, -6.2 to -0.82), arthrocentesis with platelet-rich plasma (SMD, -3.08; 95% CI, -5.44 to -0.71), arthroscopy with HA (SMD, -3.01; 95% CI, -5.8 to -0.12),temporomandibular joint surgery (SMD, -3; 95% CI, -5.7 to -0.28), injection with HA (SMD, -2.9; 95% CI, -4.9 to-1.09), arthroscopy-alone (SMD, -2.6; 95% CI, -5.1 to -0.07) and arthrocentesis with HA (SMD, -2.3; 95% CI,-4.5 to -0.18) significantly improved pain compared with placebo/control. For improving maximum mouth opening, various arthroscopy procedures (with and without platelet-rich plasma and HA injections)

followed by arthrocentesis with platelet-rich plasma or HA were the most efficacious treatment approaches. Treatments such as occlusal splint therapy, physical therapy, muscle exercises with occlusal splint therapy, and placebo/control yielded the lower quality outcomes for reducing pain and improving maximum mouth opening. Most of the evidence included in the network meta-analysis was rated as low-quality or very low-quality, except the evidence for arthrocentesis with HA injections was of moderate quality.

Hu et al. (2023) conducted meta-analyses to compare arthrocentesis to conservative therapies such as analgesic, splints, or lifestyle modifications in individuals with TMJD. (49) Seven RCTs and 1 quasi-RCT were included. Analyses demonstrated that at 1 month and 6 months, but not at 3 months, arthrocentesis used as a first line treatment significantly reduced pain scores in individuals compared to conservative therapies. They found no difference in maximal mouth opening between arthrocentesis and conservative therapy groups at 1month, 3 months, or 6 months.

Thorpe et al. (2023) compared arthrocentesis to conservative treatment in a meta-analysis of RCTs. (50) A total of7 RCTs (N=448) evaluated pain (VAS) and maximum mouth opening at 6 months. Conservative management was variable among the trials, but the majority (n=6) included occlusal splints as part of the conservative treatment plan. Maximum mouth opening was improved with arthrocentesis, but pain scores were not significantly different between groups. Significant heterogeneity was found among the studies resulting in wide confidence intervals. Differences in conservative treatments may have contributed to this finding. Irrigation solutions and volumes of these solutions also contributed to variability in the arthrocentesis procedures among the RCTs.

Observational Study

In a retrospective cohort study, Hossameldin and McCain (2018) assessed the efficacy of an office-based temporomandibular joint arthroscopic technique. The researchers assessed the following outcomes of the procedure: improvement in painless range-of-motion in the mandible, reduced pain on loading, and improvement in functional jaw pain. The cohort included an initial 363 patients, excluded 41, and an analysis was performed on the joints of the remaining 322 that were compromised. Within the 322 patients, 452 joints were operated on with a 66.6% (n=301 joints) success rate (p=.001). It is stated within the outcome variable section that the primary outcome variable of success or failure was determined by the reduction of joint pain postoperatively. This could be subjective. When the operation failed (n=151 joints, 33.3%), 141 joints were involved in a subsequent procedure that ranged from more advanced arthroscopy to a total joint replacement. (51)

Section Summary: Surgical Techniques

Meta-analyses of RCTs have reached conflicting conclusions regarding the efficacy of surgical techniques in patients with TMJD. Two recent meta-analyses each identified RCTs comparing arthrocentesis to various conservative management strategies. At 6 months, one analysis found improved maximum mouth opening with arthrocentesis while the other found similar outcomes between arthrocentesis and conservative treatments. Similarly, pain was improved

with arthrocentesis in one analysis, but not the other. However, a 2020 network meta-analysis did find various arthroscopic procedures to be the most efficacious treatment approach for patients with TMJD.

