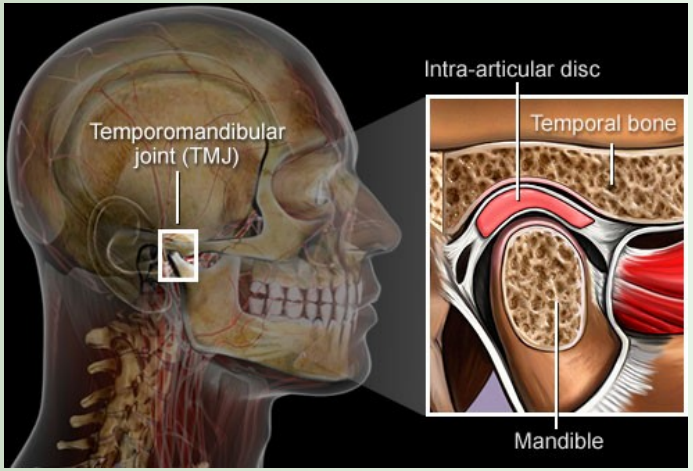
Physiotherapy, Stomatology (2024)

Temporomandibular disorders

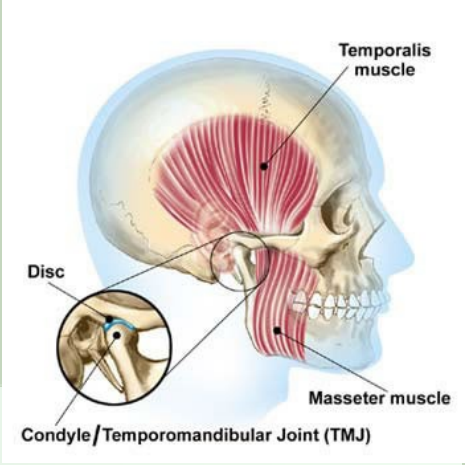


Mgr. Veronika Mrkvicová, Ph.D. (physioterapist)
Physiotherapy Department, Medical Faculty, Masaryk University

Contents

- Temporomandibular joint (TMJ)
- Temporomandibular joint dysfunction (TMD)
- Examination of TMD
- Treatment of TMD
- Physiotherapy of TMD

Introduction



The temporomandibular joint (TMJ)

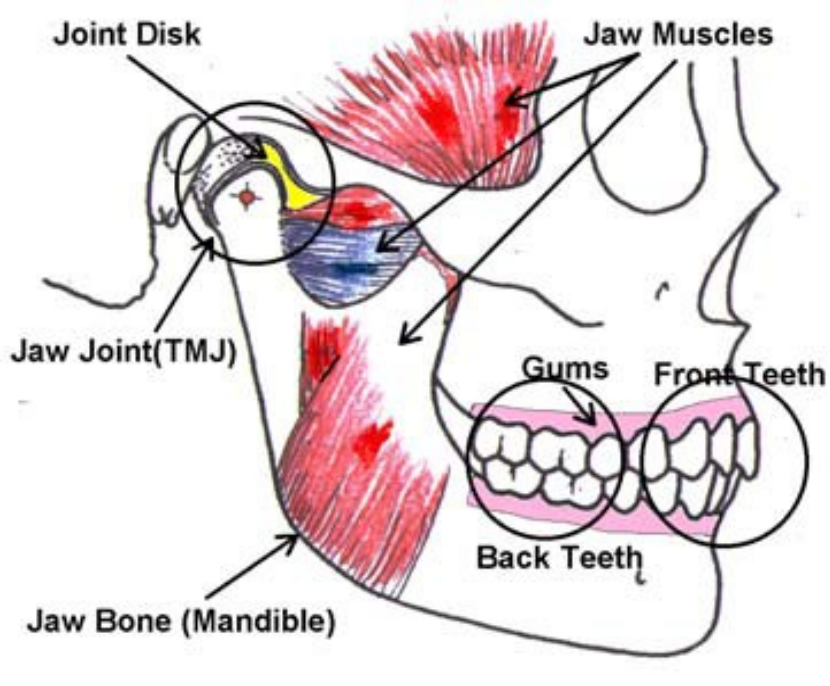
- the most active joint in the body (located on each side of the cranium)
- needs to open and close up to 2000 times a day (chewing, talking, breathing, swallowing, yawning, and snoring...)

Relations

- the jaw, cervical spine, alignment of the teeth are integrally related
- dysfunction in one of these regions may lead to **a temporomandibular joint disorder (TMD)**

TMD = a term used to describe **a variety of clinical disorders** resulting in jaw pain or dysfunction, which is very frequent in population, needs to be diagnosed early on and tread complexly (typically by the team of medical professionals: stomatologist, physiotherapist, physiatrist, orthodontist, neurologist,…), most often using conservative therapy

Anatomy



TMJ and most of the muscles of mastication are innervated by **the mandibular branch of the trigeminal nerve** (cranial nerve V)

Therefore, pain may be referred to neighbouring areas on the face in the distribution of CN V

Masticatory system

Temporomandibular joint (TMJ)

