

Sacral Insufficiency Fractures After Preoperative Chemoradiation for Rectal Cancer

Michael P. Herman,¹ Scott Kopetz,² Priya Bhosale,³ Cathy Eng,² John M. Skibber,⁴ Miguel A. Rodriguez-Bigas,⁴ Barry W. Feig,⁴ George J. Chang,⁴ Nora A. Janjan,¹ Sunil Krishnan,¹ Christopher H. Crane,¹ Prajnan Das¹

¹Department of Radiation Oncology

²Department of Gastrointestinal Medical Oncology

³Department of Diagnostic Radiology

⁴Department of Surgical Oncology

University of Texas M. D. Anderson Cancer Center

Houston, Texas, USA

Background: Sacral insufficiency (SI) fractures are a rare side-effect of pelvic radiation therapy. Our goal was to determine the incidence, risk factors, and clinical course of SI fractures in patients treated with preoperative chemoradiation for rectal cancer.

Methods: Between 1989 and 2004, 562 patients with nonmetastatic rectal adenocarcinoma were treated with preoperative chemoradiation followed by mesorectal excision. The median radiation therapy dose was 45 Gy (range, 19.8-58.6 Gy). Concurrent infusional 5-fluorouracil (5-FU) was administered to 77%, concurrent capecitabine to 20%, and other fluoropyrimidine-based regimens to 3% of patients. The hospital records and radiology reports of these patients were reviewed to identify those with pelvic fractures. For patients with any pelvic fractures, radiology images were reviewed to identify those with SI fractures. The median follow-up time was 49 months, and the patients had a median of 14 follow-up computed tomography (CT) scans.

Results: Among the 562 patients, 15 had SI fractures. The 3-year actuarial rate of SI fractures was 3.1%. The median time to SI fractures was 17 months (range, 2-34 months). Five patients had pubic fractures associated with SI fractures. Risk of SI fractures was

significantly higher in women compared with men (5.8% vs. 1.6%, $P=.014$), and in whites compared with non-whites (4% vs. 0%, $P=.037$). Risk of SI fractures was not significantly associated with age (2.6% in patients < 60 years and 3.8% in those \geq 60 years of age, $P=.418$) or radiotherapy dose (2.3% with \leq 45 Gy and 4.6% with > 45 Gy, $P=.143$). On multivariate analysis, sex independently predicted for the risk of SI fractures (hazard ratio, 3.25; $P=.031$). Documentation about the presence or absence of pain was available for 11 patients; 8 of whom (73%) had symptoms requiring pain medications, including narcotic pain medications in 7 patients, and 3 had no pain. The median duration of pain was 21 months. No patient required hospitalization or invasive intervention for pain control.

Conclusions: SI fractures are uncommon in patients treated with preoperative chemoradiation for rectal cancer. The risk of SI fractures is significantly higher in women. Most cases of SI fractures can be managed conservatively with pain medications.