

Clinical Paper
Head and Neck Oncology

Mouth opening and trismus in patients undergoing curative treatment for head and neck cancer

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Abstract. This study documents mouth opening and the incidence of and factors contributing to trismus (<35 mm mouth opening), as well as the associated impact on quality of life, following curative treatment for head and neck cancer. Patient demographics, cancer type and location, and treatments were documented. Mouth opening was measured at >6 months after treatment completion. Patients rated the impact of mouth opening on quality of life from 0 (no effect) to 10 (greatest effect). The mean mouth opening in 120 patients was 40.1 mm (range 11–65 mm), with trismus occurring in 34 (28.3%) patients. Surgery and radiotherapy, surgery and chemoradiotherapy, and resection and reconstruction were associated with reduced mouth opening. The mean effect of mouth opening on quality of life for those with and without trismus was 3.8 and 1.5, respectively. There was a significant difference between the mean effect on quality of life for patients with and without trismus for those patients who underwent chemoradiotherapy or combined surgery and radiotherapy (4.0 vs. 1.0, and 3.6 vs. 1.6 respectively). Trismus impacts negatively on patient quality of life. Multi-modality treatment is associated with decreased mouth opening, an increased incidence of trismus, and reduced quality of life.

Key words: trismus; radiotherapy; chemotherapy; surgery; cancer; head and neck; quality of life; treatment.

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Head and neck cancer (HNC) was the eighth leading cause of cancer deaths in 2000¹ and the seventh leading cause in 2004.² The majority of HNC cases require combined treatment with surgery and/or radiotherapy (RT)³ and/or chemotherapy (ChT).⁴

Trismus is defined as a progressive tonic contraction of the muscles of mastication that results in decreased mouth opening.^{5,6} Factors that contribute to the development of trismus include trauma,⁷ infection,⁸ drugs (e.g. succinyl choline, phenothiazines, and tricyclic

antidepressants),⁹ direct tumour invasion of the masticatory muscles and/or temporomandibular joint,¹⁰ submucosal fibrosis,¹¹ and RT and/or ChT.^{9,12} Trismus can lead to impairment of speech and eating, malnutrition, poor oral hygiene, and difficulty with dental treatment.^{6,10} Severe

trismus can cause difficulties with examination of and surgical access to the oral cavity and oropharynx and difficulties with intubation.^{12–14}

Trismus is a well-recognized complication of treatment for HNC¹⁵ with a reported incidence of 5–86%, depending on the study and its definition of trismus.^{6,15} The absence of a consistent definition of trismus and method of measuring mouth opening makes it difficult to compare research results.^{3,16} However, mouth opening of <35 mm has been used to define trismus in several studies.^{13,15,16} Few studies have addressed the impact of mouth opening on quality of life (QoL), and these have yielded inconsistent findings.

Materials and methods

Consecutive patients who underwent treatment for HNC with curative intent between 1 January 2009 and 1 June 2012 were identified from HNC databases at three New Zealand hospitals. Following ethical approval by the internal review boards of the three respective district health boards, the data of these patients were merged into a single database. Patients were assessed in multidisciplinary head and neck clinics and all underwent surgery and/or RT or chemoradiotherapy (CRT). They were categorized into three groups: those with primary tumours located in (1) the oral cavity, (2) the oropharynx or nasopharynx, or (3) the parotid gland, or metastatic disease in the parotid and/or neck from a skin cancer or an unknown primary. Patients were excluded from the study if they had died, had recurrent disease during the study period, had an unrelated jaw fracture, had submucosal fibrosis, moved overseas, were incarcerated, or declined participation. Patient demographics, tumour type, stage and location, presence of regional metastasis, and treatment regime were documented. Data were supplemented by review of the patient medical records.

