An Introduction to the Evaluation of Trismus In Individuals Treated for Head and Neck Cancer

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INTRODUCTION

The purpose of Part I of this resource is to provide the clinician with an introduction to the evaluation process for individuals whose trismus is related to the treatment for head and neck cancers. The assessment of trismus typically requires additional training via continuing education coursework and hands-on practice and application of evaluation skills. This resource is not intended to be a substitute for more formal training necessary to become competent in the provision of trismus rehabilitation. This resource aims to provide an overview of the following: a) what is trismus, b) evaluating maximal incisal opening (MIO) and c) patient reported outcome measured for patients with trismus.

WHAT IS TRIMUS?

Trismus is defined as reduced oral opening, or restricted range of motion of the mandible, or jaw due to any etiology (Santiago-Rosado & Lewison, 2021). Trismus can result from many different conditions including: a) traumatic, b) infectious/inflammatory processes, c) congenital malformations, d) odontogenic causes, e) neurogenic, f) iatrogenic, and g) as a result of treatment for head and neck neoplasms (Santiago-Rosado & Lewison, 2021). The impact of trismus on function can be significant. Reduced oral opening can be associated with pain, impacting speech intelligibility and non-verbal communication (e.g., facial expression), making it difficult to complete adequate oral care, changing the ability to effectively masticate solid foods, and ultimately result in reduced oral intake to meet nutrition and hydration needs. The speech-language pathologist (SLP) is uniquely positioned to address the needs of individuals with trismus by engaging them in proactive/preventive care and to provide patient-centered and evidence-informed treatments to improve upon speech intelligibility, social communication, and swallowing.

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TRISMUS RISK FACTORS

When completing a dysphagia evaluation for a patient with a history of head and neck cancer, it is important to consider the major risk factors for developing trismus: chemotherapy, radiotherapy, surgical resection and/or reconstruction and previous cancer treatment (Owosho et al. 2017). It is estimated that 32-50% of all head and neck cancer patients will develop trismus (Jeremic et al, 2011; Johnson et al., 2010; Kent et al., 2008, Sakai et al., 1988).Lee et al. (2012) report that 79% of patients receiving any head and neck surgery will develop trismus. The location of radiation will also increase the patient's risk. Specifically, patients who receive radiation therapy to the pterygoid (Jeremic et al., 2011), the nasopharynx (Chen et al., 2001b; Lee et al., 2012; Song & Jiang, 2008) and the oropharynx (Lee et al., 2012) are most at risk of developing trismus.

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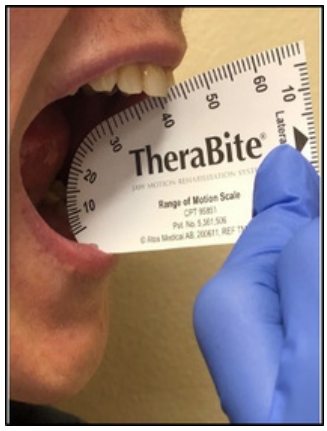
Some medical centers send patients for evaluation of dysphagia, including trismus assessment, prior to undergoing medical treatment. This model is useful because a baseline oral opening can be established prior to undergoing medical treatments (as previously mentioned) that will be more likely to lead to trismus.

MEASUREMENT OF MAXIMAL INTERINCISAL OPENING (MIO):

Maximum Interincisal Opening (or MIO) provides a clinician with a baseline and re-assessment measure that can indicate the effectiveness (or ineffectiveness) of trismus interventions.Both oral opening and lateral jaw movement can be evaluated as in the pictures below, using the TheraBite Range of Motion Scale or the OraStretch Range of Motion Scale. If you do not have access to a measuring tool you can use a small ruler. Please see step-by-step instructions below for measuring oral opening and lateral ROM.

Measuring Oral Opening with range of motion scale:

1. Instruct the patient to open their mouth as wide as they can.
2. Place notch on lower central tooth and measure to an upper central tooth. (For edentulous or limited dentition measure in between gums: subtract 20mm for edentulous, 10mm for absent lower or upper dentition).
3. Record measurement in millimeters.
4. Always re-measure using the same teeth.



