

Clinical Study

Evaluation of scoring systems and prognostic factors in patients with spinal metastases from nasopharyngeal carcinoma

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Abstract

BACKGROUND CONTEXT: The decision for operative treatment of patients with spinal metastases is dependent on the patient's predicted survival. Tokuhashi, Tomita, Bauer, and Oswestry scores have been devised for survival prediction; however, none of these systems have been evaluated in nasopharyngeal carcinoma (NPC).

PURPOSE: To investigate the accuracy of these scoring systems in predicting survival and to identify prognostic factors for survival of the patients with spinal metastases from NPC.

STUDY DESIGN: Retrospective analysis of the patients with spinal metastases from NPC who were treated in our institution.

PATIENT SAMPLE: The study included 87 patients with spinal metastases from NPC.

OUTCOME MEASURES: The primary outcome measure was the survival time of these patients. The potential prognostic factors that are known to influence survival such as general condition, extraspinal bone metastases, vertebral bone metastases, visceral metastases, and neurologic assessment based on Frankel score were also studied.

METHODS: The predicted survival according to the four scoring systems were calculated and labeled as "A" scores. These patients were then rescored by assigning NPC as a good prognostic tumor and labeled as "B" scores. The predicted survival of scores A and B were compared with actual survival. Potential prognostic factors of survival were investigated using univariate and multivariate Cox regression analyses. For all scoring systems, Kaplan-Meier survival estimates and log-rank tests were done; the predictive values were calculated using postestimation after Cox regression analyses.

RESULTS: The median overall survival for the whole cohort was 13 (range 1–120) months. In multivariate analysis, general condition ($p < .01$), visceral metastases ($p < .01$), and vertebral metastases ($p < .01$) showed significant association with survival. The absolute score of all scoring systems was significantly associated with actual survival, which extended to the different prognostic subgroups of each scoring systems. Log-rank test revealed significant differences in survival between the different prognostic subgroups of all scoring systems ($p < .01$). Predictive value of survival by modified Tokuhashi score was the highest among all four scoring systems.

FDA device/drug status: Not applicable.

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CONCLUSIONS: Patients with spinal metastases from NPC have relatively good survival prognosis. All four scoring systems could be used to prognosticate these patients. The modified Tokuhashi score is the best in doing so. © 2014 Elsevier Inc. All rights reserved.

Keywords:

Spinal metastasis; Nasopharyngeal carcinoma; Tokuhashi; Tomita; Bauer; Oswestry

Introduction

Nasopharyngeal carcinoma (NPC) is a cancer characterized by marked geographical differences in distribution [1,2]. It is endemic in Southern China with an incidence of 25 per 10,000 and Southeast Asia [1,2]. The causation of endemic NPC is strongly associated with Epstein-Barr virus. The most widely accepted classification by World Health Organization (WHO) classifies NPC into three categories I, II, and III [3]. More than 95% of patients in endemic regions belong to WHO Type III (undifferentiated) that is more radiosensitive and has a better prognosis. WHO Type I (keratinizing squamous cell carcinoma) and WHO Type II (differentiated squamous cell carcinoma) are associated with alcohol and tobacco use, are commonly found in nonendemic regions, and have a poorer prognosis [1–3]. The incidence of NPC is high in Chinese who have immigrated to Southeast Asia and in Singapore, where it is the eighth-most common cancer among males [4]. Among Chinese immigrants to the United States, the incidence of NPC is as high as 9.9 per 100,000 person year that is comparable with 12.8 per 100,000 person year in Singapore [5].

It has been previously reported that NPC has a high incidence of early bone metastases. In a study by Sundram et al. [6], 23% of newly diagnosed NPC patients had bone metastases at presentation, whereas 59% of all patients developed bone metastases in the course of their follow-up, with the spine being the most common site of bony metastases. However, NPC is highly chemosensitive, and chemotherapy in patients with metastatic NPC can achieve 50% to 80% response rates and a median survival time of 12 to 20 months [1,2].

Spinal metastases may present with pain, neurologic symptoms, and instability. The treatment options for spinal metastases in NPC patients include chemotherapy, radiotherapy, and surgery. Surgical treatment for metastatic spine disease is mainly indicated for patients in whom life expectancy is at least 6 months and who are expected to benefit from surgery [7].

Various prognostic scoring systems such as modified Tokuhashi [8], Tomita [9], modified Bauer [7], and Oswestry [10] have been devised to guide the treatment of patients with spinal metastases. We note that as yet none of these scoring systems have been validated in patients with spinal metastases from NPC, and in all the scoring systems, NPC is not included as a site of primary tumor. We hereby aim to identify prognostic factors for survival

and to investigate the robustness of the scoring systems in predicting survival of the patients with spinal metastases from NPC.

Materials and methods

Patients and data collection

We retrospectively analyzed all patients, with histologically proven NPC, who were treated at our institution. A total of 814 patients were identified between January 2007 to December 2011, of which 91 of them were noted to have spinal metastases. Of these 91 patients, 4 patients were not included in the study as these patients either had incomplete clinical/radiological investigations or were loss to follow-up and had an unknown time of death. All patients were followed up till death or for at least 1 year. The data on follow-up were collected until the study end point that was July 1, 2013. Diagnosis of spinal metastases was made radiologically by one or more of the following modalities: magnetic resonance imaging, computed tomography, and bone scan. In certain cases, bone biopsy was also procured. Patient data were collected for the demographic characteristics, tumor histology, general and specific clinical findings in relationship to the primary tumor, and skeletal metastases. These specific findings included the general condition (Karnofsky Performance Scale), number of extraspinal bone metastases, number of vertebral bone metastases, number of visceral metastases, and neurologic assessment based on Frankel score. Some or all these factors are included in the various scoring systems that we planned to study. On the basis of these findings, we retrospectively calculated the modified Tokuhashi, Tomita, modified Bauer, and Oswestry scores of these patients. All data were available through review of clinical and electronic records and sufficient to calculate the relevant prognostic scores. Patients with incomplete data (and therefore whose scores could not be calculated) were excluded from the study. The scores were calculated by first and second authors of the article independently with the patients' identity and actual survival blinded. If the scores calculated were found not to be the same, the patient was reevaluated by the two authors and the consensus score was used. We also analyzed the influence of age, sex, race, pathologic fracture, and the previously mentioned specific findings on the survival. The survival period was calculated from the date of diagnosis of the spinal metastases until death or end of the study period.

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