Quality of life in Chinese patients with laryngeal cancer after radiotherapy

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Abstract
This retrospective study explored the quality of life (QoL) in Chinese patients with laryngeal cancer (LC) after radiotherapy. Fifty-nine eligible patients with Tis-T4 LC were included in this retrospective study. All patients received radiotherapy. Outcomes were assessed before and 3 months after the radiotherapy.

Three months after the radiotherapy, all items of QLQ-C30 and QLQ-H&N35 scales changed significantly (P < .05), except the social functioning (P = .09), role activities (P = .81), and global (P = .12) in QLQ-C30 scale and social contacts (P = 1.00), teeth problems (P = .21), trismus (P = 1.00), and feeling ill (P = .07) in QLQ-H&N35 scale, compared with these items before the radiotherapy.

The results of this study showed that most items of QoL changed significantly after 3 months of radiotherapy in Chinese patients with LC.

Abbreviations: LC = laryngeal cancer, QLQ-C30 = core measure Questionnaire-C30, QLQ-H&N35 = disease-specific Head & Neck cancer module, QoL = quality of life.

Keywords: laryngeal cancer, quality of life, radiotherapy

1. Introduction
Laryngeal cancer (LC) is one of the most common malignant types of cancers in head and neck. Most of such patients were diagnosed with squamous cell cancer, chiefly on the epithelial lining of the larynx. It has been estimated that the rates of incidence and mortality in Chinese patients with LC were about 1.54 per 100,000 and 0.91 per 100,000, respectively by 2010. Although its incidence is relatively lower compared with other cancers, it severely affects the quality of life (QoL) in such patients. Additionally, its mortality rate also increases year by year.

Radiotherapy is utilized as a primary treatment for patients with early LC, and has achieved good survival outcome. It has also been reported that radiotherapy may affect the voice quality and health-related QoL in patients with LC. Several studies have evaluated the impact of radiotherapy on voice in patients with LC. However, no inconsistent results were demonstrated from those studies.

Presently, limited evidence is available to support that radiotherapy can improve the QoL in Chinese patients with LC. Thus, in this retrospectively study, we investigated the effect of radiotherapy on QoL in patients with LC after radiotherapy among Chinese population.

2. Methods and materials

2.1. Ethics statement
This study was approved by the Ethical Committees of First Affiliated Hospital of Jiamusi University, and Second Affiliated Hospital of Mudanjiang Medical University. Informed consent and required document were obtained from all patients in this study.

2.2. Design
This retrospective study included 59 eligible Chinese patients with Tis-T4 LC after radiotherapy. All the included patients completed the radiotherapy. QoL and voice quality were measured and evaluated before and 3 months after the treatment.

2.3. Subjects
Patients with Tis-T4 LC after radiotherapy were included in this study. Inclusion criteria included eligible patients older than 18 years. All patients completed the radiotherapy treatment. However, patients were excluded if they received primary surgery or radiotherapy before this study, and incomplete data.

2.4. Therapeutic methods
All patients received radiotherapy to the primary tumor with 2 Gy fractions, once daily, for a total of 22 days, and total fractions up to 44 Gy. After that, a boost dose of 2 Gy fractions, twice daily
for a total of 24 Gy to the primary tumor and involved lymph nodes.

### 2.5. Outcome measurements

The QoL was measured by the QoL core measure Questionnaire-C30 (QLQ-C30), consisting of 15 items, and the disease-specific Head & Neck cancer module (QLQ-H&N35), comprising 18 items. All of the scales and single item of QLQ-C30 range from 0 to 100. A low scale score represents a lower response level. The QLQ-H&N35 scale varies from 0 to 100. A low scale score represents a lower response level. All data of characteristics and outcome measurements were assessed before and 3 months after the radiotherapy.

### 2.6. Statistical methods

All data of characteristics and outcome measurements were analyzed by SPSS Statistics 17.0 (IBM Corp., Armonk, NY). $t$ test was used to analyze all the outcome data before and 3 months after the radiotherapy. $P < .05$ was defined as the statistical significance.

### 3. Results

The characteristics of 59 included eligible patients are summarized in Table 1. These characteristics presented with age, sex, and race, performance status of tumor, primary tumor location, T category, and chemotherapy.

Three months after the radiotherapy, all items of QLQ-C30 changed significantly ($P < .05$), except the social functioning ($P = .09$), role activities ($P = .81$), and global ($P = .12$), compared with these items before the radiotherapy (Table 2).

### 4. Discussion

Several earlier studies have addressed this issue of patients with LC receiving radiotherapy. However, the methodological quality of these studies was quite poor. Additionally, limited data are still available in Chinese patients with LC. In this study, we specifically explored the effect of radiotherapy on QoL in Chinese patients with LC.

