

Buckle Fracture of the Distal Radius in Pregnancy and Lactation- Associated Osteoporosis: A Case Report and Literature Review

Saskia Craine MB ChB*, Rangaswamy Benamanahally MBBS

Blackpool Victoria Hospital, United Kingdom

*Corresponding author

Dr S Craine

Senior House Officer Doctor working at Blackpool Victoria Hospital in the United Kingdom

Submitted : 1 Feb 2024 ; Published : 18 Apr 2024

Citation: S Craine., R Benamanahally(2024). Buckle Fracture of the Distal Radius in Pregnancy and Lactation- Associated Osteoporosis: A Case Report and Literature Review. J Medical Case Repo, 6(2):1-5. DOI : <https://doi.org/10.47485/2767-5416.1071>

Abstract

Objective: Pregnancy and lactation-associated osteoporosis (PLO) is a rare disease which occurs in the third trimester of pregnancy and/or during the lactation period. Many cases of PLO are associated with hip fractures and/or vertebral compression fractures, while distal radius fractures are rarely reported.

Case Report: A 30-year-old patient presented with a Buckle fracture four months post-partum of her second pregnancy. She was managed conservatively. She was reviewed during her first and second pregnancy by both the orthopaedic and rheumatology for PLO.

Conclusion: Doctors and patients will benefit from having more awareness of PLO to avoid missed diagnosis in pregnant women suffering from low back/hip pain and fractures caused by micro trauma. Accurate diagnosis and individualised treatment will aid in optimised pain relief and functional recovery.

Keywords: pregnancy and lactation associated osteoporosis, PLO, Buckle fracture

Introduction

Osteoporosis is characterised by low bone mass and degeneration of the microstructure of the bones, with an increase in bone fragility and an enhanced susceptibility to fractures (Jia et al, 2020). **Osteoporosis** involves a significant reduction in bone density. Reduced bone density makes the bones weaker and prone to fractures.

The main clinical symptoms include severe chronic back pain and a reduction in height due to the presence of vertebral fractures. Most cases present in the third trimester of pregnancy or early post- partum period.

This article reports a case of PLO associated with prolonged low back pain, transient osteoporosis of the hip and a buckle fracture of the distal radius.

Case Report

A 30-year-old woman presented to A&E following a fall on an outstretched hand. Her hip gave way, she fell and sustained an injury to her right wrist. At the time, she was four months post- partum of her second pregnancy. A radiograph of her arm showed an un-displaced extra-articular buckle type fracture of the distal radius. The surrounding soft tissue was swollen. She was reviewed by the orthopaedic team and was managed non-operatively with a below elbow cast. On examination, her wrist was swollen, there was palpable tenderness over the distal radius, however her hand grip was well preserved. She denied any paraesthesia in her fingers and wrist range of movement was well preserved. Laboratory tests revealed adjusted serum calcium (Ca), alkaline phosphatase (ALP), 250 hydroxyvitamin D3 (25-(OH) Vit D3 and haemoglobin (Hb) were normal.



Figure 1: AP Radiograph of Right Wrist



Figure 2: Lateral Radiograph of Right Wrist

During her first pregnancy and lactation period, the patient did not seek medical review for hip or lower back pain or discomfort. She has no known history of anorexia nervosa, diabetes mellitus,

thyroid or parathyroid disorders, rheumatoid arthritis, or kidney disease. She has a past medical history of asthma, eczema and mixed anxiety and depression and had a body mass index of 28. The patient is a smoker and drinks occasionally, however reduced intake during pregnancy. She denies any history of trauma, denies a history of long-term corticosteroid use, and denies any history of blood dyscrasias.

