



Trismus an overview

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Introduction:

The word Trismus is Latin term derived from the Greek word “*Trismos*” which means *grinding / rasping*. In lay terms Trismus means limitation of mouth opening due to reduced mandible mobility. Two bones form the boundaries of oral cavity (maxilla and mandible). Out of these two maxilla is fixed and is not mobile, where as mandible is capable of upwards and downwards mobility with a limited forward and backward mobility too. The maximal interincisal opening (MIO) of at least 35mm¹ is used as a cutoff point to determine Trismus. Less than 5 mm of MIO indicates complete ankylosis. Roughly put the mouth opening should permit a minimum of three fingers when inserted sideways. Since the movement of the mandible occurs around Temporomandibular joint Kazanjian² classified ankylosis of TM joint into true and false types. True ankylosis of TM joint is usually caused due to pathology involving the joint while the term false ankylosis is used to describe restrictions of movement resulting from extra-articular joint abnormalities. It is this type of false ankylosis which clinicians commonly term as “Trismus”.

Anatomy of masticatory apparatus:

Mastication is defined as a process by which food inside the mouth is chewed and ground to make it fit for swallowing. Muscles of mastication play an important role in lower jaw

movement. The lower jaw moves around the Temporo mandibular joint. All the muscles of mastication are supplied by the mandibular division of trigeminal nerve. The muscles of mastication include:

1. Masseter
2. Temporalis
3. Medial pterygoid
4. Lateral pterygoid

Lateral pterygoid muscles opens the mouth (depresses the mandible), whereas the medial pterygoid, Temporalis and masseter closes the mouth (elevates the mandible). This fact amply illustrates the fact that jaw closure is the most active process involving three muscles, whereas jaw opening involves just one muscle. Jaw closure seems to be more powerful than jaw opening movement.

A review of published literature on the topic of mastication reveals the paucity of material. The reason for this paucity of literature on this topic could be the complexity of the entire process making it rather difficult to scientifically analyze the components involved in mastication. The human masticatory system contains more muscles than necessary to accomplish the task of mastication. This is because of the rigid spatial requirements of the masticatory space.

There is a vital difference between jaw movements and limb movements. Limb movements are restricted / resisted by tone of antagonist muscles. In jaw opening there is very little antagonist muscle action for deceleration. Deceleration / restriction of mouth opening movements are caused by elastic and viscous load that oppose the movement. Load due to stretch and rate of stretch of the jaw closure muscles oppose the movement.

In primates there are 6 degrees of freedom involving jaw movements, out of which three are associated with opening / closing, protrusion / retrusion, and lateral motion of mandible and the other three are associated with motion of hyoid bone.

Under normal conditions jaw opening is not against a load, whereas jaw closing muscles are loaded and counteracted by food resistance which has to be overcome on a daily basis.

In primates the cyclic mechanism of jaw movements are characterized by two reflexes: Jaw closing and jaw opening reflexes. In humans jaw closing reflexes have been demonstrated conclusively while jaw opening reflexes have not been demonstrated.

Anatomically the jaw closing muscles are adapted to perform slow tonic movements to produce smooth and gradable force. Hence the proportion of slow fibers is higher in jaw closing muscles

than those involved in jaw opening. This fact is helpful in designing rehabilitation exercises in patients with trismus.

Causes of Trismus:

Etiology of Trismus may be classified into:

1. Infection
2. Trauma
3. Dental treatment
4. TM joint disorders
5. Tumors and oral care include benign and malignant lesions involving oral cavity and submucous fibrosis
6. Drug induced
7. Radiotherapy and chemotherapy
8. Congenital disorders
9. Miscellaneous disorders include Hysteria, Lupus erythematosus

Infections:

Classic symptom of masticatory space infections is Trismus. Infections causing Trismus could be of odontogenic or non odontogenic in nature.

Odontogenic infections causing Trismus include:

Pulpal infections – This condition is also known as pulpitis. This is commonly caused by dental caries which manages to penetrate through the enamel and dentine of the teeth to reach the pulp. This can also be caused due to trauma / repeated thermal injuries following dental procedures³. When Pulp becomes inflamed due to infections it causes excessive pressure build up within the Pulpal cavity causing dental pain. Pain can also be caused due to excessive pressure affecting adjacent tissues and irritation of trigeminal nerve, which leads to masseteric muscle spasm causing Trismus. Since the pulp is surrounded by hard dentine there is no scope for pressure dissipation. This causes excessive dental pain. Ultimately this can even lead to revitalization of the tooth. If the pulpitis is reversible as in the case of dental caries / exposed dentine then Trismus will reduce on effective treatment of the condition. If the condition is

irreversible pulpitis as in the case of deep caries then the condition becomes difficult to manage.

