Pregnancy and Lactation-Associated Osteoporosis With Vertebral Compression Fractures: Two Case Reports

ABSTRACT Pregnancy and lactation-associated osteoporosis is a rare disease that often occurs in the last period of pregnancy and the lactation period. Here, we report two cases who admitted our clinic with the complaint of back pain in the postpartum period. Our first case was a 21-year-old woman who referred to our clinic with a complaint of back pain one month after delivery. The other case was 20-year-old woman, and her complaints started two months after delivery. In both cases, thoracic and lumbar magnetic resonance imaging were performed, and multiple osteoporotic fractures were detected. Osteoporosis was detected in patients' bone mineral density test. The patients were diagnosed with pregnancy and lactation-associated osteoporosis. We recommended spinal brace for osteoporotic fractures. Calcium and vitamin D supplements was given to the patients. Pharmacologic treatment was not applied to the patients who did not stop breastfeeding, and the patients were followed up.

Keywords: Pregnancy; lactation; osteoporosis; osteoporotic fractures

Osteoporosis is often an age-related disease and it is common particularly among the postmenopausal women. However, it is rarely associated with pregnancy. Pregnancy and lactation-associated osteoporosis (PLO) usually occurs in the last trimester of pregnancy or in the early postpartum period. The prevalence of this disease is estimated to be 4-8 for every million patients. The etiology of the disease remains unclear, but genetic, environmental and hormonal mechanisms are claimed to be the possible causes. The leading symptoms seen in the patients are bone marrow edema and acute back pain depending on vertebral fractures.

Calcium homeostasis during pregnancy apparently changes. The calcium is transferred into the fetus from mother, and the increased intestinal calcium absorption in mother is provided by increased 1,25-dihydroxyvitamin D. The increased calcium absorption with the high estrogen level during pregnancy may be preventing bone loss. Despite these compensatory mechanisms, decrease in the bone mineral density may be seen during pregnancy. The decrease in the bone mineral density during pregnancy and breastfeeding period are often reversible, and bone mineral density (BMD) increases to the pre-pregnancy baseline levels in the 19th month postpartum irrespective of breastfeeding duration. Here, we report two PLO cases who admitted our clinic with the complaint of back pain in the postpartum period.
The author certify that he has obtained all appropriate patient consent forms.

CASE REPORTS

CASE 1

A 21-year-old woman was referred to our clinic with a complaint of back pain one month after vaginal delivery. It was found out that her complaints started in the last month of pregnancy and she breastfed her baby. She had a height of 162 cm and weight of 58 kg before pregnancy. In her history, she had a menarche at the age of 12, and it was her first live birth after having two abortions. She had no history of a disease, menstrual disorder, alcohol consumption and smoking. When the history of drug use was checked, she had a treatment of low-molecular-weight heparin (LMWH) 40 mg/day till the last month of her last pregnancy. The patient had no surgical, trauma and family history. It was learned that the patient gained 9 kg during her pregnancy. As a result of nutritional examination, it was found out that the patient took approximately 600 and 800 mg calcium daily in the course of pregnancy. In the physical examination of the patient, it was found that her spinal range of motion was limited and painful and she had a tenderness thoracic and lumbar spine with palpation and increased thoracic kyphosis. It was also found that there was a total loss of body height up to 5 cm compared to prenatal period. In the laboratory examinations, serum calcium, albumin, phosphorus, alkaline phosphatase, PTH, cortisol, prolactin, and thyroid hormone levels were normal. A mild 25-hydroxyvitamin D deficiency was detected (18.26 ng/mL). Besides, in the magnetic resonance imaging (MRI), multiple osteoporotic fractures were detected in the thoracic and lumbar vertebra (Figure 1). As a result of the measurement using dual energy X-ray absorptiometry (DEXA), L1-L4 T and Z scores were found as -3.1. On the other hand, Femur neck Z score was -1.8. By means of these data, the patient was di-

FIGURE 1: Case 1; (a) multiple osteoporotic fractures in T2-weighted MRI of the thoracic spine and (c) lumbar spine (b) bone marrow edema in STIR sequence MRI of the thoracic spine and (d) lumbar spine.
Diagnosed with PLO, pain management was applied, and spinal brace was recommended. 1000 mg calcium and 880 IU vitamin D supplement were given to the patient, who was reluctant to give up breastfeeding. In the following check-up after a month, the patient with a decreased pain complaint was given an initial exercise program (relaxing and breathing etc.). Eight weeks later, the pain was not complained and the patient’s corset was removed and a progressive exercise program was initiated, and the patient follow-up was carried on.

