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Teriparatide treatment of osteoporosis in an HIV-infected man: a case report and literature review

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Low bone mineral density (BMD) and osteoporosis are prevalent in HIV-infected men. Teriparatide – a human recombinant parathyroid hormone – is used to treat severe osteoporosis; however, its use has not been reported in HIV-infected men.

A 70-year-old HIV-infected man presented with lower back pain after carrying heavy furniture and was found to have L1 and L2 compression fractures. Osteoporosis was confirmed on dual-energy X-ray absorptiometry (DXA) with T-scores of −3.9 (BMD = 0.606 g/cm^2) at the lumbar spine, −2.6 (0.643 g/cm^2) at the total hip, and −2.8 (0.552g/cm^2) at the femoral neck (Table 1).

The patient had well controlled HIV (CD4 cell count: 880 cells/ml; undetectable HIV viral load) on tenofovir (TDF)/emtricitabine and atazanavir/ritonavir. He reported a family history of osteoporosis, a 40 pack-years history of tobacco use, and heavy alcohol consumption (>3 drinks daily). Pertinent biochemical studies revealed hypogonadism (morning testosterone level: 116.8ng/dl), vitamin D deficiency [25-hydroxyvitamin D (25OHD) level: 14.5ng/ml), and low urinary calcium excretion (<34mg/day).

Given his severely low BMD, especially at the lumbar spine, therapy with teriparatide was initiated for 24 months with subsequent consolidative therapy with alendronate. At the end of year 2, the BMD had increased significantly, with T-scores −2.8 at the lumbar spine, −2.4 at the total hip, and −2.3 at the femoral neck. Compared to baseline, the relative BMD increases at the lumbar spine, total hip, and femoral neck were 35.4, 3.5, and 12.5%, respectively. By the end of year 3, his BMD increased to a T-score of −2.4 at the lumbar spine, with relatively more robust increases to −1.9 and −2.3 at the total hip and femoral neck, respectively.

Among HIV-infected men, the cause of osteoporosis may be multifactorial. Risk factors for osteoporosis such as hypogonadism, vitamin D deficiency, smoking, and low body weight are more common in HIV-infected men than uninfected men. The direct effects of

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Conflicts of interest

There are no conflicts of interest.

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antiretroviral therapy may also play a role. An association has been reported between TDF, which this patient received, and lower BMD. Through alterations in renal phosphate handling, TDF impairs bone mineralization while increasing bone turnover and osteomalacia. These effects may be more pronounced in vitamin D deficiency [1,2]. Although this patient did not have documented renal phosphate wasting, TDF was switched to abacavir as a precaution.

Screening and treatment guidelines in HIV have typically followed those determined for the general population; however, McComsey *et al.* [3] recommended a screening DXA scan for all HIV-infected men aged at least 50 years. If osteoporosis is identified, men should be screened and treated for secondary causes, as was done in our patient. He was offered testosterone replacement for his hypogonadism and started on calcium and vitamin D supplements due to his low urinary calcium excretion and vitamin D deficiency. HIV-infected men on TDF should also undergo assessment for renal phosphate wasting by calculating the fractional excretion of phosphate using simultaneous measurements of serum and urine phosphate and creatinine [1].

Pharmacologic treatment of osteoporosis should be considered for men aged at least 50 years with hip or vertebral fractures or BMD T-score −2.5 or less at the femoral neck, total hip, or lumbar spine. Considerations should also be made for treatment if the lowest T-score is − 1.0 to −2.5 (i.e. ‘osteopenia’) and the 10-year probability of hip fracture at least 3% or major osteoporosis-related fracture at least 20% based on the US Fracture Risk Assessment Tool (FRAX) [5]. However, FRAX has not been validated in HIV-infected men and may underestimate the risk of fracture in these patients [3].

Teriparatide increases BMD by recruiting osteoblast progenitor cells and directly stimulating mature osteoblasts. US Food and Drug Administration (US FDA) approval is for up to 2 years of use, and antiresorptive therapy, generally with a bisphosphonate, is recommended for consolidation as BMD declines quickly once teriparatide treatment has concluded [6].

Teriparatide preferentially increases BMD at the lumbar spine, a site rich in trabecular bone, over the total hip and femoral neck, where it has more modest effects. Thus, one of the recommended uses for teriparatide is for severely reduced BMD, especially at the lumbar spine. This applied to our patient. Trials have demonstrated a reduction in vertebral fractures that is most pronounced in men with pre-existing fractures [4]. Teriparatide does not carry a risk of esophagitis, atypical femoral fractures, or osteonecrosis of the jaw, which can be seen rarely with bisphosphonates. However, patients on teriparatide should be monitored for hypercalcemia and hypercalciuria, which are the most common side effects.

To our knowledge, this is the first case report highlighting teriparatide’s efficacy in treating osteoporosis in the setting of HIV infection. Investigation is warranted to determine whether teriparatide reduces fracture incidence in HIV-infected individuals.

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References

1. Walker Harris V, Brown TT. Bone loss in the HIV-infected patient: evidence, clinical implications, and treatment strategies. J Infect Dis. 2012; 205(Suppl 3):S391–S398. [PubMed: 22577213]
2. Childs K, Welz T, Samarawickrama A, Post FA. Effects of vitamin D deficiency and combination antiretroviral therapy on bone in HIV-positive patients. AIDS. 2012; 26:253–262. [PubMed: 22112601]
3. McComsey GA, Tebas P, Shane E, Yin MT, Overton ET, Huang JS, et al. Bone disease in HIV infection: a practical review and recommendations for HIV care providers. Clin Infect Dis. 2010; 51:937–946. [PubMed: 20839968]
4. Kaufman JM, Orwoll E, Goemaere S, San Martin J, Hossain A, Dalsky GP, et al. Teriparatide effects on vertebral fractures and bone mineral density in men with osteoporosis: treatment and discontinuation of therapy. Osteoporos Int. 2005; 16:510–516. [PubMed: 15322742]
5. Watts NB, Adler RA, Bilezikian JP, Drake MT, Eastell R, Orwoll ES, et al. Osteoporosis in men: an Endocrine Society clinical practice guideline. J Clin Endocrinol Metab. 2012; 97:1802–1822. [PubMed: 22675062]
6. Black DM, Bilezikian JP, Ensrud KE, Greenspan SL, Palermo L, Hue T, et al. One year of alendronate after one year of parathyroid hormone (1–84) for osteoporosis. N Engl J Med. 2005; 353:555–565. [PubMed: 16093464]

Table 1

Yearly change in bone mineral density with treatment.

	Baseline	Year 1 12 months of treatment with teriparatide	Year 2 24 months of treatment with teriparatide	Year 3 12 months of consolidation with alendronate
Lumbar spine – total				
BMD (g/cm^2)[a]	0.606	0.772	0.821	0.858
SD for young adult peak BMD (T-score)[a]	−3.9	−3.2	−2.8	−2.4
% Change from baseline[b]		+11.4%	+35.4%	+41.6%
Total hip				
BMD (g/cm^2)[a]	0.643	0.660	0.665	0.747
SD for young adult peak BMD (T-score)[a]	−2.6	−2.5	−2.4	−1.9
% Change from baseline[b]		+2.7%	+3.5%	+16.2%
Femoral neck				
BMD (g/cm^2)[a]	0.552	0.604	0.621	0.620
SD for young adult peak BMD (T-score)[a]	−2.8	−2.4	−2.3	−2.3
% Change from baseline[b]		+9.4%	+12.5%	+12.3%

[a] Calculated on a Hologic QDR 4500 Dexa scanner with Discovery A software.

[b] The 2% margin of error.