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Original Article

Prognostic Factors in Patients with Symptomatic Spinal Metastases and Normal Neurological Function

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Abstract

Aims: To evaluate potential prognostic factors for predicting survival after radiotherapy in patients with painful spinal metastases and normal neurological function.

Materials and methods: In total, 173 patients were included. The following prognostic factors were assessed: primary cancer site, age, gender, albumin and haemoglobin levels, Karnofsky performance status (KPS), analgesic use, pain intensity, number of extraspinal bone metastases and visceral metastases, presence of tumour-conditioned spinal canal stenosis and metastatic spinal cord compression, and extension of spinal metastatic disease on magnetic resonance imaging (MRI). Ongoing systemic treatment, use of bisphosphonates and response to radiotherapy were also evaluated. A simple scoring system for predicting survival was used.

Results: The following predictive factors were found to be significant in multivariate analysis: primary cancer site, KPS, albumin level, number of visceral metastases and analgesic use. Three survival groups were proposed. The overall survival probabilities for groups 1–3 were 13, 46 and 94% at 6 months; 4, 28 and 79% at 12 months, respectively. The median survival times for groups 1–3 were 2.1, 5.5 and 24.9 months, respectively ($P < 0.001$).

Conclusion: The pretreatment albumin level was a significant prognostic indicator for survival. Similarly, the primary cancer site, KPS and number of visceral metastases were associated with survival; these findings were consistent with the results of previous studies. The pretreatment analgesic use was significant using the univariate and multivariate analyses and this factor can be verified in future trials. Self-reported pain intensity, pain response to radiotherapy and MRI findings did not influence survival times.

Key words: Magnetic resonance imaging; radiotherapy; spinal metastases; survival

Introduction

The spine is one of the most common sites of metastases [1]. Survival of patients with spinal metastases ranges from a few weeks to several years [2]. Within this timeframe, metastatic lesions may cause considerable morbidity, including pain, impaired mobility, pathological fractures, spinal cord and nerve root compression, and metastatic bone marrow infiltration [3].

Radiotherapy alone is an important modality for the treatment of spinal metastases [4]. Surgery, commonly followed by radiotherapy, is appropriate for a selected group of patients [5]. The treatment options for patients with disseminated disease and short life expectancies should be directed towards optimal palliation with minimal treatment-related morbidity [6]. However, in patients who have a better prognosis, the primary therapeutic goals are directed at local control and the prevention of neurological deficits combined with pain treatment [7].

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Predicting survival is an important consideration in selecting the optimal treatment for patients with spinal metastatic disease [6]. One of the most important prognostic indicators for ambulatory outcome and survival is a patient's pretreatment motor function [8]. However, a considerable number of patients receiving palliative radiotherapy for spinal metastases have normal motor function [9]. The purpose of this study was to evaluate the predictive factors for survival in patients with symptomatic spinal metastases and normal neurological status who received palliative radiotherapy. We assessed potential predictive factors such as performance status, metastatic load in the skeleton, presence of organ metastases, pain, analgesic use, laboratory parameters and ongoing treatment. We also evaluated findings observed in whole spine magnetic resonance imaging (MRI) studies as possible prognostic factors. Furthermore, we constructed and assessed a simple survival score as a treatment strategy tool in this heterogeneous group of patients.

Materials and Methods

In total, 317 patients with painful metastases in the cervical, thoracic or lumbar spine and normal neurological function who were admitted to our institution in 2007 and 2008 were considered for participation in a clinical study [10]. One hundred and seventy-three patients were included in the final, retrospective analysis. The details of the breakdown of the study cohort and the reasons for non-compliance are presented in Figure 1. The inclusion criteria were as follows: first-time admission for radiotherapy for spinal metastases, no motor deficit before treatment, availability of a pretreatment MRI of the entire spine, age above 18 years and informed consent obtained. Patients with paravertebral metastases with direct extension into vertebral bodies and patients with leptomeningeal or intramedullary metastases were not eligible. We also excluded patients with haematological malignancies such as lymphoma and multiple myeloma.

