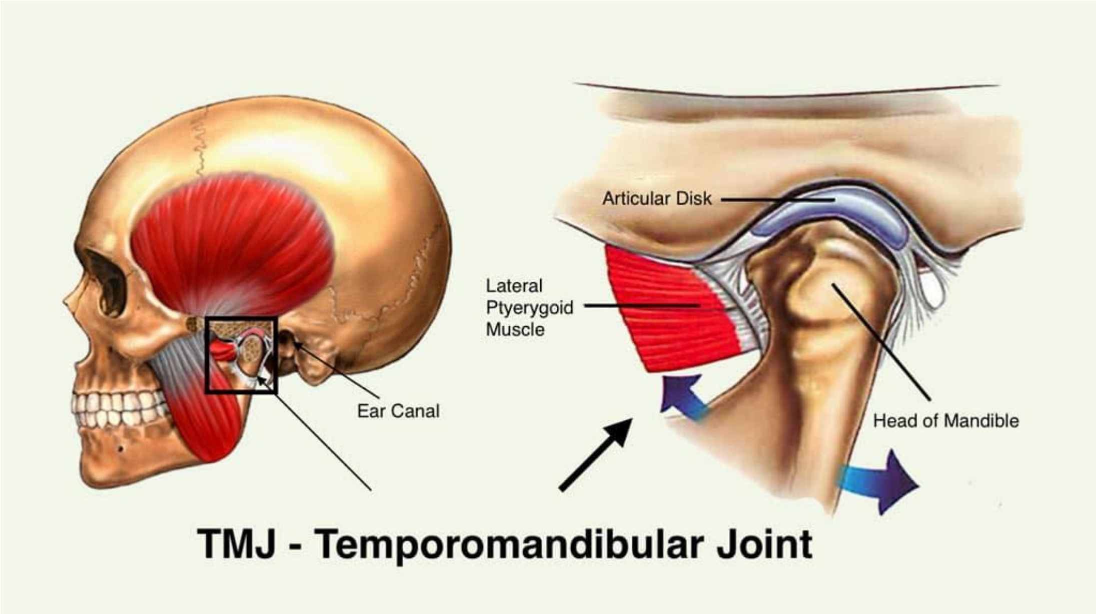
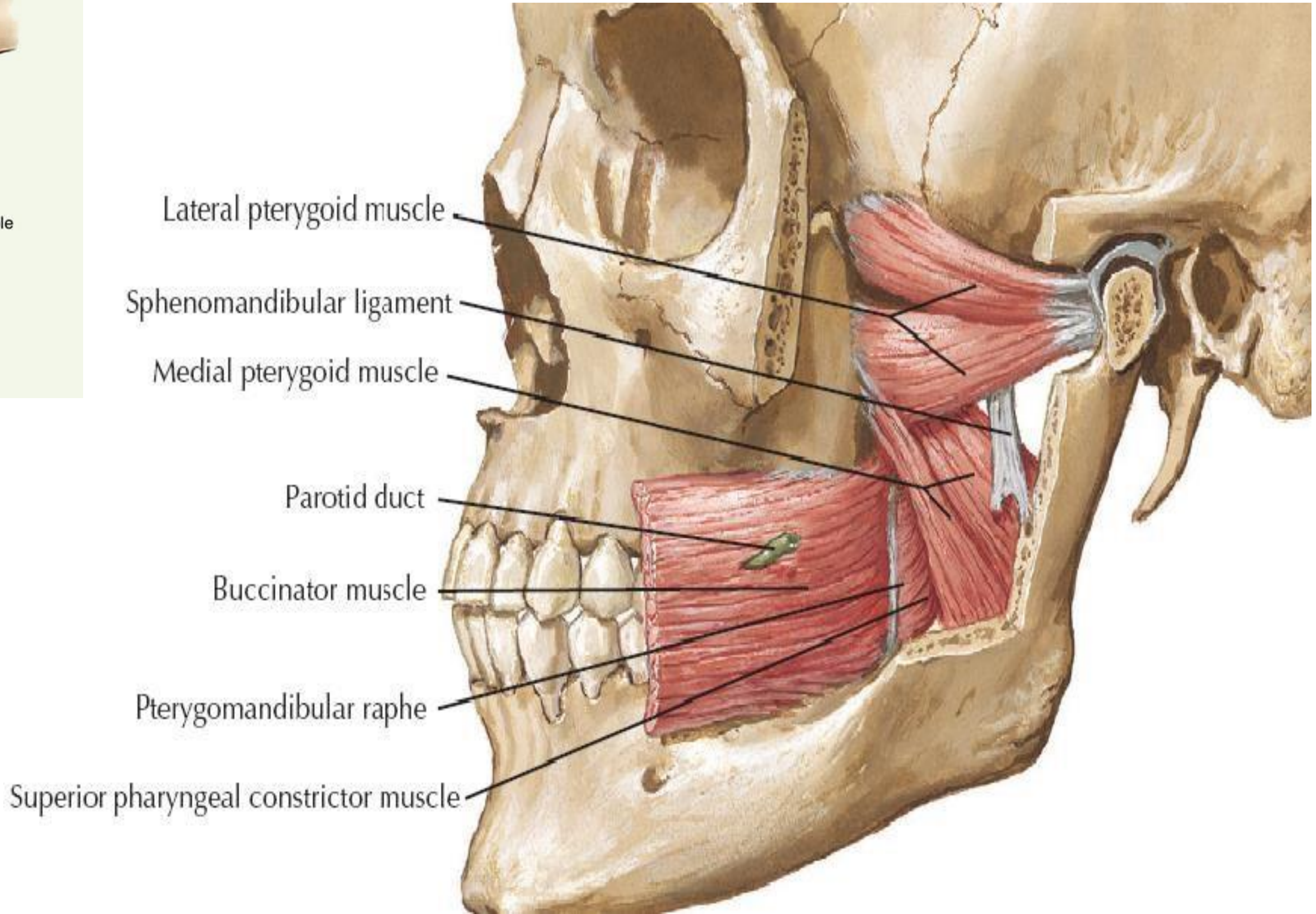
Temporomandibular Joint Disordres





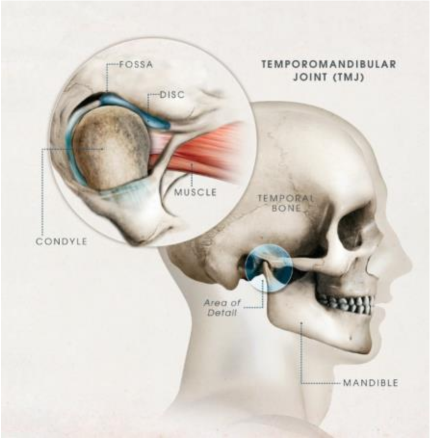
PROFESSOR ABBAS AY TAHER

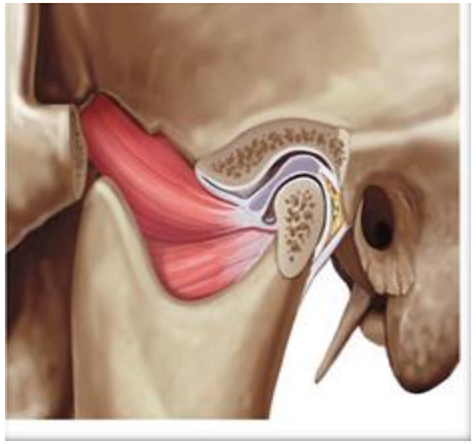
Temporomandibular Joint Disordres:

Temporomandibular disorders are complex dysfunctions of masticatory muscles and temporomandibular joints. Their symptoms affect more than 40% of the population and their prevalence is rising. It is important to establish a unified protocol for this specialistic examination.

The temporomandibular joint represents the **articulation of the mandible** to the **temporal bone of the cranium**.
Interarticular disc lies between the **mandibular condyle** and the **temporal bone**, helping in smooth motion.
This disc absorbs shocks to the jaw joint from chewing and other movements.

TMJ Anatomy:





1.Bony structures

-The temporal bone

*Articular (mandibular) fossa

*Articular eminence

-The mandibular condyles

2.Cartilage and synovium

-The articular surfaces of both the temporal and condylar bones are covered by dense articular fibrocatilage.

-Lining the capsular ligament is the synovial membrane.

Articular disk

-It is ovale in shape.

-Its nonvascularized and noninnervated (allow the disk to resist pressure).

-Posteriorly, the disk blends with a highly vascular, highly innervated structure (retrodiskal tissue or bilaminar zone).

4.Ligaments

A-Three functional ligaments:

1-Capsular ligaments: encompass the joint, attach sup. to temporal bone and inf . to condylar neck.

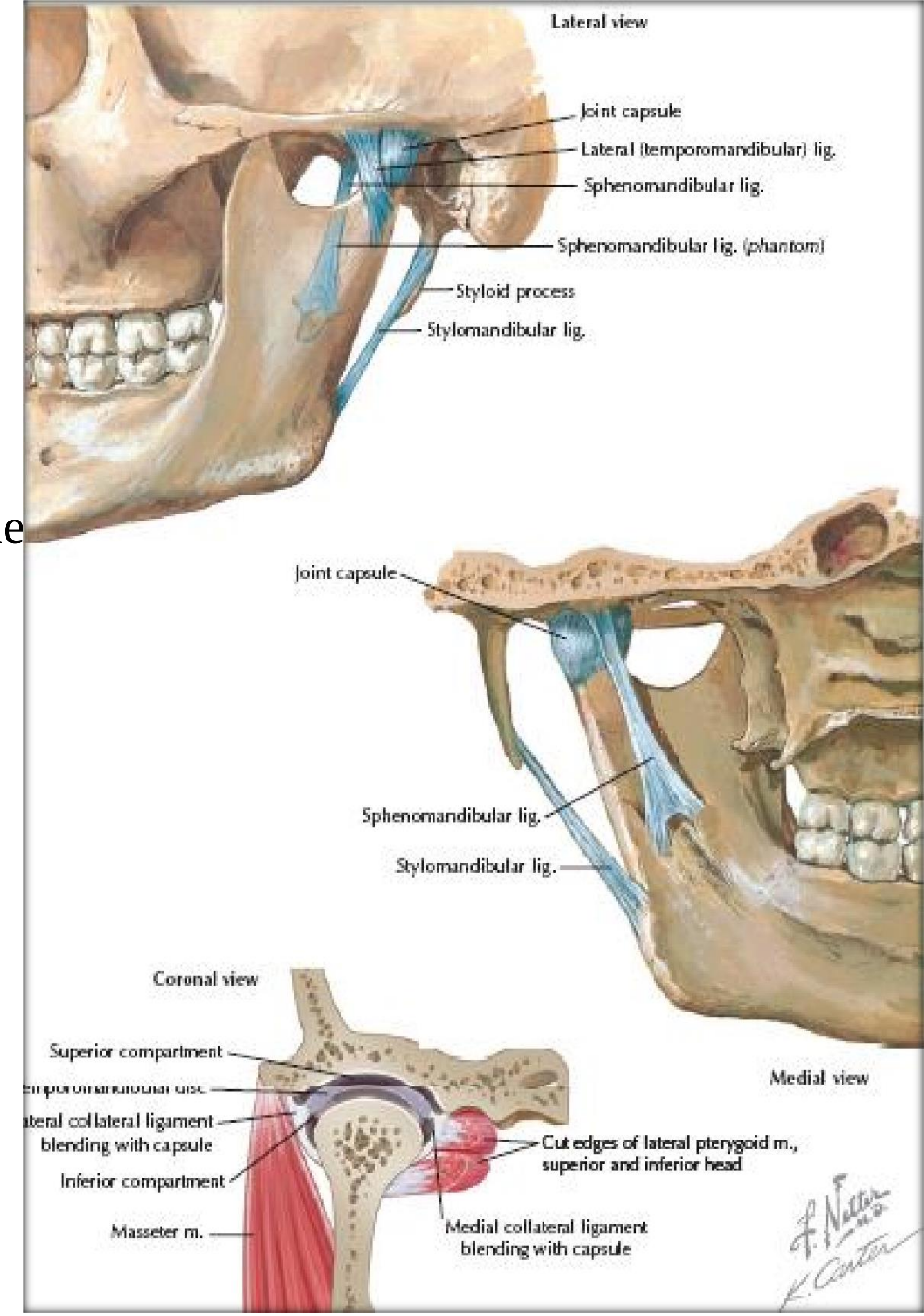
2-Collateral (Diskal): attaching the disk to **medial** and **lateral poles of condyle.**

