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A REVIEW ARTICLE ON TEMPOROMANDIBULAR JOINT DISORDER

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ABSTRACT

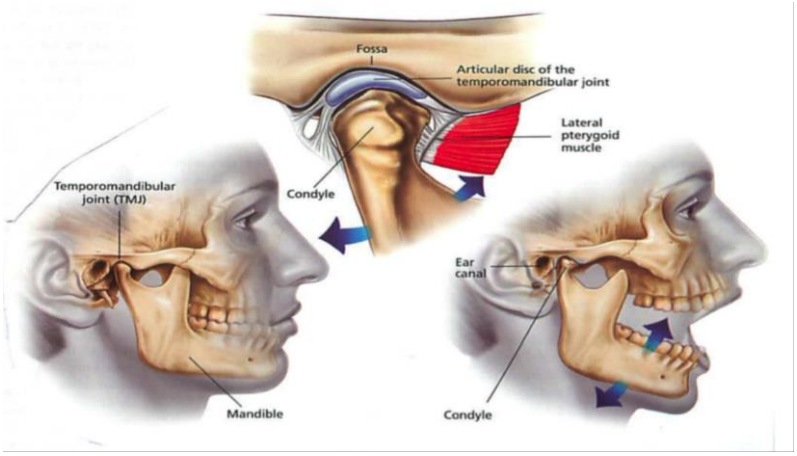
Temporomandibular common complaint (TMJ disorder) is a condition that affect the jaw joint and muscle. It can beget pain, clicking or popping sounds, difficulty opening or closing the mouth and headache. Treatment options include drug, physical therapy, life changes. Explore the colorful treatment options available, from selfcare ways like jaw exercise and hot/ cold wave remedy to professional interventions similar as dental slivers, physical remedy, and indeed surgery in severe cases. Gain precious perceptivity into preventative measures that can help maintain a healthy jaw, including stress operation, proper posture, and avoiding inordinate chewing or clenching.

KEYWORDS: *TMJ Disorder anatomy and biomechanics and TMJ imaging assessment.*

INTRODUCTION

Temporomandibular joint is formed by the mandibular condyle fitting into the mandibular fossa of temporal bone. It's considered as ginglymoarthroidal joint which mean that is suitable of both hinge type and gliding movements.[1] Former studies have reported that only 5 of the TMD population seek help.[2,3] frequency of cases presents with TMD age between 18 and 40 times and are more common among women.[4] A check conducted in Korea revealed that further than 750,000 rehabilitants visited various medical institutions in Korea for the treatment of TMD in 2015 alone.[5] TMJ hypermobility can be classified as a subluxation or a luxation. TMJ subluxation is a condition where the condyle translates formerly of the articular eminence during jaw opening and briefly catches in an open position before returning to the fossa spontaneously[6] or with manual self manipulation by the case.

The Research Diagnostic Criteria for Temporomandibular conditions (RDC/ TMD) type scheme[7] was expanded in 2014 to include less common, but clinically important conditions. According to these, the Diagnostic Criteria for Temporomandibular conditions (DC/ TMD), subluxation should have a positive history that the jaw has been caught in a wide open position and the case had to do a tone- action to be suitable to close the jaw.[8] During TMJ luxation, the case is unfit to tone return to the fossa without the help of a clinician to maneuver the jaw back into a normal position. thus, relocation of the condyle to its normal position occurs through tone- manipulation in cases of subluxation, but not in luxation.[9] Clinically, the case will present with the jaw wide open, or protruded, or in side position to the nonaffected side (in the case of a unilateral luxation)[8]



Etiology

There's numerous factors for TMD similar as(natural, emotional, social, environmental, cognitive) that's why TMD is consider multifactorial complaint, RobertL.gauer etal.in 2015 suggested that there are factors associated with TMD such as fibromyalgia, sleep apnea, autoimmune disorders, and psychiatric illness,[10] the prospective cohort study with more than 6,000 participants showed a twofold increase in TMD in persons with depression (rate ratio=2.1; 95% confidence interval, 1.5 to 3; P<0.001) and a 1.8-fold increase in myofascial pain in persons with anxiety (rate ratio=1.8; 95% confidence interval, 1.2 to 2.6; P<0.001.[10] Most patients with TMD are seeking medical help because of pain.[11] Also, One of the etiological factors that lead to disk displacement with reduction (DDWR) are slightly referred to abnormal biomechanical forces directed to the mandibular condyle, which change the shape as well as function of the articular tissue.[12] Bruxism, clenching, stress, and

malocclusion are related to TMD,[13] however, the etiological factors of this disorder are still ambiguous.[11]

