

IMPROVEMENTS IN TREATMENT PLANNING AND FRACTURE PREDICTION IN PATIENTS WITH SKELETAL METASTASIS WITH CT-BASED RIGIDITY ANALYSIS

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ABSTRACT

Key Words: *fracture risk prediction, bone, metastatic lesion, CT-based rigidity analysis*

Cancer patients are living longer due to new and aggressive treatments, yet at sites of skeletal metastasis patients experience significant complications. The dilemma for the physicians is to decide whether the metastatic tumor has weakened the bone such that pathological fracture is imminent. A multi-center, prospective, *in-vivo* study was conducted to identify significant predictors of physicians' treatment plan for skeletal metastasis based on clinical fracture risk assessments (Mirels score) and the proposed CT-based Rigidity Analysis (CTRA).

One hundred and twenty four patients with 149 appendicular skeletal metastatic lesions were enrolled. Orthopaedic-oncologists were asked to select a treatment plan based on their initial risk assessment using Mirels method and follow up on patients over a 4-month period. Then, CTRA was performed on CT scans of the involved bones, and the results were provided to the enrolling physicians, who were asked to reassess their treatment plan. The pre- and post-CTRA treatment plans were compared to identify cases where treatment plan could be changed resultant from the CTRA report.

Patient follow up resulted in 7 fracture cases, where the CTRA method was 100% sensitive and 90% specific, whereas Mirels method was 71% sensitive and 50% specific. Pain, lesion type and lesion size were significant predictors of the pre-CTRA plan. After providing the CTRA results, physicians changed their plan for 36 patients. CTRA results, pain and primary source of metastasis were significant predictors of post-CTRA plan.

Lesion type and size along with pain level were relevant clinical information that influenced physician's plan for management of metastatic appendicular lesions. Physician's treatment

plan and fracture risk prediction were significantly influenced by introduction of the CTRA results.