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Images in Clinical Rheumatology

Vertebral "bone-within-bone" appearance after childhood bisphosphonate therapy in a patient with osteogenesis imperfecta

Imagen vertebral tipo "bone-within-bone" tras tratamiento con bisfosfonatos en la infancia en una paciente con osteogénesis imperfecta

Javier Manzaneque Sánchez,* Laura Álvarez Ortiz, Piedad León Rubio, Ricardo Gil Vélez

Servicio de Reumatología, Hospital Universitario Virgen del Rocío, Seville, Spain

A 23-year-old woman with type I osteogenesis imperfecta, diagnosed at age 6, with genetic confirmation via a pathogenic heterozygous variant in the COL1A2 gene (c.946G > A; p.Gly316Ser), and a history of multiple fractures during childhood. During her growth, she received cyclic intravenous pamidronate every 3–4 months between ages 6 and 12, followed by oral bisphosphonates until age 15, a treatment widely used in paediatric patients with osteogenesis imperfecta to reduce fracture incidence and improve bone mineralisation.[1,2]

Plain lumbosacral radiographs show sclerotic bands in several lumbar vertebral bodies, parallel to the vertebral endplates and vertebral body margins, visible in both the anteroposterior and lateral projections (Figs. 1 and 2). This radiological pattern resembles the so-called "bone-within-bone appearance", characterised by the presence of a bone structure apparently included within the outline of the original bone.[3]

This finding presents a broad differential diagnosis and has been described in situations associated with growth or skeletal remodelling disorders, such as heavy metal poisoning, osteopetrosis, or other sclerosing bone dysplasias.[3] Although sclerotic metaphyseal bands (zebra lines) have been described in long bones in patients with osteogenesis imperfecta treated with bisphosphonates,[4] similar vertebral radiographic changes have been observed in other diseases of the growing skeleton following intravenous bisphosphonate treatment, related to the inhibition of osteoclastic resorption and altered bone remodelling.[5]

Since starting intravenous pamidronate, the patient has not experienced any new fractures. Currently, her bone mineral density remains within normal limits for her age (lumbar Z-score ≤.7; femoral neck Z-score ≤.4).

Recognising this radiological pattern in patients with a history of bisphosphonate treatment during growth is important to avoid misinterpretations such as pathological vertebral sclerosis or other bone dysplasias, as well as unnecessary additional tests.

* Corresponding author.
E-mail address: msjlaboral@gmail.com (J. Manzaneque Sánchez).

