Trismus: Diagnosis and Management Considerations for the Speech Pathologist

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Definition

From the Greek *trismos*; grating, grinding

**Traditional Definition**
- “Tonic contraction of the muscles of mastication” — *Taber’s Cyclopedic Medical Dictionary*

**Current Definition**
- Any restriction in mouth opening, including restriction caused by infection, trauma, surgery, or radiation

**Congenital or acquired**
Definition

- Uniform criteria is lacking!
- Various criteria for presence of trismus...
  - Mouth opening <20mm (Jen et. al., 2002)
  - Mouth opening <40mm (Nguyen et. al., 1988)
  - Severity Scales
    - Mild, >30mm; Moderate, 15-30mm; Severe, <15mm (Thomas et. al., 1998)
- Generally, opening of <35-40mm a functional guideline
- Less than 18-20mm, oral alimentation is difficult
Incidence

- Reported incidence varies greatly, anywhere from 5% to 38%
- Incidence increases in irradiated patients
- Incidence increases with head and neck cancer diagnosis
  - 36%, Nasopharyngeal tumors
  - 55%, Parapharyngeal tumors
  - Parotid gland
Complications of Trismus

- Poor oral hygiene
- Complications of conditions associated with head and neck cancer treatments
- Reduced access for oral examination and dental procedures
- Dysphagia
- Aspiration and related complications
- Malnutrition
- Decreased access for medical procedures, including intubation
- Inability to use dentures or oral/pharyngeal prosthetics
- Speech deficits
- Airway compromise
- Pain
Anatomy Review
Bones: The Mandible

- Only moveable bone in skull
- Capable of rapid movement
- Moves in multiple planes

Function:
- Mastication
- House teeth
- Modify dimensions of vocal tract

http://zemlin.shs.uiuc.edu/Skull/defult.htm
Ligaments

- **Lateral Ligament**
  - Limits & guides movement
  - Stabilizes

- **Sphenomandibular Ligament**
  - Limits protrusive and mediotrusive movements
  - Limits passive jaw opening

- **Stylomandibular Ligament**
  - Relaxes with jaw opening

Courtesy N. Capra
Muscles

Bumann & Lotzmann 2002

www.nidcr.nih.gov
Muscle Movement

- **Elevation**
  - Masseter
  - Temporalis
  - Medial Pterygoid

- **Depression**
  - Digastric
  - Mylohyoid
  - Geniohyoid
  - Lateral Pterygoid

- **Protrusion**
  - External pterygoid
  - Internal pterygoid

- **Retraction**
  - Temporalis
  - Mylohyoid
  - Geniohyoid
  - Anterior digastric

- **Lateral**
  - External pterygoid
  - Temporalis
Vascular and Neural Supply

Vascular

Neural
Temporomandibular Joint

- Most active joint in the body
- Controls mandibular movement
- Complex and easily damaged joint
- Easily evaluated
TMJ Movement

**Translation**
- Upper part of the joint capsule
- Bilateral movement
- Condyle slips forward and downward over the articular eminence
- Suprahyoid muscles

**Rotation**
- Lower part of the joint capsule
- Condyle rotates within the glenoid fossa
- Lateral pterygoids
Jaw Opening

- **Initial Phase**
  - Condyle rotates

- **Intermediate Phase**
  - Condyle translates

- **Terminal Phase**
  - Condyle reaches maximum rotation and translation

Bumann & Lotzman
Jaw Closing

- Initial Phase
- Intermediate Phase
- Terminal Phase
The Masticatory System is a Biologic System

(Bumann Model)

- A healthy system adapts and compensates in response to influences
  - Malocclusion
  - Dysfunction
  - Parafunctional activities
  - Trauma

- Symptoms arise when the adaptive mechanisms of connective tissue and the compensatory mechanisms of muscles have been exhausted
Differential Diagnosis
Trismus: Differential Diagnosis

- Infectious
- Neurologic
- Craniofacial/ Dental
- Oncology – Tumor, Treatment
- Congenital/ Developmental
- Trauma
- Iatrogenic
Differential Diagnosis: Infection

- Odontogenic Infection
  - Pupal
  - Periodontal
  - Most frequently third molar
  - Secondary to injection

- Non-odontogenic Infection
  - Tetanus
  - Tonsillitis
  - Meningitis
  - Encephalitis
Differential Diagnosis: Drug Toxicity

