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Pregnancy- and lactation-associated osteoporosis with severe vertebral deformities: can strontium ranelate be a new alternative for the treatment?

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Abstract

BACKGROUND CONTEXT: Pregnancy- and lactation-associated osteoporosis is an uncommon condition that may be a consequence of preexisting low bone density, loss of bone mineral content during pregnancy, and increased bone turnover.
PURPOSE: To present a case of severe osteoporosis associated with pregnancy and lactation and its treatment protocol.
STUDY DESIGN/SETTING: A tertiary care hospital.
PATIENT SAMPLE: A young female after twin pregnancy presenting with severe osteoporosis.
METHODS: The diagnosis was done on the basis of bone mineral density (BMD) measurement. The patient was treated with first alendronate and then strontium ranelate. She was considered as a candidate for kyphoplasty.
RESULTS: A dramatic increase in the BMD and palliation of back pain were observed.
CONCLUSIONS: Strontium ranelate may be a new alternative in the treatment of pregnancy- and lactation-associated osteoporosis.

Keywords: Osteoporosis; Pregnancy; Lactation; Strontium ranelate; Lumbar spine; Bone mineral density

Introduction

Osteoporosis is characterized by low bone mass and microarchitectural alterations of bone that predispose to fragility fractures [1]. The accrual of bone mass begins in childhood and continues until it reaches a peak between the ages of 20 and 30 years [2,3]. The peak bone mass is influenced by genetic factors, diet, activity, and reproductive health. Gonadal steroids play an important role in the prevention of osteoporosis as evidenced by anovulation and abnormal menstrual cycle patterns might place young women at increased risk for osteoporosis [4,5]. Pregnancy- and lactation-associated osteoporosis (PLO) is an uncommon condition that may be a consequence of preexisting low bone density, loss of bone mineral content during pregnancy, and increased bone turnover. Pregnancy together with the changes in the calcium and bone metabolism and the effect of gravid uterus may cause fragility fractures in susceptible women [6]. Additional changes in mineral metabolism that occur during lactation further increase the fracture risk [6]. There is no consensus to date on how to treat PLO.

In this article, we present a case of a young woman, who was previously treated for polycystic ovary syndrome (PCOS) and had a diagnosis of osteoporosis after twin delivery.

Case report

A lactating 23-year-old Caucasian woman was referred to our outpatient clinic with back pain 2 months after delivering her twin children. Her medical history revealed that she had menarche at 14 years of age and menses had been normal until the age of 19 years with subsequent oligomenorrhea. She had been treated with didrogesterone for the

FDA device/drug status: not approved for this indication (Strontium ranelate).

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menstrual irregularity for 4 years with the diagnosis of PCOS. Thereupon, she had been recommended clomiphene citrate when she wished to become pregnant. She was seen in another hospital with a history of severe, nontraumatic back pain for the last 15 days during the second month of lactation after twin delivery with C-section. She was referred to our hospital because of osteoporosis demonstrated by the thoracolumbar radiograms and a T score of −4.8 at the lumbar spine.

On admission, she complained of back pain and denied any trauma. A nutritional questionnaire showed that her daily calcium intake was about 1,000 mg. She was neither smoking cigarette nor consuming coffee or alcohol. There was no history of fractures and osteoporosis in other members of her family. The patient was 169-cm tall, had a body weight of 65 kg and a body mass index of 22.8 kg/m^2. The physical examination was unremarkable except for the scar of the C-section. Laboratory tests did not reveal any abnormality for secondary causes of osteoporosis such as hyperthyroidism, hyperparathyroidism, Cushing's syndrome, hyperprolactinoma, or hypoestrogenism. Serum levels of total alkaline phosphatase, bone alkaline phosphatase, type I collagen carboxyterminal telopeptide, type I collagen propeptide C, and urinary excretion of deoxypyridinoline and calcium were elevated (Table 1). Visual evaluation of the radiograms showed wedging of thoracic vertebrae 8-12 and of lumbar vertebrae 1-3 (Fig. 1). Bone densitometry measured by dual-energy X-ray absorptiometry (DXA) was consistent with generalized osteoporosis of the lumbar vertebrae and the hip (Table 2). The thoracolumbar magnetic resonance imaging revealed concavity of the vertebral bodies. DXA measurements of the patient's mother and sister were in normal ranges.