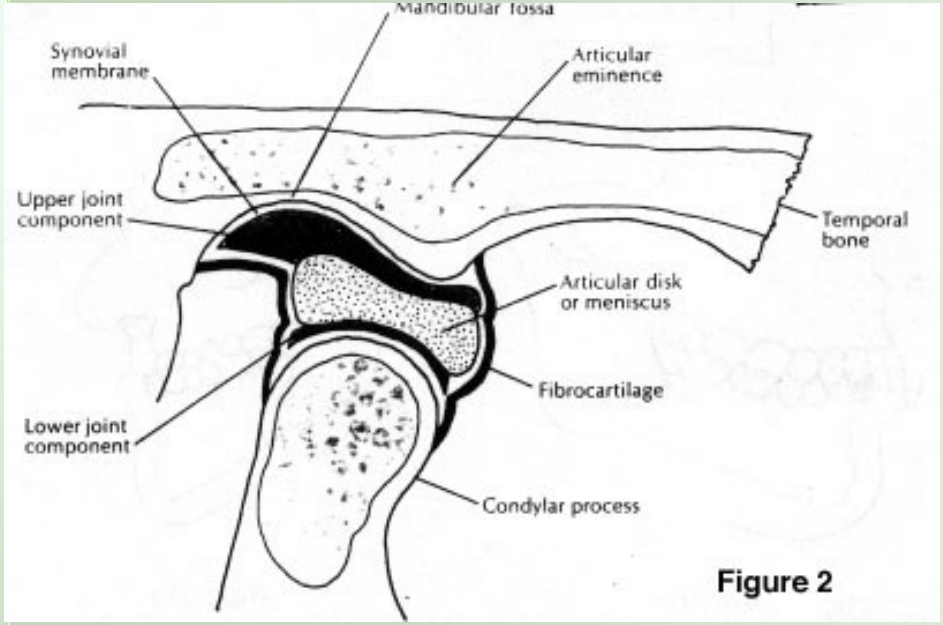
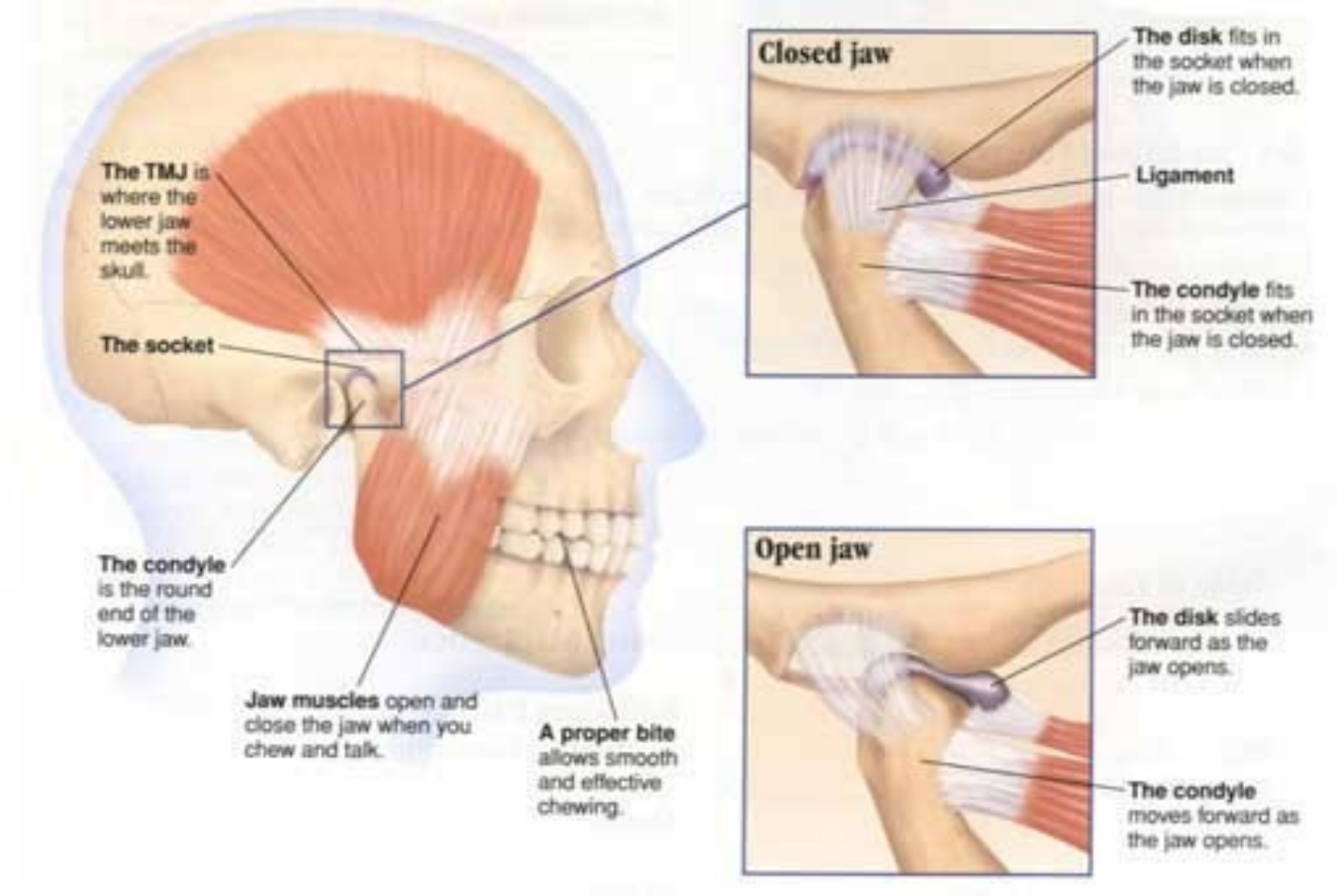


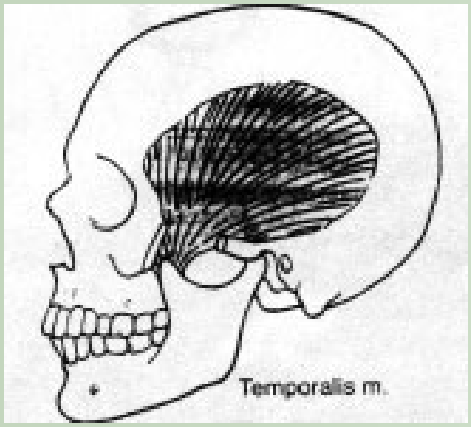
Figure 2

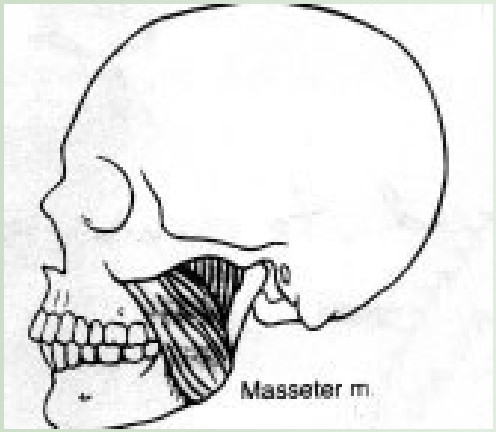
- The two bones that form the TMJ are **the mandible** (jaw) located inferiorly, and **the temporal bone** of the skull (located superiorly)
- A disc that is connected to the capsule divides the joint cavity into **inferior and superior spaces**

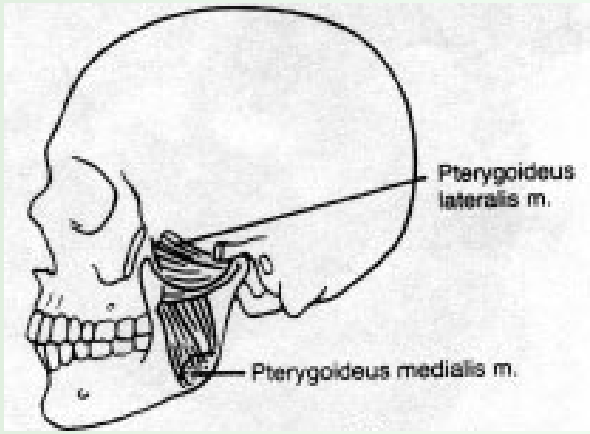
Temporomandibular joint (TMJ)



The muscles of the TMJ
(masticatory muscles)







Muscle function

Elevation: Temporalis, masseter, medial pterygoid of both sides
Depression: Lateral pterygoids (hyoid muscles)
Protrusion: Lateral and medial pterygoids.
Retraction: Temporalis (posterior fibres)
Lateral movements: Medial and lateral pterygoids of each side working alternatively