During the 18 months leading up to her second pregnancy, she complained of constant and severe left hip and groin pain which referred to her anterior thigh and proximal shin. An MRI scan revealed transient osteoporosis of the left hip with marked oedema in the left femoral neck with extension into the left intertrochanteric region. As well as moderate right posterolateral disc protrusion with annular tear at L4-5 level. She was subsequently diagnosed with suspected pregnancy related transient osteoporosis of the right hip. Ongoing symptoms included shooting pains down her left leg which arose from her lower back, around her bottom and radiated to her anterior thigh. She had meralgia and altered sensation below the knee and intermittent pain on prolonged car journeys. Her pain was managed well with co-codamol and amitriptyline. She declined bisphosphonates due being pregnant. The patient reported she did not intend to breastfeed. On examination she was unable to do a straight leg raise (SLR) beyond 20 degrees on the left side due to pain, on the right is 60 degrees. There was no weakness allowing for pain, there was no lateral pain to the hip, the SLR also caused pain.

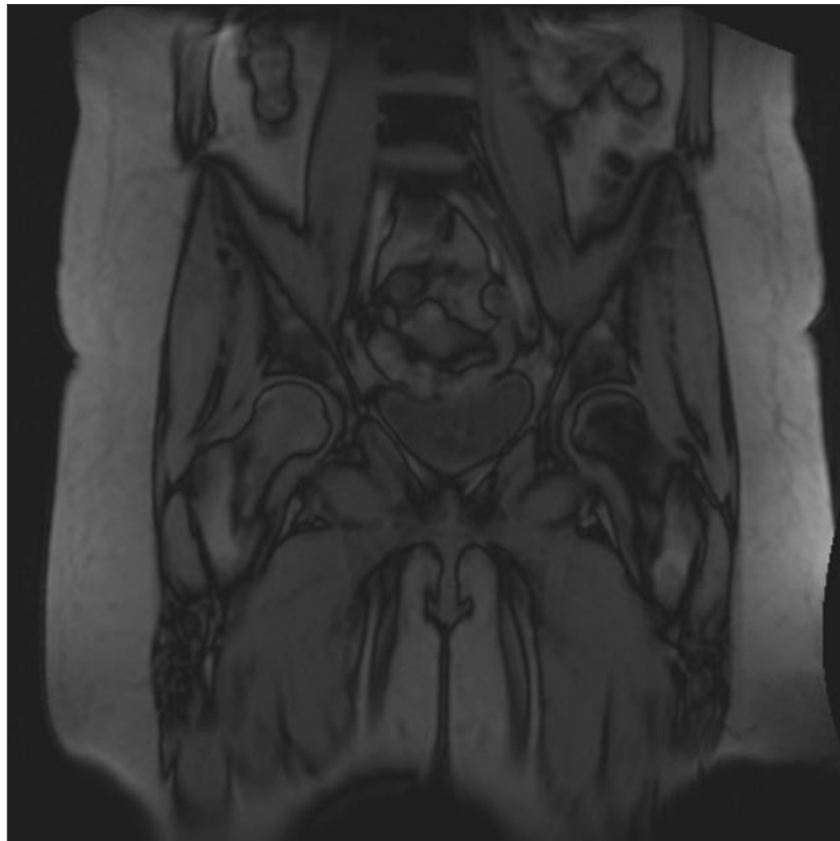


Figure 3: MRI Pelvis

Discussion

This report presents a rare case of PLO during pregnancy and the post-partum period which lead to a buckle fracture of the wrist. The patient had many consultations with physiotherapy, Rheumatology, and Orthopedics. She was diagnosed with transient PLO in the period between her first and second pregnancy.

PLO is a rare presentation that occurs during the late pregnancy and early lactation period. It is characterised by the occurrence of fragility fractures, most commonly in the hip and vertebral column during the third trimester of pregnancy, or early postpartum (Lujano-Negrete et al, 2022). There is limited epidemiological data on PLO, however previous research has shown that the prevalence is 4–8 patients per million of population (Qian et al 2021). Severe prolonged back pain is a common clinical manifestation. Subsequently PLO can have a significant impact on mental health, quality of life, and capacity to work. Research has shown that the average time for PLO patients to return to work is more than 3 years (Gehlen et al, 2019).

