Multiple Vertebral Fragility Fractures Following Pregnancy

Aditi Sharma[1], Rochan Agha-Jaffar[1], Jeremy Cox[1], Alexander N Comninos[1]

[1]Department of Endocrinology, St. Mary's Hospital, Imperial College Healthcare NHS Trust.

Introduction

- Fragility fractures are fractures that result from mechanical forces that would not ordinarily result in a fracture, known as low-level (or low-energy) trauma[1].
- Pregnancy and lactation-induced osteoporosis is rare, but can cause fragility fractures with disabling consequences at a young age and with a baby to look after.

Case description

- A 35-year old female who was previously well, until her first pregnancy in 2014 in Israel.
- Her antenatal course was uncomplicated. She breastfed postpartum and three months into this she experienced **acute back pain** on reaching for a nappy.
- She had no other constitutional symptoms and was not on any medications or supplements.
- Examination was unremarkable apart from significant vertebral tenderness and her BMI was 23.
- MRI Spine demonstrated **multiple vertebral wedge fragility fractures** at T3, T6, T8, T9, T10 and T11 with a total of over 4cm height loss. ***(Figure 1)***
- Bone densitometry at the time of fracturing in Israel **demonstrated lumbar and vertebral osteoporosis** with lumbar spine T-score -4.3 and total mean hip T-score -3.3.
- She moved to the UK 2 years later and was referred to our Endocrine Bone Clinic having received a single dose of denosumab under the rheumatologists.

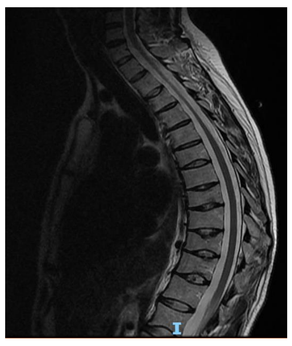

Figure 1: T2-weighted MRI thoracic spine

Figure 2: Bone mineral density scan in 2018: lumbar T-score –3.2 (Z-score -3.2) and total mean hip T-score -2.5 (Z-score -2.4)

Clinical course

- Repeat bone densitometry in June 2018 was consistent with naturally improving bone mineral density (BMD) with lumbar T-score -3.2 (Z-score -3.2) and total mean hip T-score -2.5 (Z-score -2.4) (although strictly one should not compare DEXAs from different machines). ***(Figure 2)***
- In keeping with this improved bone mineral density, she had a raised Bone-ALP (23.7iu/l, NR 6.5-14.9) but normal uNTx (18nmolBCE/mmolCr, NR 5-65), and serum P1NP (28.9ug/l, NR 15-59).
- Osteoporosis risk factors were identified as previous low BMI, ex-smoker, previous vitamin D deficiency, previous SSRI exposure, family history of osteoporosis and breastfeeding 18 months postpartum.
- Additional secondary causes of osteoporosis were excluded (normal myeloma screen, thyroid, renal, and liver functions, negative coeliac and pituitary screens).

Case outcome

- Given her young age and improving BMD, we have currently advised improved calcium intake (1000-1200mg/day), adequate vitamin D supplementation, regular exercise and nutritional support, as any anti-resorptive therapy at this point may stunt her continued natural recovery and improvements in BMD. This has significantly reduced pain and increased activity, with no further fractures.
- Combined OCP was started primarily as contraception due to patient wishes, but also ensures good systemic oestrogen levels to aid bone modelling and limit the risk of future fragility fractures.
- Teriparatide, a recombinant form of parathyroid hormone, is an option to consider if bone density improvement plateaus.
- Her management may be challenging, as she plans for further pregnancy. This provides further reason to avoid any antiresorptive medication or teriparatide for now. In addition we have advised against future lactation post-partum.

Discussion

- Calcium homeostasis is significantly altered during pregnancy and subsequent lactation ***(Figure 3)***. Current data suggest small BMD increases at cortical but decreases at predominantly trabecular sites like the spine[2].
- In pregnancy 2-3% of maternal calcium is transferred to the foetus mostly in the second and third trimester. Subsequently during lactation 300-400mg calcium per day is transferred into breast milk, which is provided predominantly from maternal bone stores[3,4] ***(Figure 3)***.
- In addition, hyperprolactinaemia as a result of lactation results in oestrogen suppression and further bone loss. Combined with calcium losses as above, lactation can induce up to 10% BMD loss[3,4].