Practice Guidelines and Position Statements

American Association for Dental, Oral, and Craniofacial Research (AADOCR)

In a 2010 (reaffirmed in 2015) the American Association for Dental Research (now the AADOCR) policy statement, recommended the following for the diagnosis and treatment of temporomandibular joint disorders (TMJDs) (52):

"It is recommended that the differential diagnosis of TMDs [temporomandibular disorders] or related orofacial pain conditions should be based primarily on information obtained from the patient's history, clinical examination, and when indicated, TMJ [temporomandibular joint] radiology or other imaging procedures. The choice of adjunctive diagnostic procedures should be based upon published, peer-reviewed data showing diagnostic efficacy and safety. However, the consensus of recent scientific literature about currently available technological diagnostic devices for TMDs is that except for various imaging modalities, none of them shows the sensitivity and specificity required to separate normal subjects from TMD patients or to distinguish among TMD subgroups…."

"It is strongly recommended that, unless there are specific and justifiable indications to the contrary, treatment of TMD patients initially should be based on the use of conservative, reversible and evidence-based therapeutic modalities. Studies of the natural history of many TMDs suggest that they tend to improve or resolve over time. While no specific therapies have been proven to be uniformly effective, many of the conservative modalities have proven to be at least as effective in providing symptomatic relief as most forms of invasive treatment…."

American Society of Temporomandibular Joint Surgeons (ASTMJS)

In 2001, the ASTMJS issued consensus clinical guidelines focused on TMJDs associated with internal derangement and osteoarthritis. (53) For diagnosis of this type of TMJDs, a detailed history and, when indicated, a general physical examination was recommended. Imaging of the temporomandibular and associated structures was also recommended. Options for basic radiography to provide information on temporal bone and condylar morphology included the use of plain films, panoramic films, and tomograms. Also recommended was imaging of the disc and associated soft tissue with magnetic resonance imaging (MRI) or arthrography. Other diagnostic procedures indicated included computed tomography, MRI, arthrography (for selected cases) and isotope bone scans.

Nonsurgical treatment was recommended as first-line therapy for all symptomatic patients with this condition. Recommended treatment options included a change in diet, nonsteroidal anti-inflammatory drugs, maxillomandibular appliances, physical therapy, injections of corticosteroids or botulinum toxin, and behavior modification. If adequate symptom relief did not occur within 2 to 3 weeks, surgical consultation was advised. The guideline stated the following surgical procedures were considered accepted and effective for patients with TMJDs associated with internal derangement or osteoarthritis:

- Arthrocentesis;
- Arthroscopy;
- Condylotomy;
- Arthrotomy (prosthetic joint replacement may be indicated in selected patients who have severe joint degeneration, destruction, or ankylosis);
- Coronoidotomy/coronoidectomy;
- Styloidectomy.

BMJ Rapid Recommendations

The BMJ Rapid Recommendations panel developed guidelines for the management of patients with chronic pain (≥3 months) associated with TMJD. (54) The international expert panel included representation from an academic center in the United States.

The panel favored the following therapies:

- Cognitive behavior therapy (strong recommendation);
- Therapist-assisted mobilization (strong recommendation);
- Manual trigger point therapy (strong recommendation);
- Supervised postural or jaw exercise (strong recommendation);
- Usual care including home exercises, stretching, reassurance, and education (strong recommendation);
- Manipulation (conditional recommendation);
- Supervised jaw exercise with mobilization (conditional recommendation);
- Cognitive behavior therapy with non-steroidal anti-inflammatory drugs (conditional recommendation);
- Manipulation with postural exercise (conditional recommendation);
- Acupuncture (conditional recommendation).

