

Total Knee Arthroplasty for Chronic Anterior Knee Dislocation

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ABSTRACT

BACKGROUND: The occurrence of chronic knee dislocation is rare. To the best of our knowledge, total knee arthroplasty for treatment of chronic anterior knee dislocation has not been reported.

METHOD: This report describes 3 cases of chronic anterior knee dislocation treated by total knee arthroplasty.

RESULTS: Three female patients with chronic anterior knee dislocation were treated by hinged prosthesis total knee arthroplasty using the Insall rectus snip approach. At a mean of 17 months (range, 12–24 months) of follow-up, all patients showed a painless stable prosthesis and expressed satisfaction with the results.

CONCLUSIONS: Total knee arthroplasty for chronic anterior knee dislocation is a challenging procedure. The Insall rectus snip approach with quadriceps release and constrained prosthesis is recommended.

KEYWORDS: Chronic knee dislocation, total knee arthroplasty, hinged prosthesis

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Introduction

It is unlikely for a single orthopaedic surgeon to have faced more than a few cases of knee dislocation in a lifetime of practice.¹ Neglected dislocation of the knee joint is rare.² Because of its rarity and the limited number of publications addressing it, an algorithm for its treatment has not been developed. Neglected or chronic dislocation of the knee with osteoarthritis is extremely rare and no treatment guidelines have been established.^{1,2} We report 3 cases of chronic anterior knee dislocation treated by total knee arthroplasty.

Case Presentation

Case 1

A 48-year-old woman presented with a history of right knee dislocation resulting from an automobile accident in 2007. As shown in her records and based on the Schenck et al³ classification, she had experienced spontaneously reduced KD3M (i.e. ACL, PCL and MCL injured) knee dislocation. One year later, she was treated by anterior cruciate ligament (ACL) and posterior cruciate ligament (PCL) reconstruction at another centre. The knee range of motion (ROM) decreased over time and the joint became deformed. On admission in 2013, she presented with fixed anterior knee dislocation in which the tibia was anterior to the femur (Figure 1A). Passive ROM was between 10° of hyperextension and 60° of flexion. The knee was unstable and painful. After discussion about the risks and benefits, a total knee arthroplasty (TKA) with a constrained hinge prosthesis (RHK;

Zimmer Biomet; USA) was performed in 2015. Two years after the TKA, the patient reported a pain-free knee with a ROM of 0° to 110° (Figure 1B). Her Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) score⁴ was 94.7. The patient was satisfied with this functional outcome.

Case 2

A 40-year-old woman presented with a history of a Schenck et al KD4 (i.e. ACL, PCL, PLC and MCL injured) left knee dislocation after an automobile accident in 2006. Her records showed that a popliteal vascular injury was treated by bypass grafting and the knee was fixed with an external fixator (Figure 2A). After 3 weeks, the posterolateral complex injury was treated by direct repair. Four years after the trauma, PCL and ACL reconstructions were performed in 2 stages at another centre (Figure 2B). On admission in 2014, she had a fixed anteriorly dislocated knee (Figure 2C). After accepting the risks and benefits of surgery, TKA with a constrained hinge prosthesis (RHK; Zimmer Biomet; USA) was performed in February 2016 (Figure 2D). At the 15-month follow-up, she had a painless stable knee with a ROM of 0° to 95° and a WOMAC score of 88.6. She was satisfied with this functional outcome.

Case 3

A 52-year-old woman, with a history of left developmental dysplasia of the hip (DDH) had been treated by left total hip



arthroplasty (THA) at another centre 1.5 years before admission (Figure 3A). She had no history of left knee pain or deformity prior to THA. Although she had no history of significant trauma, she had been unable to walk because of left knee pain and instability for 6 months prior to admission. Radiography showed anterior knee dislocation (Figure 3B). Clinical neuromuscular examination and electromyography/nerve conduction velocity (EMG/NCV) studies were normal. Passive knee ROM was between 40° of hyperextension and 30° of flexion. Because of the left THA and severe right knee osteoarthritis (Figure 3C), TKA was considered for the left knee chronic anterior dislocation. Total knee arthroplasty

with a constrained hinged prosthesis (RHK; Zimmer Biomet; USA) was carried out. During preparation of the femoral side, 1 crack was seen in the anterior cortex that was fixed with 2 wires. During final prosthesis reduction, the medial epicondyle avulsed and was fixed with a 4-mm full-threaded cancellous screw (Figure 3D and 3E). At the 1-year follow-up, the knee was painless and stable with a ROM of 0° to 90° and a WOMAC score of 81.1. She was satisfied with this functional outcome.