Unique characteristics of masticatory muscles

Have shorter contraction times than most other body muscles

Incorporate more of muscle spindles to monitor their activity

Do not have golgi tendon organs to monitor tension

Elevators predominantly white fibrous which perform fast twitching

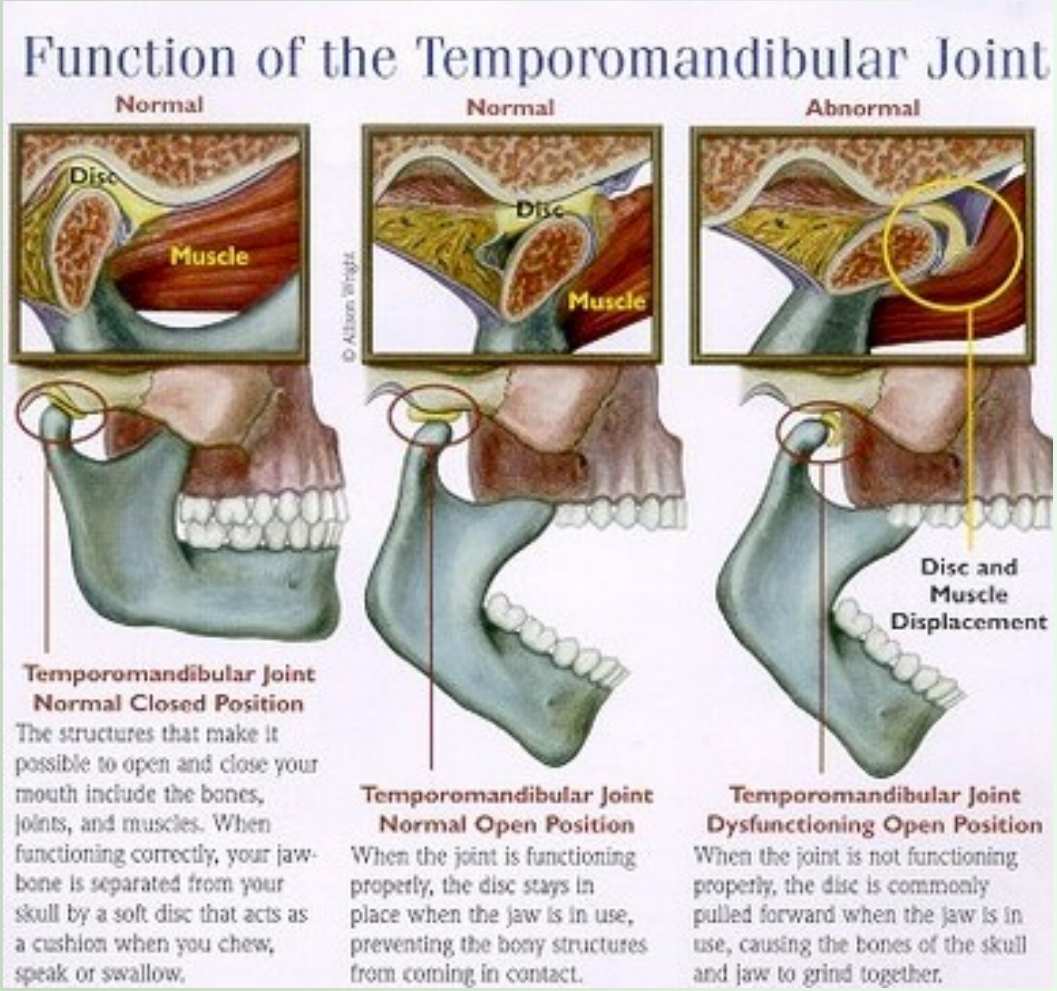
Do not get fatigued easily

Psychological stress increases the activity of jaw closing muscles

Occlusal interferences cause a hypertonic synchronous muscle activity

Closing movement also determined by the height of the teeth

Movements of the TMJ



Movements of the TMJ

Three motions occur at the mandible:

- **depression** (during mouth opening)
- **protrusion/retrusion** (or protraction/retraction)
- **lateral excursion** (right and left)

Accessory motions of **rotation**, which occurs in the inferior portion of the TMJ, and **translation** (gliding), which occurs in the superior portion of the TMJ, allow for proper function of the joint.

Both TMJ must work in **coordination** in order to allow normal movement to occur for the purpose of chewing and speaking

TMJ movement video:

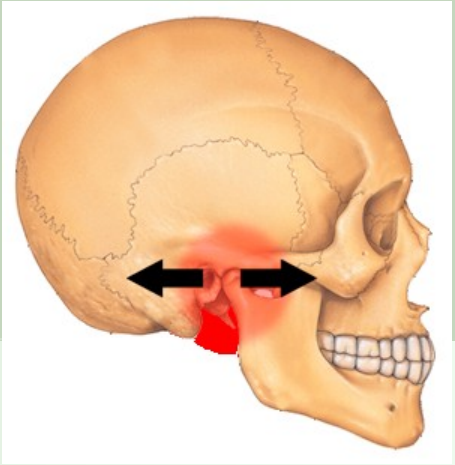
https://www.youtube.com/watch?v=lP_VPiYnyNs

Temporomandibular Joint Dysfunction (TMD)

Temporomandibular Joint Dysfunction (TMD)

- TMD describes a variety of conditions that affect jaw muscles, temporomandibular joints, and nerves
- TMD can be associated with chronic facial pain
- Symptoms may occur on one or both sides of the face, head or jaw, or develop after an injury
- TMD affects more than twice as many women than men and is the most common non-dental related chronic orofacial pain.

TMD



- The most common dysfunctions associated with the TMJ are: muscle imbalances, hypomobility or hypermobility
- The synovium, retrodiscal tissue and the capsule are some of the tissues that can become affected in the TMJ

TMD

- TMD can be often overlooked
- Some of the more common symptoms include clicking or popping with opening or closing of the mouth, pain around the jaw joints, locking of the jaw, headaches and an improper bite (teeth do not fit together properly)
- TMD video: https://www.youtube.com/watch?v=Dd3aT9c_08M

Types of TMD patology

a) muscle disorders

b) internal disk derangement (with or without dislocation of the disk)

c) subluxation of the TMJ

d) arthralgias or arthritic conditions

A. Muscle disorders

- **myofascial pain syndrome** (TPs, reffered pain)

- **emotional stress/tension** which may lead to bruxism

- **postural dysfunction** (forward head posture, resting the head in the hand), may also lead to muscle pain in the jaw from repetitive stress

- **spasm of the masticatory muscles** (most frequently involving the lateral pterygoid)

- **fibromyalgia**

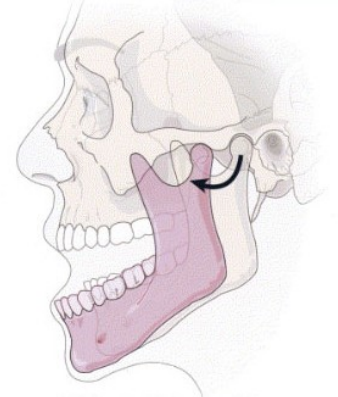
B. Internal derangement of the disk

It refers to **an abnormal relationship** between the function and position of the intraarticular disk and its two articulating surfaces

The classic sign of internal disk derangement is **joint clicking**

The most common derangement is **an anterior disk dislocation,** which can occur with or without reduction of the disk

C. Subluxation of the TMJ


TMJ Subluxation

Most often cause: poor muscular control or laxity of the articular ligaments

It can have **long term consequences** leading to TMD and internal disk derangement if left uncorrected

Predisposition for subluxation may occur as a result of a structural deformity, usually congenital, or alterations in the ligamentous structures

Signs of TMJ subluxation include excessive mandibular opening, excessive mandibular translation and joint noise at the beginning of mouth closing

Unilateral subluxation will result in a lateral deviation from midline to the contralateral side at the end of mouth opening

D. Arthralgias or arthritis conditions

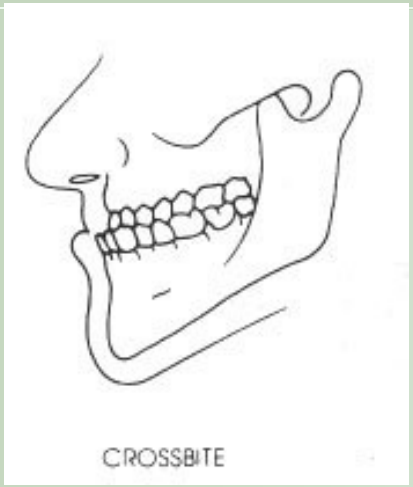
Structural disorders that affect the TMJ include:

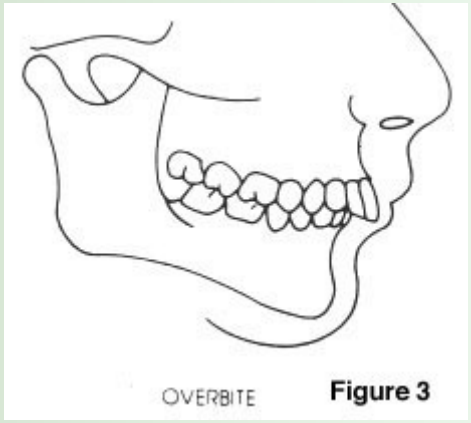
- osteoarthritis (OA)
- rheumatoid arthritis (RA)
- juvenile rheumatoid arthritis (JRA)
- ankylosis

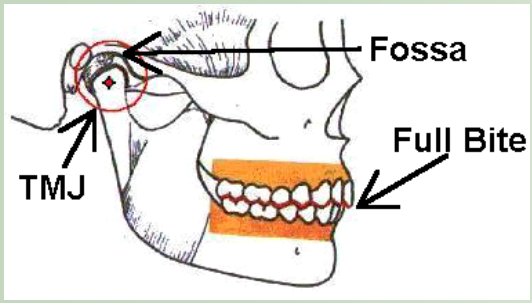
Other possible causes for TMDs

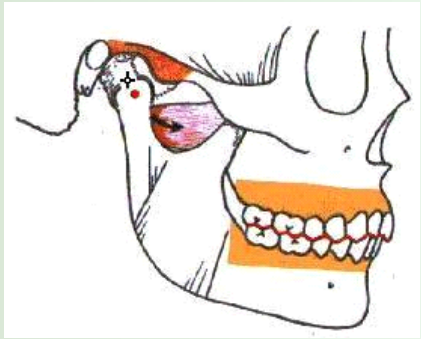
- Trauma to the joint–blow to the jaw or head
- Birth/Congenital trauma
- Whiplash injury
- Excessive stress to the joint from: gum chewing, fingernail biting, yawning, chewing on a pen, chewing on ice, and grinding teeth
- Prolonged mouth and upper respiratory breathing
- Jaw abnormalities, missing teeth, poor bite (malocclusion)
- Ligamentous laxity