The panel recommended against the following therapies:

- Reversible occlusal splints (conditional recommendation);
- Arthrocentesis (conditional recommendation);
- Cartilage supplement with or without hyaluronic acid injection (conditional recommendation);
- Low level laser therapy (conditional recommendation);
- Transcutaneous electrical nerve stimulation (conditional recommendation);
- Gabapentin (conditional recommendation);
- Botulinum toxin (conditional recommendation);
- Hyaluronic acid (conditional recommendation);
- Relaxation therapy (conditional recommendation);
- Trigger point injection (conditional recommendation);
- Acetaminophen (conditional recommendation);
- Topical capsaicin (conditional recommendation);
- Biofeedback (conditional recommendation);

- Corticosteroid injection (conditional recommendation);
- Benzodiazepines (conditional recommendation);
- Beta-blockers (conditional recommendation);
- Irreversible oral splints (strong recommendation);
- Discectomy (strong recommendation);
- Non-steroidal anti-inflammatory drugs with opioids (strong recommendation).

National Institute of Dental and Craniofacial Research (NIDCR)

The NIDCR has information for patients on their website about Temporomandibular Joint (TMJ) Disorders. (55) This information includes the following:

"Scientists sponsored by the National Institute of Dental and Craniofacial Research (NIDCR) are looking for answers to what causes these disorders and how best to treat them. Currently, there is little scientific evidence to show which treatments work, and which don't. Until there is science-based evidence to help health care providers make sound treatment decisions, NIDCR suggests the following:

- Try simple self-care practices such as eating soft foods, using ice packs and avoiding extreme jaw movements, like wide yawning and gum chewing. Short-term use of over-the-counter or prescription pain medicines may also provide relief.
- Avoid treatments that cause permanent changes in the bite or jaw. Such treatments include crown and bridge work to balance the bite, orthodontics to change the bite, grinding down teeth to bring the bite into balance (occlusal adjustment), and repositioning splints, which permanently change the bite.
- Avoid, where possible, surgical treatment for TMJ. There have been no long-term studies to test the safety and effectiveness of these procedures. Before considering any surgery on the jaw joint, it's important to get opinions from other doctors and to fully understand the risks."

The International Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) Consortium published the first evidence-based diagnostic criteria that have been developed to help health professionals better diagnose temporomandibular disorders (TMJD). The diagnostic criteria, developed by researchers in North America, Europe and Australia, are professional recommendations on how best to detect a disease or condition. The new criteria, supported in part by the National Institutes of Health, comprise an improved screening tool to help researchers and health professionals including dentists more readily differentiate the most common forms of TMD and reach accurate diagnoses that are grounded in supportive scientific evidence. Historically, diagnostic criteria for TMD have been based on a consensus of expert opinion and often reflect a shared clinical perspective. None have been rigorously tested by scientists. (56)

American Association of Oral and Maxillofacial Surgeons (AAOMS) (2017)

The AAOMS 2023 Parameters of Care: Clinical Practice Guidelines for Oral and Maxillofacial Surgery (Temporomandibular Joint Surgery) state that temporomandibular joint (TMJ) surgery is indicated for the treatment of a wide range of pathologic conditions. (57) The guideline

details indications for therapy, therapeutic goals, and specific factors affecting risk, therapeutic parameters, and outcome assessment indices for multiple conditions. The authors' state that surgical intervention for internal derangement arthritic conditions, degenerative joint disease infectious arthritis and ankylosis/restricted jaw motion is indicated only when nonsurgical therapy has been ineffective, and pain and/or dysfunction are moderate to severe.

Summary of Evidence

For individuals with suspected temporomandibular joint disorder (TMJD) who receive ultrasound, surface electromyography, or joint vibration analysis, the evidence includes systematic reviews of diagnostic test studies. Relevant outcomes are test validity and other performance measures. None of the systematic reviews found that these diagnostic techniques accurately identified patients with TMJD, and many of the studies had methodologic limitations. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with a confirmed diagnosis of TMJD who receive intraoral devices or appliances or pharmacologic treatment, the evidence includes randomized controlled trials (RCTs) and systematic reviews of RCTs. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. A systematic review of intraoral appliances (44 studies) and meta-analyses of subsets of these studies found a significant benefit of intraoral appliances compared with control interventions. Several studies, meta-analyses, and systematic reviews exploring the effectiveness of stabilization splints on TMJD pain revealed conflicting results. Overall, the evidence shows that stabilizing splints may improve pain and positively impact depressive and anxiety symptoms. The evidence related to pharmacologic treatment varies because studies, systematic reviews, and meta-analyses lack consistency in evaluating specific agents. Some systematic reviews have found a significant benefit of several pharmacologic treatments (eg, analgesics, muscle relaxants, and anti-inflammatory medications [vs. placebo]), but other studies showed a lack of benefit with agents such as methylprednisolone and botulinum toxin type A.

