Teriparatide and Its Bone Healing Power

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Introduction

Teriparatide, a parathyroid hormone analog, is an important anabolic agent approved by the U.S. Food and Drug Administration to increase bone mineral density in osteoporotic patients. Parathyroid hormone (PTH) regulates calcium, phosphate, and active vitamin-D metabolites. The amino terminal peptide fragments of PTH has been known to increase bone mass and are being used in clinical practice for osteoporosis management.[3] Teriparatide increases bone density of lumbar spine and femoral neck, and decreases the risk of vertebral and non-vertebral fractures both in postmenopausal women and men. It is also known to prevent fractures in patients with osteoporosis and promote healing of fractures.[3]

Case Report

79-year-old Hispanic female with history of osteopenia and major lumbar spine wedge compression fractures presented to our clinic for consultation. She has a past medical history of Cervical spinal stenosis, Atrial Fibrillation, Hypertension, Idiopathic progressive neuropathy, Vitamin D deficiency, Wedge compression fracture of lumbar vertebra. Initial bone density showed osteopenia and afterwards had a fall resulting in a wedge fracture of L1-L2. She was on ibandronate for four months prior to initial consultation and was having symptoms of pill esophagitis.

DEXA Scan August 2015: T-score -1.8 at L-spine and -1.5 at L. femoral neck with 3.3% bone loss. She opted to continue with ibandronate, calcium, and vitamin D instead of starting teriparatide, zoledronic acid or denosumab. Two months after initial consultation, she sustained a traumatic fracture of the posterior arch and body of C2 following a motor vehicle accident. Despite the use of a cervical collar, there was no significant improvement in healing seem in the serial images. Two months after sustaining C2 fracture, she was started on Teriparatide. Repeat Cervical X-ray three months later showed complete healing of the C2 fracture.

Imaging & Pathology

Figure 1. Cervical Xray showing C2 fracture

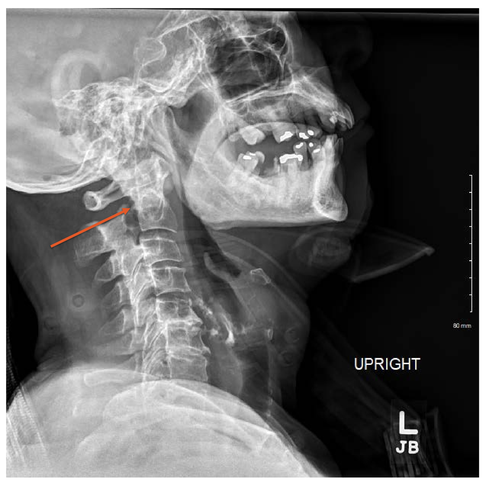
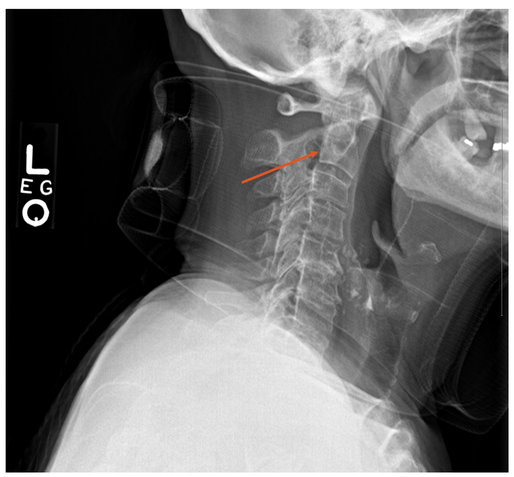


Figure 2. CT C-spine showing C2 fracture

Figure 3. Cervical Xray showing complete healing



Discussion

There are a limited number of cases reported in regards to teriparatide induced healing of non-osteoporotic fractures[4]. There has been studies showing notable increase in bone mineral content, callus volume, mineralization, bone strength, as well as the rate of successful union of the normal or delayed healing fracture site.[2] Faster healing is noted to occur in trabecular bone including vertebrae, sacral alae, and metadiaphyseal bone.[1] Sequential treatment with teriparatide following alendronate have shown increase in bone density as well as strength. Increased serum level of procollagen type 1 amino-terminal pro-peptide, which is a bone formation marker, was seen in those with prior alendronate treatment at one month after teriparatide initiation. This will increase the anabolic effects of teriparatide and reduce the time needed for fracture healing.

Teriparatide induces fracture healing via a number of mechanisms primarily via callus formation by “stimulating the proliferation and differentiation of osteoprogenitors and chondroprogenitors.” [4] Normal fracture healing is seen in those with existing diagnosis of osteoporosis.[1] There has been significant healing of nonunion fractures with use of teriparatide. Our case is one of the very few reported to have shown complete radiographic and clinical healing of a traumatic, non-osteoporotic fracture after use of teriparatide for 12 weeks.

References

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