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Usefulness of the scoring system of Mirels in the present day

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Abstract

Background Because of the rapidly aging population and the corresponding increase in cancer patients, the number of patients who need surgical treatment is gradually increasing. At the same time, advances in chemotherapy and molecular targeted therapy have improved the prognosis of cancer patients. The standard treatment for metastatic bone tumors of the extremities is medication (bisphosphonates and receptor activator of nuclear factor- κ B ligand [anti-RANKL] monoclonal antibodies), radiation, and surgical treatment. Prophylactic fixation is sometimes performed for patients with long bone metastases according to the index of the scoring system of Mirels, measurement of L-cort (axial cortical involvement), et al. In 1989, Mirels proposed a scoring system for the prediction of fracture in which several radiographic and clinical factors were combined into a single score. However, at that time, there was no medication or treatment available for patients at risk of fracture due to long bone metastases.

Purpose To evaluate the usefulness of the scoring system of Mirels in the present day.

Materials and Methods Between 2004 and 2012, 22 patients with long bone metastases from solid tumors (31 lesions) were treated with radiation without any surgery and followed-up for at least 6 months. Nine lesions (six cases) were in men and 22 lesions (16 cases) were in women. The mean age was 57.4 (38-82) years, and the mean follow-up period was 26.1 (6-86) months. The sites of metastases were the upper extremities in four lesions, the lower extremities without proximal femur involvement in

eight lesions, and the proximal femur in 19 lesions. The primary tumor sites were the breast (14 lesions), the lung (nine lesions), the kidney (three lesions), the prostate (two lesions), the bladder (one lesion), the colon (one lesion), and unknown (one lesion). We evaluated the fracture rate within 6 months after the diagnosis of bone metastasis, and the influence of treatment outcome with medication. Then, we considered the indication for prophylactic surgery using the scoring system of Mirels.

Results The numbers of lesions that scored 7, 8, 9, 10, and 11 were 5, 8, 11, 6, and 1, respectively. Eight lesions were associated with a fracture within 6 months, and of these, the numbers that scored an 8, 9, and 10 were 1, 3, and 4, respectively (Fig. 1). Twenty-three lesions had been treated with medication, and of these, the numbers that scored a 7, 8, 9, 10, and 11 were 4, 7, 9, 2, and 1, respectively (Fig. 2). Among lesions treated with medication, three were associated with a fracture, and of these, one scored an 8 and the other two scored a 9.

Discussion In 1989, Mirels described a scoring system for the impending fracture of long bones. He evaluated 78 lesions of long bone and calculated the probability of fracture within 6 months after the diagnosis of bone metastasis. He suggested that the probability of fracture warrants prophylactic fixation of the bone when a score of 9 or more is obtained for any lesion. Conversely, when a score of 7 or lower is obtained, the probability of fracture is low and such a lesion may be treated conservatively. In our study, there were no fractures in lesions with a score of 7. Therefore, we also concluded that lesions can be treated conservatively when the score is 7 or lower. Our probabilities of fracture were very similar to those reported by Mirels. However, there was obviously different fracture rate in the lesions treated with medication compared to those in the study of Mirels. For lesions treated with medication, the fracture rate within 6 months was 14% for a score of 8, 22% for a score of 9, and 0% for a score of 10 and 11. Therefore, if medication such as bisphosphonates or anti-RANKL monoclonal antibodies is used for metastatic bone tumors of the extremities, we have to be careful about the over-indication of prophylactic surgery according to the scoring system of Mirels.

Conclusions The scoring system of Mirels is good in the present day when not using medication for metastatic bone tumors of the extremities. However, we have to be careful about the over-indication of prophylactic surgery when medication is used to treat metastatic bone tumors of the extremities.

Figure 1. Thirty-one lesions of long bone metastases were treated with radiation without any surgery. There were 8 fractures within 6 months after the diagnosis of bone metastasis. The vertical axis is the number of lesions, and the cross axle is a score.

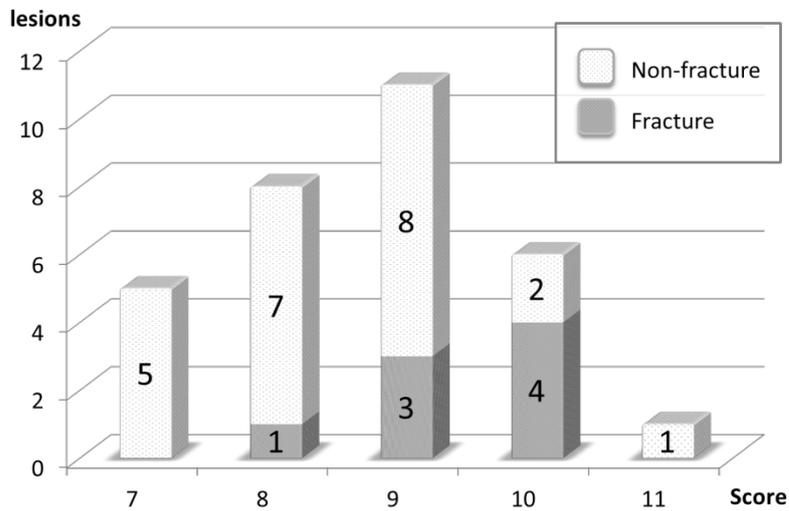


Figure 2. Twenty-three lesions had been treated with medication. There were 3 fractures within 6 months. The probabilities of fracture were lower than those in the study of Mirels. The vertical axis is the number of lesions, and the cross axle is a score.

