Eklem Hastalıkları ve Cerrahisi
Joint Diseases and Related Surgery

Case Report / *Olgu Sunumu*

Eklem Hastalık Cerrahisi
2013;24(3):178-181
doi: 10.5606/ehc.2013.38

Bilateral periprosthetic distal femoral fractures following total knee arthroplasty

Total diz artroplastisi sonrası iki taraflı periprostetik distal femur kırıkları

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Periprosthetic supracondylar femur fractures following total knee arthroplasty are infrequent, but challenging to clinicians. In this article, we present a 74-year-old female case of bilateral supracondylar femoral periprosthetic fractures which were treated with locking plates. The fractures were healed with osseous union, the range of motion was 0-110° for each knee, and there was a 6° residual varus deformity in the left knee. The functional results were excellent during two-year follow-up. Open reduction and locking plate fixation are effective treatment methods for periprosthetic supracondylar fractures following total knee arthroplasty in selected patients. If an anterior femoral notching accidentally develops during the intraoperative setting, using a femoral component with an attached intramedullary stem supports weakened distal part of the femur.

Key words: Knee prosthesis; locking plate; periprosthetic fracture.

Total diz artroplastisi sonrası periprostetik suprakondiler femur kırıkları nadir görülmekle birlikte, hekimler için zor bir durumdur. Bu yazıda, iki taraflı periprostetik suprakondiler femur kırığı olan ve kilitli plakla tedavi edilen 74 yaşında bir kadın olgu sunuldu. Hastada sol diz 6° rezidüel varus deformitesi ile beraber iki dizde de hareket genişliği 0-110° aralığında olacak şekilde kemik kaynaması ile iyileşti. İki yıllık takibinde fonksiyonel sonuçlar mükemmeldi. Seçilmiş hastalarda total diz artroplastisi sonrası periprostetik suprakondiler femur kırıklarında açık redüksiyon ve kilitli plak uygulaması etkili bir tedavi yöntemidir. Ameliyat esnasında ayarlama yapılırken kazara femur ön kortekste çentik oluşursa, femoral komponentin intramedüller stemle birlikte kullanılması distal femurdaki kemiğe destek sağlar.

Anahtar sözcükler: Diz protezi; kilitli plak; periprostetik kırık.

Periprosthetic supracondylar femur fractures are an uncommon complication of total knee arthroplasty (TKA) that occur in 0.3% to 2.5% of these patients.[1,2] Managing distal femoral fractures following a TKA can be complex and requires the equipment, perioperative support and surgical skills of both trauma and revision arthroplasty.[3] The treatment goals for fractures of the distal femur proximal to TKA are to obtain and maintain good alignment and stability that allow an early range of motion (ROM).

We present a patient with bilateral supracondylar femoral periprosthetic fractures who was successfully treated with locking plates. To date, bilateral periprosthetic supracondylar femoral fractures proximal to TKA are rarely encountered and signify a management challenge, as there is only one case report that describes the management of this condition.[4]

CASE REPORT

A 74-year-old female with severe primary osteoarthritis in both knees was treated with simultaneous TKA. No postoperative complications occurred. At the end of the first postoperative month, she reported sharp pain at both knees during physiotherapy exercises, and she could not walk. Radiographs revealed bilateral periprosthetic

• *Received: February 22, 2013 Accepted: May 16, 2013*

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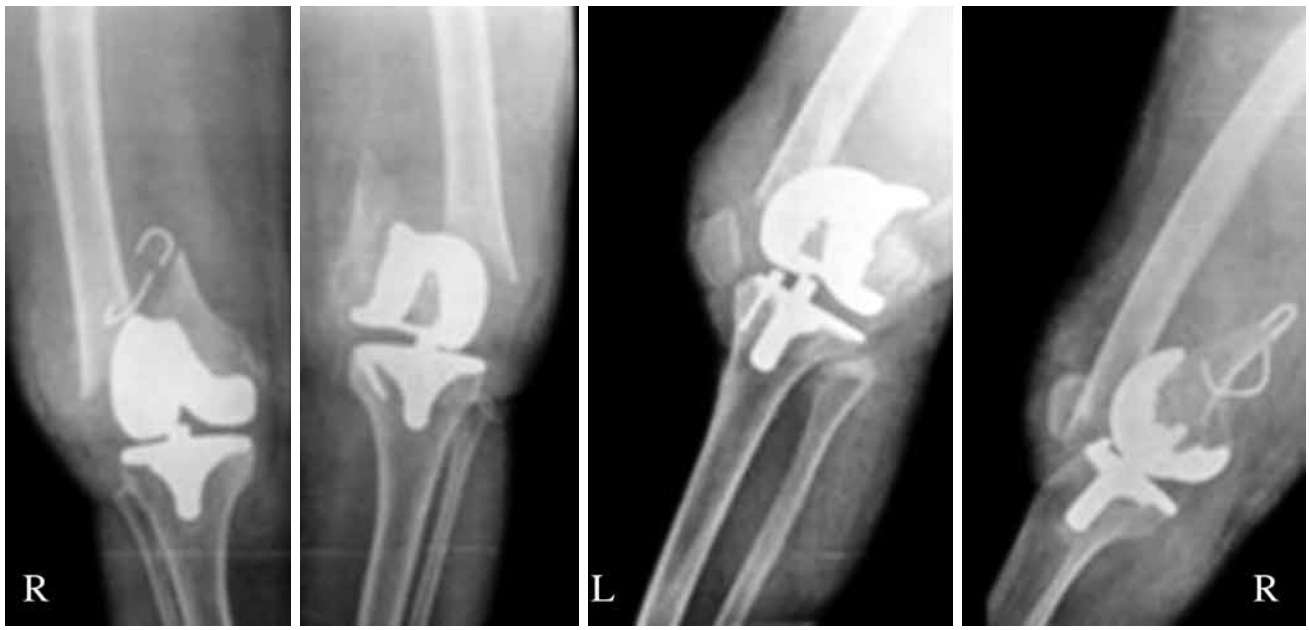

