Overview
Deficits in mandibular range of motion and impairment of mandibular function, or trismus, is a common consequence of radiation therapy (RT) when the muscles of mastication are within the treatment field. This range of muscular deficits is the result of multiple changes in this complex region, including inflammatory changes that ensue and cause sustained muscle contraction, connective tissue contracture, and eventually fibrosis. The incidence of radiation-induced trismus has been reported to range widely from 5% to 47% in those with HNCs.

Consequences of Treatment
Combined modality treatments for locoregional, advanced head and neck cancer (HNC) such as chemoradiation therapy (CRT) and surgery with adjuvant RT or CRT, clearly increase the risk for trismus. Thus, it is critically important to evaluate and report the potential side-effects of such regimens. As these modalities become increasingly effective, the number of patients surviving with trismus will increase and deficits from this problem may influence general oral functioning and speech.

Statement of Need
While RT is a highly effective intervention for many HNC sites, side effects and subsequent disability in oral functioning and quality of life (QOL) may emerge. For that reason, this study assessed the impact and disability of trismus secondary to RT or CRT.

Currently, there is a small body of research investigating the objective quantification of trismus at numerous time points following HNC treatment. Even fewer studies have considered the objective and subjective impact of treatment-induced trismus. One study has included a more comprehensive objective quantification of jaw function by also including four different measurements based on the Helkimo Masticatory Dysfunction Index (HMMD).

Methods

Objective
To identify the objective and subjective impact of trismus at 3, 6, 9, and 12 months post-treatment through a prospective, cohort study.

Participants
Twenty adult participants treated with either RT or CRT were assessed for masticatory dysfunction using four different measures of mouth opening in the Helkimo Masticatory Dysfunction Index (HMMD), maximal vertical distance, maximal protrusion distance, and maximal lateral distances—bilaterally. Further, measures using the Therabite Range of Motion Scale (TRSMS) were also acquired. The Masticatory Function Impairment Questionnaire (MFIQ) was used to assess the impact of trismus on QOL and activities of daily living. Informed consent was obtained for all participants according to our Research Ethics Board approval and guidelines.

Measurement Procedure

Masticatory Dysfunction Measurement
• Mouth-opening measured with participant seated upright.
• Boley gauge (Figure 1) calibrated to lowest measurement (closed) position.
• A diagram of measures obtained is shown in Figure 2.
• Maximal vertical distance (MVD) measured between opposing edges of upper and lower incisors (see Figure 3a).
• Maximal protrusion distance (MPD) measured from the lateral aspect of the incisors at rest to maximum protrusion of mandible.
• Maximal lateral distance (MLD) — distance between central incisors to right-most distance after instruction to slowly move mandible. Directions repeated for left MLD.

• Completely edentulous patients (in absence of dentures) measured between the alveolar ridges at the anatomical point of the central incisors.
• Procedure repeated using the Therabite Range of Motion Scale (ATOS Medical) (see Figure 3b).

Masticatory Function Impairment Assessment (MFIOQ)
All participants completed the MFIOQ. The total score is based on a 5-point Likert scale that can be used to categorize performance with respect to mouth opening. A summary is provided in Table 2.

Results

Table 1. Patient Demographics

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Maximal/Vertical Distance (MVD) Pre-Treatment Follow-up

Figure 4. MVD Measurement — Pre and Post-Treatment

Figure 3a & 3b. Measurement Procedure

Clinical Considerations

• Mandibular movement should be monitored in a regular and consistent manner to accurately document changes prior to and during treatment.
• Therabite ROM scales may not be refined enough to reveal small yet critical changes in mandibular mobility secondary to treatment, while both methods can index trismus, the Boley Gauge exhibits improved sensitivity.
• While group comparisons are common in HNC research, the present data suggest the value of individual data in identifying proportional levels of mandibular change and its associated perceived disability.
• The present data may provide valuable information as part of counseling (i.e., what is to be expected, how much of a change may occur, etc.) as well as longer term expectations post-treatment.

References