Malocclusion



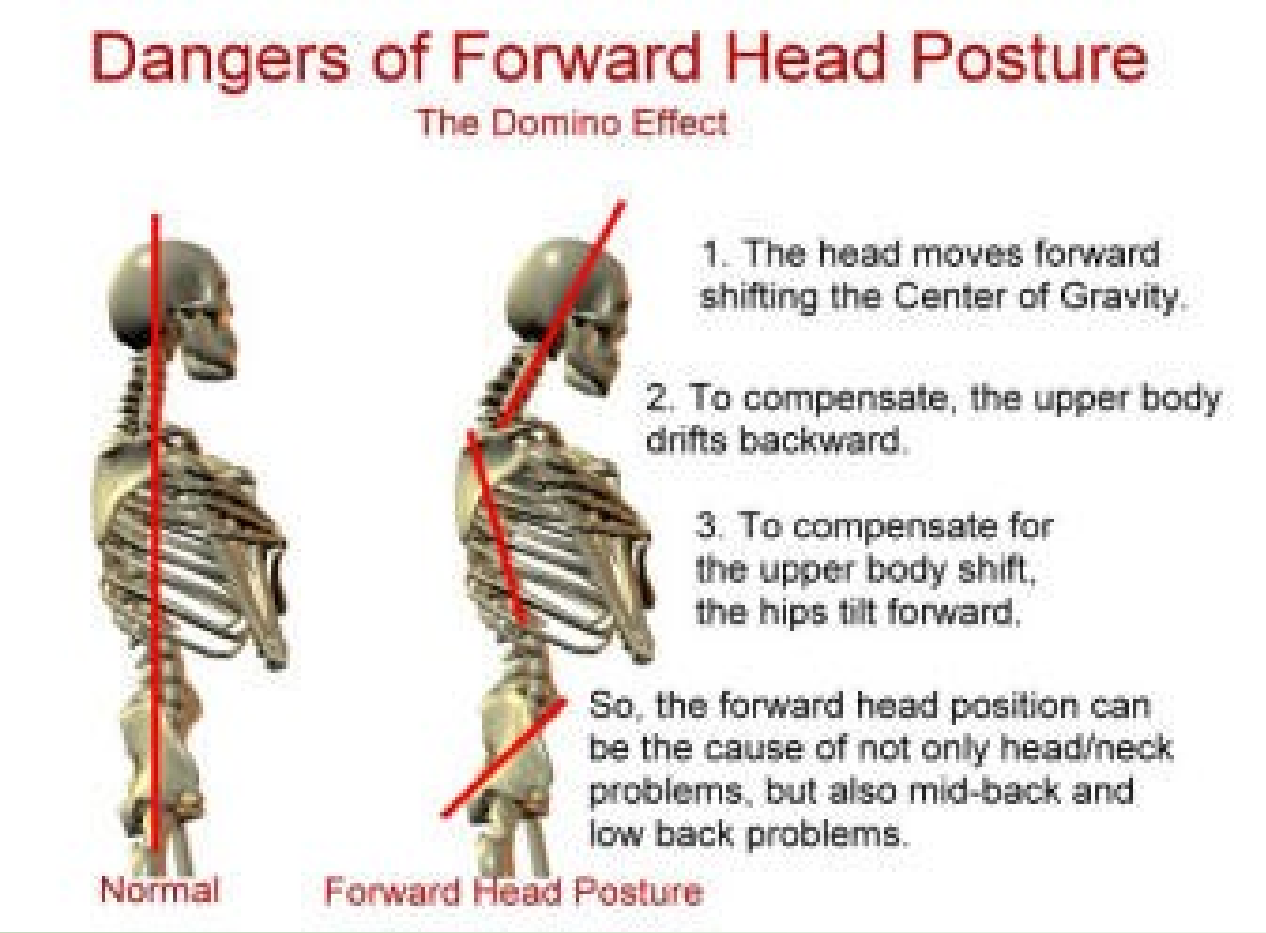






- Proper bite
- Poor bite

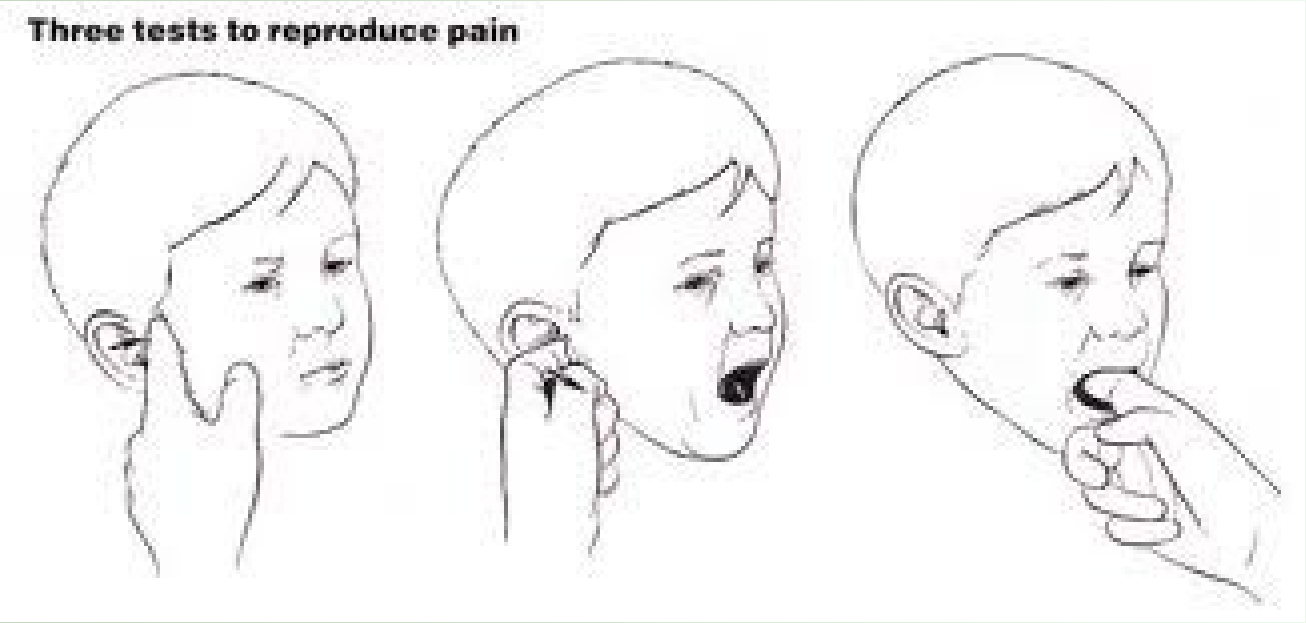
Forward Head Posture



Common signs and symptoms of TMDs

- Clicking or popping with opening or closing
- Pain at rest or with opening/closing of jaw
- Decreased ability to open the jaw (hypomobility)
- Neck pain
- Tooth sensitivity
- Dry or burning sensation in mouth
- Uncomfortable bite
- Forehead or temple headache
- Buzzing or ringing in ears
- Hearing loss

Examination



Examination of the articulatory system

- Case history
- Observation
- Pain and other complaints
- Range of movement
- Joint sounds
- Functional activities
- Occlusion, signs of bruxism
- Diagnostic imagine
- Cervical spine and upper quadrant examination

1. Case history

Medical History: Review longitudinal medical record, review of systems and intake health screening tool

History of Present Illness: Determine course of symptoms and presence of trauma, previous surgery (e.g. dental implants), and/or repetitive trauma. Signs and symptoms of TMD – unilateral x bilateral. Note any history of clicking and locking, current or past use of mouth orthotics or splints (the results and the reason the patient stopped using the appliance, if applicable)

Social History: Daily habitual activities such as smoking, bruxism, chewing gum, snoring, leaning on chin, biting nails, lip biting, clenching teeth, etc. Work, household responsibilities, hobbies and/or recreational activities may involve repetitive stress and sustained postures, e.g. computer work. Emotional stress can trigger nervous habits or poor postural responses

Medications: Note relevant medications including NSAIDS, muscle relaxants, and other analgesics

2. Observation

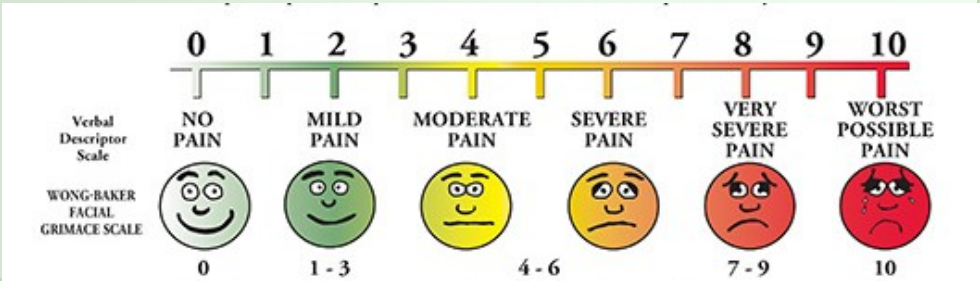
- **Opening and closing of mouth:**
  teeth normally close symmetrically, the jaw is normally centered

- **Alignment of teeth:** note cross bite, under or over bite
- **Symmetry of facial structures** (eyes, nose, mouth)
- **Posture:** forward head posture, rounded shoulders and scapular protraction is common
- **Breathing pattern:** diaphragmatic breathing or accessory pattern

3. Pain and other complaints

- **movements** that cause pain, including opening or closing of mouth, eating, yawning, biting, chewing, swallowing, speaking, or shouting.
- **headaches** and/or **cervical pain**
- pain may also be present in the distribution of one of the three branches of **the trigeminal nerve**

Other complaints may include:
- **the feeling of fullness of the ear**
- **tinnitus** and/or **vague dizziness**



4. Palpation

Palpation of lateral aspect

(a finger placed in the pre-auricular area, gently applying pressure on the lateral pole/head of the condial while the jaw is closed)

Palpation of posterior aspect

(the little finger placed in the external auditory meatus, and pressure gently applied forwards)

Palpation

TMJ:

compare bilaterally

assess joint integrity

and structural deviations

FIGURE 3- Palpation of TMJ's lateral and posterior aspects

FIGURE 4- Palpation of anterior and posterior temporalis muscle

Muscles of mastication:

compare bilaterally

assess for pain and/or

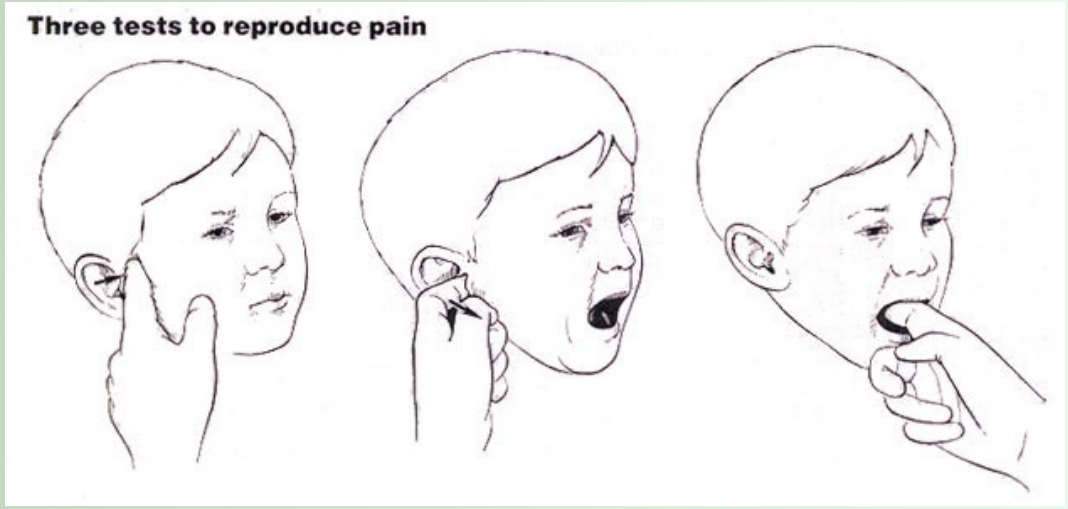
muscle spasm

FIGURE 5- Palpation of the superficial and deep masseter muscle

Three tests to reproduce pain

The pain associated with TMD can be reproduced in three ways:

- **the preauricular exam**, palpating the left and right preauricular areas over the TMJs
- **intraotic manipulation**, inserting a fingertip in each ear and pulling as the patient opens and closes his mouth
- **intraoral examination**, inserting the index finger and moving it along the cheek to palpate the pterygoid muscles at the rear of the mouth, where the maxilla connects to the mandible



The typical reflex manifestation of TPs in masticatory muscles

- **m. temporalis** – local pain or its radiation into temple area or upper teeth
- **m. masseter** – pain in the area of facial bone, hypersensitivity or pain of upper and lower teeth, unilateral tinnitus, pain in the ear and around TMJ
- **m. pterygoideus medialis** – nonspecific pain inside the mouth, in the neck, the pain around the TMJ and inside the ear
- **m. pterygoideus lateralis** – pain in the TMJ region, upper jawbone or around the ear
- **m. digastricus** – dysfagia, the pain radiating into occiput, lower teeth or tip of the tongue