Figure 1. Anteroposterior and lateral radiographs of both knees show displaced supracondylar periprosthetic fractures.

supracondylar femoral fractures, and both fractures were type 2 according to the Rorabeck classification (Figure 1).[2] Both the femoral components and the knees were stable on radiographs. The patient underwent an open reduction and internal fixation of the periprosthetic fractures with locking plates at one-week rest interval. Range of motion exercises with a knee brace were started on the second week postoperatively. Radiographs of both distal femurs revealed osseous union in two planes at the fourth postoperative month, and the patient was encouraged to resume full weight bearing. The patient was able to walk without crutches at the sixth month postoperatively. At the end of the second year postoperatively, the ROM was 0-110° for each knee, there was a 6° residual varus deformity in the left knee, and the Hospital for Special Surgery knee scores were 75 and 80 in the right and left knees, respectively (Figure 2).

DISCUSSION

Simultaneous bilateral periprosthetic supracondylar femoral fractures after bilateral TKA are rare.[4] The possible etiologic factors include trauma, road-traffic accidents, seizures, and powerful manipulation of a stiff knee.[5,6] Rheumatoid arthritis, steroid therapy, neurological disease, osteoporosis, anterior femoral notching, previous revision arthroplasty, female sex, local osteolysis, and infection are risk factors for periprosthetic supracondylar femoral fractures.[5-8] Three-millimeter notching of the anterior femoral cortex during TKA significantly lessens the load to failure by decreasing the bending strength by 18% and the torsional strength by approximately 40%.[9] However, Ritter et al.[7] reported that they were unable to find a direct relationship between anterior femoral notching and periprosthetic supracondylar femoral fracture. In that study, the

Figure 2. Anteroposterior and lateral radiographs of both knees show osseous union in two planes at the end of the second year.

patient was osteoporotic and female. In addition, a report of surgery revealed anterior notching of the right knee.

The choice of the treatment method should be based on the patient's health, the fracture displacement and fragmentation, the severity of osteopenia, and the status of the prosthetic components (loose, unstable, or misaligned). Currently, operative treatment has been shown to provide better results as a treatment for displaced fractures.[3] Historically, the open reduction and internal fixation of these fractures with conventional plates and screws have been plagued by significant rates of malunion and nonunion.[2] Moran et al.[10] reported 15 displaced fractures treated with condylar screw and plate, blade plates, and buttress plates; 10 of these 15 patients exhibited good results. There were, however, two malunions and three nonunions. A locked plating system permits stable fixation and early knee motion with minimal complications.[11,12] Locking plates have been extremely useful for comparatively distal femoral fractures that need distal fixation. Retrograde femoral intramedullary nail fixation has been proposed to improve the rate of union while decreasing the soft-tissue trauma. This technique generally requires an open-box femoral prosthesis.[13] The advantages of intramedullary nailing for fractures of the femur include high rates of union and low rates of complications, good restoration of alignment, early functional use of the extremity and increased comfort for the patients.[14] For higher supracondylar femoral fractures, a retrograde femoral intramedullary nail fixation may be the ideal choice. Both of these techniques provide a similar fixation quality for periprosthetic distal femur fractures proximal to a TKA if there is no communication in the fracture patterns; however, locking plate has a disadvantage, as the fracture pattern includes a large medial fracture gap.[15]

In this case, fixation of the fractures was achieved by locking plate and screw because the femoral prosthesis design was not appropriate for retrograde intramedullary nailing. At the end of the second year, union was achieved for both sides, there was a 6° residual varus deformity in the left knee (but flexion was 110° for both knees), and the functional results were excellent for both knees.

In conclusion, open reduction and locking plate fixation is an effective treatment method for periprosthetic supracondylar distal fractures proximal to TKA in proper cases. Particularly in the osteoporotic patient, if an anterior femoral notching accidentally develops during the intraoperative setting, choosing a femoral component with an attached diaphysis-engaging stem can support the weakened distal part of the femur.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

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