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Case Report

Bilateral Proximal Tibial Stress Fractures in Osteoarthritic Knee Treated with Simultaneous Corrective Osteotomy and Internal Fixation

We report a patient who had bilateral stress fractures of proximal tibial shaft secondary to advanced osteoarthritis of knee with varus deformity. With treatment by simultaneous correction of deformity and internal fixation, the fractures healed uneventfully and the chronic knee pain was much alleviated. Due to progression of the symptom, right total knee replacement was finally performed 9 years later. Her left knee still did well after 13-year follow-up.

Key Words
corrective osteotomy;
internal fixation;
osteoarthritic knee;
stress fracture;
tibia

A stress fracture characteristically occurs in the bone that is subjected to repeated cyclic loading. Tibial stress fractures are the most common type and are often seen in military recruits and athletic trainees.[1,2] In the elderly people, stress fractures have been reported in association with osteoporosis, rheumatoid arthritis, pyrophosphate arthropathy, post-traumatic deformity, deformed degenerate knees, and after total knee arthroplasty.[3-9] In this report, we describe an unusual case of simultaneous bilateral stress fractures of the proximal tibia in a woman with advanced osteoarthritic of both knees.

CASE REPORT

A 67-year-old woman presented with a history of pain in both knees for 2 years that had been treated with oral analgesics and intra-articular injections by a family physician. Two months prior to visiting us, she began to feel exacerbation of pain around both knees and progressive varus deformity of both lower legs, which required a walking frame. The patient was finally confined to a wheelchair because of continuing pain when she was referred to us in February 1987. The patient was 160 cm in height, and 72 kg in weight. Clinical examination revealed 10 degrees of flexion contracture and 16 degrees of varus deformity in both knees. She had severe tenderness over the medial aspect of the proximal tibia bilaterally. Plain radiographs showed advanced arthrosis of both knees with narrowing of the medial joint space, osteoporosis, and symmetric fractures of the bilateral proximal tibia (Fig. 1). Laboratory data including parathyroid hormone, serum calcium, serum phosphate, rheumatoid factor, and antinuclear antibody were all within normal limit.

Under the impression of advanced arthrosis of both knees with bilateral stress fractures of the proximal tibia, simultaneous bilateral corrective closed-wedge osteotomy through the fracture site was carried out in March 1987 (Fig. 2). Proximal fibular osteotomy was performed to facilitate the correction of left deformed knee.

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It was not required in the right knee, however, because fibular fracture had already happened. A cast brace was applied in eight weeks after operation. With the support of a walking frame, she was allowed to walk with protected weight bearing. The fracture site healed uneventfully 5 months later. The anatomic axis of both knees under radiographs was 5-degree valgus (Fig. 3). The range of motion of both knees was from 0 degree to 120 degrees. Her knee pain diminished a lot after the correction of deformity and she was able to resume normal activities. Until 1995, she felt right knee pain again and had to use a cane and take some analgesics. The radiographs showed obvious narrowing of the medial joint space (Fig. 4). Due to deterioration of the symptom, she underwent total knee replacement in August 1996 (Fig. 5). So

Fig. 1. The plain radiographs of bilateral knees show symmetric fractures of the bilateral proximal tibia associated with advanced arthrosis of both knees.

Fig. 2. Corrective closed-wedge osteotomy through the fracture site and fixed with a T-shape buttress plate. The postoperative anatomic axis was five-degree valgus.

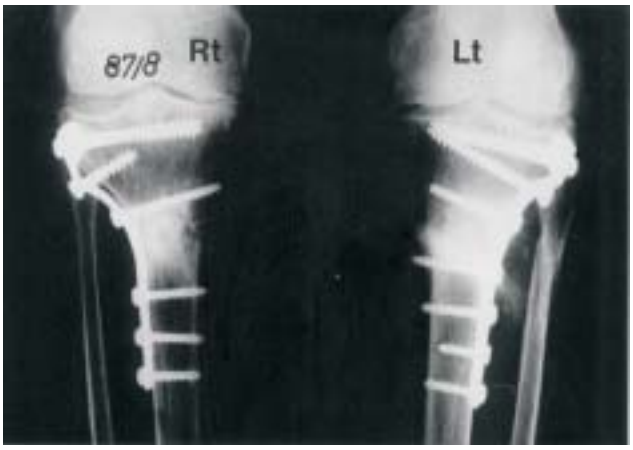

Fig. 3. Five months postoperatively. The plain radiographs show solid union of the fracture sites.

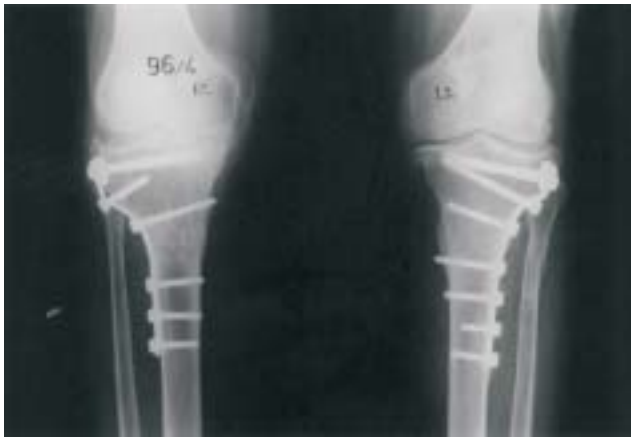

Fig. 4. Nine years postoperatively. The plain radiographs show no deterioration of the left knee, but advanced arthrosis of the right knee.

Fig. 5. The plain radiograph of the left knee, at 13 years postoperatively, shows obvious narrowing of the medial joint space. The prosthesis of the right knee is still in a good condition at the 4th postoperative year.

far, only a mild discomfort was complained of on the left knee.

DISCUSSION

In this case, advanced arthrosis with varus deformity seemed to be the main cause of stress fracture. Deformity of the knee will produce abnormal loading of the tibia.[7] Eccentric loading of a long bone sets up tension stress on its convex side and compresses the concave aspect.[10] The repetitive abnormal stress may lead to fatigue fracture of the proximal tibia. In addition, the radiographic evidence of osteoporosis was also a contributing factor. Therefore, when a patient with arthrosis of the knee presents with sudden deterioration of the symptom, the possibility of a stress fracture of the tibia should be considered.[11]

There were some options in the treatment of a degenerative knee in association with a stress fracture of the proximal tibia. Nonoperative method may achieve union in patients with minimal limb malalignment, but there is a high rate of failure in malaligned limbs and symptom derived from the arthritic knee will persist. Operative treatment with internal fixation and bone grafting will usually result in union of the fracture, but the arthrosis joint remains deformed and may be painful. A modular total knee arthroplasty with a long extension of the tibial stem bridging the fracture site has the advantages of restoring the joint alignment and treating the arthrosis in one procedure, thus allowing the fracture to unite in a biomechanically favorable situation. It also allows immediate mobilization of the patients without the need for casting or splinting.[7,12] However, the durability and possible complications of knee arthroplasty with a long tibial stem should be taken into consideration. Cameron used tibial osteotomy to treatment the fracture and corrected the deformity.[13] Total knee arthroplasty was not required.[13]

In the case presented, simultaneous bilateral valgus corrective osteotomy was chosen to treat the fractures and associated deformed knees. The long-term result of the treatment is satisfactory. The function of her left knee is still good after 13-year follow-up. Although her right knee was finally replaced, it has been spared from total knee replacement for 9 years. In addition, simple total knee prosthesis without a long extension of the tibial stem was enough for the replacement.

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