For individuals with a confirmed diagnosis of TMJD who receive acupuncture, biofeedback, transcutaneous electric nerve stimulation, orthodontic services, hyaluronic acid, platelet concentrates, or dextrose prolotherapy, the evidence includes RCTs, systematic reviews of these RCTs, and observational studies. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. Systematic reviews evaluating acupuncture for TMJD have found inconsistent improvement in outcomes compared with sham or active controls. A 2023 meta-analysis of 22 RCTs failed to find improved pain or maximum mouth opening with acupuncture compared with active controls. Systematic reviews evaluating hyaluronic acid have found similar outcomes to corticosteroids or placebo. Platelet-rich plasma has been compared with hyaluronic acid in a number of systematic reviews and RCTs, but the studies are small and have methodologic limitations. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with a confirmed diagnosis of TMJD who receive arthrocentesis or arthroscopy, the evidence includes RCTs, systematic reviews of RCTs, and observational studies. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. One review, which included 3 RCTs, compared arthrocentesis or arthroscopy with nonsurgical interventions for TMJD. Pooled analyses of the RCTs found that arthrocentesis and arthroscopy resulted in superior pain reduction compared with control interventions. A network meta-analysis, which included 36 RCTs, revealed that arthroscopy and arthrocentesis improve pain control and maximum mouth opening. Two recent meta-analyses identified RCTs comparing arthrocentesis to various conservative management strategies. At 6 months, one analysis found improved maximum mouth opening with arthrocentesis while the other found similar outcomes between arthrocentesis and conservative treatments. Similarly, pain was improved with arthrocentesis in one analysis, but not the other. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

Ongoing and Unpublished Clinical Trials

Some currently ongoing and unpublished trials that might influence this policy are listed in Table 2.

Table 2. Summary of Key Trials

NCT Number	Trial Name	Planned Enrollment	Completion Date
Ongoing			
NCT05989217	Conservative Therapies in the Treatment of Temporomandibular Disorders: A Randomized Controlled Clinical Trial	96	Sep 2024
NCT04936945	Comparative Study Between the Outcome of Intra-articular Injection of Platelet Rich Plasma Versus Hyaluronic Acid in Arthroscopic Management of Temporomandibular Degenerative Joint Diseases: A Randomized Clinical Trial	20	Jun 2023
NCT04884763[a]	A Randomized, Double Blind, Placebo-Controlled Single Center Phase 2 Pilot Study to Assess the Safety and Efficacy of Off-label Subcutaneous Administration of Erenumab-aooe in Patients with Temporomandibular Disorder	30	Jan 2024
NCT04726683	Trigger Point Dry Needling vs Injection in Patients With Temporomandibular Disorders: a Randomized Placebo-controlled Trial	64	Dec 2024
Unpublished			
NCT04298554	Comparison of Cannabinoids to Placebo in Management of Arthralgia and Myofascial Pain	59	May 2022

	Disorder of the Temporomandibular Region: A Randomized Clinical Trial.		
NCT05027243	Outcomes of Bilateral Temporomandibular Joint Arthroscopy and the Role of a Second Intervention - Timings and Results	46	Jul 2021

NCT: national clinical trial.

[a] Denotes industry sponsored or co-sponsored trial.