3-Temporomandibular: on the lat. side of each joint only, it is attached to **the zygomatic process of the temporal bone** and the **articular tubercle** and **fixed to the lateral side of the neck of the mandible.**

B-Two accessory ligaments: are not directly attached to any part of the joint.

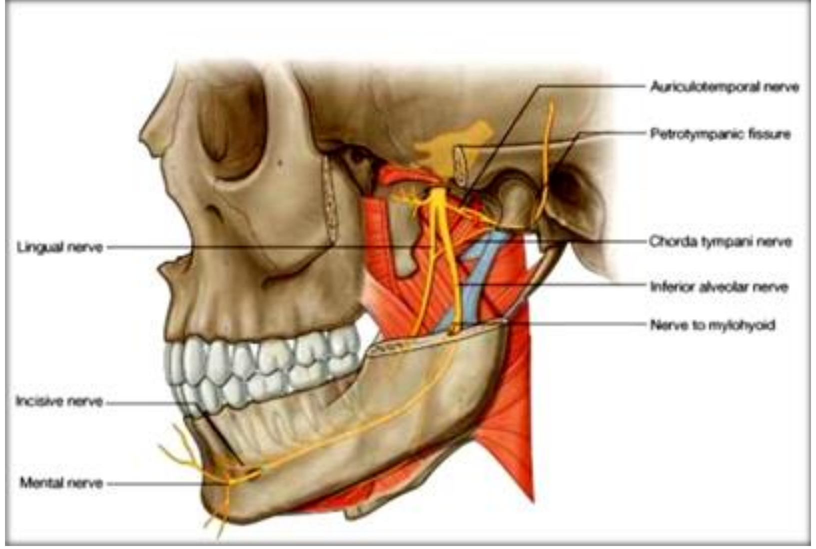
Stylomandibular ligament: Extends from the styloid process to the posterior margin of the angle and the ramus of the mandible

Sphenomandibular Ligament: Extends from the spine of the sphenoid to the lingula of the mandible



Nerve supply:

Sensory innervation of the temporomandibular joint is derived from the auriculotemporal and masseteric branches of V3 or mandibular branch of the trigeminal nerve.



Musculature

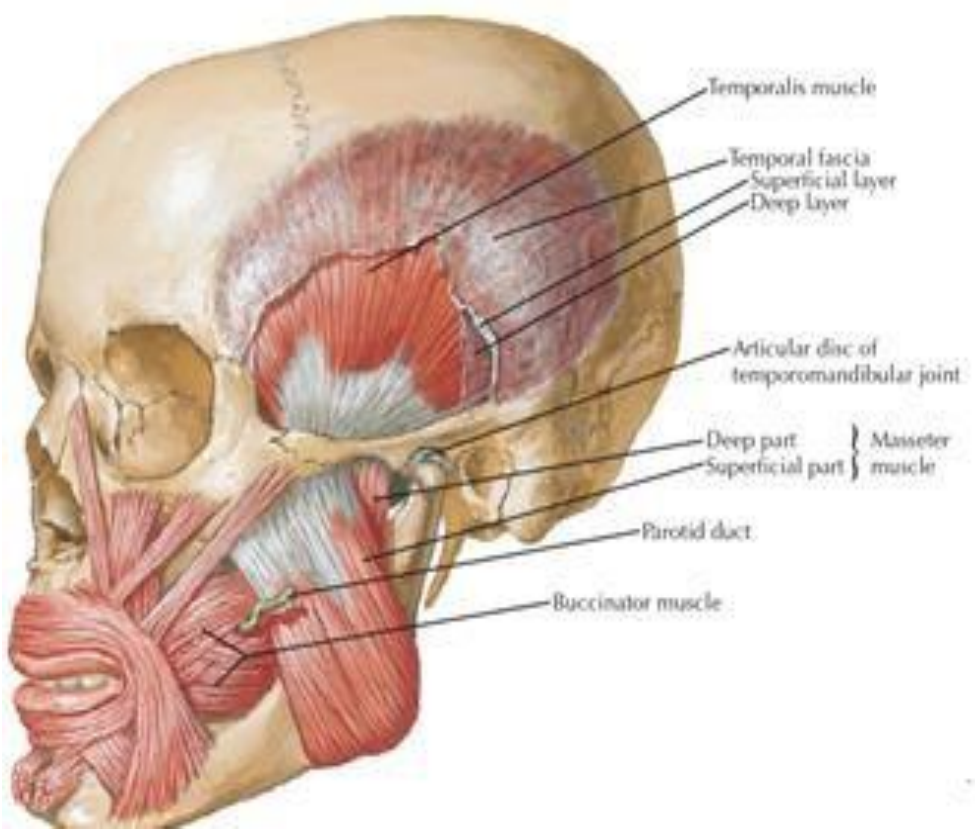
All muscles attached to the mandible influence its movement to some degree. Only the four large muscles that attach to the ramus of the mandible are considered the muscles of mastication;