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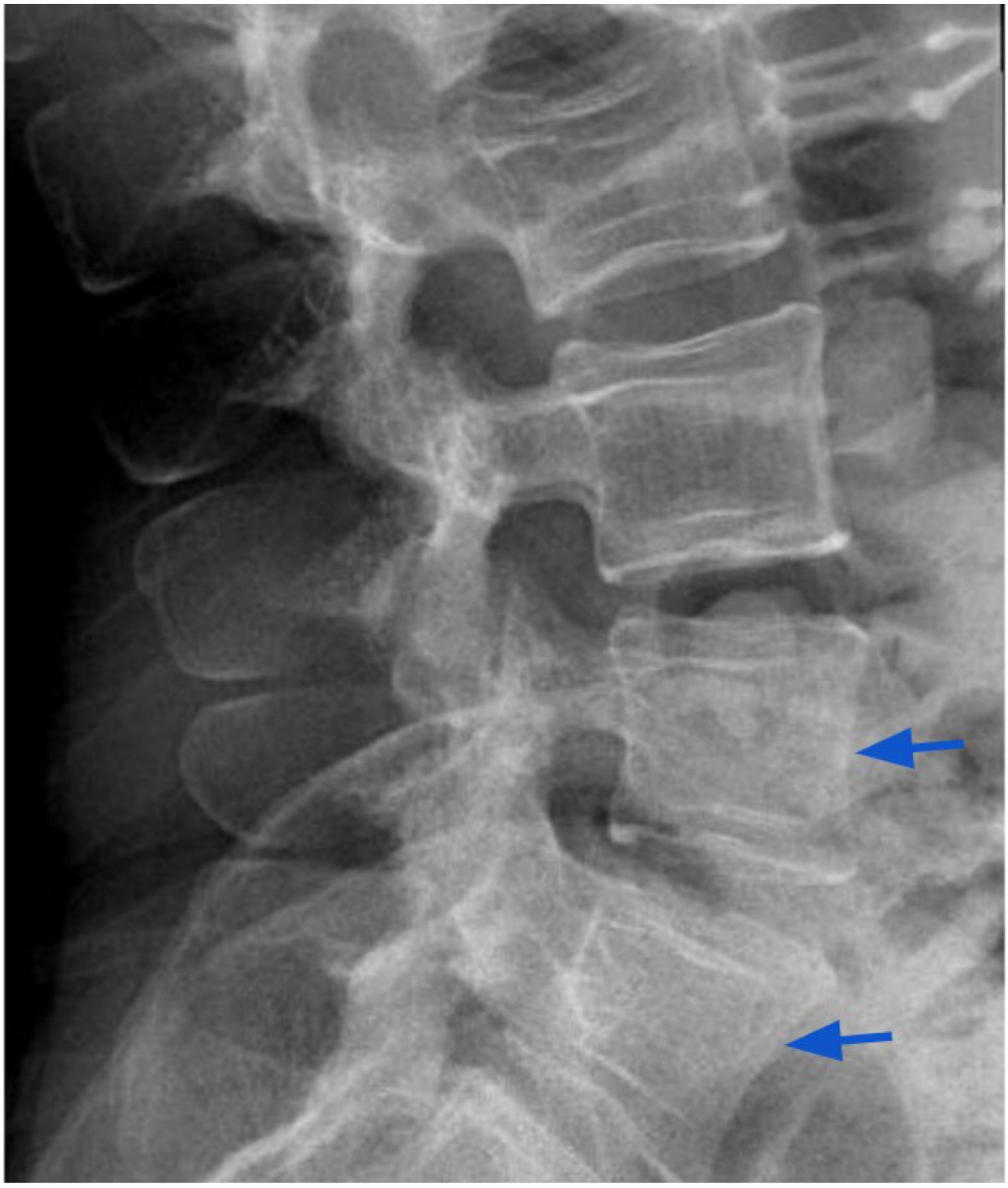

Fig. 1. Lateral lumbosacral radiograph showing multiple fine sclerotic lines in the vertebral bodies, parallel to the vertebral endplates and margins, creating a pattern consistent with bone-within-bone lesions (arrows).