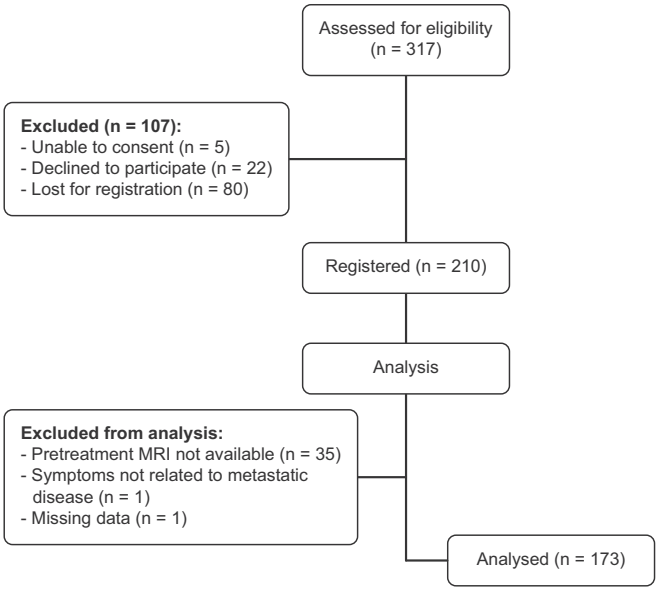

Fig 1. The breakdown of the patient cohort and the reasons for non-compliance.

All patients were interviewed and examined immediately before or at the initiation of radiotherapy and 2 months after treatment. The information obtained from the medical records included age, gender, primary cancer diagnosis, laboratory parameters, ongoing treatment and the number of extraspinal bone metastases and visceral metastases. Performance status was assessed using the Karnofsky performance status (KPS). The validated Norwegian version of the Brief Pain Inventory was used to evaluate pain intensity [11]. The worst, average and least pain experiences during the previous 24 h and the current pain level were recorded using a 10-point scale. The worst pain was used as the principal outcome measure. Self-reported pain was divided into three groups: none or low intensity pain (0–3 points), moderate pain (4–6 points) and severe pain (>7 points). Four levels of analgesic drug therapy were recorded: no analgesic use, use of non-opioid analgesics (e.g. a non-steroidal anti-inflammatory drug or paracetamol), use of weak opioids (e.g. codeine) and use of strong opioids (e.g. morphine, oxycodone) [12]. Additionally, all opioids were converted into the oral morphine-equivalent dose and the updated International Bone Metastases Consensus Working Party palliative radiotherapy end points were used to define the pain response to treatment [13]. The patients with either a complete response or a partial response were defined as responders, whereas the patients with either an indeterminate response or pain progression were defined as non-responders [13].

The MRIs of the entire spine were carried out at our institution or at local hospitals using similar protocols. The extension of bony disease in the spine was assessed using an MRI-based scoring system. The following MRI features were evaluated: the number of metastases (multiple: score 1; single: score 0), the presence of diffuse bone marrow infiltration (yes: score 1; no: score 0) and pathological vertebral fracture (yes: score 1; no: score 0). The patients were divided into two groups: group A (scores 0–1) and group B (scores 2–3). The patients allocated to group B presented with widespread spinal metastatic disease. The presence of spinal canal stenosis (SCS) and radiological signs of metastatic spinal cord compression (MSCC) were reported separately. MSCC was defined as a deviation or indentation of the spinal cord by an epidural tumour. SCS was defined as a narrowing of the cross-sectional area of the spinal canal by an epidural tumour. Compression of the cauda equina was defined as an obliteration of the cerebrospinal fluid in the dural sac at the affected level [9].

The following potential predictive factors for survival were evaluated: primary cancer site, age, gender, albumin and haemoglobin levels, KPS, analgesic use, pain intensity as reported by the patients, number and location of extraspinal bone metastases and visceral metastases, extension of spinal metastatic disease (MRI score) and presence of SCS and MSCC. Ongoing systemic treatment (hormone treatment and chemotherapy), use of bisphosphonates and response to radiotherapy were also assessed as potential prognostic factors.