

# Long-term efficacy of concurrent chemoradiation therapy on patients with nasopharyngeal carcinoma

Yan Wenming

Inner Mongolia Medical University Hospital, Department of Radiation Oncology, Hohhot, Inner Mongolia 010050.

**Abstract:** The objective of the study is to analyze and evaluate the long-term efficacy of concurrent chemoradiation therapy and the impact of other related factors to the prognosis of patients with nasopharyngeal carcinoma. A total of 897 cases of patients with nasopharyngeal carcinoma who were treated in our hospital in the period from December 2007 to February 2010 were divided into two groups according to the different treatment methods. The first group consists of 769 cases of patients treated with radical radiation therapy alone (radiotherapy group), and the second group consists of 128 patients treated with a combination of radical radiotherapy and chemotherapy (chemoradiotherapy group). While both groups of patients were subjected to the same modes of radiotherapy, an additional 2-3 cycles of concurrent chemotherapy were conducted for the second group of patients (using DDP + 5-Fu + BLM or DDP + 5-Fu). The overall 5-year survival rate of all patients was 51.23%, the 5-year survival rate among patients in the radiotherapy group was 48.46% and the 5-year survival rate of the chemoradiotherapy group was 56.80%. These results were found to be statistically significant ( $P < 0.05$ ). A multivariate stepwise regression analysis indicated that different N staging of nasopharyngeal carcinoma had a very significant effect ( $P < 0.0001$ ) for the patients' survival. In addition, the different T staging also significantly affected ( $P < 0.05$ ) the patient's survival. The type of treatment (radiotherapy or chemoradiotherapy) administered can also have a significant impact on the prognosis, whereby the chemoradiotherapy group patients' survival rate was significantly higher than the radiotherapy group ( $P < 0.001$ ). The implementation of concurrent chemoradiotherapy show long-term beneficial effects for nasopharyngeal carcinoma patients. In particular, chemotherapy has a greater impact towards the survival of N2 and N3 stage nasopharyngeal carcinoma patients.

**Keywords:** Nasopharyngeal carcinoma patients; Radiotherapy; Concurrent chemoradiotherapy; Long-term effects

## Introduction

Radiation treatment has always been the preferred treatment method for nasopharyngeal carcinoma. However, in recent years, research related to different types of radiotherapy or chemoradiotherapy has attracted much attention<sup>[1]</sup>. In the period from December 2007 to February 2010, there were 897 cases of nasopharyngeal carcinoma patients being treated in our hospital. Among these patients, 128 cases were treated with radical radiotherapy combined with chemotherapy (chemoradiotherapy), with satisfactory results

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## Materials and methods

### General Information

During the period from December 2007 to February 2010, there were 897 cases of nasopharyngeal carcinoma patients treated in our hospital, which included 683 cases of male patients and 214 cases of female patients. The patients were between the ages of 14-86 years, with a mean age of  $48.23 \pm 15.9$  years. The cases consist of different stages of nasopharyngeal carcinoma, as follows: 11 cases at stage I, 144 cases at stage II, 387 cases at stage III and 355 cases at stage IV. All patients were pathologically confirmed nasopharyngeal carcinoma patients and all of them underwent radiation therapy treatment first.

### Treatment method

The patients were divided into two groups according to different methods of treatment. Of the total number of patients, 769 cases of patients were treated with radical radiation therapy only (radiotherapy group). The modes of radiotherapy include: (i) conventional fractionation radiotherapy, (ii) in vitro radiotherapy combined with intracavitary irradiation and (iii) hyperfractionated radiotherapy. The conventional fractionation therapy was administered at a dosage of 200cGy / times / d, 5 times / week. For the in vitro radiotherapy combined with intracavitary irradiation, the in vitro radiation (conventional fractionation) dosage was DT46-56Gy, in combination with the intracavitary brachytherapy treatment, whereby the reference point dosage was set as: 18~24Gy/3~4 times/14d. The dosage for hyperfractionated radiotherapy was fixed at 120G /times, 2 times/day, 5d/week. All external radiations were implemented with fixed parameters, whereby the radical radiotherapy in vitro dosage used was 68–79.6 Gy. The 128 patients who were treated with radical radiotherapy combined with chemotherapy (chemoradiotherapy group) were administered with same radical in vitro irradiated radiotherapy compared with radiotherapy only group. In addition, these patients were also treated with 2–3 cycles of concurrent chemotherapy (using DDP + 5-Fu + BLM or DDP + 5-Fu).

### Statistical analysis of data

The SPSS17.0 statistical software was used for data processing and analysis. In this study, the patient survival rate was calculated by the Kaplan-Meier method, and the test of significance was determined by the Log-rank method. A multivariate analysis on the factors influencing the prognosis was investigated by the Cox regression model. The prognostic variables were screened for the presence of prognostic factors, whereby a ( $P < 0.05$ ) result was statistically significant.