The patient was diagnosed to have PLO and accompanying oligomenorrhea. The diagnosis of PCOS could not be confirmed because of the lack of evidence of hyperandrogenism. Due to the very low bone mineral density (BMD) values, lactation was terminated and the patient was put on calcium 1 g/day, cholecalciferol 880 IU/day and alendronate 70 mg/week after learning that she did not want to have another baby. On the fourth month of the treatment, alendronate was discontinued and 2 g of strontium/day was initiated with the purpose of increasing bone formation and decreasing bone resorption. Table 1 demonstrates the course of the bone turnover markers over time. Twenty-one months after the onset of treatment, DXA measurements showed that BMD of the patient increased 33% at the lumbar spine, 7.4% at the femur neck and 20.5% at the total hip (Table 2). Due to the persistence of oligomenorrhea, an oral contraceptive that contains ethinylestradiol and drospirenone was added to her treatment. She was considered as a candidate for kyphoplasty in the future and followed up by yearly visits by the Department of Orthopaedics and Traumatology.

At her recent follow up 34 months after the initiation of therapy, the patient was free of back pain. Urinary deoxypyridinoline was suppressed for the first time during the course. Although there was no further improvement at the hip region, the DXA evaluation demonstrated a 5.9% increase at the lumbar spine with a total of 40.1% increase with regard to the baseline value (Table 2). The Z score at the total lumbar region regressed from -4.45 to -2.49 after 34 months of therapy.

Discussion

PLO is an uncommon condition characterized by the occurrence of fragility fractures, most commonly vertebral, in

Table 1
Serum and urinary biochemistry of the patient before and after the onset of treatment

Value	Normal range values	Before treatment	After 4 mo*	After 10 mo	After 15 mo	After 34 mo
Serum						
Calcium (mg/dL)	8.6–10.2	10.5	10.0	9.8	9.1	9.5
Albumin (mg/dL)	3.2–4.8	4.8	4.6	5.0	4.9	4.4
Phosphate (mg/dL)	2.3–4.7	4.33	3.36	3.72	3.47	3.64
Creatinine (mg/dL)	0.6–1.2	0.67	0.67	0.59	0.63	0.59
ALP (U/L)	35–129	**167**	74	86	81	79
BAP (U/L)	11–30	**101**	**36.3**	**44.3**	**36.9**	28.5
Intact PTH (pg/mL)	12–65	53	53.2	52.1	36.5	31.0
25 OH D (μg/L)	10–60	19.7	33.1		18.2	21.0
OC (ng/mL)	3.7–10.0	7.1	**13.8**	5.7	5.5	8.3
TICP (ng/mL)	69–147	**371**	**67.2**	**36.0**	**51.6**	**30.1**
CTx (pg/mL)	1,200–3,400	**9,906**	3,028	**0.95**†	0.48†	**0.99**†
Urinary						
U-Ca (mg/24 h)	100–300	**324**	148			384
DPD (nM DPD/mM Cr)	3.0–7.4	**13.1**	**11.2**	**10.31**	**12.4**	5.97

ALP, alkaline phosphatase; BAP, bone alkaline phosphatase; PTH, parathyroid hormone; 25 OH, 25 hydroxy vitamin D; OC, osteocalcin; TICP, type I collagen propeptide C; CTx, type I collagen carboxyterminal telopeptide; U-Ca, urine calcium; Cr, creatinine; DPD, deoxypyridinoline.

Bold text indicates values out of normal range.

* The patient was on alendronate during the first four months of therapy, then alendronate was discontinued and strontium was initiated.

† The normal range of CTx changed to 0.3–0.8 ng/mL after a change in the laboratory technique.