Medications capable of causing trismus

- Neuroleptic agents
- Phenothiazines
- Tricyclic antidepressants
- Metaclopromide
- Halothane (general anesthetic)
Differential Diagnosis: Trauma

- Most commonly due to MVA, sport accidents, assault/battery
- Most common mandibular fractures
  - Condylar (30%)
  - Angle (25%)
  - Body (20%)
- Trismus secondary to fracture often exacerbated by prolonged immobility
- Bony Ankylosis
  - Hematoma formation within joint space and subsequent fibrosis and calcification
Differential Diagnosis: Neurologic Etiologies

- CVA and TBI
  - May result in severe trismus secondary to masseter spasticity
  - EMG will show abnormal tonic hyperactivity at rest
- ALS
  - Mazzini et. al. (1995), 9% of patients unable to undergo PEG placement secondary to severe masseter spasticity
- Restivo et. al. (2005) found masseter botulinum toxin denervation effective in reducing trismus caused by neurogenic spasticity
Temperomandibular Disorder (TMJ Syndrome)

- TMJ pain and reflex spasm of muscles of mastication secondary to...
  - Excessive tension or anxiety, jaw clenching
  - Habits, including excessive gum chewing
  - Disc displacement
  - Malocclusion
  - Bruxism

Symptoms may resolve on their own
Differential Diagnosis: Arthritis

- True ankylosis unlikely
- TMJ Arthritis
  - 50% of those with rheumatoid arthritis have some involvement
  - Traumatic
  - Degenerative joint disease
Differential Diagnosis: Congenital / Developmental

- Coronoid Hyperplasia
  - Abnormal bony elongation of normal coronoid process
  - Treatment is surgical
- Hecht Syndrome (Trismus Pseudocamptodactyly Syndrome)
- Trotter's Syndrome
Differential Diagnosis: Central Nervous System

- Conditions affecting the CNS may result in trismus, including
  - Multiple Sclerosis
  - Meningitis
  - Parkinson’s Disease
  - Epilepsy
  - Bulbar paralysis
  - Brain tumor
  - Scleroderma
Post-Surgical Effects

- Dental injections – hematoma formation and infection
- Nerve damage
- Misalignment
- Damage to muscles
- Hyperextension of joint
- Scarring
Radiation Therapy

- Trismus most likely when RT to TMJ, pterygoids, or masseter
- RT for tumors in the nasopharynx, base of tongue, salivary gland, maxilla/mandible
- RT in excess of 6000 grays
- Patients being treated for recurrence
- Patients treated concurrently surgery and RT
- Chemotherapy agents may exacerbate the condition
Time of Onset

- Most often a gradual onset, 8 – 12 weeks after completion of treatment
- May develop at any time following treatment
- Damage progresses at a rate of approximately 2.4% loss per month
- Without intervention, mean reduction of 32% opening at 4 years post treatment

- Sciubba & Goldenberg, 2006, The Lancet
Trismus Secondary to RT

- Radiation results in rapid formation of collagen
  - Progression often slow, may not notice until opening is $\leq 20\text{mm}$
  - Patients may not be eating and not notice slow changes
  - Patients may think reduced jaw opening is normal
- Radiation results in muscle results in fibrosis and contracture

- When muscles of mastication are in the field of radiation, edema, cell destruction, and fibrosis may result
Trismus: Physiologic Effects

Joint immobilization results in…

- Reduced strength
- Fatiguability
- Rapid joint and muscle degeneration
- Inflammation, pain
- Flexion contractures (common in muscles acting across a damaged joint)
- Shortening of muscle fibers
- Disuse atrophy

Pathophysiology of Trismus

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Evaluation
The Trismus Team

- Patient
- Speech-Language Pathologist
- Physical Therapist
- Dentist/ Orthodontist
- Oral Hygienist
- Oral Surgeon
- Physician
- Radiation Oncologist
- Nurse
- Social Worker
SLP Evaluation

- History and Interview
- Questionnaire
- Measure
  - Interincisal opening
  - Lateral movement
  - Protrusion
  - Retraction
- Palpation
History and Interview

- Medical/ Surgical/ Trauma History
- Medications
- Quality of life measurements
- Pain history
  - Headaches
  - Jaw
  - Neck
- Dental status and history
- Speech and swallowing history
Mandibular Function Impairment Questionnaire (MFIQ)
(Stegenga et al., 1993)