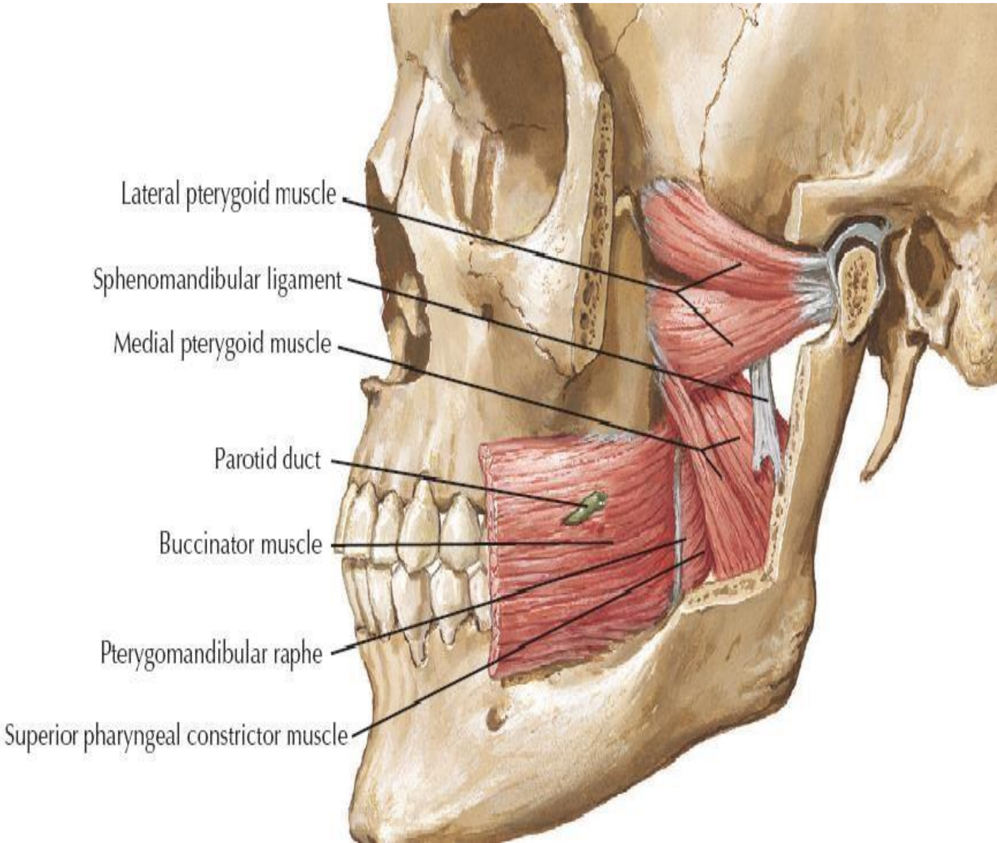
-Msseter m

-Medial pterygoid m

-Lateral pterygoid m

-Temporalis m





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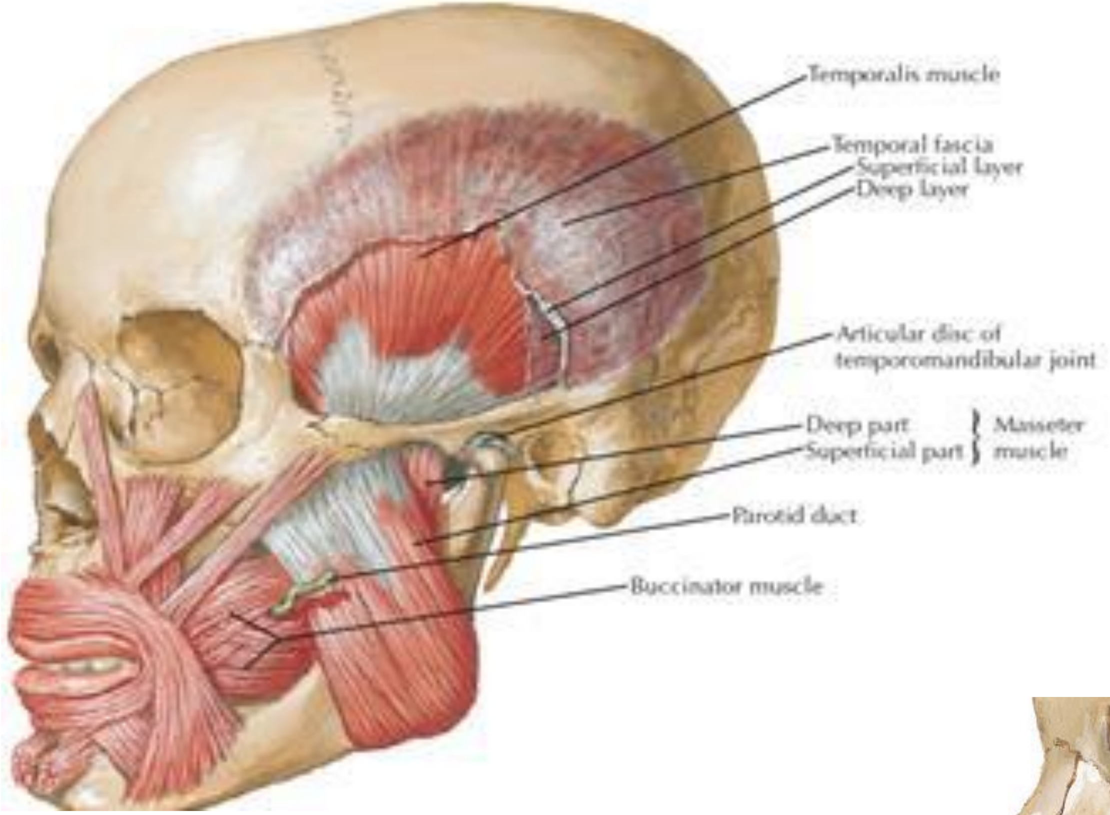
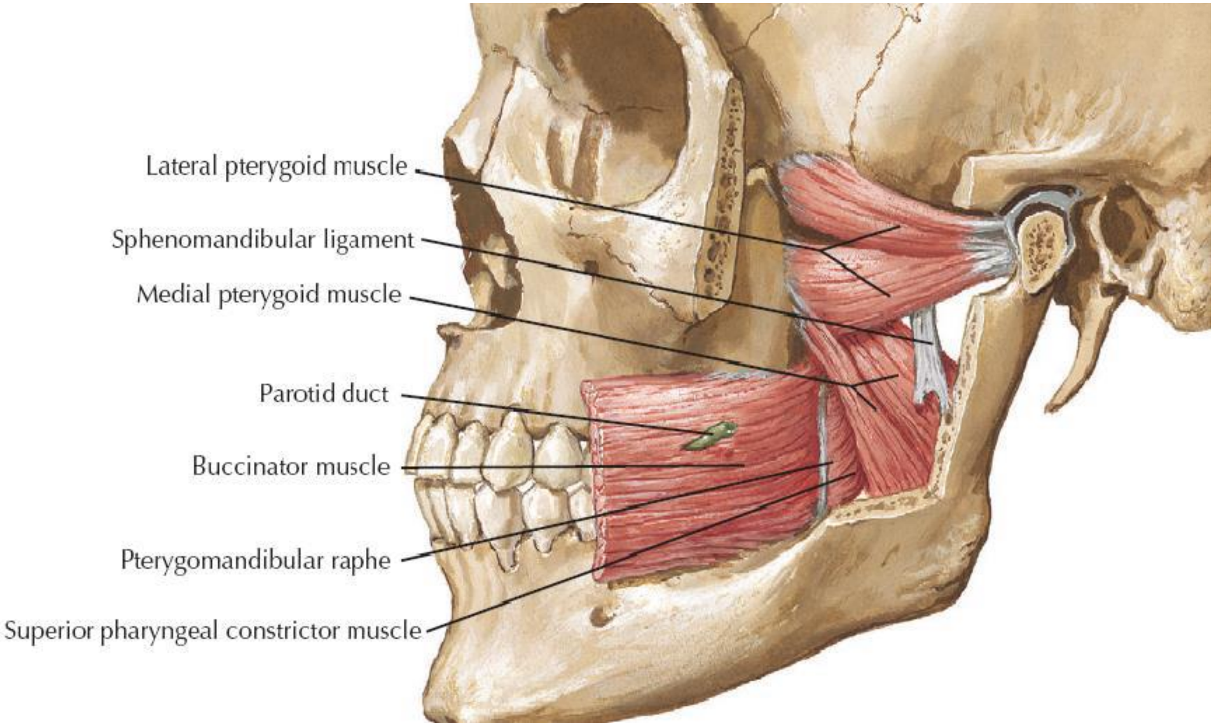




Evaluation of TMJ:

1.Medical and dental history Hx.

2.Chief complaint

3.Histoy of present illness HPI

4.Clinical examination:

Patients who have positive responses to a brief **screening questionnaire** will **potentially benefit from a clinical examination**.

A brief clinical examination,with the aid of an assistant, should only take a few minutes to complete.

TMD examinations and diagnostic criteria and provide the key information to identify the patient's clinical diagnoses. This examination collects information about the patient's pain history, opening and excursive ranges of motion, joint sounds and pain on palpation of the masticatory muscles and TMJs.

1. Muscles examination

*palpation (preauricular, intrameatal and muscles of mastication)

Systematic

The temporalis muscle is segmented into **anterior, middle**, and **posterior regions**.

1.Temporalis (anterior): Fibers of this region run vertically and were <u>palpated above the zygomatic arch and anterior to the TMJ.</u>

Systematic evaluation of muscles of mastication. **A,** Palpation of masseter muscle. **B,** Palpation of temporalis muscle. **C,** Palpation of temporalis tendon attachment on coronoid process and ascending ramus

Measurement of range of jaw motion. **A,** Maximum voluntary vertical opening. **B,** Evaluation of lateral excursive movement (should be approximately 10 mm).

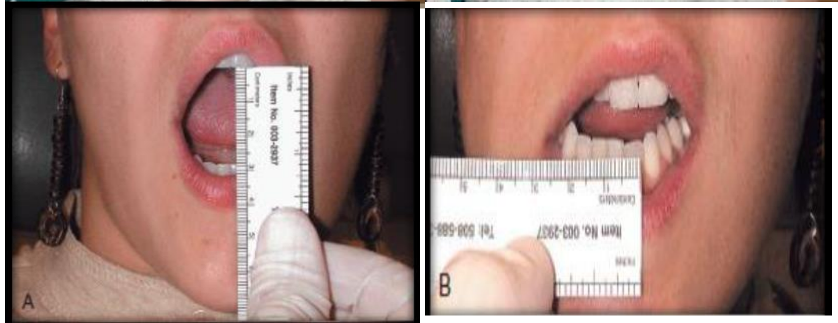
A, Palpation of masseter muscle.
B, Palpation of temporalis muscle.
C, Palpation of temporalis tendon attachment on coronoid process and ascending ramus.

Measurement of range of jaw motion.
A, Maximum voluntary vertical opening.
B, Evaluation of lateral excursive movement (should be approximately 10 mm).

Auscultation (by stethoscope for **joint sounds** for presence and **timing of clicks** and **crepitus** and their correlation to jaw movement)

Evaluation of temporomandibular joint for tenderness and noise. Joint is palpated laterally in closed position (A) and open position (B).

Mandibular openings: use a millimeter (endodontic) ruler to measure from the incisal edge of the maxillary to mandibular central incisors, and adjust (add for incisal vertical overlap)



measurement of mandibular range of motion (40_55mm) *evaluation of mandibular gait (lateral is 1:4 of opening)

Occasionally, but rarely, **aggressive local pathology can present with signs and symptoms similar to TMD** and all patients who are **being evaluated for TMD should receive a careful and comprehensive head and neck assessment**.

Diagnostic Classifications:

Results from the TMD clinical examination can be used to determine the **patient's clinical diagnosis**.

The suggested diagnostic classification **below provides a step-by-step approach that uses specific algorithms to determine a patient's diagnosis**.

Only the most common diagnostic categories are provided.

1-Diagnoses are not mutually exclusive, so TMD patients generally have multiple diagnoses.

2-The term "altered" refers to either an **aggravation** or **improvement**, and **"familiar pain"** is the pain the patient is familiar with having

Pain-related TMD

TMD fall into two main categories:

Myogenous, which involves muscles. **Myogenous temporomandibular disorders** (or **masticatory myalgia**) are characterized by pain and dysfunction that arise from **pathologic** and **functional processes** in the masticatory muscles. Pain in **temporalis** or **masseter muscle** altered by **jaw movement, function**, or **parafunction PLUS Familiar pain when palpating either muscle or familiar pain during maximum unassisted or assisted opening**

Myofascial pain with referral, e.g., tooth pain referred from a masticatory muscle:

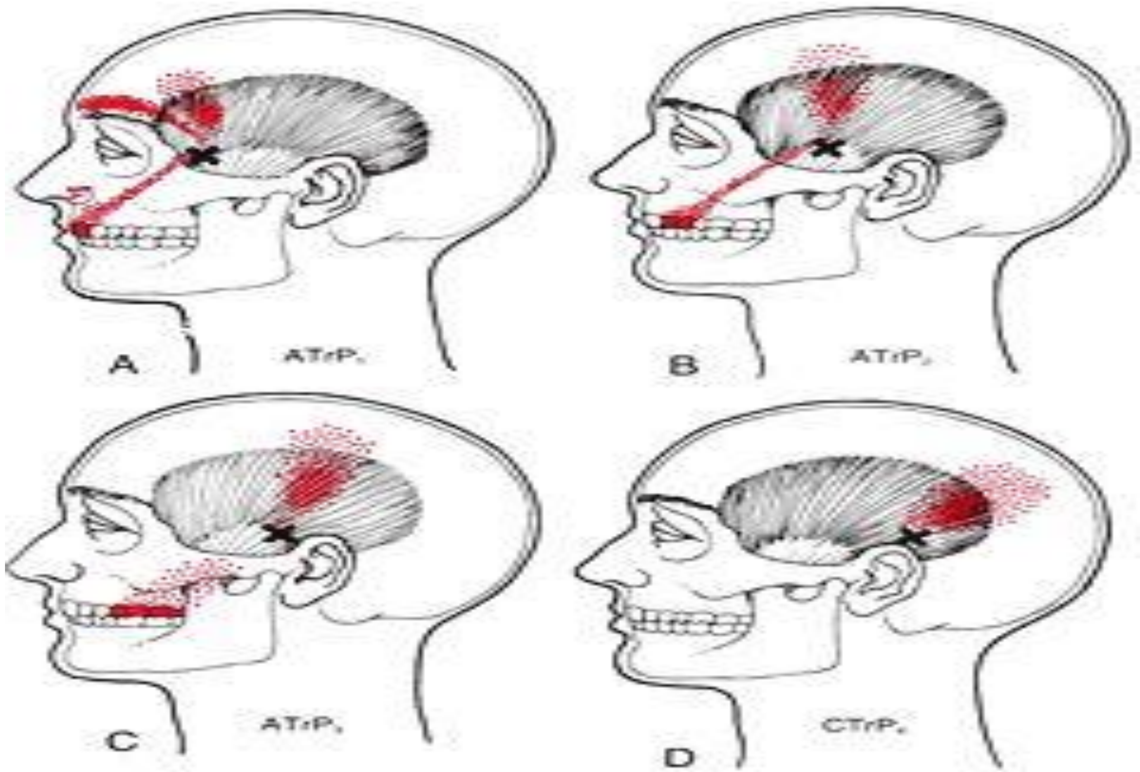
Referred pain altered by jaw movement, function, or parafunction PLUS

Familiar pain is brought on when palpating the temporalis or masseter muscle.