Classification

Congenital or developmental disorder Condylar hyperplasia
First second branchial arch disorder idiopathic condylar resorption degenerative joint disorder
Inflammatory: capsulitis, synovitis, polyarthritides (rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis, reiter syndrome, gout)
Noninflammatory : osteoarthritis disk derangement disorder displacement with reduction
Displacement without reduction (closed lock) perforation
Infection
Neoplasia
Temporomandibular hypermobility
Dislocation
Joint laxity
Subluxation
Temporomandibular hypomobility
Ankylosis: true ankylosis (bony or fibrous) or pseudoankylosis
Post radiation fibrosis
Trismus
Trauma contusion fracture
Intracapsular homorrhage

Prevelance of Sign and Symptoms of tmd

A large population-based study using the RDC/TMD estimated the prevalence of painful TMD (myalgia and/or arthralgia) is 36% in adults aged 20–49 years.[14] TMJ ‘clicking’ was reported by 30% of adults, whereas only 8% were diagnosed with a disc displacement (DD).[14] The estimated frequency of TMD degenerative common complaint (DJD) opinion, also associated with TMJ noises, is 17. Of note, TMJ DD, the presumed cause of TMJ ‘clicking’, has been argued to be a normal anatomical variant of TMJ disc position, given its high prevalence in asymptomatic populations.[15] A meta-analysis of non-patient studies estimated the need for TMD treatment in adults is 16%, with higher values for studies of older individuals (≥46 years) and those where need was clinically assessed (vs. perceived by participants).[16] Estimates of signs and symptoms of TMD in children and adolescents are more variable, as there is not a validated diagnostic protocol for this population.[17] Studies using the RDC/TMD estimated the prevalence of painful TMD ranges from 4 to 13% in children and adolescents aged 6–25 years,[18,19,20,21] A meta-analysis of 11 studies including

participants aged 3–18 years estimated the prevalence of clinically identified TMJ noises is 16%.[22]

Anatomy and Biomechanics of tmj

The TMJ is a synovial joint with 2 chambers conforming of 2 articulating shells and an intraarticular fragment. Superiorly, the mandibular fossa of the temporal bone articulates with the fragment, and inferiorly, the fragment articulates with the condyle of the beak.[23,24] The loose packed position of TMJ is with the lingo resting on the hard palate, and the close-packed position is with the mouth closed with the teeth gripped.[25] All movements of the TMJ are limited by the temporomandibular ligaments in all directions, and the capsular pattern of restriction is limitation of mouth opening.[25] Three movements do at the beak, depression (during mouth opening), projection/ retrusion (or protraction/ retraction) and side excursion (right and left).[23,25] Accessory movements of gyration, which occurs in the inferior portion of the TMJ, and restatement (gliding), which occurs in the superior portion of the TMJ, allow for proper function of the joint. Mandibular depression occurs with combined gyration and anterior restatement. Gyration accounts for roughly 25 mm and restatement accounts for roughly 15 mm of the normal 40 mm of total mouth opening. projection and retrusion do with restatement (and minimum gyration) of the mandibular condyle, while side excursion occurs with ipsilateral gyration and contralateral restatement of the mandibular condyles[25] Restoration of these normal accessory movements and common mechanics is important in the recuperation of the TMJ in order to restore functional movements of the jaw. The TMJ and utmost of the muscles of mastication are innervated by the mandibular branch of the trigeminal whim-whams, (cranial whim-whams V (CN V)); and thus, pain may be appertained to conterminous areas on the face in the distribution of CN V. As an exception, the suprahyoid muscles are innervated by CN V, VII, and XII. The main muscles of mastication and their primary function include bilaterally Masseter – mandibular elevation and projection Temporalis – mandibular elevation and retrusion Side pterygoid – mandibular depression, projection, and side excursion medium pterygoid – mandibular elevation, projection, and side excursion Suprahyoids (Mylohyoid, stylohyoid, geniohyoid, digastricus) – mandibular depression.

