



# Clinical Update: A Nonhealing Fractured Mandible

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J.C. is a 70-year-old female who was diagnosed in 1990 with stage I breast cancer. The primary tumor was 8 mm in maximum diameter with negative nodes. The breast cancer profile revealed that the tumor was estrogen receptor-positive and progesterone receptor-negative. No adjuvant treatment was recommended at the time. In 1998, J.C. presented with left shoulder pain, an inability to extend her left arm, and occasional right hip pain. A bone scan revealed increased uptake in the right superior pubic ramus that was suspicious for metastatic disease as well as increased uptake in the left shoulder. A magnetic resonance imaging (MRI) scan of the left shoulder revealed an 8 x 5 x 5 cm mass involving the superior aspect of the scapula. A computed tomography- (CT-) guided needle biopsy of the scapula mass showed poorly differentiated non-small cell carcinoma that was consistent with her primary breast disease. The scapula mass was estrogen receptor-positive, progesterone receptor-positive, HER2/neu 3+, and fluorescence in situ hybridization-negative. All other staging examinations were negative. J.C. has a history of hypertension and type II diabetes mellitus, which are well controlled.

J.C. was enrolled in a clinical trial comparing letrozole with tamoxifen and underwent radiation to the scapula and right hip. She also was started on pamidronate for bone metastasis. J.C. initially had a positive response to therapy; however, she was diagnosed with progressive bone disease in 2001. She was removed from the study and, after unblinding, was found to have been on the letrozole arm. Other restaging examinations remained negative. Her new treatment plan included tamoxifen and zoledronic acid therapy. In May 2002, J.C. was experiencing right hip pain, and a bone scan noted disease

progression to the right ischium. Radiation therapy was initiated to the right hemipelvis for palliative pain control, and J.C.'s hormonal therapy was changed to exemestane with continued bisphosphonate therapy. In December 2002, J.C. had rising tumor markers with left flank pain and underwent a bone scan that showed progressive disease as well as a CT scan of the abdomen that showed liver metastasis. Her hormonal therapy was changed to Faslodex® (AstraZeneca Pharmaceuticals LP, Wilmington, DE) with continuing zoledronic acid therapy. In March 2003, J.C. again had progressive bone and liver disease, and her hormonal therapy was discontinued. She was started on docetaxel with ongoing zoledronic acid therapy.

Unfortunately, J.C. was found to have a dental abscess and underwent tooth extraction with a subsequent fracture of her left maxilla. Open reduction and internal fixation were performed, but after two months the fracture had not healed and J.C. was experiencing significant pain. Her chemotherapy treatments frequently were delayed. Differential diagnosis for the left maxilla may include metastatic breast cancer, poor wound healing related to immunosuppression secondary to chemotherapy, poor wound healing related to diabetes mellitus, or osteonecrosis of the jaw.

In June 2003, J.C. was referred to an oral surgeon at a major teaching institution. The diagnosis by the oral surgeon was osteonecrosis of the jaw secondary to bisphosphonate therapy, which was discontinued. She was treated with multiple antibiotic therapies and hyperbaric oxygen treatments, but her symptoms and wound healing did not improve. Surgery was not an option because of the avascular necrosis involvement in the mandible and the potential for further open wounds and

poor wound healing postoperatively (see Figure 1).

In July 2003, J.C. underwent restaging examinations and was found to have progressive liver metastasis. She was given cyclophosphamide, doxorubicin, and fluorouracil until her disease progressed again in November 2003. Since then, she has been treated with capecitabine and zoledronic acid, with dramatic improvement in the liver metastasis and no further bony progression. Currently, J.C. feels well from the standpoint of her breast cancer and therapy, but her left maxillary area remains open, draining, and painful.

## Definition

Osteonecrosis, or avascular necrosis, results from temporary or permanent loss of blood supply to the bones. The condition can be caused by trauma or damage to the blood vessels that supply blood to the bones, blockage by air or fat embolisms, hypercoagulable states, or vasculitis. A loss of blood supply causes minute bone fractures, with ultimate bone collapse. Osteonecrosis of the jaw is similar to "phossy jaw," which dates back to 1845 and was found in employees in match factories that used white phosphorus in manufacturing. Phossy jaw reportedly was painful,

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