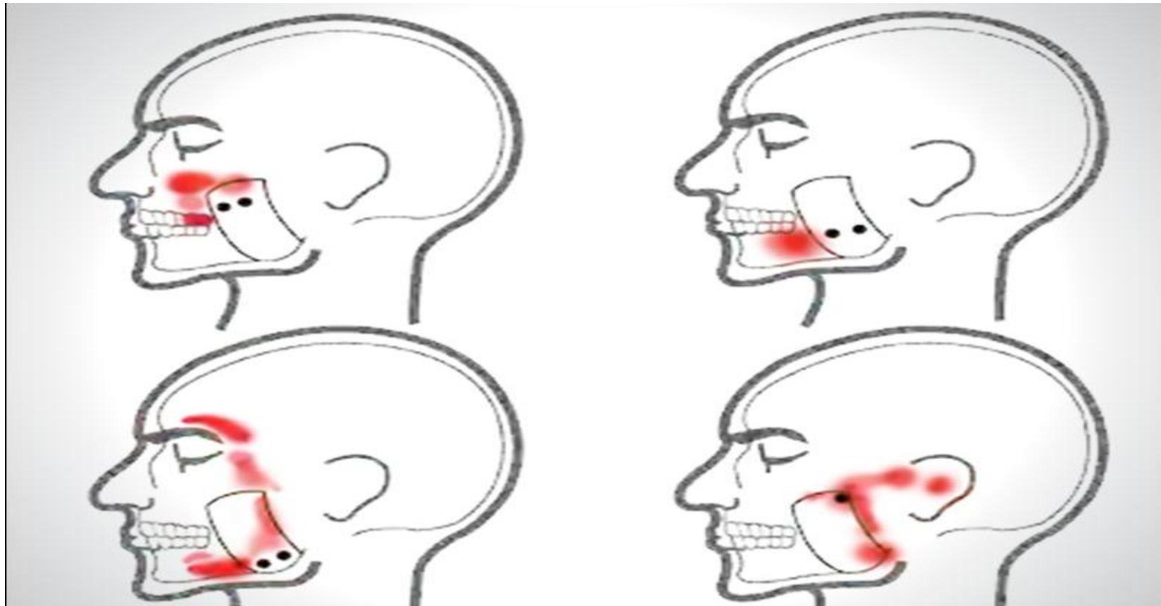
The spectrum of facial pain disorders is **secondary to parafunctional habits (teeth clenching**, **bruxism**, **lip biting**), **occlusal anomalies**, **trauma**, **internal joint problems such as disk displacement disorders or degenerative joint disease (DJD).**

The history and examination will point toward a muscular disorder. The pain is diffused, poorly localized preauricular pain that may also involve muscles of mastication. In patients with nocturnal bruxism, the pain is frequently more severe in the morning.

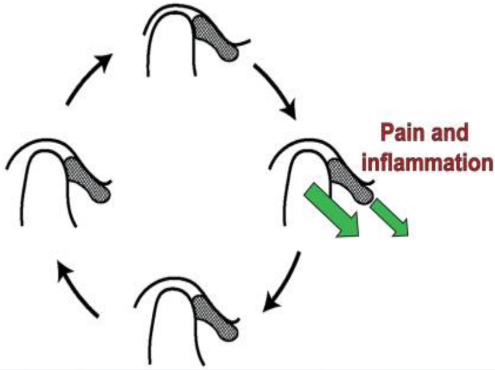
Patients generally describe decreased jaw opening with pain during functions such as chewing.



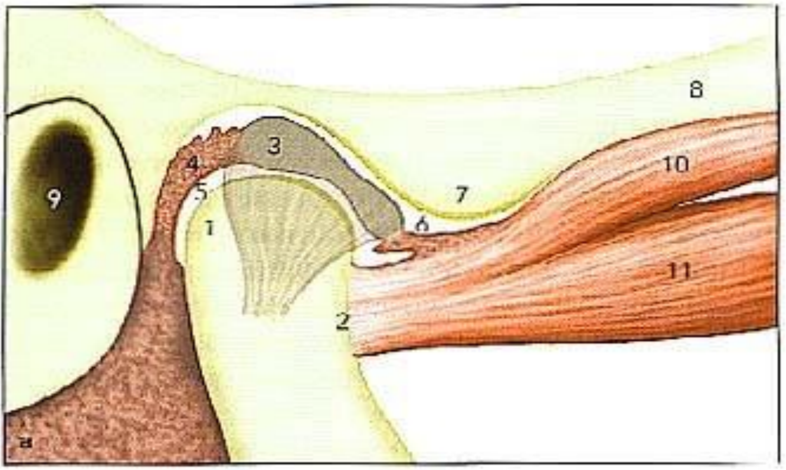
Not uncommonly, the patient has Headaches, usually bi-temporal in location. Radiographs of the TMJs are usually normal. Some patients have evidence of degenerative changes such as altered surface contours, erosion, or osteophytes. These changes, however, may result from or be unassociated with the MPD problem.



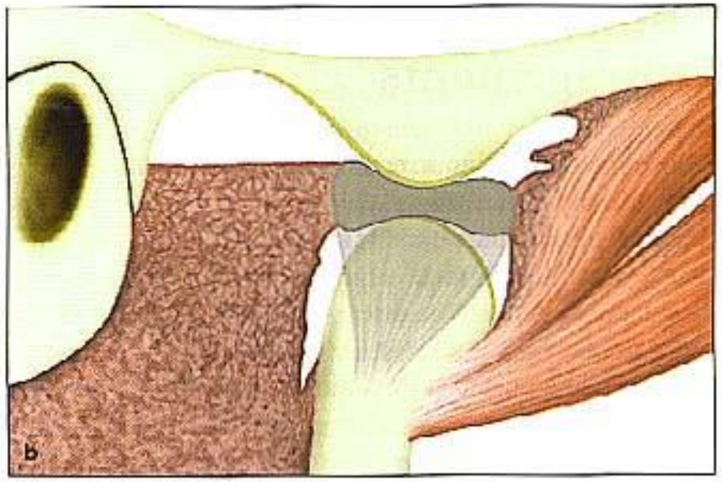
Arthrogenous: **Arthralgia:**
Pain in preauricular region altered by jaw movement, function, or parafunction *PLUS*
Familiar pain when **palpating the TMJ** ***or*** **familiar pain during maximum unassisted opening**, assisted opening, or excursive movementswhich **involves articular bones**, or **disc in between**.



Articular disorders "arthrogenous" Disk derangement disorders
Displacement with reduction.
Displacement without reduction [closed lock].
Perforation.
Dislocation(open-lock)



Jaw closed

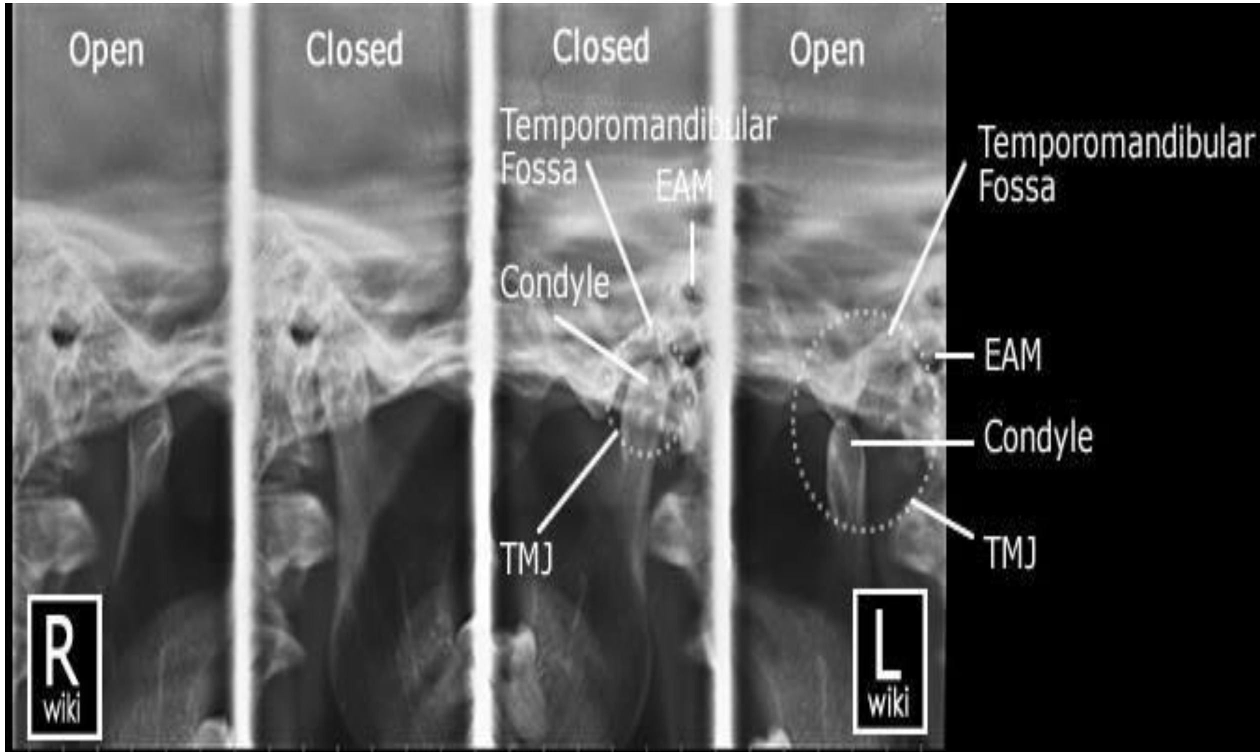


Jaw opend

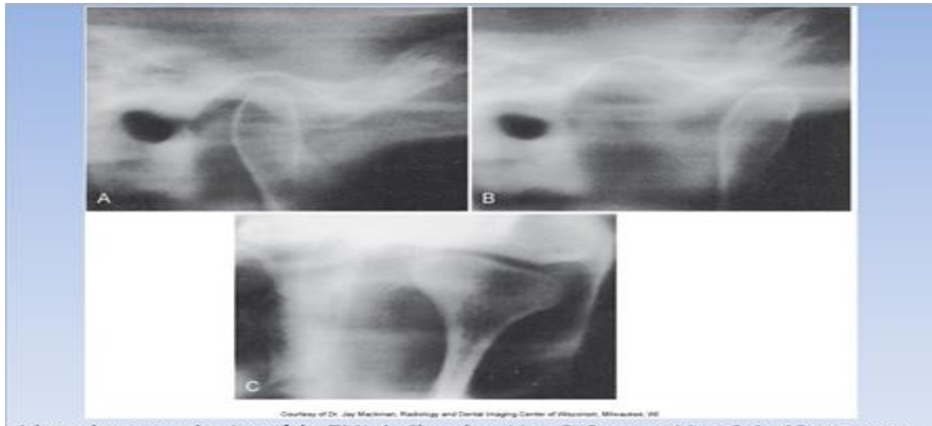
Most TMD patients will have a **myalgia diagnosis** because pain is the most common reason patients seek care and pain from the muscles is more common than from the TMJ.
Disc displacement with **reduction is fairly common,** so many patients will also have co-occurring disc displacement with reduction.
Many patients will also have a portion of their pain from the TMJ, so many will also have an **arthralgia diagnoses**, in which the TMD is from both the **myalgia and the arthralgia.** Hence, most TMD patients will have multiple TMD diagnoses.