Periodontal infections – The term periodontium is used to indicate tissues that surround and support the teeth. Chronic infections involving this supporting tissue may irritate free nerve endings causing masseteric muscle spasm. In almost all inflammatory conditions involving teeth it is the trigeminal nerve irritation that leads to Trismus.

Pericoronal infections – This condition is also known as pericoronitis. This involves inflammation of soft tissues surrounding the crown of a partially erupted tooth ⁴. As with other dental infections pericoronitis also can cause reflex irritation of trigeminal nerve throwing masseter muscle into spasm causing Trismus.

Dental infections if left unchecked can cause spread of infection into various neck spaces causing cervical cellulitis / mediastinitis.

Non odontogenic infections causing Trismus:

These include tonsillitis, tetanus, meningitis, parotid abscess and brain abscess ⁵.

Trauma:

Facio maxillary fractures involving mandible, zygoma and zygomatic arch can cause Trismus. These fractures interfere with movement of temporomandibular joint causing trismus. Commonest cause of trismus in this category is direct trauma causing fractures of mandible and other facial bones.

Trismus related to dental procedures:

Surgical procedures involving the oral cavity may lead to limitations in mouth opening ⁶. Even dental extraction can lead to trismus due to inflammation involving the muscles of mastication or due to direct trauma to Temporomandibular joint.

Causes of trismus in the category include:

1. Surgical extraction of mandibular molars
2. Inferior alveolar nerve block
3. Postero superior alveolar nerve block

4. Dental restorative procedures

Trismus in these patients develops characteristically 2 – 5 days after the procedure. These patients respond to conservative therapy like:

Heat therapy

Warm saline rinses

Analgesics

Muscle relaxants to manage the initial stage of muscle spasm

Physiotherapy

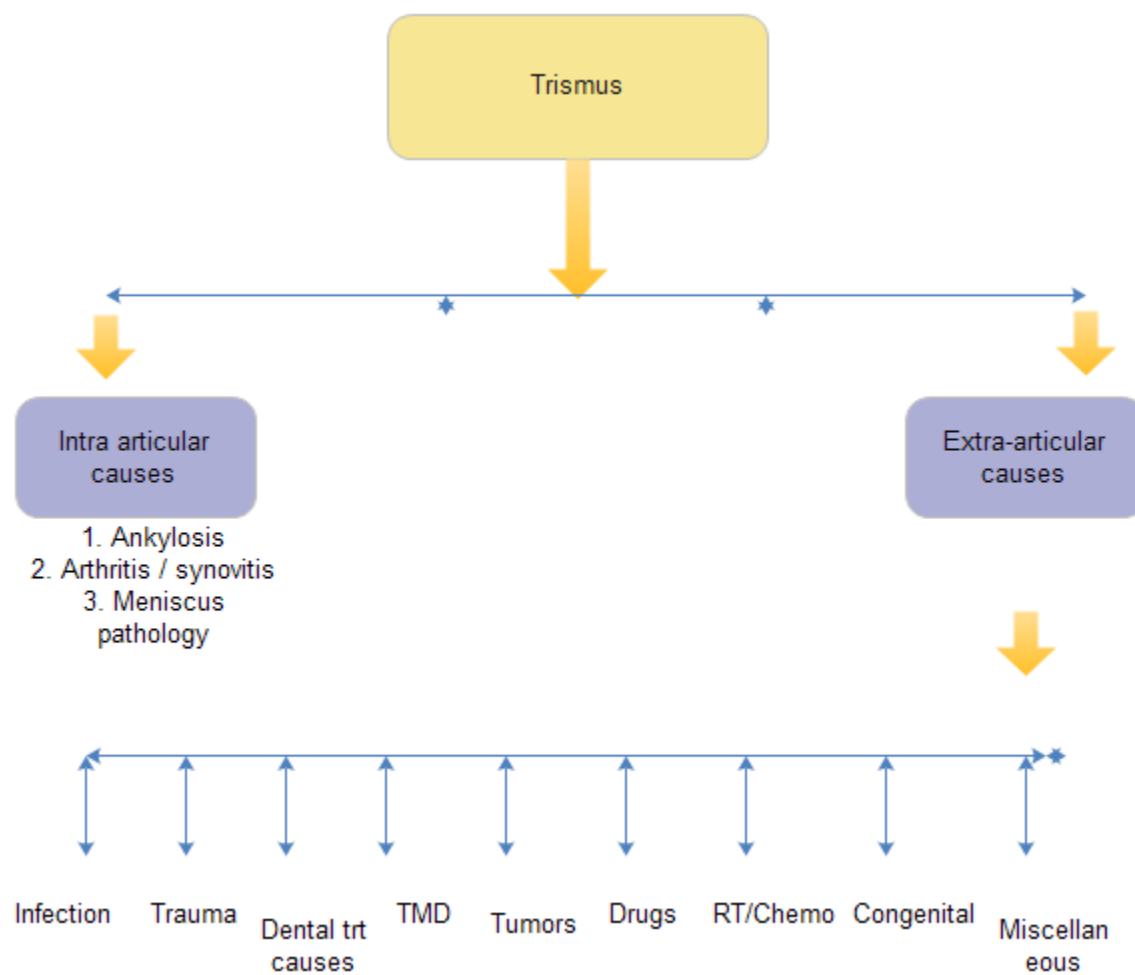
Another common cause of trismus following dental procedures is due to inaccurate positioning of needle when giving inferior nerve block causing injury to medial pterygoid muscle. Bleeding that ensues due to injury will cause hematoma and subsequent fibrosis causing trismus ⁷.

