

# Patient-reported quality of life outcomes following treatment for oral cancer

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**Abstract.** Patient-reported quality of life (QoL) outcomes have the potential to assist clinicians in providing individually tailored treatment decisions. QoL assessments were collected prospectively for 168 consecutive patients treated for oral cancer between 1 January 2010 and 31 December 2014 using the University of Washington Quality of Life Questionnaire. Patients were followed up for 18 months post-treatment. Sub-group analyses were performed using paired *t*-tests and analysis of variance (ANOVA) to compare the effects of adjunctive chemoradiotherapy, type of bone resection, and methods of soft and hard tissue flap reconstruction. The greatest statistically significant reduction in QoL for all oral cavity sub-sites was found following the treatment of floor of mouth tumours (−18.9%,  $P = 0.018$ ). Laser excision for matched patient cohorts resulted in improved resultant QoL compared to other excision techniques ( $P = 0.0002$ ). No significant difference in QoL was found when radial forearm and anterolateral thigh flaps were matched, or when fibula and scapula flaps were matched. These findings support the use of laser excision and the avoidance of postoperative radiotherapy if curative intent and survival outcomes are maintained.

**Key words:** oral; cancer; quality of life; surgery; complication.

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Patient-reported quality of life (QoL) is increasingly used by clinicians to assist in determining success following the treatment of oral cancer<sup>1,2</sup>. Unlike the more traditional parameters of survival, loco-regional disease control, and function, QoL should be determined by the patient independently of the clinician<sup>3,4</sup>. QoL questioning has the ability to delineate specific difficulties

following oral cancer resection, such as negative effects upon speech, swallowing, and social eating<sup>5–7</sup>. It can also be used to measure more global changes in patient perceptions of treatment that can be difficult to ascertain by other means of direct questioning. The use of radiotherapy, for example, is well recognized to impact negatively on QoL, and strict criteria for its use exist<sup>8–11</sup>. However it

is in those clinical scenarios for which two or more potential options are available, particularly with similar effects upon survival, that the use of QoL is potentially most advantageous.

Multiple options exist for the treatment of mucosal oral cavity cancer, with little evidence on resultant QoL to assist in their selection. The most common options for soft tissue resection include

conventional scalpel, diathermy, laser, and a harmonic scalpel. Smaller defects, such as T1 tongue tumours, can be left to heal by secondary intention; however, for larger defects, the full spectrum of the reconstructive elevator has been described, including local, regional, and distant flaps<sup>2,12,13</sup>. The resection of large tongue defects has a particularly negative impact on QoL<sup>11,14,15</sup>, with free flap reconstruction having been described as the most critical factor in achieving a successful functional result<sup>16</sup>. However limited evidence exists to determine which soft tissue flap is more successful and for which size of defect. The bulkiness of the flap used for reconstruction is thought to negatively affect QoL following tongue resection<sup>13,17</sup>. However the anterolateral thigh (ALT) perforator flap is gaining increasing acceptance over the radial forearm free flap (RFFF), even for less extensive defects. Both flaps have proved very reliable, with flap success rates of approximately 95%, but limited evidence exists to compare the effect upon resultant QoL between them<sup>16,18–20</sup>.

Bone invasion into the mandible requires resection, be that rim resection or segmental, with potentially differing effects on QoL<sup>7</sup>. Segmental mandibular defects are generally reconstructed with autologous vascularized bone free tissue transfer, while rim resections are covered with soft tissue flaps, either distant or local. It would be easy to assume that segmental resections would result in worse QoL, but there is very limited evidence to support this<sup>10,11,21–23</sup>. In a similar manner to the aforementioned soft tissue flaps, limited evidence exists to compare the effect upon resultant QoL between vascularized bone flaps<sup>24</sup>.

The substantial number of publications using the University of Washington Quality of Life Questionnaire (UW-QoL) speaks for the validity of this tool<sup>12</sup>. However the vast majority of QoL data on the treatment of oral cavity cancer have been collected retrospectively<sup>2,8,12,16,25</sup>, with very little prospective collection<sup>4,26</sup>. Such retrospective data collection in these types of studies is more subject to selection bias, and the temporal relationship to each QoL domain is particularly difficult to determine. The aim of this research was to determine whether treatment options for oral cancer with similar clinician-determined outcomes have differences in the patient-reported QoL measures when data are collected prospectively.