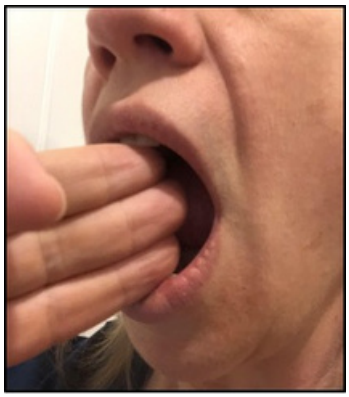
Measurement of MIO using a Therabite ROM tool.

Measuring Lateral Jaw Movement:

1. Place measurement tool on center tooth.
2. Ask patient to lateralize jaw to left and measure displacement in mm.
3. Ask patient to lateralize jaw to right and measure displacement in mm.

Measurement of lateral excursion using a Therabite ROM tool.

The vertical fingers test is an alternative to formal measurements and can be helpful for patients and caregivers to easily monitor their mouth opening. The patient can establish their baseline, ideally before treatment, and monitor for any changes and/or improvement during therapy. Generally, an individual should be able to fit three stacked fingers (from their own hand) between their upper and lower teeth.


Measurement of oral opening using vertical fingers test (individual using their own fingers).

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Once obtaining the measurements, you can consider a variety of interpretations as listed below.

Trismus Severity Rating Scale - Interincisal

Severity Level	Measurement	Number of Fingers
Normal	35-45 mm	3-4
Mild	30-34 mm	2-3
Moderate	15-29 mm	1-2
Severe	5-14 mm	1
Profound	0-4 mm	0

(Dijkstra et al., 2006)

Lateral Excursion Severity Ratings

Severity Level	Measurement
Normal	12 mm
Mild	8-11 mm
Moderate	4-7 mm
Severe-Profound	0-2 mm

(Beltran-Alacreu et al., 2014)

When reassessing MIO/oral opening, use the same measuring system and measure from the same teeth. Also, train your patients and their caregivers in measuring their oral opening so they can keep track of their progress as well.

FUNCTIONAL OUTCOME MEASURES(FOMS) /PATIENT REPORTED OUTCOMES (PROS)

FOMS or PROs are essential in measuring patient perception of their impairment levels. Impairment may or may not include pain. Options include:

Outcome Measure	Measures	Reference
Gothenburg Trismus Questionnaire (GTQ)	Trismus	Johnson et al. (2012)
Speech Handicap Index (SHI)	Speech impairment	Rinkel et al. (2007)
Eating Assessment Tool (EAT-10)	Dysphagia impairment	Belafsky et al. (2008)
Functional Oral Intake Scale (FOIS)	Diet level	Crary et al. (2005)
Performance Status Scale - Head and Neck (PSS-HN)	Diet level, speech intelligibility and meal participation	List et al. (1996)
MD Anderson Dysphagia Inventory (MDADI)	Dysphagia impairment	Chen et al. (2001a)
McGill Questionnaire	Pain	Melzack & Katz (2001)
Verbal Rating Scale (VAS)	0-10 Pain	MacFarlane et al. (2012)

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SUBJECTIVE MANUAL ASSESSMENT

Subjective manual assessment can also be completed to assess areas of tenderness and limited mobility. For example, clinicians can evaluate a patient's pterygoid, masseters, temporalis muscle and TMJ capsule. Please see the treatment section of this resource (Part 2) for more information. Further hands-on training of manual assessment is recommended. Clinician rating tools such as the Modified Ashworth Scale can be used to more objectively rate increased muscle tone during assessment (Harb & Kishner, 2022).

CULTURAL CONSIDERATIONS

Clinicians should consider individual cultural differences in food preferences, customs and speech/communication. Informed consent should be obtained before completing oral motor and oral opening evaluations, and with any manual intervention, as certain cultures do not support massage or other evaluation of a member of another gender.