Risk factors

❖ **Age**

The estimated frequency of TMD in children and adolescents varies from 6- 68, depending (as has formerly been reflected) on the different individual criteria used and on the differences in clinical examination. In a study published by List etal.[26] in adolescents between 12 and 18 times of age, 7 were diagnosed with temporomandibular pain-dysfunction, the frequency being significantly advanced in ladies than in males. Clicks were recorded 11 of the study population, with stiffness and mandibular fatigue in 3 and limitations in orifice in 1. Schmitter etal.[27] reported that senior cases witness common sounds in 38 of the cases and muscle pain in 12, however without resting pain or joint pain.

❖ **Genetic factors**

Michalowicz etal.[28] estimated the thesis that signs and symptoms of TMD may be heritable. To this effect they collected information by means of a questionnaire administered to a group of 494 monozygous and dizygoustwins. The monozygous halves showed no lesser parallels than in the case of the dizygous halves, and the homozygous halves that grew up together showed no lesser parallels than those that grew up independently. The authors concluded that inheritable factors and the family terrain ply no applicable effect upon the presence of symptoms and signs of the TMJ.

❖ **Sex**

Epidemiological studies generally validate a lesser frequency and inflexibility of TMD in ladies than in males. In effect, TMD is seen to be over to four time more frequent in women, and these tend to seek treatment for their TMJ problems three times more frequently than males. Attempts have been made to explain these differences in terms of behavioural, psychosocial, hormonal and indigenous differences, though no conclusive results have been drawn to date. It has been suggested that the presence of estrogen receptors in the TMJ of women modulates metabolic functions in relation to laxity of the ligaments, and this could be applicable in TMD. Estrogens would act by adding alert in relation to pain stimulants, modulating the exertion of the limbic system neurons. Although not all authors coincide, studies in humans have shown that the appearance of pain in the environment of TMD increases roughly 30 in cases entering hormone relief remedy (HRT) in postmenopause (estrogens), and roughly 20 among women who use oral contraceptives.[29]

❖ **Antecedents of acute trauma**

The possibility that acute trauma may induce histological differences of the TMJ has been substantiated by studies in rats in which common synovitis was generated by forcing condylar mobility. enhancement in synovitis or its total exposure 20 weeks latterly was also observed. Klobas etal.[30] set up that cases with antecedents of whiplash showed significant differences versus cases without similar antecedents, with further frequent severe TMJ symptoms (89 versus 18) and also more clinical signs. Likewise, maximum oral orifice was lower (54 mm versus 48 mm). Pain in response to the palpation of muscles and joints was more common, as was pain in response to rallying.

❖ **Bruxism**

The frequency of bruxism in the adult population is around 20, and is analogous to that recorded in children. In a recent study conducted in Boston by Cheifetz etal., parent canvassing revealed that 38 of the children (in a group of 854 with a mean age of8.1 times) presented bruxism. still, only 5 of the parents reported private symptoms of TMD in their seed.[31] The topmost prevalence of bruxism is between 20 and 50 times of age, after which the habit precipitously decreases.

❖ **Orthodontic treatment**

The possibility that orthodontic treatment could beget TMJ pathology has been considerably dealt with in the scientific literature. Despite the different methodological approaches involved, the great maturity of studies conclude that orthodontic treatment neither improves nor worsens TMD. Kim.[32] reviewed 31 publications on orthodontics and TMD. He drew attention to the diversity of the methodologies involved in these studies, and refocused out that only one of the reviewed papers set up tooth birth during orthodontic treatment to change the frequency of TMD. The author concluded that orthodontic treatment doesn't increase the frequency of TMD. Mohlin etal.[33] are of the same opinion. In a study conducted in Gothenburg (Sweden) involving 337 cases followed- up on between 11 and 30 times of age, they set up that orthodontic treatment neither prevents nor improves dysfunction of the TMJ.