## Methods

### Data collection

Version 4 of the UW-QoL questionnaire (UW-QoL v4)<sup>27</sup> was administered prospectively, pre- and post-treatment, for consecutive patients treated for oral cancer in a centralized oncology service representing three UK hospitals, between 1 January 2010 and 31 December 2014. Pre-treatment questionnaires were completed at the time of consenting the patient, which in the study unit is 1 week prior to surgery. UW-QoL v4 consists of 12 questions, each of which has between three and six Likert-scale responses rated from 0 (worst/poor) to 100 (best/excellent). Questions cover pain, appearance, activity, recreation, speech, chewing, swallowing, shoulder pain, taste, saliva, mood, and anxiety<sup>28,29</sup>. Composite health-related quality of life (HRQoL) functional scores were divided into two subscales, as suggested by Rogers et al.: average physical function and social-emotional function<sup>30</sup>. Scores for the 'physical function' subscale were computed as the simple mean of the following domain scores: chewing, swallowing, speech, taste, saliva, and appearance. Scores for the 'social-emotional function' subscale were computed as the simple mean of the following domain scores: pain, activity, recreation, shoulder function, mood, and anxiety. A time to follow-up of 12 months was chosen, as previous studies evaluating QoL in patients with head and neck tumours have shown that the most significant QoL changes occur during the first year after diagnosis<sup>27,31</sup>. Questions were asked in private consultation by a clinical nurse specialist; an interpreter was present if required. Three general questions are asked at the end of the questionnaire relating to overall HRQoL (General 1), HRQoL specifically in the last 7 days (General 2) and overall QoL which includes factors additional to health such as leisure (General 3).

### Statistical analysis

Comparisons of normally distributed continuous variables using average pre- and post-treatment scores were completed using a paired *t*-test and analysis of variance (ANOVA). The following sub-group analyses were undertaken: (1) each sub-site within the oral cavity; (2) patients who underwent surgical treatment alone compared to those who had additional adjunctive therapy (radiotherapy or chemoradiotherapy); (3) for patients with cancer of the anterior two-thirds of the

tongue staged as T1/T2 only: laser resection vs. scalpel or monopolar diathermy excision; (4) for patients with cancer of the anterior two-thirds of the tongue only: ALT flap vs. RFFF; (5) for patients who underwent mandibular resection: rim resection vs. segmental mandibulectomy; (6) for patients who underwent mandibular reconstruction following segmental resection: fibula vs. scapula flap.

Statistical significance was considered for values with  $P < 0.05$ . All statistical analyses and data presentations (tables and figures) were generated using GraphPad Prism version 6.0f (GraphPad Software, Inc., La Jolla, CA, USA).

### Ethics statement

Quality of life assessments are traditionally incorporated into the management of the centralized head and neck oncology service at the study institution and are used to focus consultations to the patient's needs. All responses were anonymized and patient data kept strictly confidential. The use of such measures within the UK National Health Service system exempts studies of this type from formal institutional review board or ethics committee approval and these were approved by the Royal Wolverhampton Hospital NHS Trust.

## Results

During the study period, 168 patients underwent surgical treatment for cancer of the oral cavity. The mean age at time of treatment was 65.5 years. 59% were male and 41% were female. At least one post-treatment QoL assessment was completed by 134 of the 168 patients. Of these 134 patients, only the 102 who completed both a preoperative QoL assessment and a 12-month follow-up questionnaire were included in this study, as the questionnaire completion at 6 months and 18 months was poor (60% and 21%, respectively). Details of the tumour staging and pathology, as well as the treatments used, are given in Table 1.

### Pre- versus postoperative QoL scores for the total 102 patients

When all oral cavity sub-sites were considered together, the overall post-treatment cumulative QoL score ( $161.1 \pm 34.95$ ) was significantly lower than the baseline pre-treatment score ( $183.5 \pm 19.48$ ) ( $P < 0.0001$ ) (Fig. 1).

When broken down by tumour location (Table 2), the greatest statistically signifi-

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