CASE REPORT

Stress fracture of the proximal fibula after total knee arthroplasty

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SUMMARY

We report a rare case of proximal fibular fatigue fracture developing 14 years after total knee arthroplasty in a known case of rheumatoid arthritis. A valgus deformity of the knee can put abnormal stress on the upper fibula leading to its failure. We believe that, as the fibula acts as an important lateral strut, its disruption due to a fracture led to rapid progress of the valgus deformity of the knee in this patient.

BACKGROUND

Stress fractures of the fibula are uncommon. The commonest reported cause¹ is in individuals involved in strenuous physical exercises (sports person, athletes, army personnel, etc) or in the elderly with severe knee arthritis and deformities. Severe valgus deformity is commonly associated with fibular fatigue fractures.² It is more commonly seen in rheumatoid arthritis (RA) than in osteoarthritis (OA). Fibular stress fracture after total knee arthroplasty (TKA) has not previously been reported.

CASE PRESENTATION

A 65-year-old woman, a known case of chronic RA, presented with a history of acute pain in the right knee with a valgus deformity for the past 3 months. There was no history of injury to this knee. However, the patient gave a history of bilateral TKA (using Kinemax plus prosthesis, Howmedica), performed 14 years prior and plate fixation for a periprosthetic femoral fracture 3 months after the index surgery on the right side. She had been doing well until recently. A plain radiograph was taken at the time of onset of recent right knee pain. This revealed minimal opening up of medial joint space with knee implants, distal femoral plate and screws in situ (figure 1A, B). Conservative treatment in the form of knee bracing, analgesics and calcium supplementation was advised. This relieved the patient's pain, but she continued to have progressive deformity of her right knee. Local examination revealed a severe valgus deformity (30°) of the right knee (figure 2), with healed scars from the previous surgery.

INVESTIGATIONS

Plain radiographs revealed more opening of the medial joint space with a healing stress fracture of the upper fibula (figure 3A, B). Laboratory investigations were within normal range. Serum vitamin D (25-OH) level was 21.3 ng/mL, and alkaline phosphatase level was 215 U/L.

TREATMENT

The patient was offered surgical intervention involving removal of the existing implant and a revision TKA, using constrained or hinged prosthesis. However, due to her reluctance, this surgery was not carried out, and she was given treatment for RA and OA, and a hinged knee brace, on an interim basis.

OUTCOME AND FOLLOW-UP

The stress fracture began healing after the use of the knee brace and other supportive treatment. Future definitive revision TKA treatment is needed.

DISCUSSION

Stress fractures are the result either of (1) fatigue fractures, due to repeated loading of a normal bone, or of (2) insufficiency fractures due to normal loading on an abnormal or diseased bone. Stress fractures of the proximal fibula are extremely uncommon and can occur with severe valgus deformities, usually in cases of knee arthritis. Abnormal loading of the proximal fibula and tibia occurs in valgus deformity of the knee. Stress fractures of the lateral tibial plateau or the proximal tibia in severe valgus deformity of the knee have been reported.² Inflammatory arthritides such as RA are much more commonly associated with

Figure 1 (A) Anteroposterior radiograph of the knee showing mild valgus deformity with TKA prosthesis, and distal femoral plate and screws in situ. TKA, total knee arthroplasty. (B): Lateral radiograph of the knee showing mild valgus deformity with TKA prosthesis and distal femoral plate and screws in situ. TKA, total knee arthroplasty.

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Figure 2 Front view of the right knee and leg showing severe valgus deformity of the knee and healed anterior scar of previous TKA. TKA, total knee arthroplasty.

valgus deformity than OA and hence proximal fibular stress fractures are also common in RA.

Rand and Coventry,³ in 1980, reported a series of 15 cases of stress fractures after TKA, but all of them were in the tibia. They concluded that these stress fractures occurred due to axial

Figure 3 (A) Anteroposterior radiograph of the knee showing severe valgus deformity with healing stress fracture of the proximal third of the fibula. (B): Lateral radiograph of the knee showing severe valgus deformity with healing stress fracture of the proximal third of the fibula.

malalignment and improper component orientation. Stress fractures due to the use of tracker navigation pins have also been reported after knee arthroplasty.⁴ Rarely, avulsion of the fibular head can occur during TKA, due to excessive hyperextension and/or varus strain during surgery.⁵

Stress fractures of the proximal fibula have not been reported after TKA. In the present case, the stress fracture occurred 14 years after TKA. The progressively increasing valgus deformity was perhaps responsible for its occurrence. Normally, with an intact fibula, the lateral tibial condyle resists the bony collapse. However, when the fibula is fractured, this preventing mechanism is lost, and the lateral tibial condyle can collapse due to excessive stresses. This explained the increasing valgus deformity occurring in our case following a fatigue fracture of the proximal fibula, due to loss of restraint by the intact fibula. A restoration of normal alignment by TKA allows tibiofibular stress fractures to heal uneventfully with excellent functional outcome.⁶ Periprosthetic fractures around TKA are commonly encountered due to several factors such as increasing age of the population, TKA being performed in younger and more active individuals, associated osteoporosis, etc.⁷ Our patient had sustained a periprosthetic distal femoral fracture soon after the primary TKA. This was perhaps due to coexisting osteoporosis due to RA and prolonged steroid use. However, the TKA was adequately salvaged with fixation of the fracture with a dynamic condylar screw and plating. However, a residual malalignment at the fracture site had led to mild valgus deformity of the knee and over a period of time, this had caused repeated stresses on the upper fibula. We believe that the fibula acts as an important lateral strut and its disruption due to a fracture led to rapid progress of the valgus deformity of the knee in our patient.

Learning points

- ▶ Stress fractures of the fibula are rare and often associated with a valgus deformity of the knee.
- ▶ Stress fractures of the fibula have not been reported after total knee arthroplasty.
- ▶ The fibula acts as an important lateral strut and its disruption due to a fracture can lead to rapid progress of valgus deformity of the knee.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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