11 items assessing perceived difficulties
- Social activities
- Speaking
- Taking a large bite
- Chewing hard, soft, and resistant foods
- Work and/or daily activities
- Drinking
- Laughing
- Kissing
- Yawning

(Stegenga et al., 1993)

Table 1  Mandibular Function Impairment Questionnaire (MFIQ) and Scoring Key

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Possible answers</th>
<th>i*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due to the complaints about your jaw, how much difficulty do you have with:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Social activities</td>
<td>No difficulty</td>
<td>0</td>
</tr>
<tr>
<td>2. Speaking</td>
<td>A little difficulty</td>
<td>1</td>
</tr>
<tr>
<td>3. Taking a large bite</td>
<td>Quite a bit of difficulty</td>
<td>2</td>
</tr>
<tr>
<td>4. Chewing hard food</td>
<td>Much difficulty</td>
<td>3</td>
</tr>
<tr>
<td>5. Chewing soft food</td>
<td>Very difficult or impossible</td>
<td>4</td>
</tr>
<tr>
<td>6. Work and/or daily activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Drinking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Laughing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Chewing resistant food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Yawning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Kissing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Eating food includes taking a bite, chewing, and swallowing. How much difficulty do you have with eating:

- A hard cookie
- Meat
- A raw carrot
- French bread
- Peanuts/almonds
- An apple
Measurement

- **Screening**
  - “Three finger test”

- **Measurement Tools**
  - Boley Gauge
  - Manufacturer’s scales
    - Dynasplint
    - Therabite

- **Influencing Factors**
  - Dental alignment
  - Age
  - Gender
  - Ramus length
  - Gonial angle

www.atosmedical.com
Measurement

- **Reliability**

- **Norms** *(Bumann & Lotzman, 2002)*
  - Jaw opening: 49-56mm
  - Laterotrusion: 10-11mm
  - Protrusion: 10-11mm
  - Retrusion: 0-1mm

- **Hypomobility**
  - <40mm *(Bitler et. al., 1991)*
  - <35 *(Dijkstra et.al., 2006)*

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Measurement Technique

- Active Opening
- Passive Opening
- Lateral Movement
- Retraction
- Protrusion
Manual Functional Analysis

- Screen neck mobility
- At rest and with movement
  - Look
  - Listen
  - Palpate
    - Joint
    - Muscles of mastication
Instrumental Evaluation

- General dental exam
- Panorex
  - Confirms degenerative joint changes
  - Quantify level of asymmetry
- CT
- MRI
- Casting
- Axiography
  - Evaluates trajectory
Traditional Treatments

- None/ Compensation
  - Diet modification
- Clothespins
- Screws
- “Open your mouth”
- Manual pressure
- Chewing gum
- Tongue depressors
Dental Treatments

- Elimination of behaviors that strengthen antagonists
- Intraoral orthotics
- Distraction osteogenesis
Physical Therapy

- Icing/ Heat
- Massage
- Manipulation/ Traction
- Compression
- TENS
- EMG biofeedback
- Ultrasound
- Manual lymph drainage
- Exercise
Facial-Flex

- Two minutes/ 2x a day
- Isometric/ Isokinetic
- Reduces scar formation and lip contraction
- Open to maximum comfort, close and hold for two seconds
Treatment: Passive ROM

- Passive
  - External force is applied
  - Joint moves
  - Surrounding muscles inactive

- Benefits
  - Improved circulation
  - Reduces inflammation
  - Elongates muscle fibers
  - Mobilizes joint
  - Increases flexibility of connective tissue

Buchbinder & Currivan (1991)
Passive ROM Devices

- Dynasplint
  - Passive
  - Low load prolonged-duration stretch
  - Spring-loaded
  - Hands-free option
  - Adjustable
  - Customized mouthpiece
  - 3x/ day for 30 minutes
  - Rented to patient

www.dynasplint.com
Therabite

- Efficacy is documented
- Dental pads
- Passive range of motion
- Patient controlled
- 7-7-7 protocol
- 5-5-30 protocol

www.atosmedical.com
Therapacer CPM

- Programmable
- 18-61 mm
- 100% passive
- Motorized
- Continuous
- 4-6 hours/day for 4-6 weeks
- Lateral and protrusive attachments
The Final Word

Abdel-Galil et al.
References


