


Arthroscopic Fixation of Osteochondral Avulsion Fracture of the Femoral Attachment of the Posterior Cruciate Ligament in an 82-Year-Old Patient: A Case Report

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Abstract

Femoral avulsion fracture of the posterior cruciate ligament (PCL) is less common compared to the tibial side. Especially, femoral avulsion in an elderly patient is an extremely rare condition. Until now, there is no report that describes its treatment and clinical outcome in elderly patients. We demonstrate an 82-year-old female who presented with osteochondral avulsion fracture of the femoral attachment of the PCL. The osteochondral fragment was fixed with an arthroscopic transfemoral suture technique. After treatment, the pain was improved and the patient achieved previous daily activity within 6 weeks. After 6 months, plain X-ray and computed tomography scans demonstrated consolidation of osteochondral fragment. The Lysholm score was 78 points at final office visit. This simple and less invasive approach is useful for pain relief and earlier return to daily activity in an elderly patient with osteoporosis.

Keywords

posterior cruciate ligament, femoral avulsion, elderly patient, arthroscopic fixation, osteoporosis

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Introduction

The posterior cruciate ligament (PCL) is considered as an intra-articular, extrasynovial structure and contributes as the primary restraint against posterior tibial translation.^{1,2} Injury of the PCL causes rupture at midsubstance rather than an avulsion fracture. Avulsion fracture of the PCL usually occurs at the tibial insertion and less common at the femoral insertion. However several reports demonstrated femoral avulsion in adolescents,³⁻⁶ very limited cases in adults have been published.⁷⁻¹¹ In addition, very recently, Albtoush and Horger reported the first case of avulsion fracture of the femoral attachment of the PCL in an elderly patient with osteoporotic status.¹²

For the treatment of femoral avulsion of the PCL, arthroscopic management was introduced in adults, although it was very limited.^{9,11} Xu et al reported young male patient with osteochondral avulsion fracture of the PCL and they demonstrated satisfactory result after fixation of osteochondral fragment with polydioxanone suture arthroscopically.¹¹ However, due to the rarity of this injury, there is no report that describes its treatment and clinical outcome in elderly patients with osteoporosis. Moreover, for fixation of osteochondral fragment

with poor bone property, a careful approach and selection of material will be required.

In this report, we describe case presentation with arthroscopic fixation in less invasive manner using specific material in an elderly patient with avulsion fracture at femoral attachment of the PCL associated with osteoporotic status.

Case Report

An 82-year-old lady fell down and hit anterior portion of the knee. Immediately, she had felt knee pain with limited range of motion and was unable to walk, then she visited our clinic on the same day. At the visit, her left knee presented 25 mL of

