CASE REPORT

A Variant of Patellar Clunk Syndrome after Bilateral Total Knee Arthroplasty: Clinical Manifestations and Arthroscopic Images

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Introduction

The clinical manifestations of patellar clunk syndrome (PCS) were first described in 1982 by Insall *et al.*¹; the term was later coined in 1989 by Hozack *et al.*² This syndrome generally occurs as a complication of posterior-stabilized total knee arthroplasty (TKA)^{2–10}; however, cruciate-retaining TKA has also been implicated^{11,12}. The incidence has ranged from 0%–20% of post-TKA patients^{3,13,14}, but has declined with the newer revised prostheses^{4,6,15,16}. PCS typically presents within one year of surgery^{2,8,14}, but can reportedly present up to 6 years after TKA^{2,8}. It is characterized by development of a hypertrophic fibrous nodule at the junction between the proximal patella pole and quadriceps tendon. Symptoms occur about when the knee is being extended from a fully flexed position, usually between 30° and 45° of flexion. Within this range, the nodule impinges against the intercondylar notch of the femoral component, whereas with further extension it jumps over the notch, causing a “clunk” sound and pain. Previous reports have noted significant associations with femoral component of older design^{3–6,13,14}, femoral component position^{17,18}, post-operative patellar position^{2,7,13,17,18}, increased knee flexion¹⁹, thickness of patella^{2,18} and level of joint-line^{2,8,18}.

Case Report

A 61-year-old man had undergone sequential bilateral TKA, first of the left knee and 12 months later of the right knee, for severe osteoarthritis (Fig. 1A). Two months after the right TKA, he developed a catching sensation in the right anterior knee that was associated with pain and accompanied by a “clunk” sound. This occurred upon initiation of standing from a seated position. Clinical examination revealed a well-healed scar with no effusion. No tenderness was elicited over the extensor mechanism, medial patellofemoral ligament or

medial collateral ligament. The active range of motion was 0°–120°. The patella was observed to impinge upon the femoral prosthesis while the patient was initiating standing from a seated position and the knee was at angle of 70°–90°. This impingement was accompanied by painful jumping of the patella over the femoral prosthesis as the patient further extended the knee. Otherwise, the patient was able to ambulate on flat ground and ascend stairs without pain.

Noteworthy medical history included arthroscopic debridement of the left knee 5 years previously. The two TKAs had been performed sequentially, 12 months apart, by the senior author with the assistance of the Stryker eNact knee navigation system (Kalamazoo, MI, USA). The TKA operative procedures for the two knees had been largely similar; both had been via a medial parapatellar approach. Intraoperatively it had been noted that the synovium and pattern of cartilage wear were consistent with osteoarthritis and not other inflammatory arthritis. Scorpio NRG prostheses (posterior stabilized; Stryker) had been fitted for both knees (Fig. 1B). Subcutaneous low molecular weight heparin and calf pumps had been used to prevent deep vein thrombosis. Intravenous antibiotics had been administered until the drain was removed. Continuous passive motion had commenced immediately after the surgical procedure and assisted ambulation on the first post-operative day with a physiotherapist. The patient's recovery till discharge from both TKAs had been uneventful.

During the TKAs, the intra-operative measurements with a navigation system had shown the right knee was corrected to 1.0° varus and 1.5° flexion, and the left knee to 1.5° varus and 3.0° extension. The post-TKA measurements for the right knee (Fig. 1C) were as follows: Insall–Salvati ratio 1.02, femoral component flexion 0.8°, joint-line level 14.30 mm, patellar tilt 1.2° and patellar thickness 30.96 mm.

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Fig. 1 (A) Plain radiograph of both knees before TKA showing changes consistent with osteoarthritis. (B) Plain radiograph (anteroposterior view) of both knees with prostheses fitted. (C) Plain radiograph (lateral view) of right knee post TKA.

The post-TKA measurements for the left knee were: Insall-Salvati ratio 0.99, femoral component flexion 0.3° , joint-line level 14.30 mm, patellar tilt 3.2° and patellar thickness 32.71 mm.