Changes in calcium metabolism in pregnancy may contribute to the development of PLO. During pregnancy intestinal calcium absorption doubles to meet the foetal demands. During the 6 weeks prior to delivery, pregnant women must provide approximately 300–500mg of calcium to the foetus every day as well as meet their own requirements. However, if maternal intake of calcium is insufficient to meet the combined needs, the maternal skeleton will undergo resorption during

the third trimester (Kovacs and Ralston 2015). The greatest demand for calcium occurs during lactation and women who breastfeed have an even greater loss of calcium to produce milk. During lactation, several hormonal changes independent of maternal calcium intake provide a 5–10 % loss of trabecular mineral content in order to provide calcium to milk (Lujano-Negrete et al, 2022). Other risk factors for PLO include lack of exercise or immobility, low body weight, alcohol or tobacco abuse, irregular menstruation, bowel disease, and the use of clomiphene or heparin (Jia et al, 2020).

Vitamin D status is related to bone mineral density (BMD) and bone turnover. BMD is expected to reduce by 1-3% per month during lactation (Kovacs 2017). Vitamin D insufficiency is not uncommon in patients with PLO. The main effect of active vitamin D metabolite 1,25(OH)₂D is to stimulate the absorption of calcium from the gut. The consequences of vitamin D deficiency are secondary hyperparathyroidism, and bone loss, leading to osteoporosis and fractures. Therefore, vitamin D supplementation is generally recommended for all pregnant and breastfeeding women (Hardcastle, Yahya and Bhalla, 2019). Additionally, inadequate calcium intake could also result in secondary hyperparathyroidism contributing to bone loss (Kovacs, 2015). Women with PLO are advised to stop breastfeeding or limit its duration to a minimum as well as maintain a balanced diet (Wang and Bai, 2020).

Furthermore, research has revealed that PLO may not appear in the first pregnancy. It might occur in the second, third or even fourth pregnancy. For patients with multiple pregnancies, PLO might appear in one of them, while other pregnancies were normal (Babbitt 1998).

Despite its relatively common occurrence there is no standard clinical guideline for the treatment of PLO. Various medications and supplements have been reported in the literature and have been used in clinical practice for the treatment of PLO including bisphosphonates, teriparatide, denosumab and calcitonin (Ying et al, 2021). Bisphosphonate treatment has been shown to be effective in patients with PLO, alongside calcium and vitamin D supplementation. O'Sullivan et. al (2006) found BMD of patients increased by 17% in 11 cases of PLO following bisphosphonate treatment. However, bisphosphonates accumulate in bones and can cross the placenta to the foetus during a subsequent pregnancy (Hassen-Zrour et al, 2010). Losad et al (2010) found 20% of congenital malformations were reported in 10 cases of women treated with bisphosphonates during pregnancy. Therefore, bisphosphonates should be used cautiously in women who are pregnant or who are planning a future pregnancy. Vitamin D and calcium supplements are important to maintain the balance of bone homeostasis. Adequate vitamin D sufficiency can be maintained by sunlight exposure or daily intake of 600-1000 IU of vitamin D3 (Wang and Bai, 2020). Those suffering from osteoporosis should be adequately provided with calcium (1200mg/ day) and vitamin D to maximise benefit of anti-osteoporotic treatment.

The most common fracture sites for PLO patients are the vertebrae. The thoracolumbar area remains the most affected area (Qian et al, 2021). BMD assessed by DEXA decreased significantly at the lumbar spine and hip during pregnancy (Moller et al, 2012). Furthermore, decreases in bone mass at the lumbar spine and hip are also associated with the amount of breast milk produced during lactation (O'Sullivan et al 2006). There is, however, no consensus regarding the change in BMD in the forearm. There is evidence for a confirmed decrease in BMD (Mollar et al, 2012) as well as the opposite conclusion (Ulrich et al, 2003). Correspondingly there are very few reports of distal forearm fractures in PLO patients in comparison with vertebral or hip fractures (Wang and Bai 2020).

Conclusion

PLO is very rare clinical type of osteoporosis and is easily misdiagnosed. Doctors will benefit from having more awareness of PLO and must keep it in mind when meeting young women with low back pain, especially during the last three months of pregnancy or three months after delivery. Pregnancy and lactation alter the maternal bone status and without a balance in metabolism, this may cause an increased risk of fracture due to changes in bone mineral density. Thoracolumbar region is most affected however, as the present case shows PLO is a systemic disease that can also affect all distal joints such as the wrist. It is, therefore, important for clinicians to be aware of the potential for fragility fractures to occur during

pregnancy and lactation to enable prompt diagnosis. Currently, bisphosphonates are most widely used to treat PLO, however further research is required for clear clinical guidelines in the future.

