Minimally Traumatic Spinopelvic Dissociation With Prolonged Bisphosphonate Use

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Abstract

Bisphosphonates have become the first-line treatment for diseases involving excessive osteoclast-mediated bone resorption. However, evidence suggests that elevated doses or prolonged treatment may impair normal skeletal mineralization and may be associated with fractures. The majority of these fractures are located in the subtrochanteric region. This article presents the first described case of atraumatic spinopelvic dissociation related to a combination of osteoporosis and prolonged bisphosphonate use. The current literature also is reviewed, and putative mechanisms and management options are discussed. [Orthopedics. 2016; 39(4):e753-e755.]

osteoporosis is characterized by diminished bone mineral density and structural instability, which may result in insufficiency fractures. As the aging population continues to increase, the burden from osteoporosis is expected to rise. Bisphosphonates have become the first-line treatment for osteoporosis and other disorders of bone resorption. However, the literature suggests that excessive dosing or prolonged duration of treatment may impair normal skeletal mineralization and result in the development of stress fractures. In particular, the subtrochanteric region has been identified as being at high risk.

This article presents the first documented case of minimally traumatic spinopelvic dissociation, likely resulting from a combination of osteoporosis and extended bisphosphonate use. Given the widespread use of bisphosphonates, this injury pattern may be seen with greater frequency in the future. The literature also is reviewed, and suggestions for assessment and management are provided.

Case Report

A 67-year-old woman with a history of osteopenia (bone mass density t-score of -1.4) and prior insufficiency fractures had been treated with alendronate for a period of 15 years. She presented to the current authors’ emergency department with groin pain after suffering a fall from standing height. On physical examination, the patient did not demonstrate any neurologic changes in the central and peripheral nerves, and she was hemodynamically stable.

Initial radiographs revealed a comminuted fracture of the left superior pubic ramus and mottled densities in the right pubis consistent with healing fractures (Figure 1). Lucencies were noted bilaterally in the sacral ala and were investigated with subsequent imaging. Computed tomography (CT) revealed acute-on-chronic bilateral sagittal zone 2 sacral fractures, with bony resorption resulting in wide defects consistent with a chronic minimally traumatic spinopelvic dissociation (Figure 2).

Magnetic resonance imaging (MRI) revealed thick-walled symmetrical cavities.

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tating lesions in the sacral ala consistent with either tumor or organizing hematoma. A bone scan yielded findings consistent with multiple healing fractures. Urinary and serum markers for infection and subsequent biopsy looking for malignancy were negative. In the absence of these other possible contributing factors, the fractures were believed to be a result of impaired bone mineralization from both osteopenia and the prolonged bisphosphonate use.

The patient was managed nonoperatively with analgesia and permitted weight bearing as tolerated. She underwent follow-up with serial radiographs and CT scans, which showed mild healing at 3 years. The sacral defects were largely maintained, with likely fibrous union (Figure 3). Despite this, the patient was able to achieve normal, pain-free ambulation and function.

**DISCUSSION**

The frequency of osteopenia, osteoporosis, and related insufficiency fractures is rising both in Australia and worldwide, with approximately 50% of women and 20% of men older than 50 years suffering insufficiency fractures. Osteoporotic fractures worldwide are estimated to represent an economic burden of $131 billion per year by 2050. Currently in Australia, 692,000 individuals have been diagnosed with osteoporosis, with 81.9% being women and the majority of the $304 million annual expense being spent on medications such as bisphosphonates. Many theories have been proposed to explain how bisphosphonates inhibit osteoclast activity. Generally, it is believed that they prevent the catabolism of bone by stimulating apoptosis in osteoclasts, thus producing relatively more osteoblastic activity and resulting in net bone growth. In the current patient, alendronate (a nitrogenous bisphosphonate that inhibits farnesyl diphosphate synthase, an enzyme critical in the regulation of osteoclastic development) was used for a period of 15 years.

The literature has shown an association between bisphosphonates and atypical fractures. Of the atypical fractures, the subtrochanteric region is especially frequent. However, bisphosphonates have
not yet been implicated in spinopelvic dissociation.

There are several putative mechanisms for bisphosphonate-related fractures in osteoporotic individuals. An incomplete stress fracture with delayed healing and instability may evolve into a complete insufficiency fracture. Bisphosphonate-related fractures are typically subtrochanteric because these medications improve the strength of the proximal femur, thus placing a disproportionate amount of stress distally. The same mechanism also may result in disproportionate forces proximally along the sacrum and spinopelvic joints.

The appropriate management of sacral insufficiency fractures has been a source of debate. In 20 patients who were managed nonoperatively with analgesia and bed rest, 17 had complete resolution of pain and only 3 required mild analgesia at 1 year after the injury. Another study found positive outcomes at 1 year with nonoperative immobilization and bed rest. However, at least 3 studies recommend surgically stabilizing the pelvic ring as it promotes early mobilization and delays the process of deconditioning. The current patient was pain-free after 6 months and 3 years of follow-up with conservative management. Follow-up CT scans have shown callus formation consistent with a healing sacral injury.

**CONCLUSION**

Spinopelvic dissociation is typically a traumatic condition where the spine dissociates from the pelvic ring and is associated with significant morbidity and mortality. With both an aging population and increasing reliance on bisphosphonates in the management of osteoporosis, the problem of minimally traumatic spinopelvic dissociation is likely to occur with greater frequency in the future. Prevention requires concordance between health professionals, especially general practitioners, on the length of time and dosage of bisphosphonate medication that is beneficial to the patient. According to one review, almost all data regarding the efficacy of bisphosphonates for use in osteoporosis is from patients who took the drug for 5 years or less, and there are little data suggesting that their use should continue beyond that point. Other researchers have expressed concern regarding long-term bisphosphonate use and recommended that the drug is ceased for a minimum of 2 years after 5 years of use to allow for adequate fracture remodeling, although the evidence for this claim is not yet substantiated. Further research is warranted in this area to provide guidelines for management and prevention.

**REFERENCES**


