

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 measured by the core measure Questionnaire-C30 (QLQ-C30), and the disease-specific Head & Neck cancer module (QLQ-H&N35). All 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.^[1–3] Most of such patients were diagnosed with squamous cell cancer, chiefly on the epithelial lining of the larynx.^[4,5] 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.^[6] Although its incidence is relatively lower compared with other cancers, it severely affects the quality of life (QoL) in such patients.^[7–9] Additionally, its mortality rate also increases year by year.^[6,10]

Radiotherapy is utilized as a primary treatment for patients with early LC, and has achieved good survival outcome.^[11] It has also been reported that radiotherapy may affect the voice quality and health-related QoL in patients with LC.^[12–15] Several studies

have evaluated the impact of radiotherapy on voice in patients with LC.^[16–18] However, no inconsistent results were demonstrated from those studies.^[16–18]

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

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J-WM and M-JZ these authors contributed equally to this study.

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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.^[19–21] 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. As for functional scales, a higher score means better QoL, whereas for the symptom scales, the higher score would indicate heavier burden. All 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* = 0.09), role activities (*P* = .81), and global (*P* = .12), compared with these items before the radiotherapy (Table 2).

Table 1
Patient characteristics (n = 59).

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)

Data are present as mean ± standard deviation or number (%).

Table 2
Comparison of QLQ-C30 before and 3-month after radiotherapy.

QLQ-C30	Before treatment (n = 59)	After treatment (n = 59)	<i>P</i>
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 (9.8)	<.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).

4. Discussion

Several earlier studies have addressed this issue of patients with LC receiving radiotherapy.^[22,23] 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.^[24] Fortunately, emotional functioning and mood improved significantly after the treatment.^[24] The other study found that after accelerated radiotherapy, high local

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

QLQ-H&N35	Before treatment (n = 59)	After treatment (n = 59)	<i>P</i>
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 (0.5)	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
Sexuality	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 (9.1)	<.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.^[25] The results of another study showed that patients with supraglottic tumors experienced more improvement in health-related QoL patients with glottic tumors after radiotherapy.^[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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References

- [1] Luo XN, Chen LS, Zhang SY, et al. Effectiveness of chemotherapy and radiotherapy for laryngeal preservation in advanced laryngeal cancer: a meta-analysis and systematic review. *Radiol Med* 2015;120:1153–69.
- [2] Salvador-Coloma C, Cohen E. Multidisciplinary care of laryngeal cancer. *J Oncol Pract* 2016;12:717–24.
- [3] Britt CJ, Gourin CG. Contemporary management of advanced laryngeal cancer. *Laryngoscope Invest Otolaryngol* 2017;2:307–9.
- [4] Gallina S, Sireci F, Lorusso F, et al. The immuno-histochemical peptidergic expression of leptin is associated with recurrence of