5. Joint sounds

- There are 2 types of joint sound to look out for: Clicks and Crepitus

Clicks (single explosive noise)

- represents the sudden distraction of 2 wet surfaces, symptomatic of some kind of disc displacement (left, right or bilateral, painful or painless, consistent or intermittent)

Crepitus (continuos 'grating' noise)

- the continuous noise during movement of the joint, caused by the articulatory surfaces of the joint being worn (degenerative joint disease)

- The joint sounds should be listened to with a stethoscope

6. Range of motion

- This is the only truly **measurable parameter**, as the others are more subjective

Movements to be measured are:

- Incisal opening - pain free limit
- Incisal opening - maximum (forced)
- Lateral mandibular excursions
- Mandible deviations on pathway of opening

Range of motion

AROM: measure from top tooth edge to bottom tooth edge

- **Opening and closing of mouth**

  Normal opening = 35-50 mm (3 knuckles between teeth)

  Functional opening = 25-35 mm (at least 2 knuckles between teeth)

- **Protrusion of mandible**

  Normal = 5 mm

- **Lateral deviation of mandible**

  Normal = 8-10 mm

- **Assymetrical movements, snapping, clicking, popping or jumps**
- **Deviations:** lateral movements *with/without* return to midline

PROM: apply overpressure at the end range of AROM **to assess end feel**

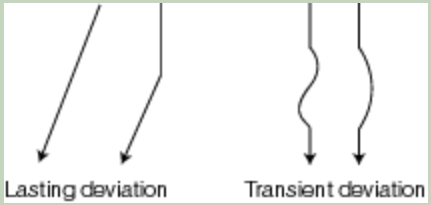
A. Incisal opening

- The incisal opening is measured from the upper incisal tip to the lower, with the patient first of all opening to the **limit of their comfortable**, pain free range.
- This is then compared to the **normal range of motion**
- Their **maximum (forced) limit** is also recorded.
- to determine whether **a limitation of vertical movement** is due to pain (muscular problem) or a physical obstruction (disc displacement)

B. Lateral Excursions

- The lateral movement should be measured from mid-line to mid-line, the patient moving the mandible to their maximum extent, from one side to the other

C. Mandibular deviation



- When the jaw is opened, the path it follows should be **straight and consistent**

- Deviations from the norm are either **lasting** or **transient**, and are all suggestive of internal derangements of different sorts

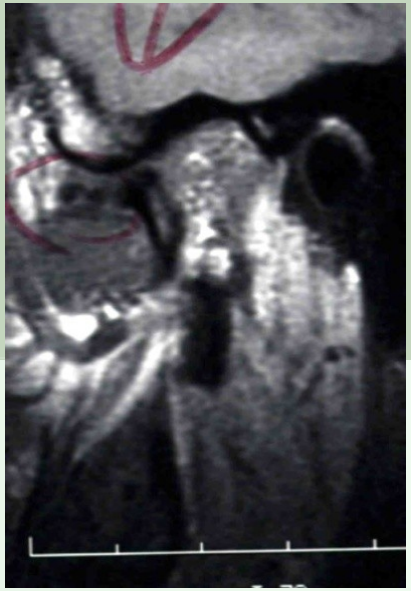
Functional activities

Assess:
chewing, swallowing, coughing, and talking

Either have patient demonstrate task or ask for patient's subjective report

Include changes the patient has made to their own diet to accommodate for their pain and dysfunction

Diagnostic imaging



Plain film radiography (X-ray): A/P and lateral views

Ultrasound

Arthrography

CT scan

Magnetic resonance imaging (MRI)

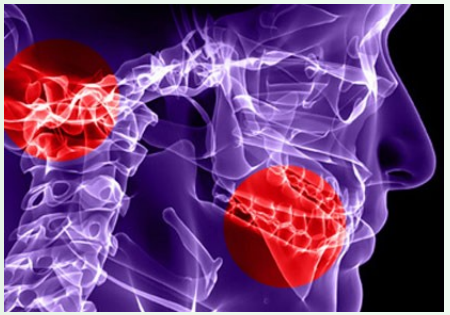
Electromyography

Arthroscopy

Differential diagnosis

Non-musculoskeletal disorders may also cause facial and/or jaw pain including:

- infection
- dental problems (including malocclusion)
- trigeminal neuralgia
- parotid gland disorder
- other lesions of the face, mouth or jaw



CAVE: examine the cervical spine and upper quadrant as a part of the TMJ evaluation

Cervical spine and upper quadrant examination

- Head and neck alignment
- Cervical AROM/PROM
- Muscles examination
- Neurological examination (muscle strength, reflexes, senzation)

Treatment

Potential impairments and functional limitations

Potential impairments:

- **Increased pain**
- **Limited AROM/PROM**
- **Impaired posture** (forward head posture, protracted shoulders, mouth and accessory muscle breathing patterns, abnormal resting position of the tongue and mandible, and abnormal swallowing mechanism)
- **Impaired motor control/strength**
- **Decreased knowledge of habit modification, relaxation techniques**

Potential functional limitations:

Inability to chew, cough, sneeze, swallow or talk without pain

Treatment of TMDs

- Most often TMD can be treated **conservatively**
- A qualified clinician (e.g. a physical therapist, dentist, or orthopedist) can be consulted for an accurate diagnosis since many conditions can mimic the signs and symptoms common to TMD
- **A combination of treatments** is often need, depending on the severity of the case

Goals of the treatment

1. Reduce (or independently self manage) **pain** symptoms
2. Normalize **ROM** and sequence of jaw movements
3. Maximize **strength** and normalize **motor control** of muscles of mastication, cervical spine and periscapular region
4. Maximize **flexibility** in related muscles as indicated
5. Maximize **postural correction** in sitting and/or standing
6. Correct **ergonomic** set-up of workstations at home and/or at work
7. Independence with **home exercise program**
8. Independence with **relaxation techniques**

Most commonly used physiotherapy interventions: an overview

- **Modalities for pain control**: heat, ice, electrical stimulation, TENS, ultrasound, laserotherapy
- **AROM/AAROM/PROM**
- **Stretching** (active, assisted and passive stretching)
- **Joint mobilization or manipulation** (restore normal joint mechanics of the TMJ, C/Th spine)
- **Soft tissue mobilization, myofascial release and deep friction massage**
- **Muscle energy techniques**
- **Neuromuscular facilitation** (hold-relax, contract-relax, alternating isometrics)
- **Relaxation techniques**
- **Biofeedback and EMG training** (to promote muscle control and relaxation)
- **Therapeutic exercises**
- **Changing or stopping poor habits (**including grinding or clenching teeth)
- **Postural re-education** and maintenance correct resting position of the tongue and mandible
- **Diaphragmatic breathing**
- **Home exercise program** instruction

Self-care for Management of Symptoms

- Habit Modification
- Diet Modification
- Pharmacological
- Hot compresses
- Dental Appliances
- Cold packs
- Positioning
- Stress Management
- Posture
- Massage

1. Habit Modification

- Try to avoid the activity that is causing the increased stress to the joint such as nail biting, gum chewing, and ice biting
- You may see a dramatic change in your symptoms by simply modifying these habits

2. Diet Modification

- Eat a diet of soft foods in addition to chewing evenly
- You may want to cut your food into small pieces which will help decrease overuse of the TMJ