While details regarding the gender of participants in the research summarized within this document is readily available, information regarding the race and/or ethnicity of the participants was not reported. When considering the use of manual therapies such as MFR to treat individuals with speech, voice, and/or swallowing disorders, it is imperative to strive for implementation of a patient-centered approach that takes into consideration the individual's wants and needs related to their treatment plan. Providers may also consider implementation of a patient-centered culturally sensitive approach to health care, such as the model described by Tucker et al. (2011). In addition, members of the Medical SLP Collective may also consider joining the Diversity Collaboration Committee for discussion and mentorship.

CONCLUSION

While the evaluation of trismus requires mentoring and ongoing learning that begins with education on risk factors, measurement scales, measurement methods and functional outcome measures can best identify a patient's baseline and help to provide evidence of progress throughout their therapy course. Please see Part II of the trismus resource for an introduction to recommendations for the treatment of trismus.

RESOURCES

Therabite ROM Scales: https://www.atosmedical.us/product/therabite-jaw-motion-rehabilitation-system/

OraStretch ROM Scales:
https://www.craniorehab.com/OraStretch-Jaw-ROM-Scale-Pack_p_16.html

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REFERENCES

Belafsky, P. C., Mouadeb, D. A., Rees, C. J., Pryor, J. C., Postma, G. N., Allen, J., & Leonard, R. J. (2008). Validity and reliability of the Eating Assessment Tool (EAT-10). *Annals of Otology, Rhinology & Laryngology, 117*(12), 919-924.doi: 10.1177/000348940811701210.

Beltran-Alacreu, H., López-de-Uralde-Villanueva, I., Paris-Alemany, A., Angulo-Díaz-Parreño, S., & La Touche, R. (2014). Intra-rater and inter-rater reliability of mandibular range of motion measures considering a neutral craniocervical position. *Journal of Physical Therapy Science, 26*(6), 915-920. doi: 10.1589/jpts.26.915.

Chen, A. Y., Frankowski, R., Bishop-Leone, J., Hebert, T., Leyk, S., Lewin, J., & Goepfert, H. (2001a). The development and validation of a dysphagia-specific quality-of-life questionnaire for patients with head and neck cancer: The MD Anderson Dysphagia Inventory. *Archives of Otolaryngology–Head & Neck Surgery, 127*(7), 870-876. https://jamanetwork.com/journals/jamaotolaryngology/article-abstract/482382

Chen, M., Zeng, X., Zhao, C., Wu, S., Huang, X., HAN, F., Luo, W., Lu, T., Cui, N. (2001b). Radiation-induced temporomandibular joint lesion in patients with nasopharyngeal carcinoma. *Chinese Journal of Cancer, 20,* 651-653. http://www.cancercommun.com/fulltextnew.asp?y=2007&m=1&ym=64

Crary, M. A., Mann, G. D. C., & Groher, M. E. (2005). Initial psychometric assessment of a functional oral intake scale for dysphagia in stroke patients. *Archives of Physical Medicine and Rehabilitation, 86*(8), 1516-1520. https://doi.org/10.1016/j.apmr.2004.11.049

Dijkstra, P.U., Heisman, P.M., & Roodenburg, J.L.N. (2006). Criteria for trismus in head and neck oncology. *International Journal Oral Maxillofacial Surgery*, 35 (4), 337-342. http://dx.doi.org/10.1016/j.ijom.2005.08.001

Harb A, & Kishner S. (2022 May 8). *Modified Ashworth Scale*. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. https://www.ncbi.nlm.nih.gov/books/NBK554572/

Jeremic, G., Venkatesan, V., Hallock, A., Scott, D., Hammond, A., Read, N., Franklin, J., Yoo, J., & Fung, K. (2011). Trismus following treatment of head and neck cancer. *Journal of Otolaryngology Head and Neck Surgery, 40*(4), 323-329.

Johnson, J., van As-Brooks, C. J., Fagerberg-Mohlin, B., & Finizia, C. (2010). Trismus in head and neck cancer patients in Sweden: Incidence and risk factors. *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research, 16*(6), CR278–CR282.