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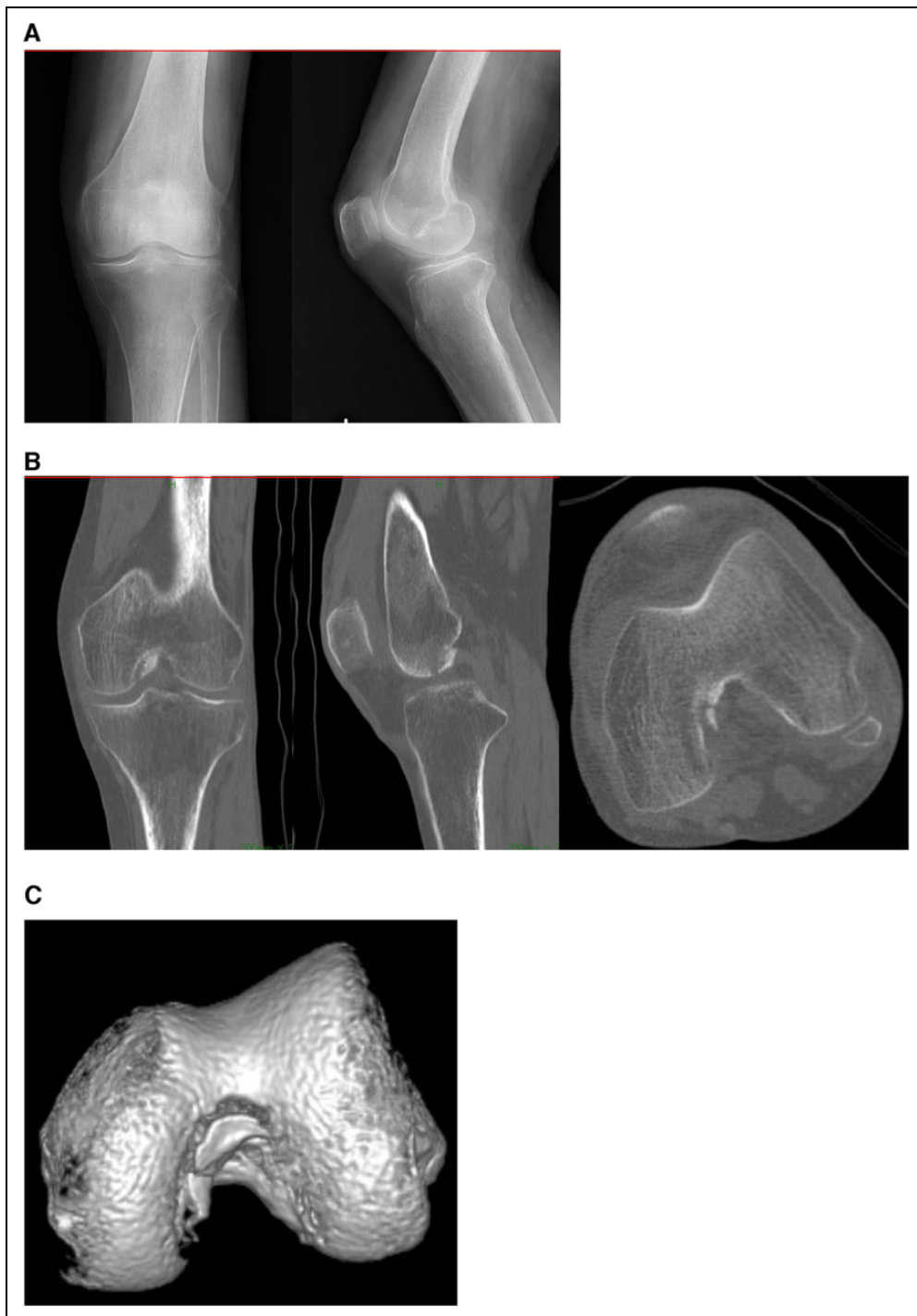


Figure 1. A, Preoperative AP and lateral radiographs of the left knee showed osteoporotic status. In lateral view, discontinuity of subchondral bone line is observed at the notch. B, Coronal section in CT showed fracture line from intercondylar notch to the lateral wall of medial femoral condyle (left). In sagittal section, displaced fragment is demonstrated (middle). Axial section showed 2 bony fragments at the femoral attachment of the PCL (right). C, Three-dimensional image of the left knee demonstrated 2 bony fragments and their displacement. CT indicates computed tomography; PCL, posterior cruciate ligament.

hemarthrosis without any skin damage. The range of motion of left knee was limited, -10° in extension and 90° in flexion with severe pain. Past medical history included left hip joint replacement and left olecranon fracture. Drug history included alendronate sodium hydrate based on the diagnosis of osteoporosis

from previous hospital and nonsteroidal anti-inflammatory drug for the back pain; however, patient presented poor medication adherence. Radiographs demonstrated a discontinuity of subchondral bone line at the notch in lateral view (Figure 1A). Plain computed tomography (CT) scans clearly