Trismus caused due to fibrosis of medial pterygoid muscle is rather difficult to treat.

Temporomandibular joint disorders:

Disorders involving this joint can lead to trismus. These disorders for the sake of convenience divided into extracapsular (myofascial causes) and intracapsular causes. This condition is common in females. It does not warrant urgent intervention.

Intracapsular causes of trismus are commonly caused by trauma. Pain on palpation lateral to the joint capsule is a classic finding seen in this condition. Presence of clicks in the temporomandibular joint indicates anterior disk displacement. If the click is painless then treatment is not a must. Fibrosis / unilateral condylar hypoplasia needs to be managed surgically. Acute trismus due to temporomandibular joint causes almost always occurs when the meniscus becomes displaced anteromedial to the condyle. These patients usually have a mouth opening of 20 – 25 mm. Mouth opening which is lesser than this level is usually caused by muscular spasm.



Flow chart showing the causes of trismus

Techniques of measuring maximal intercisal opening:

Measurement of maximal intercisal opening and its accuracy is a must in any study of trismus. Ideally this can be measured using a millimeter scale with the patient seated upright. In patients with intact dentition it can be measured as the distance between opposing incisal edges of maxillary and mandibular incisors. In patients with dentition in only one jaw this measurement is taken between incisal edge of anterior incisor and opposing alveolar ridge. In edentulous patients the measurement should be taken between the opposing alveolar ridges.

Clinical features of trismus:

Trismus can affect –

1. Speech
2. Food intake
3. Oral hygiene

These patients are very low in their self esteem.

Management of patients with trismus:

Treatment should ideally be directed towards managing the cause of trismus⁸. If trismus is caused due to muscle fibrosis / formation of immature scar tissue formation physical therapy and use of trismus appliance could be of use. Immature scar tissue formation could result due to reparative process. If this scar tissue becomes dense then physical therapy may not be of much use.

Trismus caused due to intracapsular pathologies involving temporomandibular joint, bony interference from styloid or coronoid processes, formation of dense fibrosis may need surgical management.

Physiotherapy: This includes exercises which relaxes the masticatory muscles, improves its strength. Devices are available that keeps the mouth open in a graded manner. Wooden top can be used to gradually open the mouth. Bunch of ice cream sticks can be inserted between the upper and lower incisors to keep the mouth open.

Objective of physiotherapy include:

1. Reduction of oedema
2. Soften and causing stretch of scar tissue
3. Increasing the range of joint movement
4. Increasing muscle strength of masticatory muscles

Three facets of physiotherapy in the management of trismus include:

1. Heat – commonly used as adjunct therapy to stretching exercises involving the muscles of mastication. Heat has been known to increase the extensibility of collagen tissue, decreases joint stiffness, and relieves pain and muscle spasm. It is also known to increase blood flow which washes away inflammatory mediators and reduces oedema of the muscles of mastication.
2. Massage – This adjunct therapy increases blood flow and helps in relaxation of muscles of mastication.
3. Exercise- This therapy breaks the fibrosis involving muscles of mastication

Forced opening of the jaw under general anesthesia should be attempted when all other treatment modalities are exhausted ⁹. Manipulation under anesthesia can cause instability of temporomandibular joint.

