Case report

Spontaneous bilateral displaced femoral neck fractures in nutritional osteomalacia—a case report

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A 24-year-old woman presented with sudden onset severe pain in both groins and inability to stand without support. She had had some groin discomfort for the past few weeks on walking. She had a sedentary lifestyle and took no strenuous exercise. She had no history of trauma or seizures. She was not on any medication and had no history of steatorrhea.

Radiographs revealed generalized osteopenia with bilateral displaced subcapital fractures of the femoral neck with Looser's zones in the pubic rami (Figure 1). Serum calcium was 8.1 mg% (normal range 9–10.5 mg%), phosphate 2.6 mg% (normal range 3–4.5 mg%) and alkaline phosphatase 40 KA Units (normal range 3–13 KA Units). Total proteins, liver function tests and kidney function tests were normal. Skeletal survey showed no other abnormal findings.

She underwent open reduction and internal fixation with a muscle-pedicle bone graft (Meyers et al. 1974) first on the left and then on the right. Intraoperatively, bone resorption was noted at the fracture site on the right side. Retrospectively, it was also noticed that proximal migration was more marked on the right side, suggestive of probable earlier displacement than on the left side. Postoperatively, she was given therapeutic doses of vitamin D and calcium supplements. She was not allowed to bear weight until 3 months postoperatively. Repeat biochemical analysis done 3 months postoperatively revealed a serum calcium level of 10.5 mg%, phosphate level of 3.5 mg% and alkaline phosphatase level of 15 KA Units. Postoperative radiographs showed healing of Looser zones and trabecular continuity across the fracture site on the left side (Figure 2). On the right side, the fracture line was still visible at 34 months follow-up, but there was neither failure of implant nor loss of reduction (Figure 4), although the patient had been ambulatory with support for the last 31 months. CT Scan done at 1 and 2 years postoperatively (Figure 3) suggested union on the

Figure 1. Bilateral displaced subcapital fractures of the femoral neck. Looser's zones can be seen in the pubic rami.

Figure 2. 12 months postoperatively. Healing of Loozer's zones and trabecular continuity on the left side. Fracture on the right side showed bone resorption intraoperatively and the fracture line is still visible.

Figure 3. 27 months postoperative CT scan suggestive of union with no collapse or increase in bone density of the femoral head. The neck on the right side is shorter than on the left as a consequence of resorption at the fracture site.

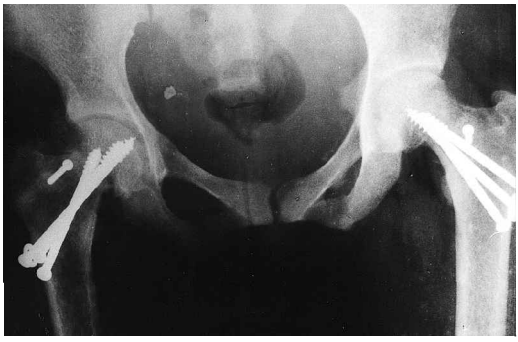

Figure 4. 34 months postoperatively. Neither failure of implant nor loss of reduction on the right side.

left side and showed no increase in bone density or collapse of the femoral head on the right side.

Discussion

Bilateral displaced fractures of the femoral neck are extremely rare. Most occur as a result of seizures of epileptic, drug-induced, electrically induced (Powell 1960), hypocalcemic (Taylor and Grant 1985) or uremic origin. Cases have also been reported in patients with severe osteoporosis (Adinoff and Hollister 1983, Kose et al. 1998) or renal failure (Gerster et al. 1983).

Dietary deficiency-induced osteomalacia is one of the commonest metabolic bone disorders in northern India, especially in women in the reproductive age group, belonging to the poorer socioeconomic class, living in slums (Park and Park 1986). These women complain of chronic backache and generalized aches and pains, but orthopedic complications are infrequent. Dietary deficiency of vitamin D, lack of exposure to sunlight in some communities, poor bioavailability of dietary calcium and frequent pregnancies with subsequent lactation severely affect the calcium metabolism resulting in a negative calcium balance. The incidence of vitamin D deficiency in the Asian immigrant population in the UK has been quoted to be up to 24% (Taylor and Grant 1985, Smith 1990).

Radiographically, osteomalacia presents with generalized osteopenia and multiple, bilateral and often symmetrical radiolucent lines seen in the cortex perpendicular to the long axis of the bone. They are referred to as 'Looser's zones' or 'pseudofractures', which represent cortical stress fractures filled with poorly mineralized callus and fibrous tissue and are common along the axillary margins of the scapulae, the inner margin of the femoral neck, the ribs and the pubic ramii (Greenspan 1988). A 'pseudofracture' or Looser zone rarely becomes the site of a true fracture, presumably as a result of torsional, tensile or shearing stress on the weakened area in the bone. Occasionally, an acute fracture is the initial complaint leading to the diagnosis of the primary disease (Mankin 1974). Only a high index of suspicion of underlying calcium deficiency can help to diagnose such cases.

Looser zones in the femoral neck often heal, but sometimes progress to displaced fractures even without trauma. However, this does not imply that all Looser's zones should be fixed prophylactically. This possibility should be kept in mind and regular follow-up ensured. Sudden onset or exacerbation of pain at the sites of Looser's zones, loss of active motion and inability to bear weight should alert the treating surgeon about possible acute displacement. If this occurs, it should be immediately operated on. However, it is difficult to determine the precise timing of displacement in such cases since they may occur without preceding trauma. We found no recommendations in the literature on treatment of these fractures and what kind of operative procedure to choose. In our view, as the time passed since the fracture occurred cannot be accurately determined, the operative procedure chosen should be similar to those recommended for the management of traumatic fractures of the neck of femur diagnosed late. These procedures should provide stable fixation of the fracture along with either a muscle-pedicle graft (Meyers et al. 1974) or fibular graft (Nagi et al. 1986) to increase the vascular supply to the femoral head. Replacement

arthroplasty is well suited to elderly patients with femoral neck fractures. Since our patient was young, we felt that an attempt should be made to retain the patient's femoral head.

In the presence of osteomalacia , the fracture callus usually does not form normally and healing occurs slowly as a result of delayed mineralization (Buckwalter and Cruess 1991). Once the medical treatment is started, there is generally little problem with bone healing and union occurs fairly rapidly, except perhaps in patients with hypophosphatasia (Mankin 1974). Surgery, immobilization, therapeutic doses of vitamin D and calcium supplements may lead to dangerous hypercalcemia. This condition is characterized by severe symptoms of anorexia, nausea, vomiting, weight loss, confusion and even seizures. Large doses of vitamin D treatment, > 50,000 units per day (Evans et al. 1980, Canale 1998), should be deferred for 3–4 weeks before surgery, otherwise dangerous hypercalcemia is likely to be precipitated by immobilization in the immediate postoperative phase. Mobilization of the patient as quickly as possible after surgery will allow early resumption/initiation of medical treatment and prevent delayed mineralization of the callus (Canale 1998).

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