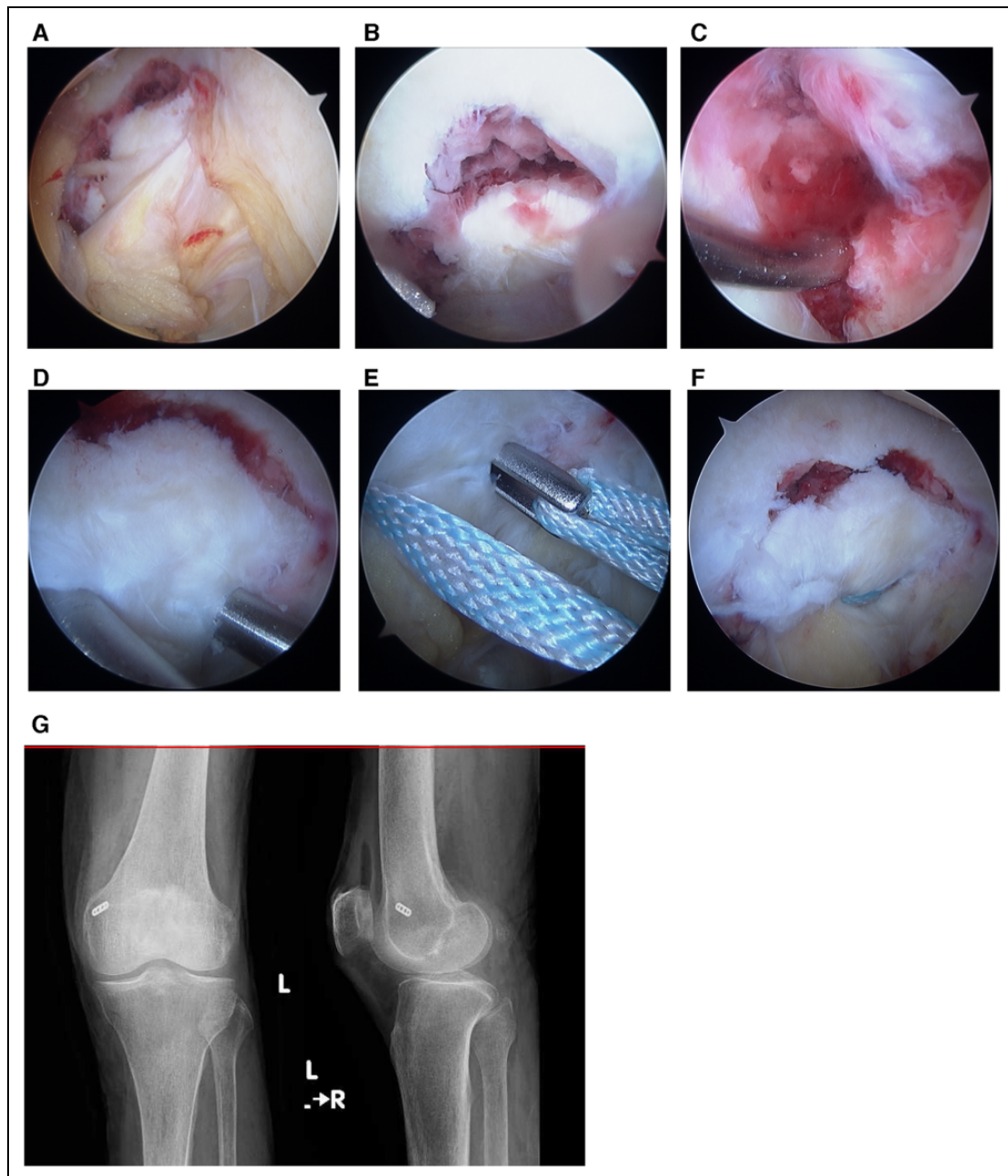


Figure 2. A, Arthroscopic images demonstrated osteochondral fragment and its displacement with intact PCL. B and C, The defect was filled with clot and scar tissue. Lesion bed was refreshed until bleeding was confirmed. D, The osteochondral fragment was reduced and temporarily fixed with two 2.4-mm passing pins. E, The ultratape was passed to the bone tunnels. F, Then, osteochondral fragment was fixed under arthroscopic guiding with Endobutton. G, Postoperative radiographs demonstrated the Endobutton at the surface of the medial femoral condyle. PCL indicates posterior cruciate ligament.

demonstrated 2 parts of bony fragment and their displacement from the original position (Figure 1B and C). Also, the images of femur and tibia showed diffuse osteoporosis.

For this patient, we first performed arthroscopic examination 1 week after injury. Anterolateral and anteromedial portals were created according to the PCL reconstruction. From arthroscopic observation, osteochondral fragment was attached both of anterolateral and posteromedial bundles of the PCL (Figure 2A and B). Both PCL bundles were intact. The lesion bed was refreshed

with curettage and the osteochondral fragment was reduced by probe (Figure 2C). Keeping this reduced position, osteochondral fragment was fixed temporarily with two 2.4-mm passing pins with eyelets (Smith & Nephew, Andover, Massachusetts) that inserted in parallel manner from the anterolateral portal (Figure 2D) and confirmed both of pin and fragment positions with fluoroscope. Then, a suture tape, 2-mm Ultratape (Smith & Nephew), was passed to the medial side using passing pins (Figure 2E). A 3-cm-long small incision was made at medial and this