Temporomandibular joint imaging assesment

❖ **Radiographic examinations**

TMJ radiographs give information on the morphological characteristics of osseus factors of the joint and certain functional associations between the condyle, articular excrescence and fossa, but are hamstrung for assessing the soft apkins.[34,35,36] Several anatomical and

specialized factors can help a clear and unstopped radiographic image of the TMJ.[36,37] When choosing TMJ radiography, one needs to consider the identification of boney structural details, the specific suspected clinical complaint, the quantum of characteristic information clinically available for the opinion, the cost of these examinations, and their radiation cure.[38,35] The radiographic ways most frequently used in the routine operation of TMJD are panoramic radiography, planigraphy, and transcranial radiography.[34,38,39,40]

❖ **Panoramic radiography**

As it provides a maxillary overview, it is useful in the differential diagnosis of odontogenic alterations whose symptoms overlap with TMJD.[39,41] It can reveal advanced bone alterations in the condyle, such as asymmetries, erosions, osteophytes, fractures, changes in size and shape, degenerative and inflammatory processes, growth alterations, maxillary tumors, metastases, and ankylosis.[34,39,40,36] However, it does not provide functional information on condylar excursion.[35] Also, only gross alterations in the articular tubercle morphology can be seen because of the superimposition of images of the skull base and the zygomatic arch.[38,35,36,41] This technique is useful as a screening tool, as it allows the initial diagnosis and assessment of TMJ alterations that are not so subtle[40] It is also indicated when the patient has reduced mouth opening and the differential diagnosis of fracture is considered.[34,38]

❖ **Planigraphy (or panoramic radiography with programs for TMJ)**

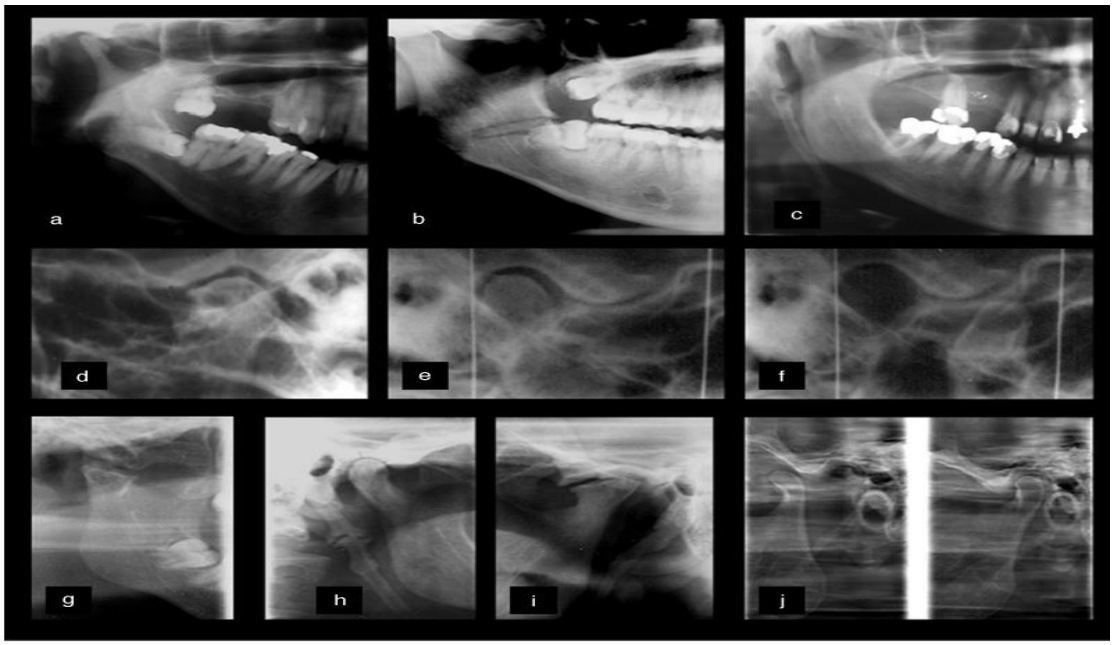
This system provides considerable delicacy and produces images without important imbrication. It visualizes the articular boney detail and reveals any anatomical abnormalities in structures conterminous to the TMJ, similar as the styloid process, mastoid process, and zygomatic bow.[38,40] It can be attained in the sagittal and coronal aeroplanes, establishing the relationship of the condyle with the articular fossa in maximum habitual intercuspation (MHI) and the excursion extension during minimal mouth opening (MMO). It provides a direct comparison of both sides regarding the hypo-, normo-, or hyper excursion of the condyle, which is useful in attesting a clinical dubitation of hypermobility.[34,38] In malignancy of the relative identification of the TMJ boney structures, it does parade some exaggeration that's essential to the fashion. still, it's useful for functional assessment of mouth opening, evaluation of morphological revision and the common spaces, analysis of dimension, fractures, and ankylosis.[38]

