ABSTRACT:
Trismus, a severely restricted mouth opening is a problem commonly encountered by the dental practitioners. It is very important that dentists are familiar with the differential diagnosis of limited jaw opening. Treatment of trismus may be easy or complicated. It is important to remember that multiple potential causes exist. Trismus is a condition that impairs eating, interferes with oral hygiene, restricts access for dental procedures and may adversely affect speech and facial appearance.

Key words: Trismus, extra articular and intra articular

INTRODUCTION
The term trismus denotes a motor distribution of the trigeminal nerve, especially spasm of the masticatory muscle, with difficulty in opening the mouth.1,2 According to Dorland’s illustrated dictionary trismus means (Greek trimos; grating, grinding)2,3

Trismus has a number of potential causes which could range from simple and non progressive to those that is potentially life threatening. In a busy practice, it is not unusual to see several patients each month with a complaint of trismus.2

Trismus impairs the ability to incise and masticate the food, interferes with the oral hygiene and restricts access to dental procedures. It may adversely affect speech and it can also compromise or prevent the construction and use of removable or fixed appliances.1

The knowledge about normal range of mouth opening is very essential in the diagnosis of trismus. It varies from patient to patient within a range of 40-60mm.

2 finger breadth (40mm) and 3 finger breadth (54-57mm) is usual width of opening.

Trismus has been defined variously as a mouth opening less than 20mm. other authors have used a classification for trismus such as

Mouth opening of > 30 mm indicated light trismus
Mouth opening of 15-30mm indicated moderate trismus
Mouth opening of < 15 mm indicated severe trismus

Etiology
The etiology of trismus may be classified as Extra articular and Intraarticular
Extra articular causes

Infections

The hallmark of masticatory space infection is limited jaw opening. Infections causing trismus may be of an odontogenic nature. Odontogenic infections are Pulpal, periodontal and pericoronal and non odontogenic causes include tetanus which is a life threatening infection and is rare in the developing world. Trismus and dysphagia are the most common presenting symptoms.

Tetanus is an infectious disease that results from wound contamination with clostridium tetani, an anaerobic, gram positive, motile, spore forming rod which may survive for years in some environment. Trismus is the common presenting symptom, but patients often develop dysphagia as well as pain and stiffness of the musculature. Markedly increased tone in the central muscle (face, neck, chest, back and abdomen) with superimposed generalized spasm strongly suggest tetanus.

Sustained contraction of the facial muscle causes ‘risus sardonicus’- the so called ‘sneering grin’ expression. With severe trismus there is opisthotonos, caused by generalized spasm and resulting in flexion of the arms, extension of the legs and rigidity of the abdominal wall, followed by rigidity of the trunk and limbs.

The spatula test is the simple bedside test to diagnose tetanus. The posterior pharyngeal wall is touched with spatula and reflex spasm of the masseter occurs (positive) instead of the normal gag reflex (negative).

Trauma

1. Surgical extraction of the mandibular molars
2. Post anesthetic injections; inferior alveolar nerve block, posterior superior alveolar nerve block
3. Direct trauma

Fracture of the mandible.

Other facial fractures.

Patients who have had mandibular third molar surgically removed frequently have mild to moderate trismus. This interferes with patients normal oral hygiene and eating habits. Patients should be warned that they will be unable to open their mouths normally after surgery. The trismus gradually resolves.

Post anesthetic infections.

Limitations of oral opening and occasionally paresthesia after local anesthetic injections for dental treatment continue to be problems in dentistry. Although the incidence of such morbidity is low, it is accompanied often by distress for both patient and attending clinician and could lead to litigations.

It is hypothesized that the barbing of the needles at the time of the injection followed by tissue damage on withdrawal is a likely explanation for some rare cases of post injection persistent paresthesia. Post injection trismus is related to tearing of masticatory muscle by penetration of the needle during injection into the muscle. Most commonly involved muscle is medial pterygoid during inferior alveolar nerve block. Good injection technique by staying lateral to the pterygomandibular raphe during penetration will avoid the medial pterygoid muscle, since this muscle lies medial to the raphe.

Drug therapy

Some drugs are capable of causing trismus as a secondary effect. Phenothiazine, Succinyl choline and tricyclic antidepressants being more among the most common.

Trismus can be seen as extra pyramidal side effects of metaclopromide, Phenothiazine and other medications.