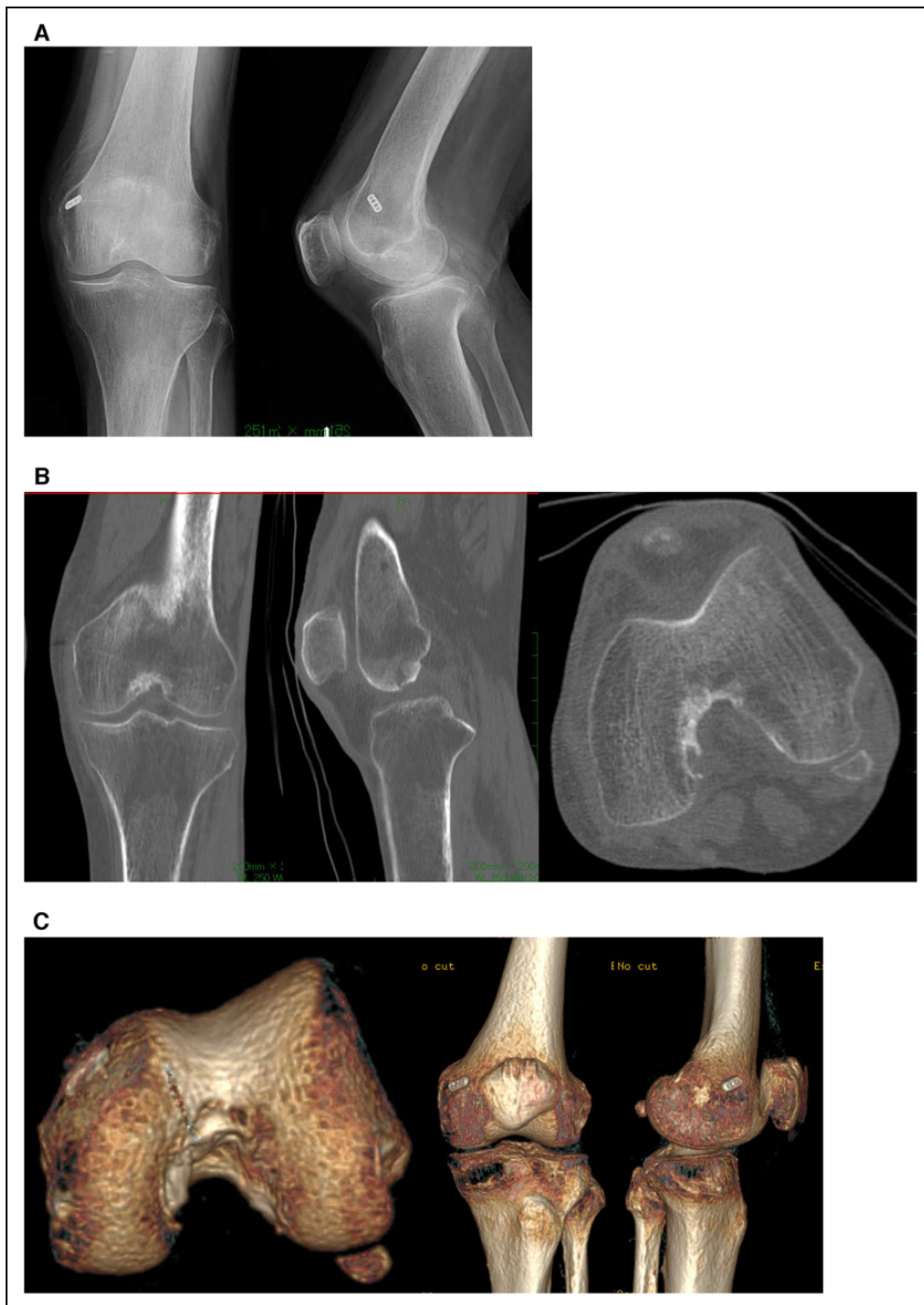


Figure 3. A, Postoperative radiographs taken at 6 months after surgery. The continuity of subchondral bone line at the notch was observed. B, Computed tomography scans obtained at 6 months after surgery demonstrated consolidation of the fragments, although osteoporotic status is still observed. C, Three-dimensional images presented consolidation of fragments and Endobutton without critical displacement.

suture tape was retrieved and tightened using the Endobutton (Smith & Nephew) on the surface of superior part of the medial femoral condyle under arthroscopic observation. Once reposition of the osteochondral fragment was achieved, suture tape was tied over the Endobutton. For fixation, left knee was kept in fully extended position preventing posterior sagging of the tibia. Then, the stability of osteochondral fragment was confirmed during full range of motion arthroscopically (Figure 2F and G).

