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LETTER TO THE EDITOR

Diagnosis and management of bilateral diaphyseal femoral fracture

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To the Editor,

Atypical femoral fractures (AFFs) had typical clinical and radiological features: they occur in the subtrocanteric or diaphyseal region after minimal or no trauma, and they may be preceded by prodromal pain that can occur several months before. They are bilateral in 50% of cases, cortical thickening and periosteal reaction are observed, and often fracture healing is delayed. The case of an old woman with bilateral diaphyseal femoral fracture is reported, and current knowledge about the pathogenesis of AFFs and their management is briefly discussed.

In October 2008, a 72-year-old woman came to our Bone Metabolism Unit. In August 2008, after she suffered a right femoral fracture, which was preceded by two-weeks of prodromal pain. She had Type 2 diabetes diagnosed 7 years earlier (treatment insulin glargine and metformin, no microvascular complications) and bilateral knee osteoarthritis. She had no previous fragility fracture. She had been treated from October 2007 with ibandronate 150 mg monthly.

Routine biochemistry, thyroid function, and PTH were normal, except for FPG which was 133 mg/dl and HbA1c 6.6. 25 OH vitamin D was 11.6 ng/ml showing vitamin D deficiency, and bone turnover markers were in the normal postmenopausal range except serum CTX which was slightly suppressed.

DXA showed lumbar osteoporosis: lumbar spine Tscore of −3.4, and femoral neck Tscoreof −2.3. Bone scintigraphy demonstrated pathological uptake in right iliac blade, which may suggest a neoplasm, but MRI showed only degenerative changes. Our diagnosis established osteoporosis and diaphyseal right femur fracture. In May 2009, treatment was changed to zoledronate (5 mg/yearly) and calcifediol (16,000 UI/monthly).

A breast nodule was detected in a routine mammography in December 2009. After the diagnosis of breast cancer, a metastatic cause of the femoral fracture was suspected, and zoledronic acid was increased (4 mg/3 months). In January 2010, a new bone scintigraphy showed focal increased radionuclide uptake at lumbar spine suggesting vertebral fractures and at left femoral neck, not suggestive of malignancy. In October 2010, breast surgery was performed. A cervico-thoraco abdominal scan showed that tumor markers were normal. In January 2010, she suffered a left diaphyseal femoral fracture with no previous trauma and prodromal pain the days before, which was treated with intramedullary nailing (Fig. 1). In January 2011, a PET–CT excluded disseminated disease, and the patient was referred to Endocrinology for study of osteoporotic fractures with poor clinical course.

Our diagnosis was bilateral atypical femoral fracture in a patient with different risk factors: type 2 diabetes, hypovitaminosis D, breast cancer, and bisphosphonate treatment.

Features for diagnosis of AFFs have been defined recently by the American Society of Bone and Mineral Research Task Force [1]. They proposed major features that must also be present and minor features that may or not be present (Table 1). In our case, all major features and also some minor features were present: prodromal pain, delayed healing, comorbid conditions as vitamin D deficiency, and bisphosphonate treatment.

Regarding the pathophysiology of AFFs, different factors have been proposed [2], although the lack of data in humans and the absence of those findings in many cases of

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Fig. 1 Diaphyseal femoral fracture showing major criteria of AFFs

Table 1 AFFs ASBMR task force report: major and minor features of AFFs

Major features
Located anywhere along the femur from just distal to the lesser trochanter to just proximal to the supracondylar flare
Associated with no trauma or minimal trauma, as in a fall from a standing height or less
Transverse or short oblique configuration
Noncomminuted
Complete fractures extend through both cortices and may be associated with a medial spike; incomplete fractures involve only the lateral cortex
Minor features
Localized periosteal reaction of the lateral cortex
Generalized increase in cortical thickness of the diaphysis
Prodromal symptoms such as dull or aching pain in the groin or thigh
Bilateral fractures and symptoms
Delayed healing
Comorbid conditions (e.g, vitamin D deficiency, RA, hypophosphatasia)
Use of pharmaceutical agents (e.g, BPs, glucocorticoids, proton pump inhibitors)

AFFs make their pathophysiology unresolved. Although bisphosphonate treatment is not a prerequisite for the development of AFFs, they may contribute to their development in some cases [3]. Although the quality of evidence is poor, vitamin D levels below 20 ng/ml and the presence of comorbid conditions such as diabetes and glucocorticoid use is now recognized to be linked to AFFs. Taking this into account, the presence of type 2 diabetes and low vitamin D in our patient constitute a risk factor for fractures and maybe also for AFFs. Most reports showed normal bone turnover markers [1], as occurred in our case.

The management of patients with AFFs includes both surgical and medical recommendations [1]. In our case, although the first bone scintigraphy did not show any uptake in the right femur, in the second one, there was an increased uptake in the right diaphysis, which may have allowed identifying the risk of AFF development. Moreover, the presence of breast cancer complicated the diagnosis in this patient until metastatic disease was excluded.

We think that this case is of interest for the following reasons. First, the presence of conditions linked to AFFs may have allowed to suspect it. Second, it shows that in a patient with a femoral fracture, an adequate medical interview may allow identifying patients with AFFs, who are at risk for the development of another fracture, and correction of predisposing factors as for vitamin D deficiency may be done.

Conflict of interest No potential conflicts of interest relevant to this article were reported.

References

1. E. Shane, D. Burr, P.R. Ebeling, B. Abrahamsen, R.A. Adler, T.D. Brown, A.M. Cheung, F. Cosman, J.R. Curtis, R. Dell, D. Dempster, T.A. Einhorn, H.K. Genant, P. Geusens, K. Klaushofer, K. Koval, J.M. Lane, F. McKiernan, R. McKinney, A. Nug, J. Nieves, R. O'Keefe, S. Papapoulos, H.T. Sen, M.C. van der Meulen, R.S. Weinstein, M. Whyte, American Society for Bone and Mineral Research, Atypical subtrochanteric and diaphyseal femoral fractures: report of a task force of the American Society for Bone and Mineral Research. J. Bone Miner. Res. **25**, 2267–2294 (2010)
2. J. Compston, Pathophysiology of atypical femoral fractures and osteonecrosis of the jaw. Osteoporos. Int. **22**, 2951–2961 (2011)
3. G. Mazziotti, J. Bilezikian, E. Canalis, D. Cocchi, A. Giustina, New understanding and treatments for osteoporosis. Endocrine **41**, 58–69 (2012)