**CASE 2**

A lactating 20-year-old woman who gave her first birth by cesarean delivery three months ago was referred to our clinic with the complaint of back pain. It was learned that breastfeeding patient had a history of onset of back pain two months after her delivery. The patient had a height of 158 cm and a weight of 48 kg before pregnancy. It was also found that there was a total loss of body height up to 4 cm compared to prenatal period. It was learned that the patient gained 7 kg during pregnancy and, she’s had low calcium intake throughout her pregnancy. She had no medical treatment, surgery, trauma and family history. In the physical examination, thoracic region had tenderness with palpation. In the laboratory tests, there was no abnormality other than mild level of 25-hydroxyvitamin D deficiency (16.53 ng/mL). However, thoracic MRI showed multiple osteoporotic vertebral fractures (Figure 2). As a result of the measurement using DEXA, L1-L4 and femur neck Z scores were found to be -3.5 and -1.6, respectively. Jewett spinal brace was recommended to the patient. 1000 mg calcium and 880 IU D vitamin were given to the patient, who was reluctant to give up breastfeeding. In the following check-up after a month, the patient, whose pain remarkably regressed, was given an initial exercise program, and patient follow-up was continued. The corset was removed in the tenth week and the exercise program was reorganized.

![FIGURE 2](image)

*FIGURE 2: Case 2; (a) multiple osteoporotic fractures in T2-weighted MRI of the thoracic spine (b) bone marrow edema in STIR sequence MRI of the thoracic spine (c) T2-weighted MRI of the lumbar spine (d) bone marrow edema in STIR sequence MRI of the lumbar spine.*
DISCUSSION

PLO is difficult to diagnose because they are not present with common risk factors as in postmenopausal osteoporosis, and they are often healthy. In this report, we discuss two patients with PLO who were admitted to our clinic with the complaint of back pain, loss of height and increased thoracic kyphosis.

The exact cause of PLO is not yet known. However, increased parathyroid hormone-related protein (PTHrP), which leads to bone resorption, has been suggested as a possible reason. On the other hand, genetic defects in the calcitonin and calcitonin receptors may play a role in the etiology of the disease. Phillips et al. defined risk factors for osteoporosis only in two patients in a 13-patient series with PLO. One of them had the history of mild type 1 osteogenesis imperfect, while the other had a history of fertility (clomiphene and menotrophin) treatment. Furthermore, low calcium intake, Vitamin D deficiency as well as taking glucocorticoids and certain anticonvulsants during pregnancy may be considered as risk factors. Recently Hadji et al. released a case control study conducted on 102 patients with pregnancy-associated osteoporosis. They determined in their studies that PLO was multifactorial disease to which various individual factors contribute. In the same study, they also found significant relationship between PLO and serious dental problems, immobility as well as lack of exercise in childhood.

Long-term use of unfractionated heparin is a serious risk factor for osteoporosis. The cause of osteoporosis induced by heparin is not known, but several probable mechanisms have been reported. It is thought that heparin may cause this condition by directly affecting the bone cells or damaging mineralization. Moreover, it has been shown that heparin chelates calcium in vitro. The decrease of ionized calcium may stimulate parathyroid hormone, which increases osteoclastic activity and may give rise to demineralization. Our first case had a history of low-molecular-weight heparin (LMWH) intake, but it has been reported that long-term use of LMWH does not cause significantly bone loss in the studies carried out. Despite this, some cases were reported to have taken LMWH treatment throughout the pregnancy and to have possibly related osteoporosis in the literature.

Calcium and Vitamin D optimization are recommended to all cases though there is not a guideline on the treatment of PLO. 1200 mg-day is recommended from all sources for calcium. Along with the changes depending on the guidelines, any vitamin D intake is required to achieve a level of 25-hydroxyvitamin D of >50 nmol/L or >75 nmol/L. Additionally, breastfeeding was discontinued in most of the case, and one of the drugs including bisphosphonate, strontium ranelate, denosumab or teriparatide was added to the treatment in literature. Bisphosphonates, strontium ranelate and denosumab are used in postmenopausal women, and there are safety concerns on the skeleton and non-skeleton in the long term. When these long term safety concerns are taken into consideration, the physicians should think carefully before they initiate this treatment.

In the cases that were treated by only discontinuing breastfeeding and supplementing vitamin D and calcium, it was observed that there was an increase in the lumbar BMD by 6% between 8 and 18 months after the treatment, while this rate rise to 9.5% between 2 and 4 years following the treatment. It was determined that prolonged lactation retarded recovery, and although discontinuing breastfeeding contributes significantly to the recovery process of BMD, baseline values could not be reached. These patients typically apply to the clinics with the complaint of back pain in the last trimester or during lactation and often following the first pregnancy. Osteoporotic fractures may occur in some of these patients. The complaints of our first case were in the last month of the pregnancy, whereas the complaints of our second case started two months after delivery. In our both cases, osteoporotic vertebral fractures were detected. After diagnosing our patients, pain management was applied and spinal brace was recommended. Both cases had low calcium intake during pregnancy and lactation. Additionally they had a mild level vitamin D deficiency. Calcium supplementation and vitamin D op-
timization were done. The teriparatide treatment was initially considered owing to the fact that our patients with multiple vertebral fractures were in their early reproductive period; however, the treatment was not initiated as the patients refused to discontinue breastfeeding.

In conclusion, pregnancy and lactation-associated osteoporosis should be kept in mind as differential diagnosis of patients who present with back pain and/or increased thoracic kyphosis and/or loss of height especially in the last trimester of pregnancy or in the lactation period. Further research is needed to determine the etiology of PLO and to establish guideline for treatment strategies.

Informed Consent

The author certify that he has obtained all appropriate patient consent forms.

## REFERENCES


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