3. Pharmacological

- **Analgesics and non-steroidal anti-inflammatory drugs (NSAIDs)** such as aspirin or ibuprofen can help to decrease pain and inflammation
- **Antidepressants** (tricyclic antidepressants, SSRI)
- **Benzodiazepines**
- However, you should **consult with your physician** before taking any of these medications

4. Hot or cold compresses

- Use a washcloth soaked in warm/cold water or a commercial moist hot or cold pack over the area of pain or tenderness

It is used to help reduce:

- Warm: any muscle spasm you may be experiencing
- Cold: any swelling, pain and muscle spasm

- Keep the compress on for about 10-15 minutes

- If the spasms are severe, try to use these compresses hourly

5. Dental Appliances

- You may need some type of intra-oral splint, nightguard or other appliance which can be given by your dentist or physical therapist upon diagnosis
- This may help to stabilize the TMJ so the muscles, teeth, and joints work together without adding additional strain to the TMJ

6. Positioning

- The best position to keep your TMJ in is with your teeth slightly apart and lips together
- Placing the tongue on the roof of the palate (top of the mouth) to ensure the position is kept
- try to breathe through your nose as much as possible

7. Stress Management

- stress is a common contributing factor to TMD
- deep relaxation training, breathing, meditation or biofeedback

8. Posture

- A forward head posture is a big contributor to TMD
- Try to practice good posture, especially when sitting or standing for long periods of time

9. Massage

- gentle massage over and around the area of discomfort
- help to relieve muscle spasm
- can be done with your mouth open and closed
- massage the area for about 10- 15 minutes

Bite Correction

- If your TMJ disorder has caused problems with how your teeth fit together, you may need treatment to correct your bite, although this is seldom necessary
- Bite problems may be corrected either by orthodontic wiring, or by placing a crown or filling onto your teeth

Surgery

- Can help restore jaw joint and its movement, eliminate the pain and other symptoms of TMJ disorders
- It is rarely needed, except in very severe cases, if the joint has become so badly damaged that it cannot be corrected by other means

Invasive treatment

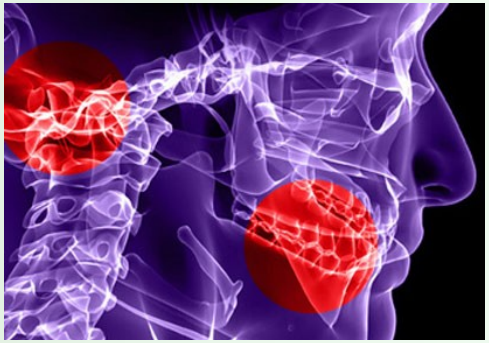
- **Intra-articular injection**,
  using steroid or hyaluronic acid
- **Surgery options:**
  Therapeutic arthroscopy
  Arthrocentesis
  Removal of loose bone fragments
  Reshaping the condyle
- **More complex procedures**, including joint replacement

- **Botulinum toxin A injections**

Recommendations and referrals to other providers:

- **Speech and Language Pathologist**

  for assessment and treatment of speech or swallowing dysfunction associated with the TMD



- **Rheumatologist**
- **Psychologist/Psychiatrist**
- **Surgeon**

  if conservative measures do not alleviate the patient's symptoms, surgical management may be considered. Surgical interventions may include dental implants, condylectomy, condylotomy, ORIF or surgical manipulation.

  1. Otolaryngologist

  2. Dentist or oral surgeon

  3. Orthopedic surgeon

Physical Therapy

Physical Therapy

- Physiotherapy plays an important part in the treatment of any musculoskeletal disorders, and it is beneficial to any patient with TMD where there is muscle involvement

Methods that are applied in the management of TMDs:

- Exercise therapy
- Thermal treatment (hot and cold)
- Mobilisation, Massage, Stretching
- Ultrasound, Laserotherapy, TENS, Short wave diathermy

Other methods:

- Acupuncture
- Biofeedback
- Relaxation

Physical Therapy

- A variety of physiotherapy techniques help regain the harmony of jaw joints and muscles
- is often used when disk, ligaments or other joint tissues are injured
- promotes healing and reduces pain and swelling
- aids muscle relaxation and increases jaw's range of motion

Therapeutic exercises

1) Tongue Rest Position
   Tongue Proprioception and Control
   Control of Jaw Muscles

2) Control TMJ Rotation

3) Isometrics

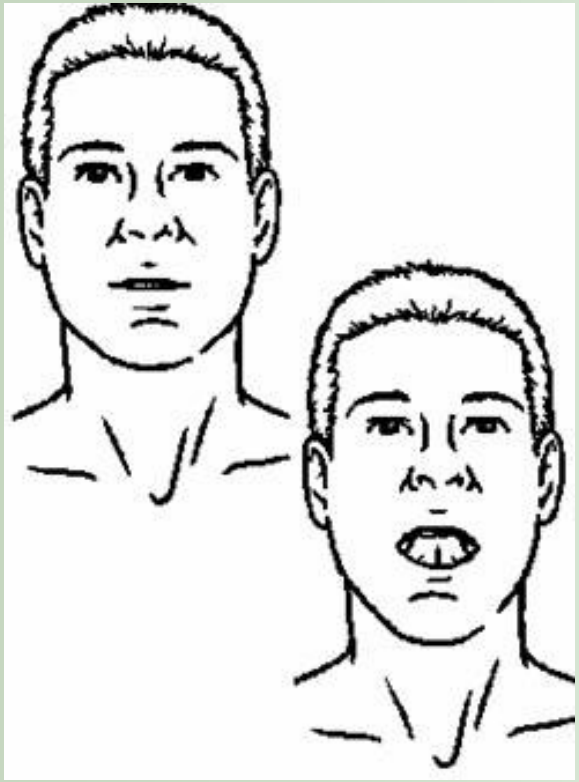
4) Rhythmic Stabilization Technique
   Lightly resisted motions: opening, closing, lateral deviations

5) TMJ mobilization

Midline exercise

- Look in mirror, bite teeth together, look at position of two center teeth on lower jaw (central incisors)
- Open slowly while watching these two teeth and attempt to keep lower jaw "centered" as you open

TMJ/muscle relaxation



- Place tongue on roof of mouth as far back as possible. Slowly open mouth as far as possible, tongue on the roof

Lateral Glide (isometric)

- Place two fingers on right side of jaw. Resist movement of jaw to same side. Relax. Repeat on opposite side

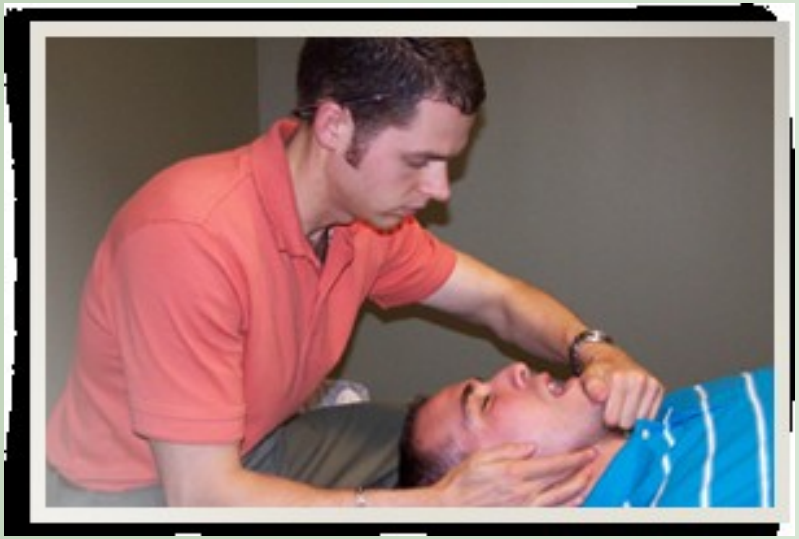
Protrusion (isometric)

- Place two fingers on chin. Resist forward movement of chin. Relax. Repeat

Opening (isometric)

- Place fist below jaw. Resist downward movement of chin. Hold. Relax

Assisted opening



Place two fingers on lower front teeth, slowly open as wide as is comfortable while pushing down with your fingers.