Discussion

There are multiple reports of open reduction for chronic knee dislocation with or without ligament reconstruction. The final results ranged from poor to excellent functional outcomes.⁵⁻¹¹ Arthroplasty and arthrodesis are 2 conventional methods of treatment for chronic posterior knee dislocation. We could find no previous article reporting on TKA for neglected anterior dislocations of the knee in the English literature.

Matthai et al reported on a 20-year-old manual labourer with neglected anterior knee dislocation and common peroneal nerve palsy (CPN) who was treated 1 year after injury with arthrodesis and CPN release. At the 2-year follow-up, the patient had minimal functional disability. He had returned to his previous occupation as a manual labourer.¹²

Kapil Mani et al reported on a 30-year-old man with neglected anterior knee dislocation who was treated 1 month after injury with open reduction. One year after surgery, the ROM of the knee joint was 0° to 50° with mild pain on walking.

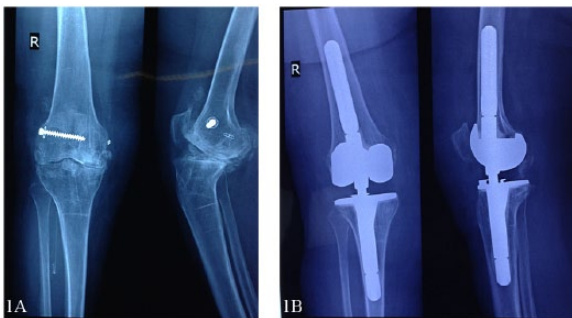


Figure 1. Case 1: (A) Preoperative AP/lateral knee radiographs show fixed anterior knee dislocation with osteoarthritis. (B) Two-year postoperative AP/lateral knee radiographs show stable prosthesis. AP indicates anteroposterior.

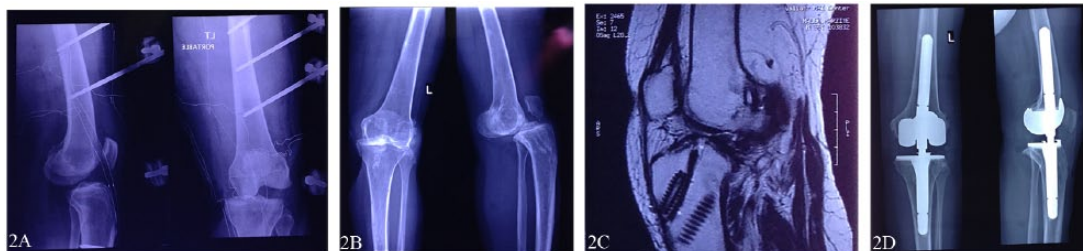


Figure 2. Case 2: (A) AP/lateral knee radiographs show knee dislocation fixed by external fixator in a subluxed position. (B) AP/lateral knee radiographs show fixed anterior knee dislocation with osteoarthritis. (C) MRI shows fixed anterior knee dislocation and previous multiple ligaments reconstruction. (D) 15-month postoperative AP/lateral knee radiographs show well-fixed stable prosthesis. AP indicates anteroposterior.