The patient's symptoms of PCS did not resolve with conservative management and he consented to arthroscopic surgery 3 months after presenting with them. Arthroscopy revealed a hypertrophic scar nodule in the supra-patellar region (Fig. 2) impinging on the femoral housing during extension from a flexed position, notably from 70° to 90° of knee flexion. The tissue was associated with thick lateral plica-like scar tissue and had condensed with thick scar tissue in the supra-synovial pouch (Fig. 3). While assessing femoral-patellar tracking, this tissue caused a degree of tilt in the patellar button because of tethering. Figure 4 is a diagrammatic representation of all the scar tissue. Using a shaver, the scar nodule was excised in continuity with the lateral plica-like scar tissue. Radio-ablation was used to trim the scar tissue and coagulate its surface. After debridement of the scar tissue, no "clunk" could be elicited with flexion and extension of the knee

and patellar tracking was optimal. No loose bodies were noted and the knee prostheses were *in situ*. The final passive range of motion was 0° to 120° . Analgesia, anti-emetic agents and 24 h of i.v. antibiotics were administered post operatively. Cold packs were applied and a treatment with a continuous passive motion device was commenced post-operatively. The patient was allowed full weight bearing on the knees as tolerated. His post-operative course was uneventful and he was discharged the next day.

Discussion

Patellar clunk syndrome is a complication of posterior-stabilized TKA that can be disheartening for both patient and doctor. The mechanism of formation of the characteristic fibrous nodule is believed to be parallel to that of scar tissue; however, the process is not fully understood.

Synovial entrapment, a similar entity, was first described in 2002 by Pollock *et al.*¹⁰ and is also a complication of posterior-stabilized TKA. Hypertrophic synovial tissue formed in the junction between the quadriceps tendon and the proximal pole of the patella rubs over the distal aspect of the

Fig. 2 Arthroscopic image of the hypertrophic scar nodule.

Fig. 3 Arthroscopic image of the lateral plica-like scar tissue.

Fig. 4 Diagrammatic representation of the right knee showing synovial scar tissue arising from the suprasynovial pouch and connected with the hypertrophic fibrous nodule on the suprapatellar region via some lateral plica-like scar tissue.

anterior flange of the femoral component at 90° of flexion. Symptoms of pain and crepitation are noted during active knee extension from 90° to 0° of flexion and when rising from a seated position; there is no associated clunk. The mechanism is comparable to that of PCS, but without formation of a nodule or a demonstrable clunk.

Our case differed from others reported in that the PCS symptoms and clunk were demonstrated at 70° to 90°

of knee flexion, compared with the 30° to 45° reported by others^{2,3,6,7,9,11,12}. We believe that our patient had a combination of PCS and synovial entrapment. PCS associated with the Scorpio NRG knee system (Stryker) has not previously been reported. The most similar prosthesis studied for PCS is the Scorpio Posterior Stabilized knee system (Stryker) prosthesis, for which Choi *et al.* reported a 0% incidence of PCS over a mean of 4.8 years follow-up in 135 knees²⁰. We also believe that this case report is the first to describe unilateral PCS occurring in a patient with bilateral TKA. The management of this condition consisted of en bloc excision of the fibrous nodule and lateral plica-like and suprasynovial scar tissue. We performed this arthroscopically, which achieved immediate and complete relief of symptoms post-operatively. We believe preventive measures include choice of the most suitable prosthesis, minimal cautery of the suprapatellar synovium and accurate prosthesis positioning.

In conclusion, we have described a variant of unilateral PCS following sequential bilateral TKA for severe osteoarthritis. We were unable to attribute the development of this unilateral PCS to any of the specific reasons or anatomical measurements that other authors have found significant. The post TKA measurements were largely similar for both knees. The value of this case report is that it describes a previously undescribed atypical presentation of PCS in a patient with the new Scorpio NRG knee system prosthesis. In evaluating a patient with PCS, we recommend that specific attention is paid to the angle of motion at which the clunking sensation occurs. During arthroscopic debridement, a detailed exploration should be undertaken to identify other areas of scar tissue in addition to the typical site at the superior pole of the patella.

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