

## CASE REPORT

# Bilateral Hip Fractures Associated with Transient Osteoporosis of Pregnancy

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### Abstract

**A case of transient osteoporosis of pregnancy complicated by bilateral neck of femur fractures is reported. We discuss the condition and review the literature, provide information to aid in the diagnostic dilemma clinicians may face when considering imaging techniques and the potential for foetal harm during radiation exposure. We discuss management strategies in such patients.**

### Introduction

Transient osteoporosis of pregnancy is an uncommon condition, which affects women in their third trimester of pregnancy [1]. Often under- or misdiagnosed, patients may present late to the orthopaedic surgeon for treatment of resultant fragility fractures. We discuss the case of a 31 year-old lady presenting with bilateral subcapital hip fractures associated with transient osteoporosis of pregnancy which required internal fixation. The aetiology, diagnosis, use of radiographic investigations and treatment are discussed.

### Case Report

A 31 year-old woman designer presented to the accident and emergency department with increasing bilateral hip pain and inability to weight bear ten days after spontaneous vaginal delivery of her first child. The pain started ten weeks previously in the third trimester of her pregnancy, however at that time no imaging was performed and a diagnosis of pubic symphysis dysfunction was made with subsequent referral for physiotherapy. During the pregnancy, the hip pain had slowly intensified, the right more so than the left and, during delivery, a 'click' was heard in the right hip. She had no other medical history, did not smoke or drink alcohol and was on no regular medication.

Clinical examination revealed inability to weight bear and decreased bilateral hip movements due to severe pain. Serum biochemistry revealed a corrected calcium of 2.60 mmol/L (2.1 – 2.55 mmol/L) and alkaline phosphatase of 316 U/L (40 – 150 U/L); Parathyroid hormone, Thyroid Stimulating Hormone, vitamin D, phosphate, ferritin, B12, folate and serum electrophoresis were normal. Radiograph of the pelvis (Figure 1) revealed bilateral subcapital femoral neck fractures.

She underwent closed reduction and internal fixation of the hips using cannulated screws (Figure 2). She was kept non-weight bearing. At clinical review five weeks postoperatively there was no



*Figure 1: AP radiograph of the pelvis demonstrating bilateral femoral neck fractures.*



*Figure 2: Postoperative AP radiograph of the pelvis following fixation of the fractures with cannulated hip screws.*

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pain in the hips and range of movement was normal bilaterally. At eight months postoperatively she was asymptomatic and reported that she was 13 weeks pregnant with her second child. With this pregnancy she had started taking calcium supplements. Further radiographs were not performed in view of her early pregnancy. The cannulated screws were removed two years after initial treatment (Figure 3).



**Figure 3:** Follow-up AP radiograph at 2 years from index operation, after removal of cannulated screws.

## Discussion

Transient osteoporosis of pregnancy is an uncommon, self-limiting skeletal condition associated with the third trimester of pregnancy. Curtiss and Kincaid [1] first reported this condition in 1959, describing three cases of osteoporosis of the hip related to pregnancy. Although the hip is affected most commonly either uni- or bilaterally [2], there have been reports of this condition affecting the ankle [3], talus [4], knee [5] and sacrum [6]. Multiple joints affected simultaneously have also been described [3,7]. Its incidence may be underestimated [8].

Plain radiographs demonstrate changes from three to eight weeks after onset of symptoms. Typically there is a mottled osteopenic appearance, preservation of joint space and no joint erosion. Magnetic resonance (MR) imaging enables differentiation between transient osteoporosis of pregnancy and osteonecrosis, whose early stages can be similar. MR is highly sensitive and bone marrow oedema can be seen within 48 hours of the onset of symptoms [9]. Low signal intensity bone marrow is shown on T1-weighted images and high signal intensity bone marrow oedema on T2-weighted images [10]. However, oedema is not specific to transient osteoporosis of pregnancy and can be caused by other conditions. Dual energy X-ray absorptiometry and serial bone mineral density offer a method to follow up and monitor the progression of resolution. Niimi et al [11] showed that density was lowest two months after the onset of symptoms.