All patients were staged using the TNM staging system¹⁷ following clinical and radiological assessment. They were treated with surgery and/or RT or CRT. Patients with primary cancer located in the oral cavity were more likely to undergo surgical resection (with or without adjuvant RT ± ChT), whereas those with oropharyngeal or nasopharyngeal cancer mostly received RT usually combined with ChT.⁴ Of the patients who underwent surgery, those with less extensive disease generally underwent resection alone,

whilst those with more extensive disease underwent resection and reconstruction.

All patients receiving RT were treated with three-dimensional conformal RT or intensity modulated RT (IMRT). ChT was used together with RT either as a primary treatment or in adjuvant settings after surgery.

Patients were followed up routinely in outpatient clinics and were assessed for recurrence clinically and, if indicated, radiologically. Patients with tumour recurrence during the study period were excluded.

In order to assess the mouth opening experienced by the patients on a day-to-day basis, mouth opening was measured as the distance between the upper and lower incisors in dentate patients, or between the maxillary and mandibular alveolar ridges in edentulous patients who did not wear dentures, using a TheraBite Range of Motion Scale. Patients who wore dentures were measured with their dentures in situ. Trismus was defined as mouth opening of <35 mm, whilst severe trismus was defined as mouth opening of <25 mm. Patients completed a questionnaire assessing the impact of mouth opening on QoL, using a visual analogue scale from 0 (no effect) to 10 (greatest effect). All non-responders at 2 weeks were followed up by phone.

The statistical analysis was performed using the Student's *t*-test for independent variables.

Results

Two hundred and fifty-nine patients were identified for inclusion in the study.

Patients were excluded if they had died ($n = 94$), developed recurrence during the study period ($n = 10$), had an unrelated jaw fracture ($n = 1$), moved overseas or were lost to follow-up ($n = 5$), were incarcerated ($n = 1$), were deemed unable to give informed consent to participate ($n = 1$), or did not consent to participate ($n = 27$). Our final study population was 120 patients; 43 were females and 77 were males, and they ranged in age from 34 to 87 years (mean 63.7 years) (Table 1). The locations of the primary tumours are shown in Table 1. Due to small numbers of tumours at each sub-site, they were categorized into three groups based on anatomical proximity and likely method of treatment. The tumours were located in the oral cavity ($n = 45$), oropharynx or nasopharynx ($n = 35$), and parotid gland, or metastatic disease in the parotid and/or neck from a skin cancer or an unknown primary ($n = 40$).

Patients were treated with surgery alone ($n = 18$, 15%), surgery with postoperative adjuvant RT ($n = 56$, 46.7%), surgery with postoperative adjuvant CRT ($n = 7$, 5.8%), primary CRT ($n = 34$, 28.3%), or RT alone ($n = 5$, 4.2%). The mean follow-up period between completion of treatment and the measurement of mouth opening was 709.7 days (standard error of the mean 31.67, median 654, standard deviation 34.5 days).

All patients who completed the questionnaire had their mouth opening measured; mean mouth opening was 40.1 mm (range 11–65 mm). Trismus was identified in 34 (28.3%) patients, with four (3.3%) classified as having severe trismus (mouth

Table 1. Patient demographics and location of primary tumours.

	Total no. of patients	No. of patients with trismus ^a (%)
<i>Sex</i>		
Male	77	20 (26.0)
Female	43	14 (32.6)
<i>Tumour location</i>		
Oral cavity	45	10 (22.2)
Nasopharynx	2	2 (100.0)
Oropharynx	33	11 (33.3)
Parotid	6	0
Metastatic disease to parotid and/or neck from skin cancer	25	10 (40.0)
Metastatic disease to parotid and/or neck from unknown primary	9	1 (11.1)
<i>Dental status</i>		
Incisor ^b –incisor	93	27 (29.0)
Incisor ^b –alveolar ridge	15	5 (33.3)
Alveolar ridge–alveolar ridge	12	2 (16.7)

^a Defined as mouth opening of <35 mm.

^b Incisor of the native dentition or that of the denture.

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