Radiological findings.

TMJ OPG: It is different from the small close up x-rays dentists take of individual teeth. An OPG may also reveal problems with the jawbone and the joint which connects the jawbone to the head, called the Temporomandibular joint or TMJ. An OPG may be requested for the planning of orthodontic treatment, for assessment of wisdom teeth or for a general overview of the teeth and the bone which supports the teeth.



B-Tomography: allows radiography sectioning of the joint at different levels of the condyle and fossa complex which provides individual views visualizing the joint in slices from the medial to the lateral pole. These views eliminate bony superimposition and overlap and provids a realatively clear picture of the bony anatomy of the joint.

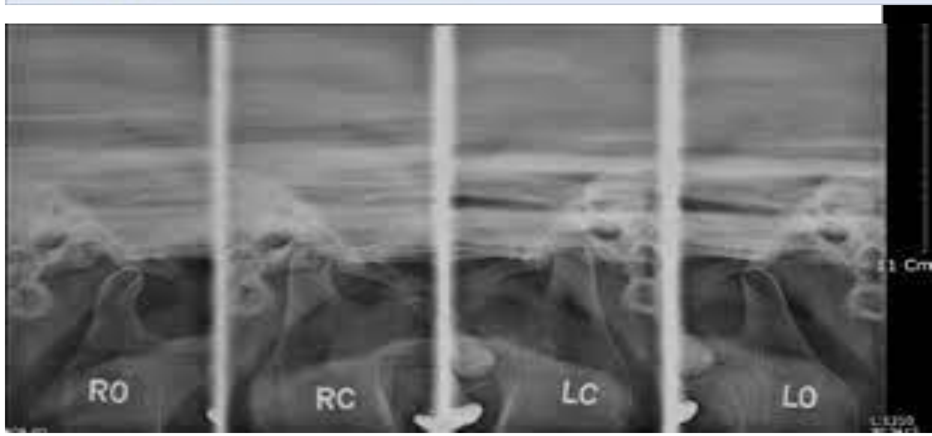


A lateral tomography view of the TMJ. A, Closed position. B, Open position. C, An AP tomogram. Note the fine clarity provided by tomography. (Courtesy of Dr. Jay Mackman, Radiology and Dental Imaging Center of Wisconsin, Milwaukee, WI.)

3-Transcranial

Transcranial TMJ projection :

An intensifying screen of 7 to 15 impulses with a fast film and exposure time at 65 kVp and 10 mA is used. The lateral one third of the joint space can be visualized. The patient head is positioned parallel to the cassette with the side to be imaged closest to the cassette.



4-CT:

provide the most accurate radiographic assessment of the bony components of the joint

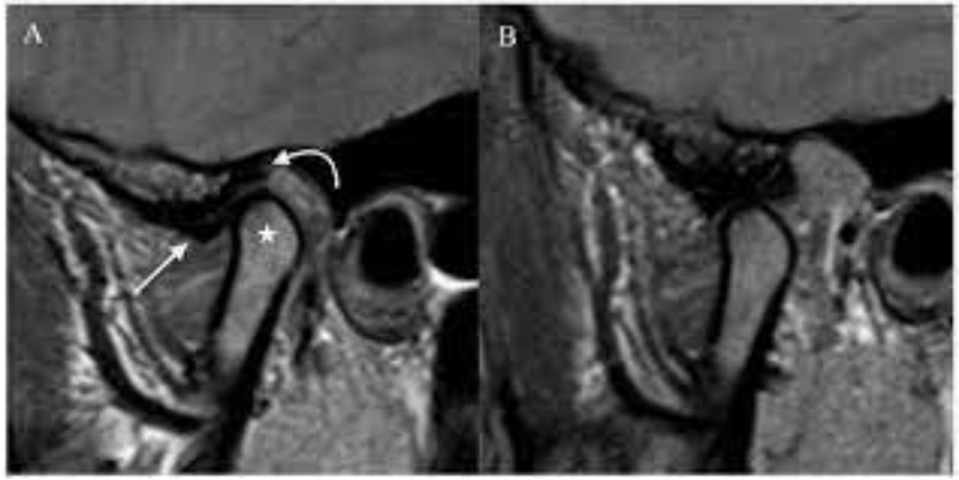
-

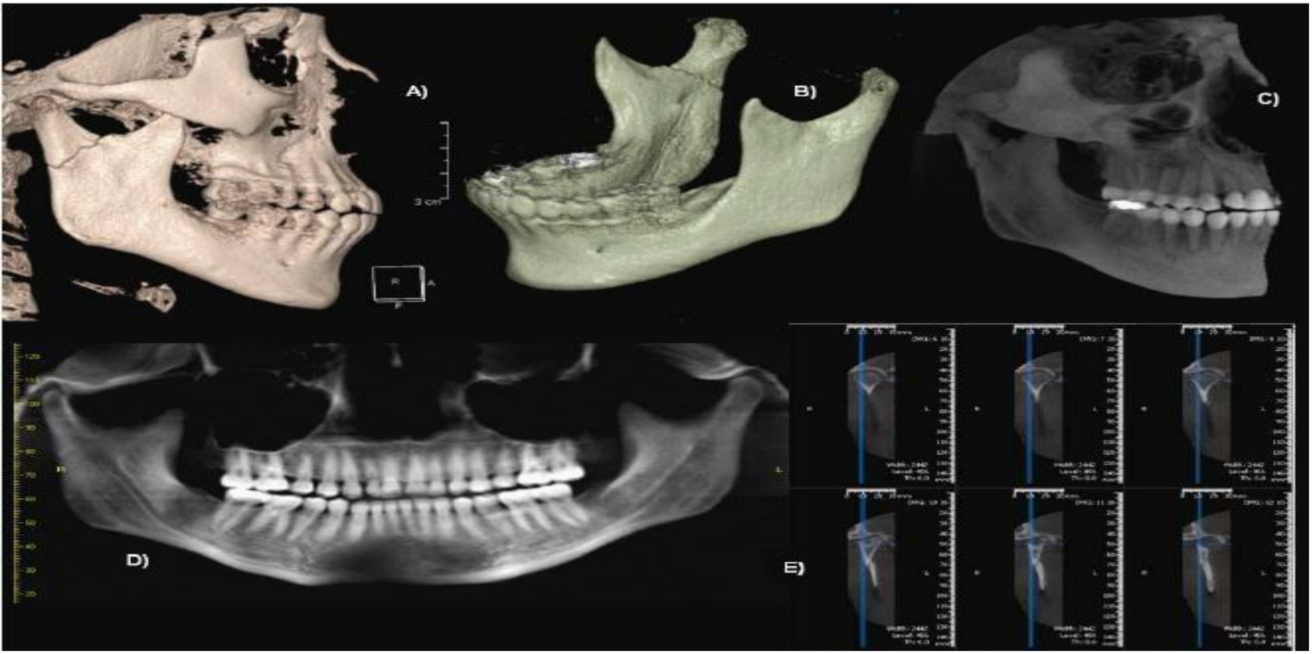
5-MRI: the most effective diagnostic imaging technique to evaluate TMJ soft tissue and for disk morphology and position with the fact that this technique does not use ionizing radiation is a significant advantage

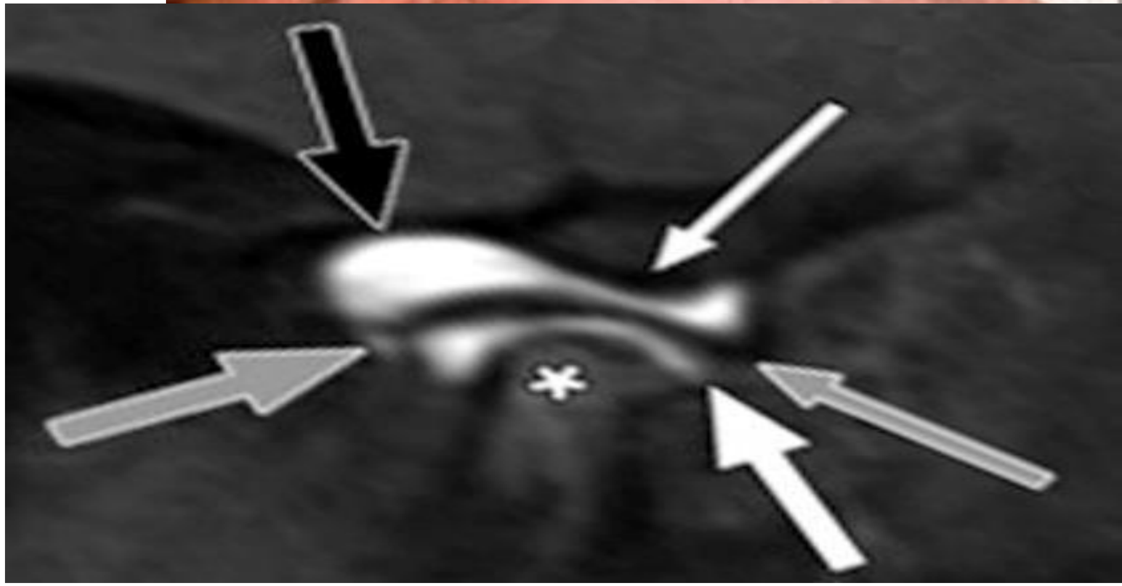
6-Arthrography: This involves the injection of contrast material into the inferior or superior spaces of the joint after which the joint is radiographed and this well allows evaluation of the position and morphology of the articular disk and to demonstrates the presence of perforations and adhesions of the disk or its attachments

7-Cone beam computerized tomography (CBCT)

Become a popular diagnostic tool among dentists and oral-maxillofacial surgeons, When evaluating bony structures, it has the diagnostic accuracy of conventional CT scanners.







Management of TMJD:

The treatment of TMDs must be based on a proper diagnosis, collecting data regarding patient's history; trauma, accidents, or oral habits. Management of TMDs can be summarized into ***supportive*** and ***definitive*** treatments.

Supportive therapy; refers to treatment methods that are directed toward <u>altering patient's symptoms</u>, such as pain and dysfunction. No or little effect on the etiology.

Definitive treatment; directed toward <u>elimination or alteration of the etiologic factors</u> responsible for the disorder.

I) supportive therapy (Non-surgical)

<u>1-Behavioral</u> (soft diet, avoid chewing gum)

2-<u>Pharmacological:</u>

-analgesics (non opiate/opiod)

-anti-inflammatory (NSAI, steroids)

-muscle relaxants (centrally acting/peripherally)

-anxiolytics (diazepam)

-antidepressants (TCA/MAOIs)

-Local anesthesia: for diagnosis to block intraarticular or intramuscular/pain relief/increase range of motion

3-Physical therapy :

Can be categorized in **physical modalities** and **manual techniques**.

(A) Physical therapy Modalities:

1-Thermotherapy:

It is the application of hot fomentation on the symptomatic area for 10 to 15 minutes, not exceeding 30 minutes.
The primary goal, is to increase blood supply through vasodilatation, leading to decrease pain and joint stiffness.