Radiotherapy

Radiotherapy is commonly used to treat squamous cell carcinoma of head and neck malignancy and regional lymphomas. The primary advantage of using radiotherapy to treat oral cancer is the preservation of normal tissue and function, however complications may develop, depending upon which healthy tissue are in the path of radiation beam, the amount of radiation given and the course of treatment.
Osteoradionecrosis may occur, resulting in pain, trismus, suppuration and occasionally a foul smelling wound. When the muscles of mastication are within the field of radiation, fibrosis may lead to trismus reducing the range of movements. Fibrosis and trismus have been attributed to the ischemia caused by endarteritis obliterans. Trismus complicates post radiation dental care.

Trismus is present at the time of diagnosis in about 2% of the patients suffering with a head and neck cancer due to tumor growth. For Tumors of nasopharynx, trismus may be the first sign.6

Trauma

Fracture of the mandible may cause limited jaw opening. Backland et al defined as devastating events e.g. sports injury, administration of general anesthesia and performance of dental procedure such as difficult extractions requiring lengthy appointments.2

Trismus has also been reported due to accidental incorporation of foreign bodies because of external traumatic injury.11

Another relatively rare cause of trismus is trauma to the zygomatic arch and zygomaticomaxillary complex, which interferes with movements of coronoid process

Temporomandibular joint disorder

Temporomandibular joint disorder may be divided into extra articular and intra articular problems (including disc displacement, arthritis, fibrosis.) intracapsular problem are often caused by trauma2.

Congenital/developmental cause

Trismus have been reported as a result of hypertrophy of the coronoid process causing interference of coronoid against the anterior medial margin of the zygomatic arch. Coronal exostosis, congenital or acquired coronoid hyperplasia, coronoid osteochondroma, osteoma also results in limited mouth opening.5 Trismus pseudocamptodactyly syndrome is a rare combination of hand, foot, mouth abnormalities and trismus.

Miscellaneous causes

Oral submucous fibrosis is a potentially malignant condition, commonly seen in people from indian subcontinent. Patients presents with trismus due to fibrosis of the submucosal tissue in the oral cavity. This causes blanching of the mucosa and can affect speech by restricting the tongue and soft palate movements.3

Hysterical trismus refers to muscular limitation that is a consequence of psychological trauma.17 The presentations are varied and include paralysis, blindness, anesthesia, anorexia and vomiting. The onset of hysteria is usually before the age of 35 and occurs mainly in women.2

A muscle in spasm is acutely shortened grossly limited in range of motional and painful. Other terms for this disorder include myospasm, acute trismus, charley horse or cramp. If left in a contracted state, pain decreases, but fibrous scarring and contracture will begin developing in several weeks as a result of decreased function. Contracture is also referred to as chronic trismus or muscle fibrosis.17

Differential diagnosis

A systemic approach using a disciplined and organized process is more likely to yield an accurate diagnosis. To diagnose trismus, the clinician must be able to determine the cause from variety of possibilities. A thorough history and clinical examination has to be taken and appropriate radiograph has to be taken to arrive at a definitive diagnosis.

Possible causes are summarized in table-1

Management of trismus

The success of treatment depends on the recognition of the cause and initiation of appropriate management. To manage the initial phase of muscle spasm, the practitioner should prescribe the following
Heat therapy
Analgesics
Soft diet
Muscle relaxants.

Heat therapy consists of placing moist hot towel on the affected area for 15-20 minutes every hour.

Analgesics- aspirin is usually adequate in pain management associated with trismus in managing trismus associated pain.

Diazepam (2.5-5mg 3 times daily) or benzodiazepam may be prescribed for muscle relaxation.

When the acute pain is over the patients should be advised to initiate physiotherapy for opening and closing the jaws and to perform lateral excursions of the mandible for 5 minutes every 3-4 hours. Sugarless chewing gums is another means of providing lateral movements of the TMJ. When trismus is the presenting feature and if any infected tooth has to be removed then closed mouth nerve block usually provides relief.

If the trismus is suspected to be associated with the infection, appropriate antibiotics should be prescribed.

In addition, trismus appliances are used in conjunction with physical therapy and are most effective when the condition is the result of muscle fibrosis or scar tissue that is not yet matured. Trismus appliance act either externally or internally and the forces they impart and the force they impact can be continuous or intermittent, light or heavy and elastic or inelastic.

Treatment objectives are to remove edema, soften and stretch fibrous tissue, increase the range of joint motion, restore circulatory efficiency, increase muscular strength.

Seven appliances have been described in literature.

Dynamic bite opener; this appliance was described by Drane and later by Brown. This appliance provides continuous elastic forces to depress the mandible, and the amount and direction of the force can be controlled.