Resisted opening

- Cup palm under chin, open jaw slowly, and gently resist opening with hand under chin

Lateral movement exercise

- Open jaw about one inch from clenched bite
- Move lower jaw as far to the right (straight to the right without opening more) as is comfortable

Stabilization exercises

TMJ mobilisation

Ischemic compression (m. masseter)

Stretching

- **PIR (postisometric muscle relaxation) of masticatory muscles**

Soft tissue techniques, mobilization (C, Th)

Hyoid bone mobilization

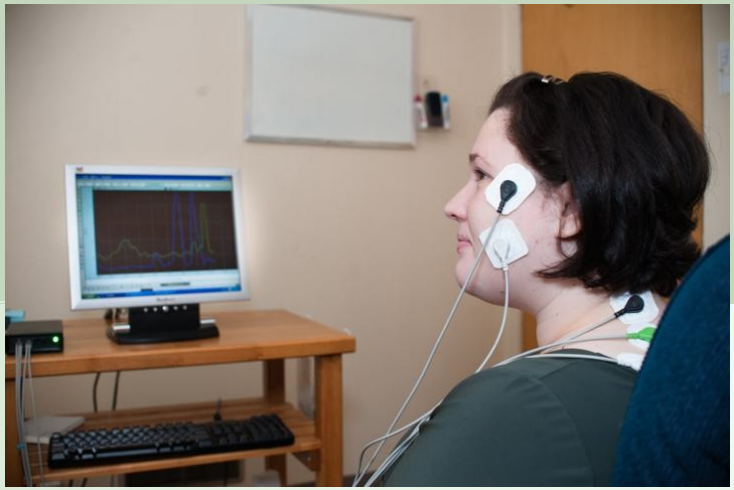
Therapy of the neck spine

Modalities

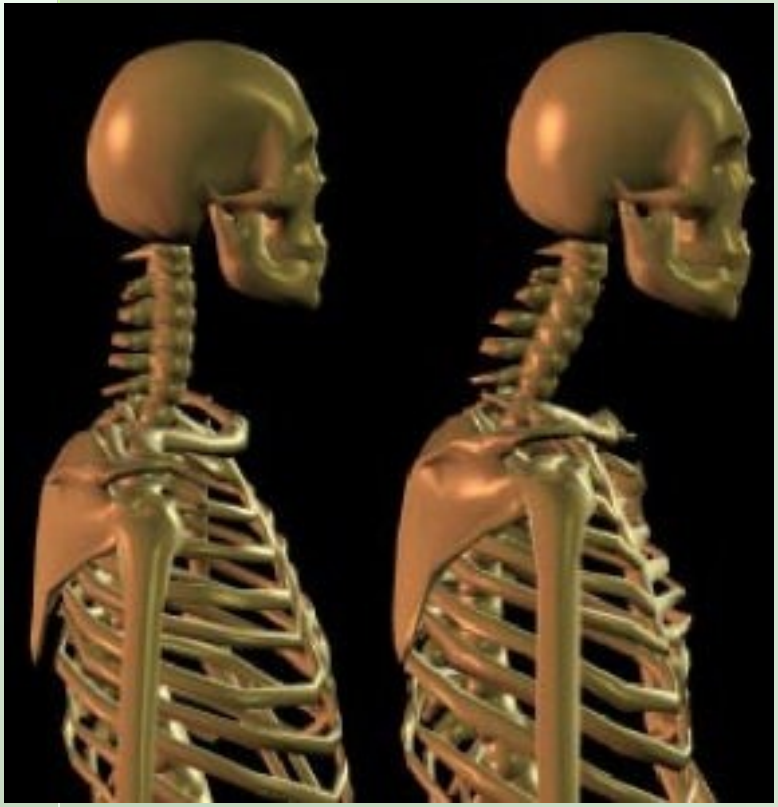
Ultrasound

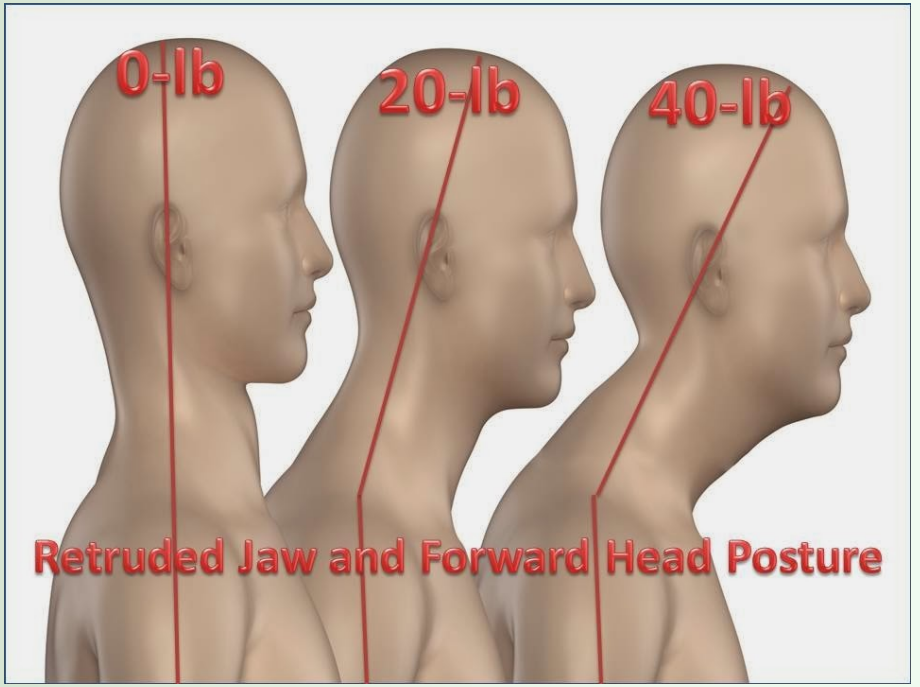
Transcutaneous electrical stimulation (TENS)

Other methods

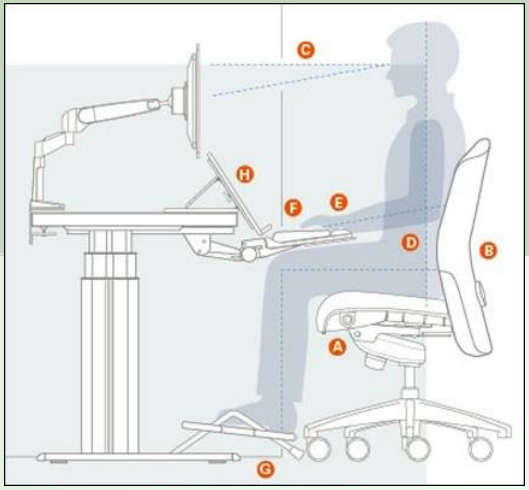


Posture correction





Ergonomic principles



- Sitting position correction
- Ergonomic pillow/mattress
- Ergonomy of the workplace

Thank you for your attention