References

1. Korompilias, A., Karantanas, A., Lykissas, M., Beris, A. (2008). Transient Osteoporosis. *Journal of the American Academy of Orthopaedic Surgeons*, 16(8):480-9. DOI: 10.5435/00124635-200808000-00007
2. Wang, G., Xiaodong, B. (2020). Barton Fracture of the Distal Radius in Pregnancy and Lactation-Associated Osteoporosis: A Case Report and Literature Review. *The International Journal of General Medicine*. 13: 1043-1049.
3. Kovacs, S., Ralston. (2015). Presentation and management of osteoporosis presenting in association with pregnancy or lactation. *Osteoporosis International*. 26: 223–2241.
4. Lujano-Negrete, A., Rodríguez-Ruiz, M., Skinner-Taylor, C., Perez-Barbosa, L., Cardenas de la Garza, J., García-Hernández, P., Espinosa-Banuelos, L., Gutierrez-Leal, L., Jezzini- Martínez, S., & Galarza-Delgado, D. (2022). Bone metabolism and osteoporosis during pregnancy and lactation. *Archives of Osteoporosis*. 17: 36
5. Qian, Y., Wang, L., Yu, Lili, Huang, W (2021) Pregnancy- and lactation-associated osteoporosis with vertebral fractures: a systematic review. *BMC Musculoskeletal Disorders*. 22 (926).
6. Gehlen, M., Lazarescu, AD., Hinz, C., Schwarz-Eywill, M., Pfeifer, M., Balasingam. S (2019). Long-term outcome of patients with pregnancy and lactation-associated osteoporosis (PLO) with a particular focus on quality of life. *Clinical Rheumatology*. 38:3575–83.
7. Hardcastle, A., Yahya, F., Bhalla, K (2019). Pregnancy-associated osteoporosis: a UK case series and literature review. *Osteoporosis International*.30(5):939–948.
8. Kovacs, C (2017). The skeleton is a storehouse of mineral that is plundered during lactation and (fully?) replenished afterwards. *Journal of Bone and Mineral Research*. 32:676–680.
9. Lips, P., van Schoor, N (2011). The effect of vitamin D on bone and osteoporosis. *Best Practice Research and Clinical Endocrinology Metabolism*. 25(4): 585-91 DOI: 10.1016/j.beem.2011.05.002.
10. O'Sullivan, SM., Grey, AB., Singh R, et al. (2006). Bisphosphonates in pregnancy and lactation-associated osteoporosis. *Osteoporosis International*. 17(7): 1008-1012. DOI:10.1007/s0017/s00198/s00198-006-0112-3.
11. Hassen-Zrour, S., Korba, W., Beja, I., Saidani Z., Bergaoui, N. (2010). Maternal and foetal outcome after long-term bisphosphonate exposure before conception. *Osteoporosis International*. DOI: 10.1007/s00198-009-0983-1.
12. Losada. I., Sartori. L., Di Gianantonio. E, et al (2010). Bisphosphonates in patients with autoimmune rheumatic disease: can they be used in women of childbearing age? *Autoimmune review*. 9(8): 547-552. DOI:10.1016/j.autrev.2010.02.002

-
13. Ulrich, U., Miller, P., Eyre, D et al (2003). Bone remodelling and bone mineral density during pregnancy. *Archives of Obstetrics and Gynaecology*. 268 (4): 306-316. DOI:10.1302/0301-620X.47B4.724
 14. Moller, U., Vio. S., Mosekilde. L et al. (2012). Changes in bone mineral density and body composition during pregnancy and post-partum. A controlled cohort study. *Osteoporosis International*. 23(4): 1213-1224. DOI: 10.1006/s00198-011-1654-6

Copyright: ©2024 S Craine. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.