After cessation of pain patient is asked to perform opening and closing movements of mouth along with lateral excursions of mandible for every 3-4 hours ¹⁰. Chewing bubble gum is an excellent way of providing lateral movement of the mandible.

Conservative medical management for acute trismus:

1. Heat therapy – By placing moist hot towels on the affected area for 10-20 minutes / hour.
2. Analgesics – Aspirin is adequate. Narcotic analgesic may be indicated if the discomfort is too much.
3. Soft diet
4. Muscle relaxants – Benzodiazepines ¹¹ 2.5 – 5 mg three times a day may be indicated in patients with excessive masticatory muscle spasm

Physiotherapy can be started after cessation of the acute phase.

Antibiotics is indicated only if trismus has been attributed to infection.

Trismus appliances:

Can be used to treat trismus in combination with physical therapy. These devices can act externally by forcibly stretching the elevator muscles. This is usually achieved by depression of mandible. Internally activated devices applies stretch to trismus affected elevator muscles or other tissue that limits mandibular opening.

Externally applied appliances:

These appliances impart forces that could be continuous / intermittent, light / heavy, elastic / inelastic.

Types of externally applied appliances:

Dynamic Bite opener:

This device was first described by Drane ¹². This appliance provides continuous elastic force to depress the mandible. This device provides the facility to control the amount and direction of the force.

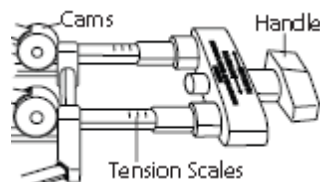


Figure showing dynamic bite opener

It is always better to apply moist heat to the muscles of mastication for about 10 minutes before using the Bite opener. Analgesic and anti-inflammatory drugs may be of use in these patients.

Step I: The bite opener should be kept in closed position (zero position). The mouth of the patient is opened as much as possible and the mouth piece of the Bite opener should be

inserted in such a way that the teeth and gums rest comfortably against the Bite opener. The handle of the bite opener is turned slowly till the sensation of gentle stretch of mouth opening is felt. The increase in mouth opening should be performed only in a stepwise pattern. This system should not be used for more than 5 mins per sitting to start with. This is then increased by 2 mins per sitting gradually till the maximum limit of 30 mins is reached. After each session Ice packs need to be applied to the muscles of mastication.

Threaded tapered screw:

This appliance resembles the toy Top. It is made of acrylic resin. This can be placed inside the mouth of the patient between the posterior teeth, with gradual turns the maxillary and mandibular teeth are spread apart ¹³. This appliance provides force that can be controlled by the patient. The force imparted is of course not elastic in nature.



Image showing tapered screw

Author prefers to use the age old toy The Top in place of threaded tapered screw. This is inexpensive and easily available and does the same job.



Figure showing Toy Top being used as tapered screw

To use this type of device teeth must be present. This method is not useful in edentulous patients. Since enormous amount of force is generated by using tapered screw, in some patients anterior teeth could get loosened on prolonged use.

Screw type mouth gag:

This type of appliance was first described by Nakajima. This appliance has a screw type component which provides continuous unilateral and inelastic force. The force generated can be adjusted by the dentist of the patient. This appliance can be used only in dentate / partially edentulous patients.



Figure showing screw type mouth gag

Fingers:

This external method was first described by Rouse ¹⁴. In this method patient is trained to use the fingers to depress the mandible. The musculature is submitted to a sustained tension over a slow count of ten. This exercise should be repeated by the patient many times a day. The most important aspect of this method is the compliance of the patient.

Use of tongue blades:

Tongue blade can be used to pry open the mouth. Stack of wooden tongue blades can be used to keep the mouth open.



Stack of wooden tongue blades that can be used for managing trismus

Role of surgery in the management of trismus:

Role of surgery is limited. If trismus is caused due to submucous fibrotic band, these bands can be lysed using laser. Masseter muscle myotomy can help in selected cases where spasm of this muscle causes trismus.

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