Coding

Procedure codes on Medical Policy documents are included **only** as a general reference tool for each policy. **They may not be all-inclusive.**

The presence or absence of procedure, service, supply, or device codes in a Medical Policy document has no relevance for determination of benefit coverage for members or reimbursement for providers. **Only the written coverage position in a Medical Policy should be used for such determinations.**

Benefit coverage determinations based on written Medical Policy coverage positions must include review of the member's benefit contract or Summary Plan Description (SPD) for defined coverage vs. non-coverage, benefit exclusions, and benefit limitations such as dollar or duration caps.

CPT Codes	20550, 20605, 20606, 21010, 21050, 21060, 21070, 21073, 21076, 21081, 21085, 21089, 21110, 21116, 21120, 21121, 21122, 21123, 21141, 21142, 21143, 21145, 21146, 21147, 21193, 21194, 21195, 21196, 21198, 21199, 21240, 21242, 21243, 21480, 21485, 21490, 29800, 29804, 64553, 64555, 70100, 70110, 70140, 70150, 70220, 70250, 70260, 70300, 70310, 70320, 70328, 70330, 70332, 70336, 70350, 70355, 70360, 70486, 70487, 70488, 76100, 76120, 76125, 76496, 76999, 77077, 78300, 78305, 78306, 78315, 95851, 95867, 95868, 95927, 95937, 97010, 97014, 97024, 97026, 97032, 97033, 97035, 97140, 97530, 97535, 98925, 98943
HCPCS Codes	E1700, E1701, E1702, E0746

*Current Procedural Terminology (CPT®) ©2023 American Medical Association: Chicago, IL.

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Centers for Medicare and Medicaid Services (CMS)

The information contained in this section is for informational purposes only. HCSC makes no representation as to the accuracy of this information. It is not to be used for claims adjudication for HCSC Plans.

The Centers for Medicare and Medicaid Services (CMS) does not have a national Medicare coverage position. Coverage may be subject to local carrier discretion.

A national coverage position for Medicare may have been developed since this medical policy document was written. See Medicare's National Coverage at <http://www.cms.hhs.gov>.

Policy History/Revision	
Date	**Description of Change**
07/01/2024	Document updated with literature review. The following changes were made to Coverage: Acupuncture, hyaluronic acid, dextrose prolotherapy and Botulinum toxin A were added to the non-surgical treatments that are considered experimental, investigational, and/or unproven for treatment of temporomandibular joint disorders. Devices promoted to maintain joint range of motion and to develop muscles involved in jaw function was removed from the non-surgical treatments that are considered experimental, investigational and/or unproven for treatment of temporomandibular joint disorders. References 4-7, 9-51, and 54 were added; others removed.
02/01/2024	Document updated with literature review. Coverage unchanged. Reference 5 added and some updated.
10/01/2022	Reviewed. No changes.
04/15/2022	Document updated with literature review. The following change was made to Coverage: Platelet concentrates were added to the non-surgical treatments that are considered experimental, investigational, and/or unproven for treatment of temporomandibular joint disorders. Reference 19 added; some updated and others removed.
08/15/2020	Reviewed. No changes.
08/01/2019	Document updated with literature review. The following change was made to Coverage: Treatment-Surgical section combined the second and third bullet. References 1-2, 4-5, and 14 were added and some references removed.
07/15/2017	Reviewed. No changes.
09/15/2016	Document updated with literature review. The following has been added to the coverage section: Oral devices to prevent TMJ disorders are considered experimental, investigational and/or unproven.
02/01/2016	Reviewed. No changes.
04/15/2014	Document updated with literature review. Coverage unchanged.
07/01/2011	CPT/HCPCS code(s) updated.
10/15/2008	Policy reviewed without literature review; new review date only.
09/15/2007	Coverage revised
05/01/2006	Revised/Updated Entire Document
11/01/1999	Revised/Updated Entire Document
04/01/1999	Revised/Updated Entire Document
09/01/1996	Revised/Updated Entire Document
05/01/1996	Revised/Updated Entire Document
10/01/1993	Revised/Updated Entire Document
01/01/1993	Revised/Updated Entire Document
09/01/1990	New medical document