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Mirels for Humerus Lesions is Both Reproducible and Valid but of Low Specificity

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Abstract

Mirels Rating System is commonly used to predict risk of fracture in patients with metastatic bone lesions to long bones, but it has not been independently validated for use in humeral bone lesions. We asked whether this system is a valid and reproducible instrument for predicting impending pathologic fractures in the humerus. We presented 17 case histories and plain radiographs of 16 patients with humeral metastases through a web-based survey to 39 physicians with varying training and experience. Participants scored each case using Mirels criteria and provided a fracture prediction, which was compared with actual outcome in the subset of 12 patients with 3 fractures not treated prophylactically. Using Mirels' definition of impending pathologic fracture (9 points or greater), the sensitivity and specificity for determining the likelihood of pathologic humeral fracture were 61% and 44%, respectively. When we used 7 or more points as the definition of impending pathologic humeral fracture, sensitivity improved to 81% but specificity was reduced to 32%. Kappa analysis suggested moderate reproducibility across groups for prediction of pathologic fracture. The Mirels Rating System for humeral lesions is reproducible and valid, but the problem of low specificity at acceptable sensitivity levels as reported for the femur remains.

Level of Evidence: Level III Diagnostic study.