❖ Arthrography

Arthrography is a variant of the radiographic fashion for TMJ, which aims to assess the TMJ soft apkins. In the 1970s and 1980s, arthrography was the system of choice for the identification of slice relegation.[35,40,42] Slice morphology, positioning, and function were laterally linked by discrepancy injection into the superior and/ or inferior common spaces.14 After the injection, dynamic images were attained, recording mandibular movements.[43] Indeed though it's useful for slice position identification, arthrography isn't presently recommended as it's an invasive procedure and carries a threat of iatrogenic slice perforation and facial whim-whams damage.[35] There are also the pitfalls of radiation to radiosensitive structures (crystalline and thyroid), pain and limitation of movement after the injections, infections, disinclinations to the fitted color, and it's an examination that's considered delicate to perform.[34,35,40,45]

❖ Transcranial radiography

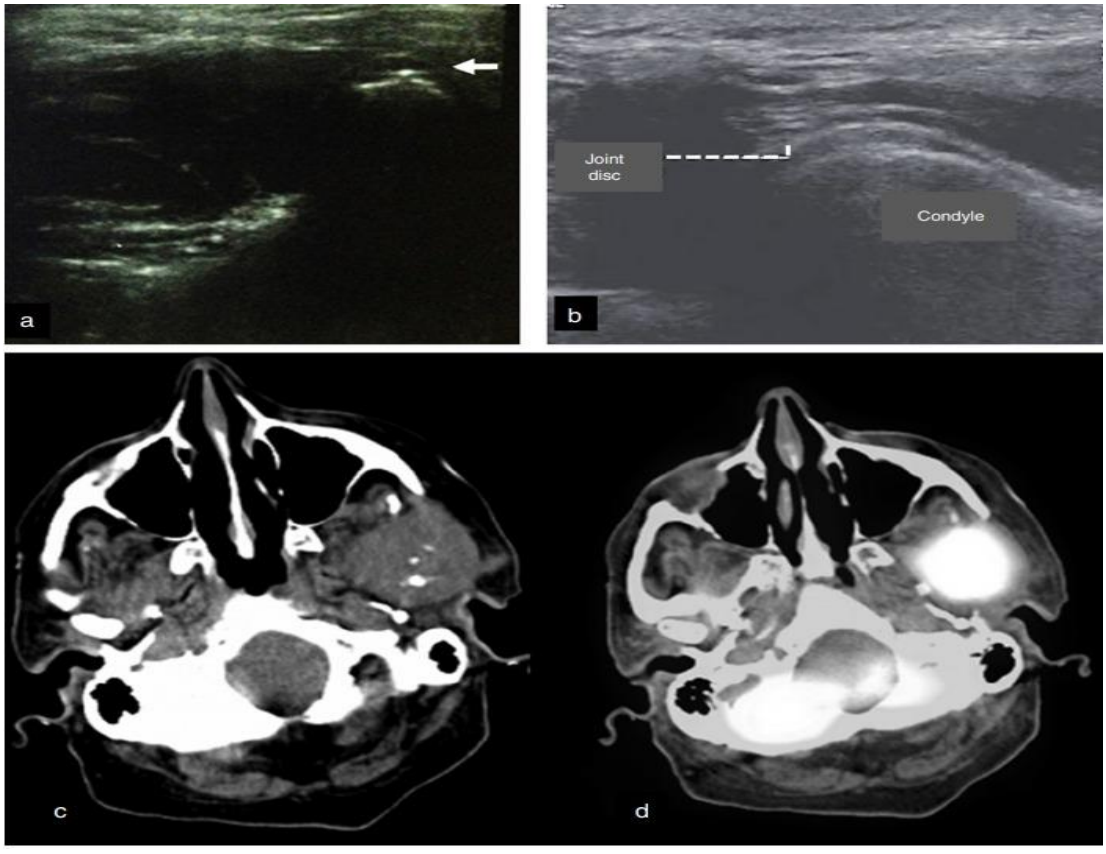
Similarly to the planigraphy, this evaluation provides good anatomical assessment of the condyle, fossa, and articular tubercle.[34,35,37] In this technique, an X-ray beam is obliquely directed through the skull to the contralateral TMJ, producing a sagittal view.[37] Thus, the central and medial portions of the condyle are projected inferiorly and only the lateral joint contour is displayed.[37] It is useful to identify bone alterations and displaced fractures of the head and neck of the mandibular condyle, as well as to assess excursion and to determine radiographic joint spaces.[38,35,37]



