

# Implications of Androgen-Deprivation Therapy in Patients With Prostate Cancer: A Case Study

Susan Doyle-Lindrud, MS, NPC

S.R., a 65-year-old male with a history of prostate cancer, went to a cancer center in 2003. He had developed symptoms of bladder outlet obstruction in 1999 and was seen by a urologist. His baseline prostate-specific antigen (PSA) was 44 ng/ml. On physical examination, his prostate was enlarged, and a biopsy in January 2000 revealed adenocarcinoma with a Gleason score of 8. A metastatic workup, including a bone scan and a computed tomography scan of the abdomen and pelvis (CT A/P), was negative for evidence of metastatic disease. S.R. received conformal external beam radiation, and the luteinizing hormone-releasing hormone agonist leuprolide acetate was initiated. Following treatment, his PSA nadired to 0.2 ng/ml, and he did well until 2002, when his PSA started to rise. A reevaluation CT A/P revealed enlarged retroperitoneal and pelvic lymph nodes, and a bone scan was positive for metastatic disease. He underwent a bilateral orchiectomy in November 2002.

S.R. was evaluated at a cancer center soon after his orchiectomy and was treated with multiple chemotherapeutic regimens over the course of 24 months. Most regimens were clinical trials for androgen-refractory metastatic prostate cancer that were available at the center.

Studies have shown that androgen-deprivation therapy in men with prostate cancer can decrease bone mineral density (Diamond et al., 2004; Shahinian, Kuo, Freeman, & Goodwin, 2005). Studies that specifically assessed patients' bone density after orchiectomy have revealed bone loss within six months of surgery (Agarwal et al., 2005). A dual-energy x-ray absorptiometry (DEXA) scan was ordered for S.R. because his treatment history included hormonal therapy followed by an orchiectomy. The DEXA scan revealed osteoporosis with a T score of -2.7.

Studies have demonstrated improved bone mineral density with bisphosphonate therapy (Diamond, Campbell, Bryant, & Lynch, 1998). In addition to the

benefit of bisphosphonate therapy for osteoporosis, data support a benefit of bisphosphonate zoledronic acid in patients with hormone-refractory metastatic prostate cancer. Saad et al. (2002) compared zoledronic acid 4 mg IV to placebo IV every three weeks in patients with hormone-refractory metastatic prostate cancer. The study found that a greater proportion of patients who received placebo had a skeletal-related event compared to those receiving zoledronic acid. A skeletal-related event was defined as pathologic bone fracture, spinal cord compression, surgery to bone, radiation therapy to bone, or a change of antineoplastic therapy to treat bone pain (Saad et al.). Zoledronic acid was initiated for S.R. at a dose of 4 mg via IV every four weeks, which was well tolerated.

After nine months of treatment with zoledronic acid and continued chemotherapy on a clinical trial, S.R. was seen for a routine monthly visit. Oral examination revealed a bony protrusion of the left mandible that was approximately 4 mm in size and was not tender. The remainder of his physical examination was within normal limits.

Clinicians recommended discontinuing bisphosphonate and arranged for S.R. to see his oral surgeon immediately. The oral surgeon confirmed osteonecrosis of the jaw.

## Discussion

Case studies continue to report osteonecrosis of the jaw related to bisphosphonate therapy, and patients with cancer appear

Susan Doyle-Lindrud, MS, NPC, is an assistant director of clinical research at the Gallo Prostate Cancer Center, The Cancer Institute of New Jersey, in New Brunswick.

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