Acta Orthop. Belg., 2011, **77**, 402-405

CASE REPORT

Delayed fixation of displaced bilateral, atraumatic, femoral neck fractures in a patient with pregnancy related osteomalacia

Charles DOCKER, Ian STARKS, Roger WADE, Charles WYNN-JONES

From the University Hospital of North Staffordshire, Stoke-on-Trent, UK

We present the case of a woman diagnosed with simultaneous displaced intracapsular femoral neck fractures following the birth of her second child. No traumatic event was identified. Diagnosis was delayed as the cause of her pain was thought to be non-skeletal in origin. Radiological and serological investigations were diagnostic of osteomalacia. Surgical fixation of her fractures was further delayed due to profound hypocalcaemia. Despite the delays, fixation with bilateral dynamic hip screws resulted in union with no evidence of avascular necrosis at 2 years follow-up. We believe this to be the first report of atraumatic bilateral femoral neck fractures and it shows that a good result can be achieved even in the presence of delayed fixation.

Keywords : osteomalacia ; fractured neck of femur ; pregnancy.

INTRODUCTION

Atraumatic femoral neck fractures are an uncommon complication of osteomalacia. We present the case of a woman with pregnancy related osteomalacia who suffered bilateral atraumatic intracapsular hip fractures and in whom surgical intervention was delayed due to profound hypocalcaemia. We believe this to be the first reported case of its kind.

CASE REPORT

A 20-year-old, westernised lady of Pakistani parentage presented with bilateral thigh pain 6 weeks following the birth of her second child. She had first complained of thigh pain 2 months preterm but this had later subsided. A healthy baby had been delivered by normal vaginal delivery. Her first child, aged 14 months, had been breast fed for the first 4 months. Her second child was fed formula milk. No traumatic event was identified.

The only past medical history of note was surgical treatment of genu valgum aged 12. She had made a good recovery and had been discharged at skeletal maturity. She was not vegetarian, did not eat many dairy products and ate, on average, two chapattis a day.

On presentation, both legs were mildly swollen. In view of the vague nature of her pain she was admitted to a medical ward for investigation of a

■ Charles Docker, FRCS (T&O), Consultant Orthopaedic Surgeon.
Department of Trauma and Orthopaedics, Worcestershire Acute Hospitals NHS Trust, Worcester Royal Infirmary, Worcester, UK.
■ Ian Starks, BA BM BCh, FRCS (T&O), Specialist Registrar Trauma and Orthopaedic Surgery.
■ Roger Wade, MD FRCS (T&O), Consultant Orthopaedic Surgeon.
■ Charles Wynn-Jones, FRCS, Retired Consultant Orthopaedic surgeon.
Department of Orthopaedics and Trauma, University Hospital of North Staffordshire, Stoke-on-Trent, UK.
Correspondence : Mr Charles Docker, 10 Silhill Hall Road, Solihull, B91 1JU, United Kingdom.
E-mail : cdoc999@aol.com

No benefits or funds were received in support of this study

Table I. — Patient's relevant biochemical profile along with normal reference values

Parameter	Result	Reference Values
Calcium	1.17	2.10-2.60 mmol/l
Phosphate	1.30	0.70-1.34 mmol/l
Alk. Phos.	309	30-135 U/l
TSH	0.8	0.3-5.0 mU/L
PTH	10.4	< 6.4 pmol/L
Vitamin D_3	6.2	10-30 mcg/l (Winter)

suspected deep vein thrombosis. Investigations excluded thrombosis but revealed an abnormal serum calcium at 1.17 mmol/l, raised creatinine kinase (CK) at 1020 U/l and alkaline phosphatase at 309 (Table I).

She was unable to weight bear with increasing pain and was noted to have abnormally externally rotated lower limbs. Radiographs of her hips 12 days after admission revealed bilateral displaced intracapsular femoral neck fractures and Looser's zones of the femoral shafts (Fig. 1-3). At this time she had a positive Chovstek sign.

Anaesthetic advice was obtained and she was deemed unsuitable for anaesthesia until the serum calcium had been corrected. She was treated with oral calcium and vitamin D3 supplements.

The following surgical options were considered : prosthetic replacement or internal fixation (+/- vascularised bone graft). In view of the patient's young age, closed reduction and internal fixation with dynamic hip screws was decided upon. Hip replacement carried an unacceptably high risk of revision. Fixation was performed 24 days following admission when her neuromuscular irritability had subsided. Post operative management involved mobilising non weight bearing for 3 months followed by a further two months of protected weight bearing.

At two years follow-up radiographs showed good evidence of union with no radiographic osteonecrosis or collapse (Fig. 4). At this time she was mobilising independently and was asymptomatic.

Fig. 1. — Displaced intracapsular fracture of the right hip

Fig. 2. — Displaced intracapsular fracture of the left hip

DISCUSSION

Osteomalacia is uncommon in the United Kingdom *(3,9)* yet remains prevalent in other parts of the world. Immigrants from these areas, especially Asia, are particularly at risk with a reported prevalence of up to 24%. Environmental and social factors are implicated. Fractures may occur in affected bone though these may be incomplete.