Radiographic assessments of different TMDs. (a---c) Close-up in panoramic image showing mandibular condyle hypoplasia (a), horizontal impaction of the third molar (a, b) fracture line in the region of gonial angle (b) and elongated styloid process. The transcranial images (d---f) show the presence of osteophytes (d), preservation of joint spaces in maximum habitual intercuspation (MHI) (e) and the identification of condylar hyperexcursion (f). The planography techniques (g---j) demonstrate: mandibular neck fracture and ankylosis (g) elongated styloid process (h), advanced remodeling process, superior-anterior flattening, cortical irregularities, and osteophyte formation (i) in addition to mandibular head hyperexcursion, defining TMJ hypermobility (j).

Temporomandibular joint disorder

One of the failures in opinion and treatment planning is an incorrect or gratuitous selection of infelicitous individual tests. This occurs because of a lack of knowledge on the part of the professionals regarding the suggestions of the applicable tests.[44] The correct suggestion of an imaging study should be grounded on the case's need for legal attestation, his/ her individual complaints, and the linked clinical signs and symptoms attained during history-taking and physical examination.[45,44,46]



Diagnostic task

Diagnostic task	Panoramic	Transcranial	Skull views	Tomography	Arthrography	CT	MRI
Ankylosis Bony	0	0	0	++	0	+++	+
Ankylosis fibrous	0	0	0	0	0	++	+++
Arthritis	+	+	0	++	O	++	+++
Anomaly	+	+	+	++	0	+++	++
Disk position	0	0	0	0	++	+	+++
Fractures	++	+	++	++	0	+++	++
Inflammatory conditions	0	0	0	+	++	+	+++

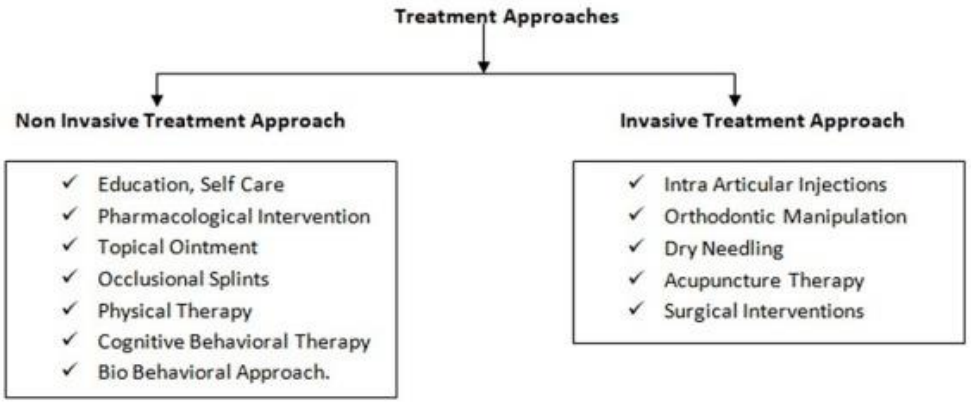
Table–1: Radiographic appearances of TMJ anomalies in relation to various imaging techniques

Prognosis

Almost cases can be successfully treated, although originally it may be delicate to diagnose the problem and find an effective result. Some cases of pain go down on their own, without treatment. The TMJ- related pain tends to be cyclical and may return again in future. Still, treatment can be particularly tricky because it's a sleeping geste and that's hard to control, If the cause is night- time clenching. Cases with observance symptomatology tend to have a prolonged course of illness. Given complications of long standing TMJ dysfunction include differences in dentition, habitual facial pain and malocclusion.[47] The establishment of a multidisciplinary pain platoon can help the interpreters in reducing similar complications.