In relation to pregnancy, non-ionising imaging modalities are preferred, although Brodell et al [12] suggested that radiographs with foetal shielding should be taken if a pregnant woman presents with hip pain. MR is the modality of choice, and though safety of MR in pregnancy has not been proven there is yet to be conclusive evidence of long-term sequelae [13].

The condition is essentially a diagnosis of exclusion and differential diagnoses include pubic symphysis dysfunction, osteonecrosis of the femoral head, rupture of the pubic symphysis, infection, stress fracture, synovial chondromatosis, complex regional pain syndrome and malignancy [14,15]. Many benign musculoskeletal symptoms are associated with pregnancy and are well recognised and described. The gravid uterus exerts forces that change the maternal centre of gravity and thus loading patterns on the skeleton, in addition the change in hormonal levels and fluid retention can cause the common musculoskeletal complaints of pregnancy [16]. Consequently, symptoms of transient osteoporosis of pregnancy can be falsely attributed to the aches and pains expected in normal pregnancy.

Thus far, the aetiology is unknown, though numerous theories have been proposed. It has been suggested that transient osteoporosis of pregnancy is neurogenic in origin, whereby intermittent obturator nerve compression from the foetal head may lead to local demineralisation, though experimental compression and section of nerves has failed to confirm this hypothesis. Lequesne et al [17] suggested that transient osteoporosis of pregnancy was similar to complex regional pain syndrome, with pain and demineralisation; however, the lack of limb swelling and trophic changes make this unlikely. Venous obstruction has been postulated, though with first trimester abortion transient osteoporosis of pregnancy generally resolves therefore suggesting a more chemical aetiology [18]. Calcium homeostasis has also been implicated, in the pregnant state hypercalcaemia arises and there is a decrease in bone mass; however, this does not account for the localised phenomenon of transient osteoporosis of pregnancy [19]. Currently, it is postulated that the combination of osteopenia, overload and hormonal change causes microdamage and regional acceleratory phenomena that is both prolonged and excessive, thus leading to bone marrow oedema and transient osteoporosis [20].

Both pharmacological and surgical modalities of treatment have been tried though results are inconsistent [19]. The low incidence of transient osteoporosis of pregnancy, uncertain aetiology and lack of clinical studies prevents the formulation of a definitive treatment. The mainstays of treatment are therefore protected weight bearing and analgesia. However, time to recovery can be lengthy, averaging 7.8 months [19]. The use of other interventions has been shown to expedite resolution times. The bone sparing steroid deflazacort has been shown to be effective [21], although other steroids, both intra-articular and systemic have not demonstrated efficacy [17]. Bisphosphonates are efficacious in the treatment of osteoporosis and Paget's disease and, based on this premise, they have been used in the treatment of transient osteoporosis of pregnancy [22,23]. Case reports of bisphosphonate administration during pregnancy have not described any risk to the foetus, but these agents are still not recommended, as it remains unclear as to whether they can cross human placenta and potentially interfere with bone modelling [24]. They have been shown to be efficacious postpartum and are not detected in the breast milk of patients [25]. Studies have shown that intravenous, intramuscular and oral bisphosphonates reduce the duration of transient osteoporosis of pregnancy [26]; oral alendronate (70 mg weekly) has been shown to improve symptoms within two weeks and normalise MR findings in 12 weeks [27]. Calcitonin, another antiresorptive agent can also be used, reviews report an average resolution time of three months [19]. There is no research on its safety during pregnancy, although

O'Regan et al [28] reported no obstetric or foetal adverse effects when using it to treat giant cell granuloma.

Surgical interventions for hip fracture associated with transient osteoporosis of pregnancy include closed or open reduction and internal fixation using cannulated screws or a dynamic hip screw to preserve bone stock in the femoral head of young patients. Follow-up should be made to monitor fracture union and potential complications such as non-union, avascular necrosis and implant migration or cut out.

Although spontaneous resolution of transient osteoporosis of pregnancy is reported to occur a few months postpartum [29], duration of recovery can be significantly reduced with medical intervention, thus minimising the risk of insufficiency fractures. The condition has been known to recur in future pregnancies [30].

## Conclusion

Whilst fractures associated with transient osteoporosis of pregnancy are uncommon a high index of suspicion should be maintained. MRI is the imaging modality of choice. Early recognition and treatment by simple measures will preclude the development of significant complications.

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