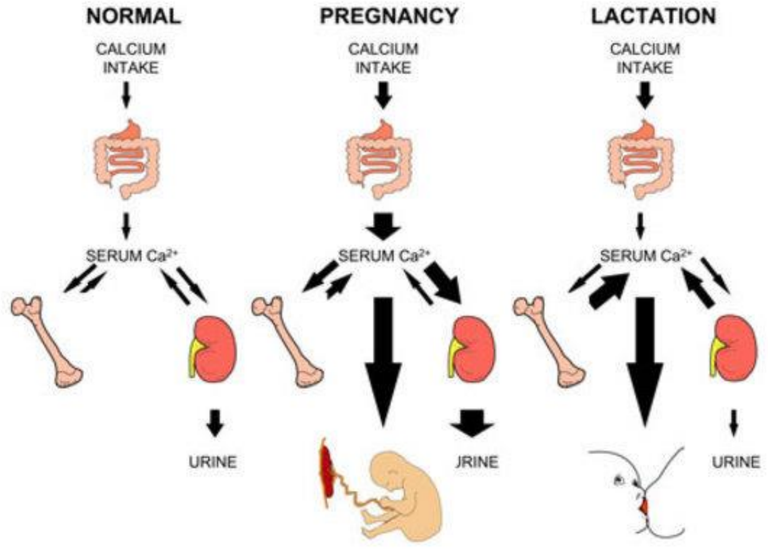

Figure 3: Calcium homeostasis during pregnancy and lactation

- There is no mutually-agreed opinion or guideline on the treatment of pregnancy and lactation-induced osteoporosis[5]. Treatment is complicated by the fact that the effects of bisphosphonates and denosumab are not clear on a developing foetus but it is known that they can cross the placenta as well as being present in breast milk and so are generally contra-indicated. These agents can be used however on completion of lactation if appropriate, but antiresorptive therapy may stunt natural bone recovery by reducing bone modelling. Teriparatide is an option depending on the course of natural recovery as it is a bone formation agent (but it is contraindicated in pregnancy and lactation)[6].
- There are reports of a rebound increased risk of multiple vertebral fractures in (post-menopausal) women, post-cessation of denosumab. This is associated with a rebound increase in bone turnover markers and so we are monitoring these closely as she was administered a single dose of denosumab prior to referral. A short course of a bisphosphonate may be required if they overshoot the reference range but this will need to be balanced against the patients desire and timing of attempts at conception in the near future.

Summary

- In this case, it is likely her pre-pregnancy BMD was suboptimal, given the additional significant risk factors including previous low BMI and family history. This led to a reduced baseline BMD as she entered pregnancy and lactation which resulted in further losses and ultimately multiple vertebral fractures.
- Osteoporotic fracture is an important differential to consider in women presenting with acute back pain during or after pregnancy[5]. Often there is a natural recovery while pharmacological agent-use is complicated at this time especially if considering further pregnancies/lactation.
- Furthermore, this case highlights the need to consider cautioning patients with reduced BMD regarding future lactation as they enter pregnancy, while ensuring adequate calcium and vitamin D intake.

References

1. NICE. Osteoporosis: assessing the risk of fragility fracture: NICE Guidelines CG146. Manchester: National Institute for Health and Care Excellence, 2012.
2. Salari P, Abdollahi M. The influence of pregnancy and lactation on maternal bone health: a systematic review. *J Family Reprod Health*. 2014;8(4):135-48.
3. Sanz-Salvador L, García-Pérez MÁ, Tarín JJ, Cano A. Bone metabolic changes during pregnancy: a period of vulnerability to osteoporosis and fracture. Eur J Endocrinol. 2015;172:R53–R65.
4. Nakamura Y, Kamimura M, Ikegami S, et al. A case series of pregnancy- and lactation-associated osteoporosis and a review of the literature. Ther Clin Risk Manag 2015;11:1361–5
5. Terzi R, Terzi H, Özer T, Kale A. A rare cause of postpartum low back pain: pregnancy- and lactation-associated osteoporosis. Biomed Res Int 2014;2014:287832.
6. Winarno AS, Kyvernitakis I, Hadji P. Successful treatment of 1–34 parathyroid hormone (PTH) after failure of bisphosphonate therapy in a complex case of pregnancy associated osteoporosis and multiple fractures. Z Geburtshilfe Neonatol. 2014;218:171–173.

BES2018 31--EP

Bone and calcium

Aditi Sharma

Poster presented at: SfE BES 2018 19-21 November GLASGOW

PosterSessionOnline.com