Previous published studies have found that radiotherapy significantly impacted the patients with LC. One study demonstrated that after radiotherapy for LC, there was a temporary deterioration in physical functioning and symptoms, because of the treatment. Fortunately, emotional functioning and mood improved significantly after the treatment. The other study found that after accelerated radiotherapy, high local

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**Table 1**

| Characteristics                        | Value     |
|----------------------------------------|-----------|
| Age, y                                 | 61.9 (11.7) |
| Sex                                    |           |
| Male                                   | 40 (67.8)  |
| Female                                 | 19 (32.2)  |
| Race                                   |           |
| Han ethnicity                          | 59 (100.0) |
| Performance status                     |           |
| 0                                      | 42 (71.2)  |
| 1                                      | 17 (28.8)  |
| Primary tumor location                 |           |
| Glottic                                | 22 (37.3)  |
| Supraglottic                           | 37 (62.7)  |
| T category                             |           |
| Tis                                    | 1 (2.3)    |
| T1                                     | 33 (76.7)  |
| T2                                     | 6 (14.0)   |
| T3                                     | 2 (4.7)    |
| T4                                     | 1 (2.3)    |
| Chemotherapy                           |           |
| Cisplatin                              | 31 (52.5)  |
| Fluorouracil                           | 12 (20.3)  |
| Capecitabine                           | 14 (23.7)  |
| Carboplatin                            | 7 (11.9)   |
| Gemcitabine                            | 2 (3.4)    |
| Gemcitabine                            | 2 (3.4)    |

**Table 2**

Comparison of QLQ-C30 before and 3-month after radiotherapy.

| QLQ-C30          | Before treatment | After treatment | $P$    |
|------------------|------------------|-----------------|-------|
| Fatigue          | 19.8 (1.7)       | 23.1 (2.1)      | < .01 |
| Pain             | 13.5 (1.4)       | 14.6 (1.5)      | < .01 |
| Nausea and vomiting | 3.3 (0.4)  | 4.1 (0.7)       | < .01 |
| Dyspnea          | 11.2 (1.1)       | 11.9 (1.2)      | < .01 |
| Insomnia         | 23.4 (2.5)       | 21.8 (2.7)      | < .01 |
| Appetite loss    | 8.5 (1.7)        | 10.2 (2.0)      | < .01 |
| Constipation     | 3.9 (0.6)        | 3.2 (0.7)       | < .01 |
| Diarrhea         | 2.7 (0.7)        | 3.0 (0.8)       | .03   |
| Physical functioning | 90.5 (7.4) | 86.3 (8.0)      | < .01 |
| Emotional functioning | 71.0 (6.6) | 74.4 (6.9)      | < .01 |
| Cognitive functioning | 87.1 (7.8) | 88.2 (8.1)      | .45   |
| Social functioning | 86.1 (5.9) | 88.0 (6.2)      | .09   |
| Role activities  | 82.9 (6.6)       | 83.2 (6.7)      | .81   |
| Global           | 74.2 (5.4)       | 75.8 (5.9)      | .12   |

Data are present as mean ± standard deviation. QLQ-C30 = quality of life core measure Questionnaire-C30.

Three months after the radiotherapy, patients with LC showed dramatically change in all items of QLQ-H&N35, except the social contacts ($P = 1.00$), teeth problems ($P = .21$), trismus ($P = 1.00$), and feeling ill ($P = .07$), compared to them before the radiotherapy (Table 3).

**Table 3**

Comparison of QLQ-H&N35 before and 3-month after radiotherapy.

| QLQ-H&N35        | Before treatment | After treatment | $P$    |
|------------------|------------------|-----------------|-------|
| Pain             | 16.0 (1.2)       | 16.7 (1.4)      | < .01 |
| Swallowing       | 13.8 (1.7)       | 15.1 (1.9)      | < .01 |
| Social contacts  | 5.1 (0.4)        | 5.1 (0.9)       | 1.00  |
| Social eating    | 7.1 (1.0)        | 8.9 (2.2)       | < .01 |
| Speech           | 32.4 (4.1)       | 26.1 (4.4)      | < .01 |
| Taste/smell      | 4.6 (0.8)        | 10.2 (4.1)      | < .01 |
| Sexual activity  | 17.1 (3.2)       | 15.8 (3.6)      | .04   |
| Teeth problems   | 12.1 (2.9)       | 12.8 (3.1)      | .21   |
| Trismus          | 3.4 (0.7)        | 3.4 (0.8)       | 1.00  |
| Dry mouth        | 18.9 (2.7)       | 36.6 (8.1)      | < .01 |
| Sticky saliva    | 21.0 (4.2)       | 35.9 (7.4)      | < .01 |
| Cough            | 21.4 (3.3)       | 26.8 (4.1)      | < .01 |
| Feeling ill      | 14.5 (2.8)       | 14.7 (2.9)      | .70   |

Data are present as mean ± standard deviation. QLQ-H&N35 = quality of life core measure Head & Neck cancer module.
tumor control was achieved, and speech and swallowing function were maintained, although long-term adverse events of dry mouth, sticky saliva, and changes in taste/smell occurred in patients with LC.\textsuperscript{[23]} The results of another study showed that patients with supraglottic tumors experienced more improvement in health-related QoL patients with glottic tumors after radiotherapy.\textsuperscript{[26]}

In this study, we explored the effect of radiotherapy on the QoL in patients with LC among Chinese population. The results of this study showed that after 3 months radiotherapy, the QoL of patients changed significantly, measured by QLQ-C30 scale, except the social functioning, role activities, and global, and QLQ-H\&N35 scale, except the social contacts, teeth problems, trismus, and feeling ill, compared these items before the radiotherapy. It indicates that radiotherapy greatly affects the QoL in Chinese patients with LC.

This study suffers from several limitations. First, this retrospective study did not include a control group. Second, the number of patients is quite small in this study. Third, the follow-up period is relative short, that is 3 months, in this study. All those limitations may impact the results of this study. Future studies should avoid these limitations.

5. Conclusion

The results of this study showed that radiotherapy may significantly impact the QoL in Chinese patients with LC 3 months after radiotherapy.

Author contributions

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