Fig. 3. — Looser's Zone in the right femoral shaft

Whilst femoral neck fracture has been described before, atraumatic bilateral femoral neck fractures have not previously been reported. In addition, definitive treatment was complicated by both a delayed diagnosis and subsequent need for medical optimisation. Furthermore, whilst osteomalacia of pregnancy has previously been reported it remains uncommon. A high index of suspicion must therefore be maintained to avoid a delay in diagnosis as occurred in this case.

Taylor and Grant reported a case of bilateral femoral neck fractures during a presumed hypocalcaemic convulsion. Their case bears some similarities to ours. However, there was a clear history of trauma i.e. a seizure. The diagnosis in that case was made immediately and the patient's calcium level was corrected within 36 hours of presentation making her safe for surgical intervention (*10*). The risks of anaesthesia in the presence of profound hypocalcaemia are high and include cardiac arrhythmia and coma (*8*).

Fig. 4. — AP of the pelvis at 2 years showing fracture union with no evidence of AVN.

The temporal relationship of both the previous report and ours to the birth of a baby is interesting. As well as osteomalacia, a specific syndrome known as "post-pregnancy osteoporosis" has been described (*7*). Cases of insufficiency fracture have been reported secondarily to this condition. The vertebral column is most commonly affected (*1*). However, in some cases of this syndrome, there is the possibility of the diagnosis being osteomalacia, rather than osteoporosis. This is due to incomplete initial investigations being presented. Transient osteoporosis of the hip has also been described in pregnancy (*2*). This condition has been associated with femoral neck fractures and presents in the third trimester of pregnancy.

The cause of osteomalacia is likely to be multifactorial. Pregnancy itself places an increased requirement for calcium on the mother though this is usually not enough in itself to cause a problem. However when this is combined with vitamin D deficiency (dietary +/- reduced exposure to sunlight) and limited calcium intake, calcium metabolism may be affected. This may be further compounded

by a diet rich in Chapattis. Chapatti flour is a potent source of phytate (inositol hexaphosphate) which acts to reduce calcium absorption from the gut (*9*).

Fracture fixation was performed as early as was deemed safe. It has been suggested that in the presence of significant delay to surgery a bone graft (free or vascularised) should be used to augment fracture fixation, to promote union and reduce the risk of osteonecrosis (*5,6*). What timescale is considered to be "delayed" remains controversial and its relevance depends on patient age and energy of injury (*4*). The positive outcome at two years with our patient may be related to the nature of her fractures. Being low energy in nature and possibly having occurred over a prolonged period of time may have allowed for some degree of vascular compensation. Avoiding early arthroplasty has been deemed a successful outcome in this young lady.

REFERENCES

1. **Di Gregorio S, Danilowicz K, Rubin Z, Mautalen C.** Osteoporosis with vertebral fractures associated with pregnancy and lactation. *Nutrition* 2000 ; 16 : 1052-1055.
2. **Fingeroth RJ.** Successful operative treatment of a displaced subcapital fracture of the hip in transient osteoporosis of pregnancy. A case report and review of the literature. *J Bone Joint Surg* 1995 ; 77-A : 127-131.
3. **Ford JA, Colhoun EM, McIntosh WB *et al*.** Rickets and osteomalacia in the Glasgow Pakistani community, 1961-71. *Brit Med J* 1972 ; 2 : 677-680.
4. **Jain R, Koo M, Kreder HJ *et al*.** Comparison of early and delayed fixation of subcapital hip fractures in patients sixty years of age or less. *J Bone Joint Surg* 2002 ; 84-A : 1605-1612.
5. **Myers MH, Harvey Jr JP, Moore TM.** Delayed treatment of subcapital and transcervical fractures of the neck of the femur with internal fixation and a muscle pedicle bone graft. *Orthop Clin North Am* 1974 ; 5 : 43-756.
6. **Nagi ON, Gautam VK, Marya SKS.** Treatment of femoral neck fractures with a cancellous screw and fibular graft. *J Bone Joint Surg* 1986 ; 68-B : 387-391.
7. **Nordin BE, Roper A.** Post-pregnancy osteoporosis ; a syndrome ? *Lancet* 1955 ; 268 : 431-434.
8. **Prough D, Mathru M.** Acid-Base, Fluids, and Electrolytes. In : Barash P, Cullen B, Stoelting R. (eds) : *Clinical Anaesthesia*, 4th ed., pp 189-191., Lippincott Williams & Wilkins, Philadelphia, 2001.
9. **Smith R.** Asian rickets and osteomalacia. *Q J Med* 1990 ; 76 : 899-901.
10. **Taylor LJ, Grant SC.** Bilateral fracture of the femoral neck during a hypocalcaemic convulsion. *J Bone Joint Surg* 1985 ; 67-B : 536-537.