Threaded, tapered screw: this appliance is constructed of acrylic resin and is placed by the patient between the posterior teeth. With gradual turns of the screw, the mandible is depressed and the maxillary and mandibular teeth are forced apart.

Screw – type mouth gag: employs a screw–type component similar to the type incorporated into orthodontic palatal expansion appliance. It provides continuous, unilateral and inelastic force.

Fingers: patient should use the finger to depress the mandible, stretch the muscular to the maximum, and then maintain the position for a slow count of ten. This exercise is repeated by the patient throughout the day.

Tongue blades: for years, tongue blades have been recommended for use as a wedge or as a mouth prop to sustain maximal opening. Tongue blades are effective only in a dentate patient.

Continuous–dynamic jaw extension apparatus: this appliance consist of a contra rotating extending screw attached to the maxillary and mandibular arches by two resilient stainless steel wire arms that are connected to acrylic resin splints. The apparatus distributes the forces generated by the screw over the entire dental arch covered by the splints. The force provided is continuous, bilateral and elastic.

II. Internally activated appliances: rely on the patients depressor muscle to stretch the elevator muscles. Since the elevator muscles can generate forces that are ten times greater than those generated by the depressor muscles, the mechanical advantage gained through the use of depressor muscle is limited.

The amount of force delivered depends on the strength and motivation of the patient, as do the frequency and duration of stretching.
**Examples include**

**Tongue blade:** Tongue blade can be employed so that force delivered is imparted by the depressor muscle alone, and thus the tongue blades are not used as a wedge. A stack of tongue blades held together with adhesive tape can provide a goal or standard for opening the masticatory muscles.

Plastic tapered cylinder: this simple, carrot-shaped appliance has proven effective and it allows the patient to easily identify the maximal maxillomandibular distance on initial stretching, by noting which ring on the taper is reached when both the maxillary and mandibular teeth come into contact with the tapered cylinder. This appliance relies on the patient’s depressor muscles to depress the mandible.

**Modified spatula technique:** Trott described, this method for patients with severe, non irritable but long standing temporomandibular restriction of mouth opening. Clinically this method is also useful for patients with disc displacement without reduction and for trismus patients\(^1\).

The principle is that the elevator muscles are inhibited by contract-relax technique including passive forces towards mouth opening.

**Starting position and method**

The patient opens the mouth as far as possible. The clinician inserts as many spatulas as can be fitted between the upper and lower molar teeth. The patient will experience an increased tension in the masticatory muscles and the muscle relief becomes clearly visible.

A contract-relax technique is applied. The patient is asked to gradually increase the closing force for a few seconds.

After asking the patient to open the mouth wider, the clinician attempts to insert another spatula between two others. The patient usually reports an increase of muscle tension that will decrease after a few seconds due to decreased activity in the contractive tissue.

Afterwards, passive mobilization, contract relax, mouth opening and inserting more spatulas is repeated.

The mouth opening occurs in the transverse axis of the head of the mandible the distance between the upper and lower molar teeth will always be smaller than between the incisors spatulas are around 2mm wide, therefore only 3-7 spatulas are needed for an opening range of 20-30mm.

**Recommended activities of daily living**

Self regulating activities performed at home, during work significantly influence craniofacial muscular pain in both the short and long term. Three principles of mechanical influence, reflex inhibition and facilitation of sensomotor cortex apply. They may be performed with or without appliance.

**With appliance.**

Cork and spatula exercise: with a cork cut to the appropriate size, exercise may be performed in end of range aperture. For example, performing rolling movements with the cork may have a positive influence on maximum aperture. Changes of neck position in flexion and extension may also lead to positive results.

**Without appliance**

Thumb depression technique is ideal. This exercise can be performed anywhere without appliance and without neck appliances.

**Conclusion:**

Trismus, in many ways is mostly harmless, but it could give rise to many constraints for the patient, including social injunctions that can cause anxiety and danger. Therefore, it is important for the clinicians to be aware of this significant condition, its causes and the treatment for trismus should primarily be directed towards its cause and unless treated properly, trismus may lead to permanent impairment of function. Treatment objectives are to remove edema, soften and stretch the fibrous tissue, increase the range of joint motion, restore circulatory efficiency increase the muscular strength and retain muscular dexterity.
## Table-1: Trismus (Aetiology and differential diagnosis)

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<th>Intra-articular</th>
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<td>1. Infection</td>
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<td>3. Meniscus</td>
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