- lignancy in laryngeal squamous cell carcinoma. *Acta Otorhinolaryngol Ital* 2015;35:15–22.
- [5] MegwaluF UC, Sikora AG. Survival outcomes in advanced laryngeal cancer. *JAMA Otolaryngol Head Neck Surg* 2014;140:855–60.
- [6] Zhang SS, Xia QM, Zheng RS, et al. Laryngeal cancer incidence and mortality in China, 2010. *J Cancer Res Ther* 2015;11:C143–8.
- [7] Kucuk H, Kurnaz SC, Kutlar G. Treatment expectations and quality of life outcomes of patients with laryngeal cancer based on different treatment methods. *Eur Arch Otorhinolaryngol* 2015;272:1245–50.
- [8] Stewart MG, Chen AY, Stach CB. Outcomes analysis of voice and quality of life in patients with laryngeal cancer. *Arch Otolaryngol Head Neck Surg* 1998;124:143–8.
- [9] García-León FJ, García-Esteba R, Romero-Tabares A, et al. Treatment of advanced laryngeal cancer and quality of life. Systematic review. *Acta Otorrinolaringol Esp* 2017;68:212–9.
- [10] Robertson SM, Yeo JC, Sabey L, et al. Effects of tumor staging and treatment modality on functional outcome and quality of life after treatment for laryngeal cancer. *Head Neck* 2013;35:1759–63.
- [11] Koyfman SA, Hunter GK, Reddy CA, et al. Definitive radiotherapy for early (T1-T2) glottic squamous cell carcinoma: a 20 year Cleveland Clinic experience. *Radiat Oncol* 2012;7:193.
- [12] Mouw KW, Solanki AA, Stenson KM, et al. Performance and quality of life outcomes for T4 laryngeal cancer patients treated with induction chemotherapy followed by chemoradiotherapy. *Oral Oncol* 2012;48:1025–30.
- [13] Karabulut B, Başaran B, Yenice H, et al. The relationship between operation type, adjuvant radiation therapy, spinal accessory nerve and quality of life in patients with laryngeal cancer. *Kulak Burun Bogaz Ihtis Derg* 2013;23:153–62.
- [14] Al-Mamgani A, Tans L, van Rooij P, et al. A single-institutional experience of 15 years of treating T3 laryngeal cancer with primary radiotherapy, with or without chemotherapy. *Int J Radiat Oncol Biol Phys* 2012;83:1000–6.
- [15] Adams G, Burnett R, Mills E, et al. Objective and subjective changes in voice quality after radiotherapy for early (T1 or T2, N0) laryngeal cancer: a pilot prospective cohort study. *Head Neck* 2013;35:376–80.
- [16] Bibby JR, Cotton SM, Perry A, et al. Voice outcomes after radiotherapy treatment for early glottic cancer: assessment using multidimensional tools. *Head Neck* 2008;30:600–10.
- [17] Niedzielska G, Niedzielski A, Toman D. Voice after radiotherapy of the larynx carcinoma. *Radiother Oncol* 2010;97:276–80.
- [18] Leeper HA, Parsa V, Jamieson DG, et al. Acoustical aspects of vocal function following radiotherapy for early T1a laryngeal cancer. *J Voice* 2002;16:289–302.
- [19] Aaronson NK, Ahmedzai S, Bergman B, et al. The European Organization for Research and Treatment of Cancer QLQ-C30: a quality-of-life instrument for use in international clinical trials in oncology. *J Natl Cancer Inst* 1993;85:365–76.
- [20] Bjordal K, Hammerlid E, Ahlner-Elmqvist M, et al. A 12 country field study of the EORTC QLQ-C30 (version 3.0) and the head and neck cancer specific module (EORTC QLQ-H&N35) in head and neck cancer patients. EORTC Quality of Life Group. *Eur J Cancer* 2000;36:1796–807.
- [21] Bjordal K, Hammerlid E, Ahlner-Elmqvist M, et al. Quality of life in head and neck cancer patients: validation of the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire H&N35. *J Clin Oncol* 1999;17:1008–19.
- [22] List MAL, Ritter-Sterr CA, Baker TM, et al. Longitudinal assessment of quality of life in laryngeal cancer patients. *Head Neck* 1996;18:1–10.
- [23] Morton RP. Laryngeal cancer: quality-of-life and cost-effectiveness. *Head Neck* 1997;19:243–50.
- [24] de Graeff A, de Leeuw RJ, Ros WJ, et al. A prospective study on quality of life of laryngeal cancer patients treated with radiotherapy. *Head Neck* 1999;21:291–6.
- [25] Janssens GO, Langendijk JA, Terhaard CH, et al. Quality-of-life after radiotherapy for advanced laryngeal cancer: results of a phase III trial of the Dutch Head and Neck Society. *Radiother Oncol* 2016;119:213–20.
- [26] Tuomi L, Karlsson T, Johansson M, et al. Health-related quality of life and voice following radiotherapy for laryngeal cancer—a comparison between glottic and supraglottic tumours. *Acta Oncol* 2015;54:73–9.