2-Coolant therapy:

-It is the application of cold fomentation such as ethyl chloride and fluoromethane sprays.
-This intends to decrease pain by numbing the symptomatic area.
-Combination of hot and cold fomentation is helpful.

3-Acupuncture:

It is one of the alternative Medicine techniques.
Its action is still unclear but was successfully used in treating TMD symptoms.

4-***Electromyographic Biofeedback:***

some emotional states may be associated to muscle hyperactivity, relaxation training assisted by the use of EMG biofeedback, can reduce diurnal muscle activity; thus reducing pain.

5-Ultrasound therapy:

It has the same concept of thermotherapy, but more effective; because it acts on deeper tissues, not just the surface.
Ultrasound not only increases the blood flow in deep tissues but also seems to separate collagen fibers, which improves the flexibility and extensibility of connective tissues, decrease joint stiffness, provide pain relief, improve mobility, and reduce muscle spasm.

6-Transcutaneous Electrical Nerve Stimulation "TENS":

Electric stimulation devices for treatment of TMD are claimed to have two main purposes; relief of pain and relief of muscle hyperactivity or spasm.

7-LASER *"Light Amplification by Stimulated Emission of Radiation":*

It has wide application in dentistry.

The only physical risk is eye damage; special eye goggles should be worn for protection.

(B) Manual techniques "Hands on therapy":

These include treatment procedures intended to promote motion and relieve pain in musculoskeletal structures. As

1-Soft tissue mobilization.

2-Joint mobilization.

3-Muscle conditioning.

Jaw exercise:

Passive jaw exercise has received a great deal of attention recently. Many authors report significant improvement in pain and mobility in the nonsurgical phase of treatment for TMD.

Passive jaw exercise is also very effective for patients experiencing muscular trismus and myofascial pain dysfunction (MPD).

It may be contraindicated in patients with severely displaced disks, due to the possibility of damage to the disk or retrodiskal tissues.

Passive jaw exercise allows the patient to manually (or with a device such as Therabite Jaw Motion Rehabilitation System or A trismus screw) increase interincisal opening

Active exercise: using the patient’s jaw musculature may be incorporated into a home therapy program. One regimen allows the patient to activate, for example, their suprahyoid muscles (geniohyoid, mylohyoid, digastric, and stylohyoid), thereby inactivating the elevators of the jaw (medial pterygoid, masseter, temporalis).

This may allow for the relaxation of hyperactive muscles of mastication and may assist in increasing maximal incisal opening. In the active stretch phase patients are advised to keep their mouths open for several seconds and relax. They are instructed to open until they perceive pain and then advised to hold for several seconds and repeat this exercise several times a day.

II) Definitive Treatment

1- Occlusal therapy;

A-Reversible occlusal therapy.

Reversible occlusal therapy temporarily alters the occlusal condition and/or joint position but when removed returns the patient to the preexistent condition. An example would be an occlusal appliance (Figure 17-1). When the occlusal appliance is used, it creates a favorable alteration in the occlusal contacts and joint position. When it is removed, the patient’s original occlusal condition returns.

B-Irreversible occlusal therapy permanently alters the occlusal condition so the original condition cannot be recovered. An example would be selective grinding of the teeth whereby the occlusal surfaces are reshaped with the goal of improving the occlusal condition and orthopedic stability. Since this procedure involves the removal of enamel, it becomes irreversible and therefore permanent.
Other forms of irreversible occlusal therapy are fixed prosthetic procedures and orthodontic therapy

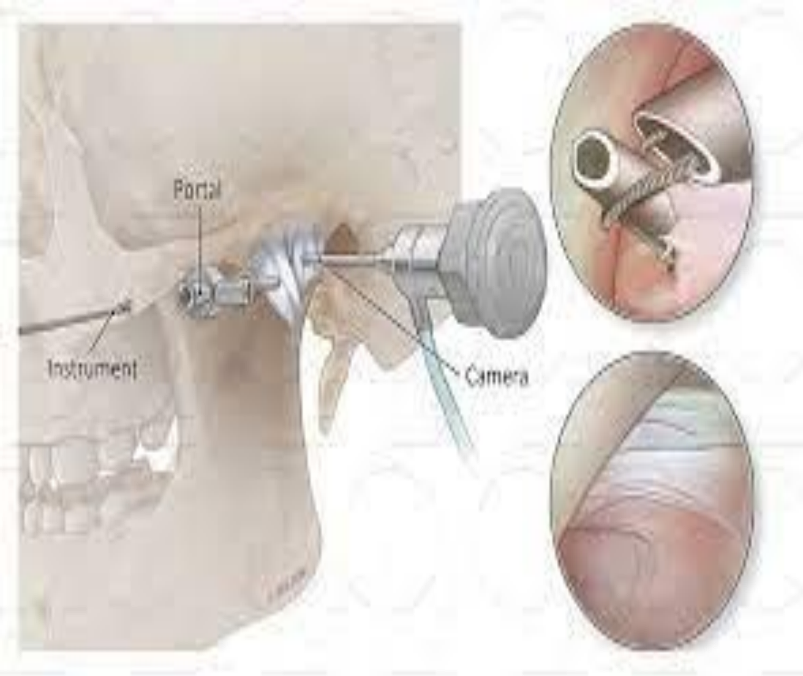
Minimally invasive (arthrocentesis, arthroscopy)

The term arthrocentesis means “joint puncture (aspiration),” togather with lavage for flushing out the proinflammatory cytokines, pain mediators, and cartilage matrix degradation products. It is effective for reduction of pain and disability. It is a simpler, less invasive technique than arthroscopy and is popular with comparable treatment outcomes to arthroscopic lysis and lavage.

Indications:

1. The primary indication for arthrocentesis is the management of irreducible anterior disc displacement with acute closed lock of the TMJ.
2. Some early controversy is related to the use of arthrocentesis for chronic closed lock

Procedure:
The procedure can be carried out under local analgesia. The upper joint cavity is puncturec small needle (19 to 21 gauge) via the skin in front of the tragus to irrigate, and the fluid is expelled via an outflow needle. The first needle is placed 10 mm anterior and 2 mm below line from the midpoint of the tragus to lateral canthus, and the outflow needle is placed 20 anterior and 10 mm below. The volume of irrigation was originally 500 mL of lactated Rin solution, although the literature currently suggests 100 to 200 mL of lavage is sufficient.



SURGICAL MANAGEMENT :

-Surgical procedures:

1.Disc repositioning (discopexy)

2.Disc repositioning & discoplasty.

3.Disc repositioning & arthroplasty for condyle or fossa.

4.Disc repair.

5.Discectomy

6.Discectomy with replacement by:

Temporalis muscle/fascia flap Ear cartilage

Dermal graft:Abdominal dermis/fat graft Tissue engineer

7.Modified mandibular Condylotomy: intraoral vertical subsigmoid osteotomy with condylar sagging for 4 mm

Preauricular surgical technique:

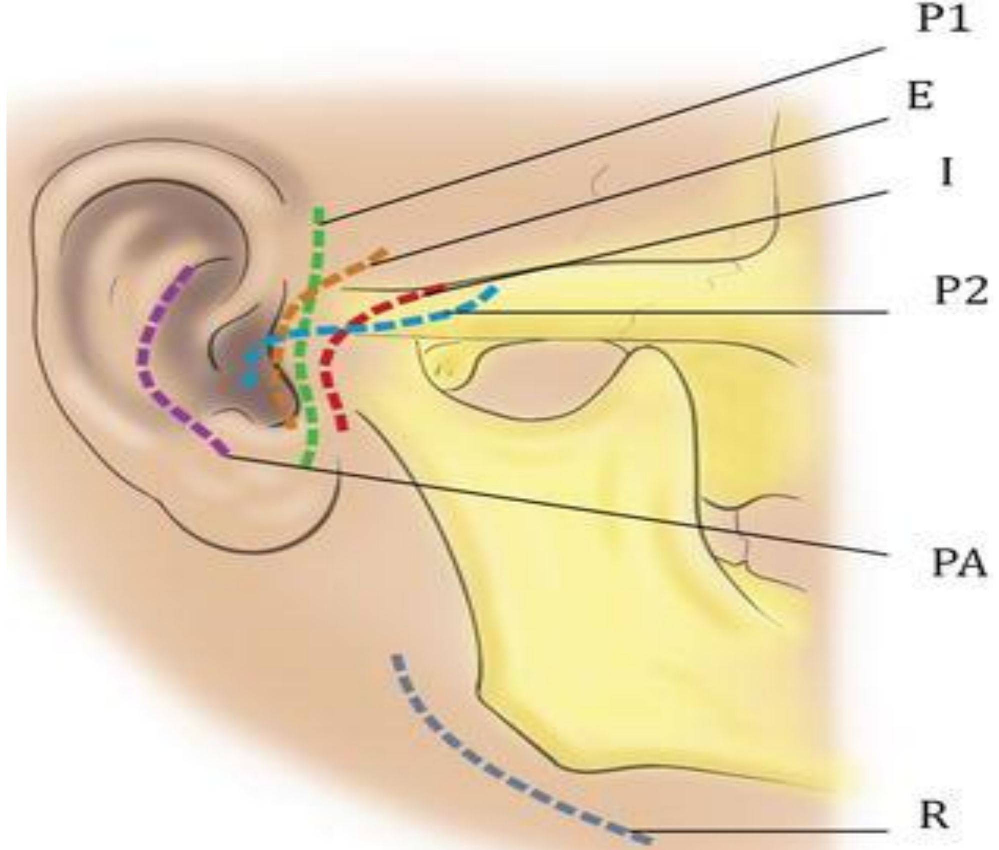
Preauricular incision is made along the natural crease anterior to the tragus

Dissection should be continued along the cartilage of external auditory canal in order to prevent damaging the auriculotemporal nerve and superficial temporal artery. Superficial layer of the temporalis fascia would be incised 2 cm above the zygomatic arch in an oblique line. Blunt dissection should be continued to reach the zygomatic arch.

The periosteum of the zygomatic arch is incised at this time, and it should be reflected laterally to achieve to the articular capsule the surgeon needs to expose the superior joint space, the incision should be made along the posterior slope of the articular eminence. Incising the disc along the superior joint space, lateral recess allows the surgeon to expose the inferior joint space.

Advantages:

Almost invisible scars are main advantages of a preauricular approach. This surgical technique provides access to the superior part of the TMJ and anteromedially displaced mandibular condyle.

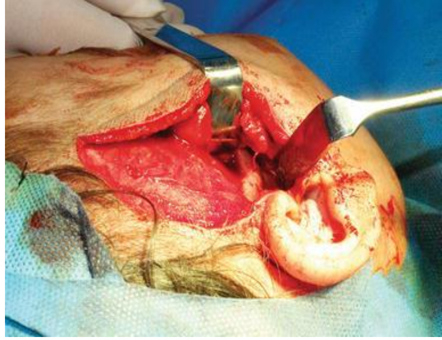


Surgical approaches to the TMJ. P1 and P2—preauricular approaches; PA—postauricular approach; I—inverted hockey stick approach; E—endaural approach. R—retromandibular approach.