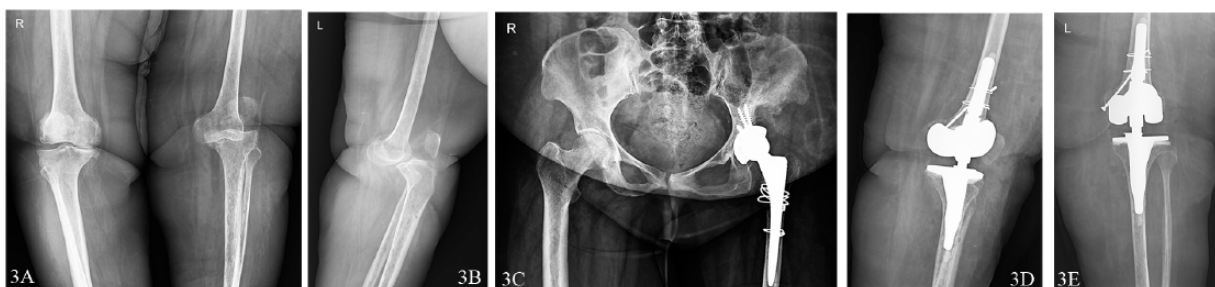


Figure 3. Case 3: (A) Pelvic radiography shows left total hip arthroplasty. (B) Preoperative lateral knee radiograph shows fixed anterior knee dislocation. (C) Preoperative AP radiograph. Left knee dislocation and right knee osteoarthritis (D) and (E) One-year postoperative radiography shows well-fixed stable prosthesis. AP indicates anteroposterior.

Their plan was to perform either arthrodesis or TKA if the patient continued to have significant knee pain in the future.¹³

There are a few reports on arthroplasty for chronic posterior knee dislocation. Constrained or semiconstrained prosthesis and quadricepsplasty are common recommendations.^{1,2,14–16}

We report for the first time on 3 cases of chronic anterior knee dislocation treated by TKA. All 3 patients experienced disability because of severe knee pain and instability. In all cases, recurvatum deformity and quadriceps contracture with limited range of flexion was seen. Owing to severe arthritic changes in cases 1 and 2, the risks and benefits of arthrodesis and arthroplasty were explained to the patients that elected to undergo arthroplasty over arthrodesis. Owing to a hip prosthesis on the same side and severe contralateral knee osteoarthritis in the third case, the senior author decided to perform TKA.

Before surgery, the lower limb arterial condition was evaluated by Doppler ultrasonography. During exposure, quadriceps muscle contracture was seen in all 3 cases; thus, the Insall¹⁷ rectus snip approach was used for exposure. The suprapatellar pouch and fibrotic tissue were excised. Blunt release of quadriceps femoris from the distal femur was performed manually by the surgeon. To gain access to the distal femur, we cut the proximal tibia in the knee extension position with an extra medullary guide. Because of multiple ligament injuries and multidirectional instability after aggressive release required for reduction and because of preoperative recurvatum deformity, a constrained prosthesis was used. In the 2 cases with a history of ACL and PCL reconstruction, the femoral and tibial tunnels used for reconstruction of ligaments were filled with bone grafts obtained at the time of TKA.

Because of preoperative recurvatum deformity, after surgery, a hinged knee brace locked at 10° of flexion was fitted for 6 weeks. No major complications such as infection, wound breakdown, deep venous thrombosis, or vascular injury occurred.

Final active and passive knee flexion was limited in all 3 cases, with a mean of about 100° (range, 90°–110°). Active extension was full without any extension lag. At 1 to 2 years of follow-up, all 3 cases had painless, stable, well-functioning prostheses.

Our case report has some limitations. All 3 cases were referred from other centres so their original radiographs were not available nor were their records complete. Their preoperative WOMAC scores were also not available.

Conclusions

TKA for chronic knee dislocation is a challenging procedure. We recommend it for patients with osteoarthritic changes when associated conditions prohibit open reduction or arthrodesis and when the patient does not accept the limitations caused by arthrodesis. The Insall rectus snip approach with quadriceps release and constrained prosthesis is recommended. Before surgery, the vascular condition of the affected limb must be evaluated. Patient must be informed about the resulting limited knee flexion.

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This article is unique because to the best of our knowledge, total knee arthroplasty for treatment of chronic anterior knee dislocation has not been reported. We report 3 cases.


Author Contributions


MJ and SG conceived and designed the experiments. SG and AB wrote the first draft of the manuscript. MJ, HH, and AA contributed to the writing of the manuscript. MJ, AB, HH, AA, and SG agree with manuscript results and conclusions, jointly developed the structure and arguments for the paper, made critical revisions, and approved the final version. All authors reviewed and approved of the final manuscript.

Disclosures and Ethics

The authors have read and confirmed their agreement with the ICMJE authorship and conflict of interest criteria. The authors have also confirmed that this article is unique and not under consideration or published in any other publication.

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