Treatment for temporomandibular joint disorder

The orthodontic and surgical approaches will permanently alter the common deconstruction, and hence they're avoided in several cases, and cases go for conservative curatives similar as physical remedy, pharmacotherapy, occlusal slivers, behavioral approach, and tone- care. Nearly 50 of individualities symptoms remit within one time while 85 of the population.[48]



❖ **Education and Self-Care**

Tone- mindfulness and education are precious strategies for pain operation. A slight benefit was attained with education when comparing this intervention with occlusal slivers. This intervention approach, when compared with certain interventions like primer remedy and exercise, showed no fresh benefits.[49,50] tone- care is the dependence of the treatment. It includes the tradition of simple exercises, and behavioral variations are encouraged. This is indicated in a case with a new or intermediate clinical donation.

❖ **Pharmacological intervention**

This intervention includes acetaminophen, andnon-steroidalanti-inflammatory medicines, which help with acute and habitual pain; for muscular spasms and teeth- clinging muscles, relaxants are specified, similar as benzodiazepines.

❖ **Intra-Articular Injections**

The inflammation of the TMJ and the capsule can be resolved withintra- articular injection with original anaesthetics or corticosteroids. These injections are only used for severe acute exacerbation and after the failure of conservative treatments. A regular review set upnon-significant validation for repetitive intraarticular injections in TMD.

❖ **Dental therapies**

Dental occlusion slivers and endless dental adaptation are the reliances of the treatment; the slivers are named grounded on the condition. The occlusal slivers are used to correct the alignment of the upper and the lower teeth, and thenon-occluding slivers are substantially used for mouth opening, releasing muscle pressure, and grinding of teeth.

❖ **Physical therapy**

Physical therapy plays an important role in reducing pain, improving joint mobility, restoring motor functions, and reducing inflammation to relieve the symptoms of TMD. The intervention includes several types of exercise.

❖ **Surgical interventions**

In colorful cases similar as internal derangement, degenerative changes, and common pathology, the arthrocentesis/ arthroscopic approach is used. In the case of internal derangement, surgical intervention isn't recommended, and a conservative approach and recuperation are recommended rather. For other conditions like fragment relegation,

minimally invasive intervention is used. Recent substantiation has shown that the injection of platelet-rich tube and arthrocentesis is effective in osteoarthritis of TMJ; this should be verified by conducting further studies.

Table 2: Counselling and home self-care guidelines for the TMD patient.

Counselling
1. Modify your diet
Try eating soft foods like soup, yogurt, mashed potatoes etc. Avoid eating hard foods or chewing for a long time. Do not chew gum!
2. Avoid opening the mouth wide
Avoid yawning, screaming, singing, and long sessions at the dentist.
3. Use hot compresses
Apply moist heat to the painful area for 20 minutes, two to four times a day.
4. Relax your jaw muscles
Try not clenching your teeth. Practice keeping your tongue on the roof of your mouth behind your front teeth. The rule is "lips together and teeth apart."
5. Keep good posture
Maintaining good posture of head, neck, and back will help relax your jaw muscles.
6. Improve your sleep
Try to have a resting sleep. Avoid sleeping on your back or in other positions that stretch your jaw and neck muscles.
7. Practice aerobic exercises
Walking and water aerobics are excellent ways to help improve your pain and your overall health.

Frequency and Duration

The frequency and duration of follow up treatment sessions will be individualized based on the specific impairments and functional limitations with which the patient presents during the initial evaluation. On average, the frequency may range from 1-2 times per weeks for 4-6 weeks.

CONCLUSION

TMJ disorder is a condition that affect the joint and muscle, causing pain and difficulty in jaw movement. Review article provide valuable insights into the etiology, diagnosis, and treatment options for TMJ disorder. A multidisciplinary approach involving dentist, orthodontist, and physical therapists is crucial for effective management. Remember, prevention is key, so adopting healthy habits and minimizing stress can go a long way in maintaining optimal jaw health. Stay informed, take control, and embrace a pain-free life with a happy, healthy jaw.

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