Johnson, J. Carlsson, S., Johansson, M., Pauli, N. Ryden, A., Fagerberg-Mohlin, B. & Finizia, C. (2012). Development and validation of the Gothenburg Trismus Questionnaire (GTQ). *Oral Oncology, 48 (8), 730-736.* doi:10.1016/j.oraloncology. 2012.02.0013.

Kent, L. M., Brennan, M. T., Noll, J. L., Fox, P. C., Burri, S. H., Hunter, J. C., & Lockhart, P. B. (2008). Radiation-induced trismus in head and neck cancer patients. *Supportive Care in Cancer: Official Journal of the Multinational Association of Supportive Care in Cancer, 16*(3), 305–309. https://doi.org/10.1007/s00520-007-0345-5

List, M. A., D'Antonio, L. L., Cella, D. F., Siston, A., Mumby, P., Haraf, D., & Vokes, E. (1996). The performance status scale for head and neck cancer patients and the functional assessment of cancer therapy head and neck scale: A study of utility and validity. *Cancer: Interdisciplinary International Journal of the American Cancer Society*, *77*(11), 2294-2301. https://doi.org/10.1002/(SICI)1097-0142(19960601)77:11%3C2294::AID-CNCR17%3E3.0.CO;2-S

Macfarlane, T. V., Wirth, T., Ranasinghe, S., Ah-See, K. W., Renny, N., & Hurman, D. (2012). Head and neck cancer pain: Systematic review of prevalence and associated factors. *Journal of Oral Maxillofacial Research, 3*(1), e1. doi:10.5037/jomr.2012.3101. PMID: 24422003; PMCID: PMC3886092.

Melzack, R., & Katz, J. (2001). The McGill Pain Questionnaire: Appraisal and current status. In D. C. Turk & R. Melzack (Eds.), *Handbook of pain assessment* (pp. 35–52). The Guilford Press.

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REFERENCES

Ming-hu, J. (2008). Effect of man-made intervention on intensity modulated radiation therapy-induced trismus in patients with nasopharyngeal carcinoma. *Chinese Clinical Oncology*. https://cco.amegroups.com/

Owosho, A. A., Tsai, C. J., Lee, R. S., Freymiller, H., Kadempour, A., Varthis, S., Sax, A. Z., Rosen, E. B., Yom, S. K., Randazzo, J., Drill, E., Riedel, E., Patel, S., Lee, N. Y., Huryn, J. M., & Estilo, C. L. (2017). The prevalence and risk factors associated with osteoradionecrosis of the jaw in oral and oropharyngeal cancer patients treated with intensity-modulated radiation therapy (IMRT): The Memorial Sloan Kettering Cancer Center experience. *Oral Oncology, 64*, 44–51. https://doi.org/10.1016/j.oraloncology.2016.11.015

Rinkel, R. Verdonck-de Leeuw I., van Reij E., Aaronson N., & Leemans R. (2007). Speech Handicap Index in patients with oral and pharyngeal cancer: Better understanding of patients' complaints. *Head and Neck, 30,* 868-874. doi:10.1002/hed.20795

Santiago-Rosado, L. M., & Lewison, C. S. (2021, November 24). *Trismus*. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. https://www.ncbi.nlm.nih.gov/books/NBK493203/

Sakai, S., Kubo, T., Mori, N., Itoh, M., Miyaguchi, M., Kitaoku, S., Sakata, Y., & Fuchihata, H. (1988). A study of the late effects of radiotherapy and operation on patients with maxillary cancer. A survey more than 10 years after initial treatment. *Cancer, 62*(10), 2114–2117. https://doi.org/10.1002/1097-0142(19881115)62:10<2114::aid-cncr2820621008>3.0.co;2-j

Tucker, C. M., Marsiske, M., Rice, K. G., Nielson, J. J., & Herman, K. (2011, May). Patient-centered culturally sensitive health care: Model testing and refinement. *Health Psychology, 30*(3), 342-350. https://doi.org/10.1037/a0022967

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