## Results

### The 5-year survival rate of patients

In this study, the data of all patients were tracked up to January 2012. The overall 5-year survival rate of all patients was 51.23%. The 5-year survival rate among patients in the radiotherapy group was 48.46%. Whereas, the 5-year survival rate of patients in the chemoradiotherapy group was 56.80%. The difference was statistically significant ( $P < 0.05$ ). The 5-year survival rate of cases in each stage of nasopharyngeal carcinoma are shown as follows: 5-year survival of stage I, II, III and IV patients were 87.8%, 76.6%, 55.02% and 31.10%, respectively. The difference between the groups was statistically significant ( $P \text{ all } < 0.0001$ ).

### The 5-year survival of patients with different clinical N stages classification

The overall 5-year survival rates of all patients with clinical N0, N1, N2 and N3 stages were 73.13%, 67.69%, 49.11%

and 23.12% ( $P < 0.001$ ), respectively. However, the 5-year survival rates of radiotherapy group patients were different to patients from chemoradiotherapy group. At stage N0, the survival rates of both the groups were 73.24% and 100%, respectively. For the stage N1 patients, the survival rates of the two groups of patients were 66.54% and 77.25%, respectively. For patients with stage N2 and N3 nasopharyngeal carcinoma, the survival rates for the two stages were 47.07–63.97% and 17.21–37.25%, respectively. The results show that the implementation of chemotherapy has a greater impact on the survival rates of the stage N2 and N3 patients.

### Multivariate stepwise regression analysis

The results of a multivariate stepwise regression analysis indicate that different N staging has a very significant effect ( $P < 0.0001$ ) on the patient's survival. In addition, the T stage classification also affected the patient's survival significantly ( $P < 0.05$ ). The type of treatment (radiotherapy or chemoradiotherapy) can have a significant impact on the prognosis of the patients. In this study, it was found that the patients who underwent the chemoradiotherapy had a survival rate that was significantly higher than the radiotherapy group ( $P < 0.001$ ). On the other hand, factors such as the patient's gender, age and mode of radiotherapy had no significant impact on patient survival ( $P > 0.05$ ) (Table 1).

Table 1. The results of a multivariate regression analysis on all patients.

Index	value	P value	RR
Gender	- 0. 0126	0. 9142	0. 0117
Age	0. 0333	0. 6685	0. 1831
Plus chemotherapy	-0.7186	0. 0001	15. 0547
Radiotherapy method	0.1142	0. 2528	1. 3071
Total staging	0.1753	0. 1787	1. 8113
N staging	0.5852	< 0. 0001	46. 9622
T staging	0. 1961	0. 0103	6. 6022

### Discussion

In recent decades, radical radiotherapy treatment is widely used to treat patients with nasopharyngeal carcinoma. In the past, the 5-year survival rate of patients with nasopharyngeal carcinoma reported in the literature was in the range of 31 to 58%<sup>[2-5]</sup>. However, in the last two years, there were many reports on the improvement of nasopharyngeal carcinoma survival rates, which range from 41 to 62%<sup>[6-8]</sup>. In this study, the overall 5-year survival rate of all patients was 51.23%. Whereas, the five-year survival rate of patients in the radiotherapy group was 48.46%, and the 5-year survival rate of patients in the chemoradiotherapy group was 56.80%. The difference was statistically significant ( $P < 0.05$ ), and it was consistent with the results reported in China in recent years.

In this study, the 5-year survival rates of stage III and stage IV patients were 55.02% and 31.10%, whereby the difference was statistically significant ( $P < 0.0001$ ). The results of this study also showed higher 5-year survival rates of patients in stage III and stage IV nasopharyngeal carcinoma compared to previously reported works, which reported a stage III 5-year survival rate of 33 to 53% and stage IV 5-year survival rate of 12 to 30%<sup>[9]</sup>. This may be due to recent advances in imaging equipment and technology, so that doctors are able to determine the extent of the cancer progress more precisely<sup>[10]</sup>. By multivariate regression analysis, it was shown that different N staging has a very significant effect ( $P < 0.0001$ ) on the patient's survival. In addition, the T staging also affected the patient's survival significantly ( $P < 0.05$ ). The implementation of different treatments (radiotherapy or chemoradiotherapy) could have a significant impact on the prognosis of the patients. It was found that the survival rate of the chemoradiotherapy group was significantly

higher than the radiotherapy group ( $P < 0.001$ ). Overall, the implementation of the combined radiotherapy and chemotherapy treatment resulted in long-term beneficial effects for patients with nasopharyngeal carcinoma. The administration of chemotherapy had an especially large impact on the survival of N2 and N3 stage nasopharyngeal carcinoma patients. The possible reasons for the improved efficacy of chemoradiotherapy over radiotherapy may be because chemotherapy could improve the effectiveness of radiotherapy treatment by its sensitizing effect. Furthermore, to a certain extent, chemotherapy could eliminate the adverse effects caused by the rapid proliferation of tumor cloned cells that takes place during radiotherapy.

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