# Asymmetrical bone loss in a patient with poliomyelitis: an indication for anti-osteoporotic therapy

SCIENCE

Case Studies

A 49-year-old female was referred to the hospital after a dual energy X-ray absorptiometry (DXA) scan. She had a history of childhood poliomyelitis affecting the left lower-limb, resulting in flaccid paralysis and reduced muscle power of the left lower limb. Although fully ambulant with use of a walking aid, she was unable to weight-bear on the affected limb. She was perimenopausal and denied prolonged glucocorticoid intake, smoking or alcohol consumption.

**The most likely diagnosis of this presentation is**

- Osteoporosis
- Arthritis
- Osteoarthritis

**Introduction**

Poliomyelitis is estimated to have affected more than one million people worldwide and was the commonest cause of disability amongst children in 1950s-60s. Those survivors who are now in the older adult age group (50-70 years) suffer from morbidities collectively termed postmyelitic-syndrome[1,2]. The post-myelitic complications which include increased risk of falls and osteoporosis are often overlooked. To date, there is sparse data that looked into the problem of osteoporosis amongst poliomyelitis survivors. The study by Mohammad et al. highlighted that up to 96% of polio survivors had osteoporosis or osteopenia in the affected limb and the major osteoporotic fracture incidence in this cohort was as high as 38% over 5 years[3]. Almost all fractures involved the femoral neck of the affected or atrophic limb[3,4]. Despite the alarming rates of fractures only less than a quarter were treated with anti-osteoporotic agents.

**Medical History**

The patient had no history of fractures prior to this and there was no family history of osteoporosis.

**Examination**

On examination, she was a medium built lady, with a body mass index of 22.4kg/$m^2$. Measured limb-length was 86 cm in the affected limb (left) and 88 cm in the contralateral limb. There was profound muscle wasting and flaccid paralysis over the left lower limb with a muscle power of 4 out of a score of 5. DXA scan revealed significant discrepancy in bone mineral density (BMD) between both femoral necks. The BMD of the left neck-of-femur (NOF) was significantly reduced at 0.504g/$cm^2$ (Z score: -3.2) compared to the right NOF which was 0.798g/$cm^2$ (Z score: -1.1). Lumbar spine BMD was 1.001 g/$cm^2$ (Z score: -1.4). Laboratory-investigations reported serum corrected calcium: 2.4mmol/L (N:2.2-2.6), phosphate: 1.0mmol/L (N:0.7-1.1), alkaline phosphatase: 78 IU/L (N: 50-136), 25(OH) vitamin D3: 29ng/ml, intact PTH: 2.1pmol/L (N:1.5-7.8), normal liver function, renal function, thyroid function and complete blood count that ruled out other causes of secondary osteoporosis.

**Management**

She was diagnosed with regional osteoporosis of the left hip secondary to poliomyelitis. Considering her fall and fracture risk in the pathological underdeveloped poliomyelitic limb, she started anti-resorptive therapy with oral bisphosphonate-weekly alendronate of 70 mg and supplemental calcium carbonate of 1

gm/day and vitamin D (cholecalciferol) of 1000 IU/day. She was also given advice on fall prevention and referred to the physiotherapist for lower limb muscle strengthening exercises. A repeat DXA scan of both hips and lumbar spine is scheduled at 2 years from commencing anti-osteoporotic therapy to assess response.

## Discussion

Poliomyelitis is known to be the commonest cause of disability amongst children in 1950s-60s. Those survivors who are now in the older adult age group (50-70 years) suffer from morbidities collectively termed postmyelitic-syndrome. The post-myelitic complications which include increased risk of falls and osteoporosis are often overlooked. The increased risk of fractures is directly related to increased risk of falls. Falls is a major concern amongst poliomyelitis survivors with up to 60-80% of survivors having reported to have fallen at least once in the past year and the incidence increases with advancing age [2, 3, 5]. The fall risk is believed to be four times higher than the age matched normal population and one third who fell had sustained fragility fractures in the affected limb[5].

Although the susceptibility of falling and other factors are a clear reason for increased fracture risk in poliomyelitic survivors, this fails to explain the disproportionately greater prevalence of fractures in the atrophic limb. Generally, poliomyelitic patients had lower BMD than their age and gender matched healthy counterparts and the atrophic leg is shown to have a significantly lower femoral neck BMD compared to the contralateral leg[6]. The regional osteoporosis in the atrophic leg occurs as a result of flaccid paralysis, muscle disuse, underdeveloped growth of the limb and nonweight bearing bone[3-6]. The regional osteoporosis and the interplay between other local factors such as reduced stability and poorly developed muscle in the atrophic limb leads to increased risk of fractures in that limb. Hence, the present case report underscores the importance of screening aging poliomyelitis survivors early using a simple tool such as a DXA scan on both afflicted atrophic limb and contralateral limb as well as the lumbar spine for comparison. As shown by Marshall et al., the prediction of osteoporotic-fracture risk using BMD is site-specific[7]. Therefore, the finding of regional osteoporosis in the atrophic limb should warrant commencement of anti-osteoporotic therapy with calcium and vitamin D supplementation, more so in the context poliomyelitis survivors who are clearly at increased fracture risk for the reasons highlighted above.

## Learning

1. Fall prevention plays an essential role in preventing fractures in this cohort of individuals besides advocating lower limb muscle strengthening exercise and adequate calcium and vitamin D supplementation that would improve stability and musculoskeletal function.
2. Further systematic research is warranted to determine the appropriate type of anti-osteoporotic therapy, the exact timing in which treatment should be commenced and the duration treatment should be continued, weighing the benefits and risks of long-term anti-osteoporotic therapy in this special group of aging poliomyelitis survivors.

## References


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