The disadvantage:

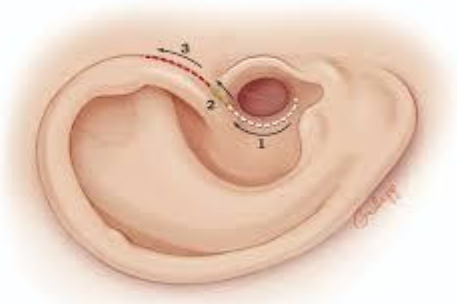
There is no access to the lower portion of condylar process. Rigid fixation of mandibular condyle fracture is difficult in this approach .

The possibility of facial nerve damage is a major disadvantage of this surgical technique.



Endaural surgical technique

This approach is provided to achieve the benefits of preauricular methods simultaneously with more cosmetic results. The incision is made behind the prominence of the tragus. The skin flap · reflected over the cartilage of the tragus, and then, dissection is continued in the same manner o preauricular approach



Advantage:

The cosmetic result of scar is better than preauricular incision

Disadvantages

Tragus cartilage damage is the main disadvantage of this approach. When the problem happens, poor healing process is expected.

Postauricular surgical technique

The incision is made 3 mm posterior to the posterior auricular fold and carried to the mastoid fascia .Dissection is continued above the mastoid fascia to the external auditory canal which is then transected to retract the pinna anteriorly. Dissection through the superficial layer of temporalis fascia is carried out to the zygomatic arch, and the periosteum is sharply incised to expose the joint. There is no need to suture the cartilage after the surgery, and closing the skin of the ear is enough. **Advantages**

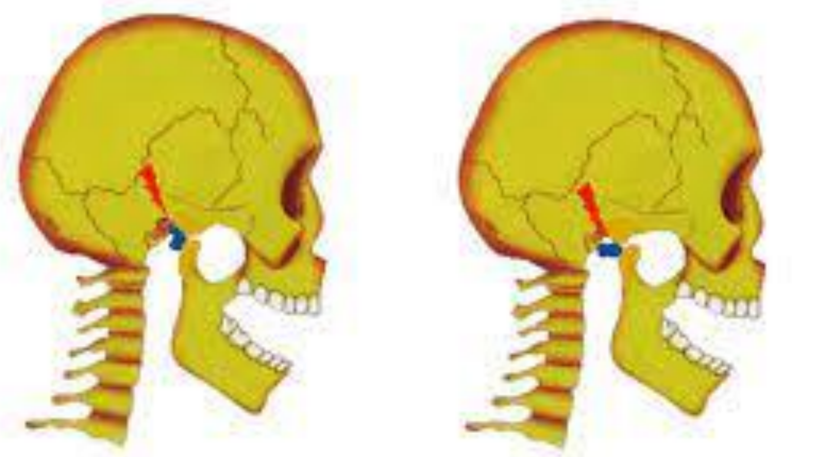
The resulting scar is not very noticeable, and an excellent exposure to the TMJ is provided by this method

Hypermobility of TMJ:

Hypermobility is characterized by early and/or excessive forward gliding (translating) of one or both TMJs. This excessive forward gliding results in lax of the surrounding capsule and ligaments and the temporalis tendon

1.Subluxation: the mandible out of glenoid fossa that can be returned by patien

2.Dislocation: the mandible out of glenoid fossa that can't be returned by patie



Causes:

1.Extrinsic trauma: force against a partially opened mandible

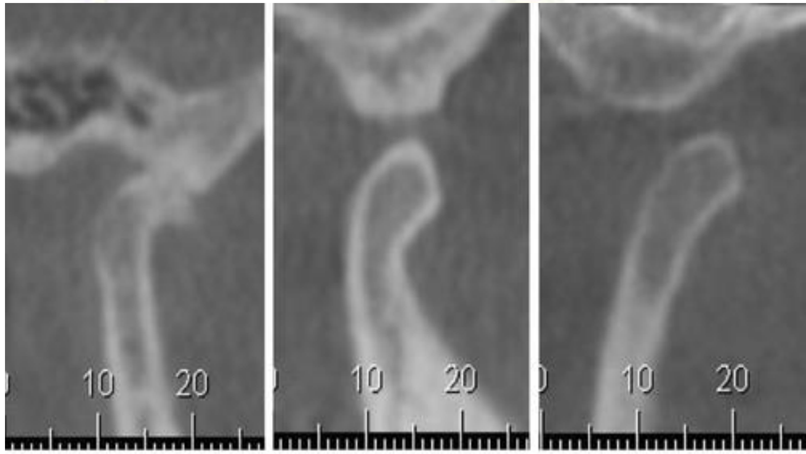
2.Intrinsic trauma: excessive opening of the mandible (such as may occur during yawning and dental procedures

3.CT disorders

4.Psycogenic: habitual

5.Drugs induced; phenothizine

Lateral slices of the temporomandibular joint (TMJ) in maximum opening. The classification of condylar mobility was (a) hypomobility, (b) normal mobility and (c) hypermobility



Treatment :

Acute

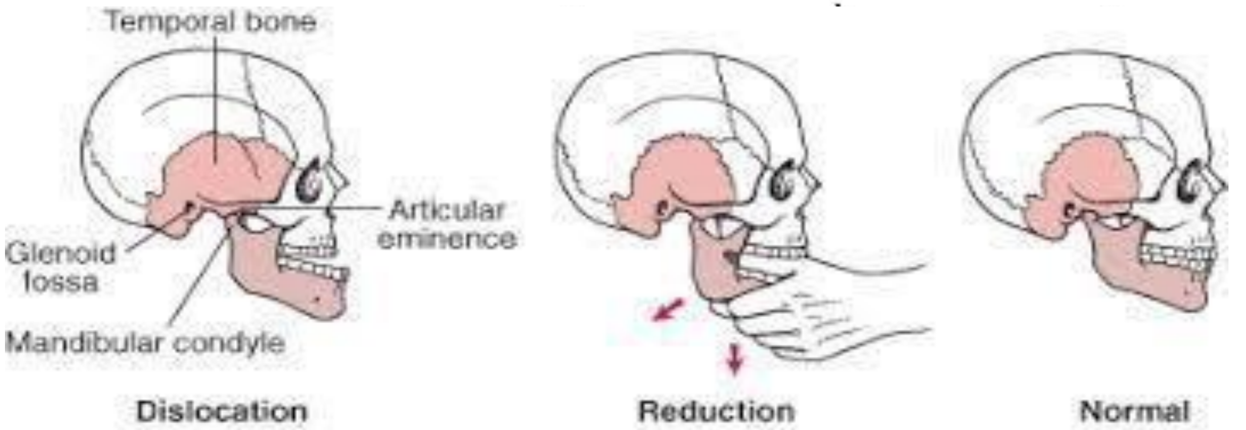
-Manual reduction **followed by IMF for 2w**

Chronic:

-Manual reduction

-Condylotomy

-Condylectomy



A-**Conservative:**

a.Prolonged IMF (Intermaxillary fixation) for 2_6weeks

b.Chemical capsulorrhaphy by STD or sodium psylliate

B-Surgical:

1.Capsular application

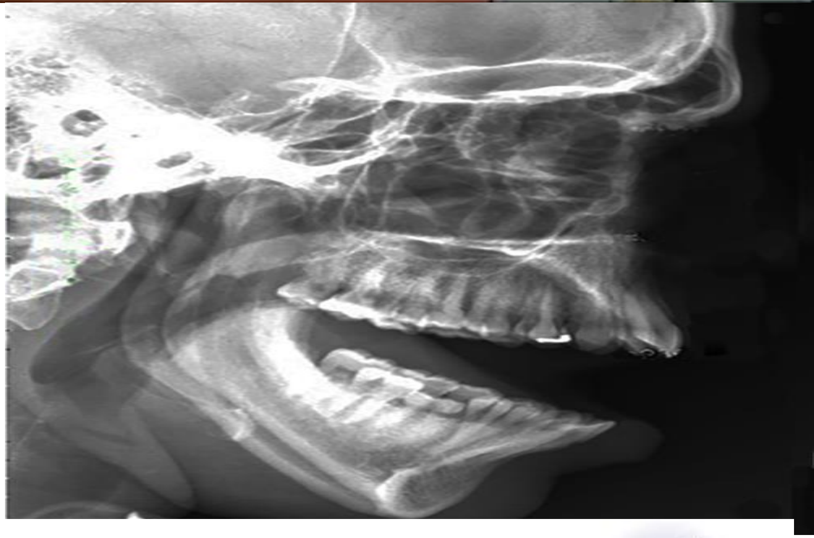
2.Augmentation of articular eminence by bone graft or L shaped pin

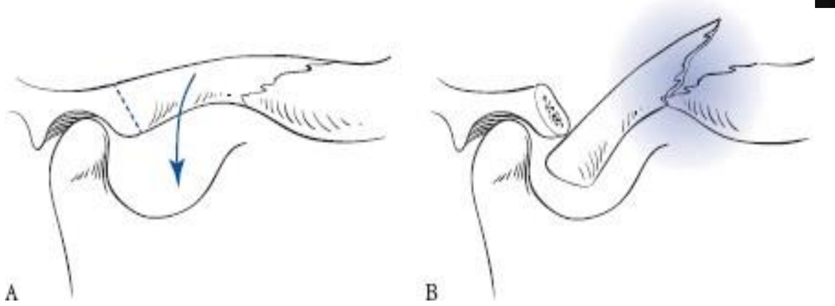
3.Inferior displacement of zygomatic arch (LeClerc procedure: vertical fracture of zygomatic arch in front of the joint and the proximal segment is lowered to obstruct the condylar path, modified by Dautery: downward and forward osteotomy)

4.Eminectomy (removal of articular eminence)

5.Lat pterygoid myotomy

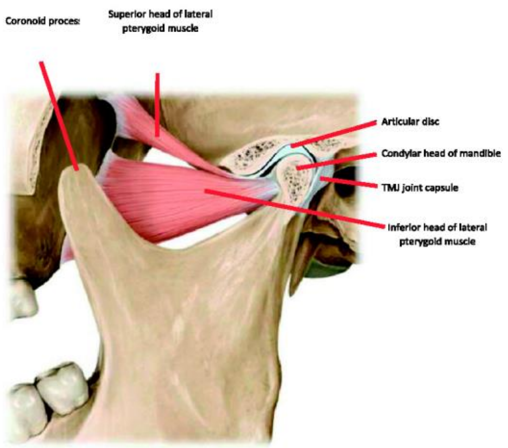
6.Inj of botulinium toxin in LPM





*Recurrent:

-Conservative: a. Prolonged IMF (Intermaxillary fixation) for 2_6weeks b. Chemical capsulorrhaphy by STD or sodium psylliate



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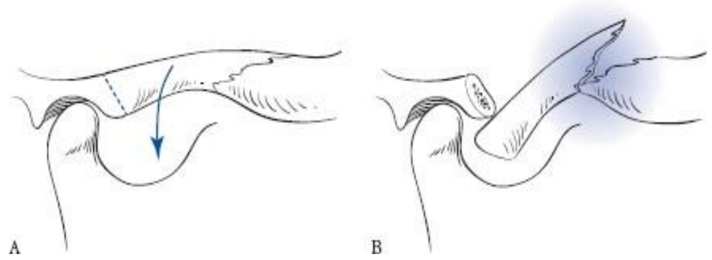

Hypomobility of TMJ:

Etiology:

Trismus: temporary limitation of mouth opening usually caused by muscle spasm

-Odontogenic: myofascial pain, malocclusion, erupting teeth
-Infection: pterygomandibular, lateral pharyngeal, temporal
-Trauma: fracture of the mandible, muscle contusion
-Tumors: nasopharyngeal tumors, tumors that invade jaw muscles
-Psychologic: hysteric trismus
-Pharmacologic: phenothiazines
-Neurologic: tetanus

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Ankylosis :

A-Pseudoankylosis(Extra articular)

-Depressed zygomatic arch fracture

-Fracture dislocation of the condyle

-Hypertrophy of the coronoid process

-Fibrosis of the temporalis muscle

-Myositis ossificans

-Scar contracture following thermal injury

B-True ankylosis:

persistent limitation of mouth opening. it may be bony, fibrous or mixed ankylosis.