After 2 weeks of immobilization with brace, partial weight bearing in extended knee position with brace was allowed. Three weeks after operation, the range of motion with PCL brace was started. Full weight bearing was allowed at 4 weeks after operation. After 6 weeks, patient achieved almost full range of motion, -5° in extension and 130° in flexion, and T-cane gait smoothly without PCL brace. At 6 months after surgery, plain X-ray and CT scans demonstrated consolidation

of osteochondral fragment (Figure 3A, B, and C). As of 18 months since the operation, patient has suffered no pain and the range of motion of the left knee is -5° in extension and 140° in flexion. She returned to previous daily activity without any limitation. The Lysholm score was improved from 35 points as preoperative status to 78 points at final office visit.

Discussion

In this case report, we demonstrated a rarely encountered geriatric patient with femoral avulsion fracture of PCL-associated osteoporosis and its treatment. Less invasive arthroscopic fixation using low-profile suture tape showed favorable clinical outcome.

The avulsion fracture of the femoral attachment of the PCL is a rarely encountered type of avulsion, especially in adults. In 2012, Xu et al reported a 22-year-old male with femoral avulsion of the PCL and their literature search with their own report presented 11 cases in adolescents and only 5 cases in adults.¹¹ The range of age was 20 to 42 years old in these adult patients. From the data, they made assumption that patients younger than 25 years old have limited property of strength at the femoral PCL attachment compared to older adults. This age-associated difference in bone property at the site of footprint of the PCL should be considered as a key factor. In terms of bone quality, Albtoush and Horger showed the first case of insufficiency avulsion fracture of the femoral attachment of the PCL in an elderly patient, 63 years old, associated with secondary osteoporosis.¹² Thus, it is likely that femoral avulsion fracture at the PCL footprint is an extremely rare condition in elderly patients. The case presented in this report is 82 years old and shows poor bone quality with hip joint replacement and olecranon fracture. The mechanism of injury was a simple blow to the anterior aspect of the knee, commonly observed in the PCL injury, and the type of avulsion fracture was similar to the Albtoush's case. Therefore, osteoporosis could be a critical factor for this rarely encountered avulsion fracture in elderly patients.

Although several treatment approaches have been introduced in adults, up to middle-aged patients,^{9,11,13} the treatment option in elderly patients with osteoporosis has not been discussed before. For the fixation of bony avulsion of the PCL from the femoral insertion, arthroscopic fixation will be a favorable approach with its less invasive manner. In 2005, Park and Kim reported the case of a 42-year-old patient with a femoral avulsion of the PCL and reattached the fragment using arthroscopic transfemoral suture technique.⁹ They used 2 No. 5 Ethibond sutures with 4 transfemoral tunnels. Following this report, in 2012, Xu et al demonstrated an osteochondral avulsion of the PCL posteromedial bundle at the femoral origin associated with hyperflexion in a 22-year-old man.¹¹ They also fixed the fragment arthroscopically with polydioxanone sutures, absorbable material. After 11 months of surgery, the patient returned to normal activity before injury without pain. In our case, the patient was an elderly lady, 82 years old. As far as we know, she is the oldest case ever reported with not only a

femoral avulsion of the PCL but also arthroscopic fixation. For arthroscopic fixation, the cut-out failure of osteochondral fragment with strong sutures was concerned due to the poor bone quality. Therefore, we used smooth and wide suture tape to fix the fragment. This suture tape has wider contact area compared to other suture threads; thus, this property likely to have favorable effect to prevent the cut-out failure of the fragment. In addition, to minimize damage and preserve bone stock of the fragment, only 2 tunnels were introduced. Thus, our procedure is less invasive with arthroscopic approach, minimum number of bone tunnels, and low-profile suture material.

In conclusion, our case presents the elderly patient reported with the uncommon injury of femoral avulsion of the PCL. Arthroscopic suture technique using 2 tunnels and low-profile smooth wide tape will be a favorable approach in this injury, especially for elderly patients with osteoporosis to preserve bone stock and secure fixation. This less invasive procedure will be able to produce rigid fixation for early rehabilitation and return to daily activity without pain for elderly patients.

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