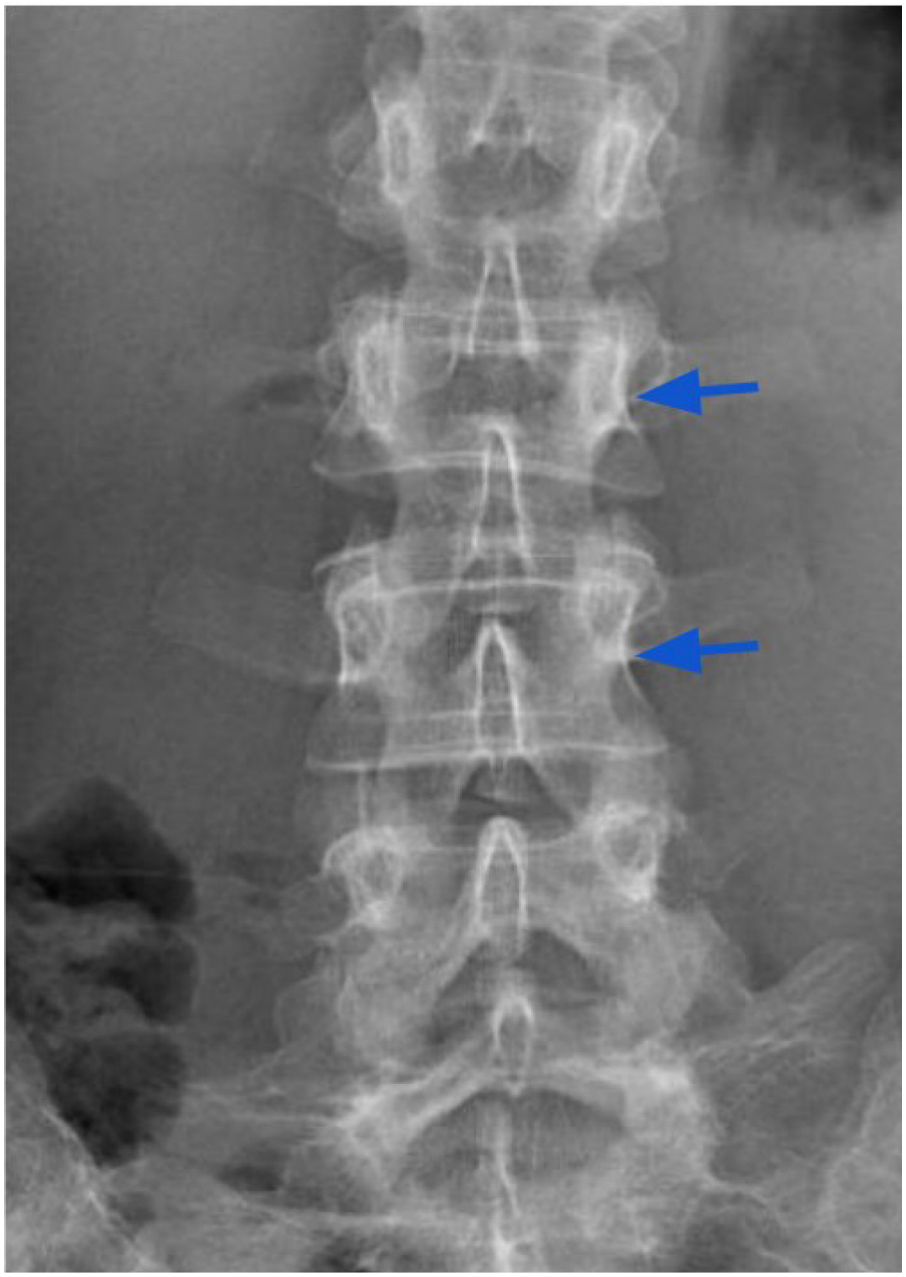

Fig. 2. Anteroposterior lumbosacral radiograph showing linear sclerotic images parallel to the lumbar vertebral endplates and vertebral body margins (arrows).

Declaration of competing interest

The authors have no conflict of interests to declare.

References

1. Rauch F, Glorieux FH. Osteogenesis imperfecta. *Lancet*. 2004;363:1377–1385, http://dx.doi.org/10.1016/S0140-6736(04)16051-0.
2. Falk MJ, Heeger S, Lynch KA, et al. Intravenous bisphosphonate therapy in children with osteogenesis imperfecta. *Pediatrics*. 2003;111:573–578, http://dx.doi.org/10.1542/peds.111.3.573.
3. Ihde LL, Forrester DM, Gottsegen CJ, et al. Sclerosing bone dysplasias: review and differentiation from other causes of osteosclerosis. *Radiographics*. 2011;31:1865–1882, http://dx.doi.org/10.1148/rg.317115093.
4. Sukumar SP, Balachandran K, Sahoo JP, Kamalanathan S. Zebra lines in osteogenesis imperfecta on bisphosphonate therapy. *BMJ Case Rep*. 2013;2013, http://dx.doi.org/10.1136/bcr-2012-008536, bcr2012008536.
5. Papakonstantinou O, Sakalidou M, Atsali E, Bizimi V, Mendrinou M, Alexopoulou E. Radiographic and MR imaging findings of the spine after bisphosphonate treatment, in a child with idiopathic juvenile osteoporosis. *Case Rep Radiol*. 2015;2015:727510, http://dx.doi.org/10.1155/2015/727510.