Trauma: intracapsular fracture (child), medial displaced condylar fracture (adult)

Infection: otitis media, suppurative arthritis

Inflammation: rheumatoid arthritis, still’s disease, ankylosing spondylitis, psoriatic arthri

Surgical: postoperative complications of TMJ or **orthognathic surgery**

Topazian classification of TMJ ankylosis:

Stage 1: Ankylotic bone limited to the condylar process

Stage 2: Ankylotic bone extending to the sigmoid notch

Stage 3: Ankylotic bone extending to the coronoid process

Features of long standing ankylosis:

Facial Features

-Deviation of the chin and the mandible toward the side of the defect

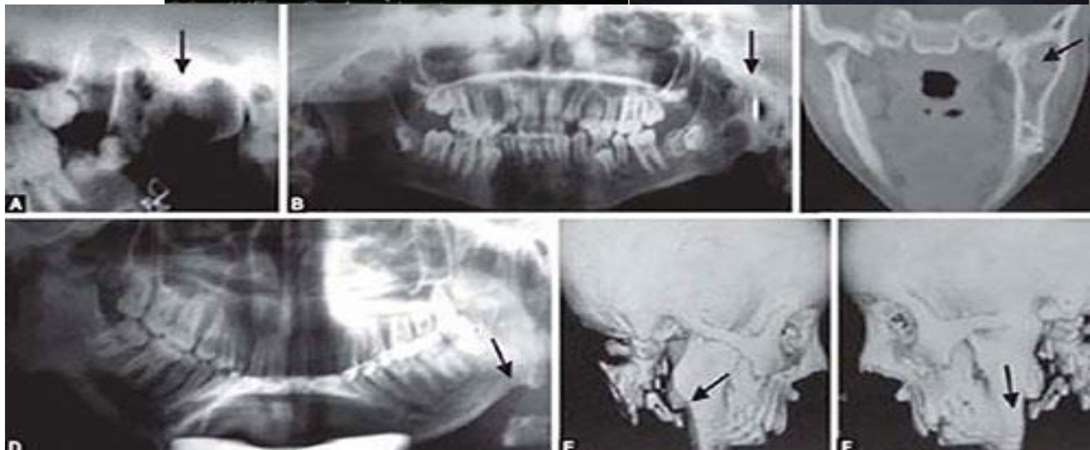
-Unilateral vertical deficiency of the side of the defect

-Retrognathic mandible

-Microgenia

-Convex facial profile

-Obtuse cervicomental angle



-Larger nasolabial angle
-Bird face deformity: “Andy Gump deformity”
-Prominent antegonial notch
-Markedly elongated coronoid process
-Obstructive sleep apnea in some cases

a b c

Oral Features

-Occlusal canting with deviation of maxillary and mandibular midlines toward the affected side
-Generally a Class II malocclusion, sometimes a Class I occlusion may be seen
-Posterior crossbite
-Deviation toward affected side on opening
-In bilateral ankylosis, an anterior open bite may be seen
-Severe oral hygiene maintenance problems, leading to caries and periodontal problems

The basic principles of TMJ ankylosis release should be followed:

1-**Gap arthroplasty:** resection of ankylotic mass and creation gap for **at least 1 cm** between roof of glenoid fossa and the ramus.

2**Interpositioning:**

-temporalis myofascial flap

-temporalis fascia alone

-full thickness temporalis pericranial flap

-alloplastic materials

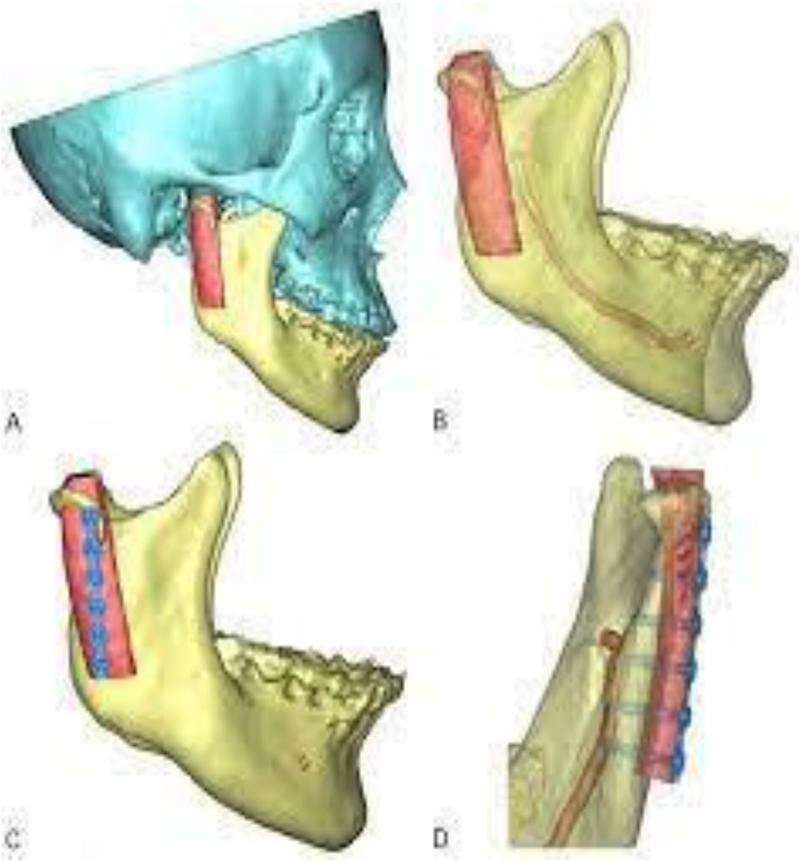
3-**Reconstruction of resected joint:**

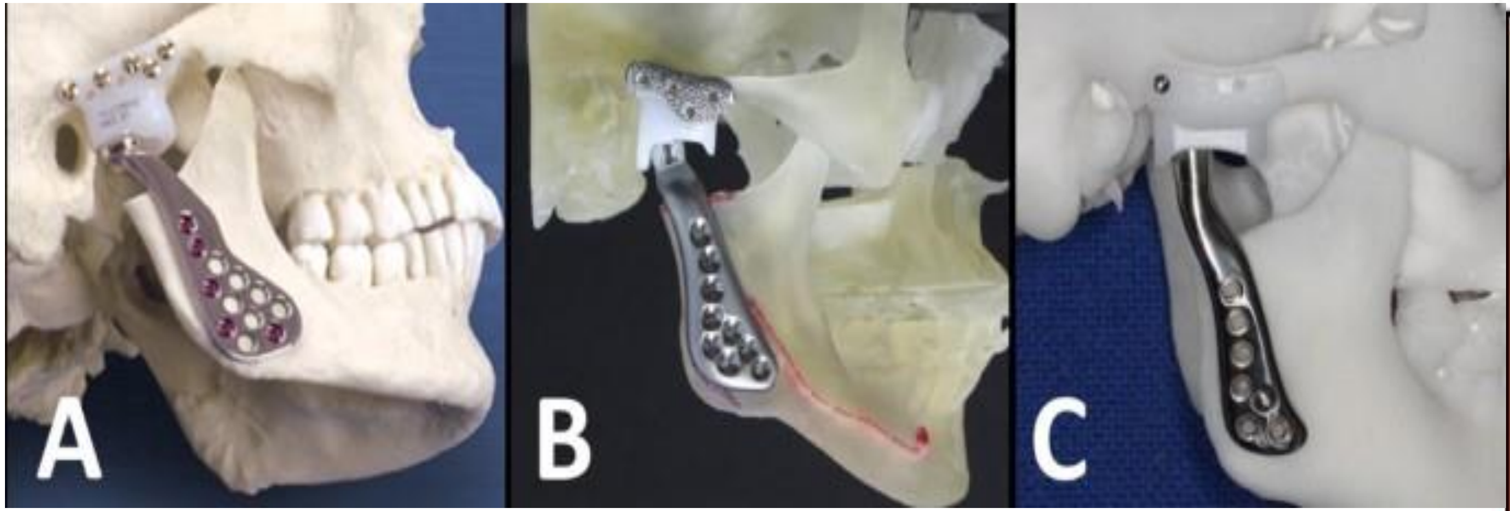
Goals:-restore joint function

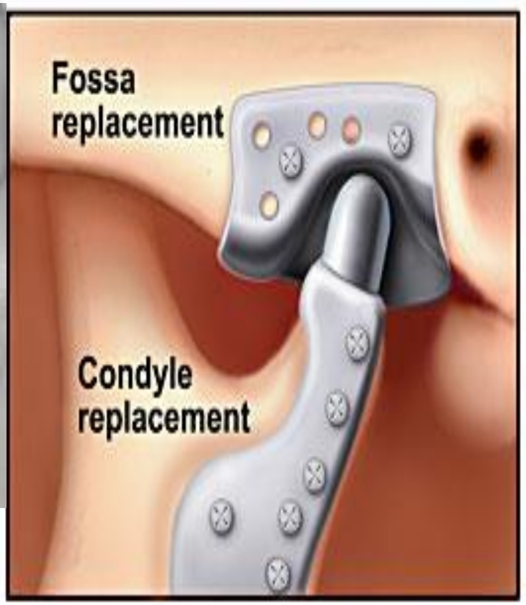
-reestablish vertical height of ramus

-provide growth potential in children: Based on the concept that condylar cartilage is the major growth center of mandible, autologous costochondral graft gained popularity.

Usually the fifth or sixth costochondral junction is harvested from the right side, but in females sixth or seventh costochondral junction is harvested







Total joint replacement

TMJ replacement surgery, or total temporomandibular joint replacement is a relatively new surgical procedure that involves replacing the joints between the lower jaw and the base of the skull with custom-made prosthetic joints

4-Aggressive postoperative physiotherapy

Figure 4: Use of wooden ice-cream sticks held together with the help

Thank You