

**Treatment of bilateral patellar dislocation after bilateral total knee arthroplasty of a patient with Parkinson's disease: A case report**

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## Case Report

### Treatment of bilateral patellar dislocation after bilateral total knee arthroplasty of a patient with Parkinson's disease: A case report

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## ABSTRACT

We present a case of Parkinson's disease (PD) patient, who sustained bilateral lateral patellar dislocation shortly after bilateral total knee arthroplasty (TKA). Prior to admission to our hospital, he underwent several surgical reduction attempts in other health centers. His Modified Hoehn and Yahr scale was 4. Surgical procedures included medial patellofemoral ligament (MPFL) reconstruction and Insall procedure. Non-absorbable polyethylene multifilament suture was used to repair the soft tissue. Two months postoperatively, the patient sustained fracture of the right patella due to falling. Patella fracture occurred at the tunnel level that was drilled for MPFL reconstruction. The fracture was treated with the tension band technique. After two years of follow-up, he was able to walk with the help of a walker. His Knee Society Score and Womac Score improved from preoperatively 6 to postoperatively 52, and from preoperatively 5.5 to postoperatively 52.3, respectively. PD may negatively affect the medial retinaculum and tendon healing because of muscular rigidity, weakness and imbalance. Use of non-absorbable polyethylene multifilament sutures may be more helpful for healing of medial structures of patella in TKA surgery in patients with neurodegenerative diseases such as PD.

**KEY WORDS:** bilateral patellar dislocation; bilateral total knee arthroplasty; Parkinson's Disease; patellar fracture

## INTRODUCTION

Patellar dislocation after total knee arthroplasty (TKA) surgery is a rare disease which causes difficulty in walking.<sup>[1]</sup> Dislocation of the patella may be due to insufficient surgical technique and component malposition, disruption of the extensor mechanism, high Q angle and neuromuscular disorders.<sup>[2]</sup> Patellar dislocation is one of the revision surgery causes in TKA.<sup>[3]</sup> In their study with 142 patients, Pećina *et al* reported that revision surgery was performed in 3 patients because of patellar instability.<sup>[3]</sup> Parkinson's disease (PD) is a neurodegenerative disorder that affects predominately dopamine-producing ("dopaminergic") neurons in a specific area of the brain called substantia nigra. Tremor (mainly at rest), bradykinesia, limb rigidity, muscle weakness, gait and balance problems are the most common symptoms that patients suffer from.<sup>[4]</sup> As it is very well known, patella is stabilized in knee joint by vastus medialis, vastus lateralis muscles and the medial patellofemoral ligament (MPFL). During TKA surgery, medial structures of patella as patellar insertion of MPFL, medial retinaculum and vastus medialis muscle tendon are cut and sutured routinely with absorbable sutures. In this study, we present a report with 2 years follow up of a PD patient who was surgically treated with the diagnosis of bilateral lateral patellar dislocation after TKA, and patellar fracture complication after our patella reduction surgery.

## CASE REPORT

A 61-year old male patient with PD for 12 years was admitted to orthopedics and traumatology polyclinic with complaints of inability to walk, limited range of motion (ROM) of both knees, inability to lift straight legs and pain. He had bilateral TKA 9 months ago (Smith & Nephew, TC-PLUS™ PRIMARY). There was no history of trauma. Within 1 month of TKA surgery, patellar dislocation in both knees occurred. He never had patellar dislocation prior to TKA. Due to bilateral patellar dislocation, the patient had soft tissue

interventions performed for the right knee twice and to the left knee once. It was noted in his discharge summary that he had TKA in the same surgical session via medial parapatellar approach to both knees. After 1 month, he had medial retinacular repair in both knees. One month later, he again had patellar dislocation at his right knee. Therefore, the medial retinacular repair surgery was repeated. But his patellar dislocation at both knees repeated again within 1 month. As stated in his discharge summaries, the medial retinacular repairs were done via absorbable suture no:2 vicryl surgery as a routine application.

During examination, the patient could not lift his legs straight. Both patellas were laterally dislocated (Fig. 1a). Passive ROM of his knees was between 30°-100° and the active ROM was 50°-90°. Passive and active ROM of the patient was observed painful. In clinical (Fig. 1a) and radiological (Fig. 1b) examinations, the patellas were fixed at lateral of the knee. With palpation, there was a gap between the tendo vastus medialis and the patella. Based on the normal clinical examination results and laboratory values, we did not think of infection at the knees. The valgus malalignment and rotational malalignment are frequently the causes of the patella dislocation after total knee arthroplasty. During preoperative examinations, we observed that the patient was not able to extend his knees because of patellar dislocation and pain sensation. For this reason we could not take a full-length X-ray of the lower limb of the patient. However, we evaluated the possible rotational malalignment through computed tomography (CT) of his knees. In radiological examination, we observed no malrotation at the components of arthroplasty. As being a PD patient for 12 years, he had tremor, bradykinesia and limb rigidity. He did not use his medications regularly. His Modified Hoehn and Yahr scale value, a scale to present the stage of PD, was 4 (table 1).<sup>[5]</sup> Before surgery, his Knee Society Score was 6 and Womac Score was 5.5.

Under spinal anesthesia, both knees were entered through the prior incisions. It was observed that the musculus vastus medialis was not inserted into the patella. Both patellas had lateral retinacular release. After the lateral release, patella placed into the trochlear groove of femoral component. Then, the Q angle between the quadriceps tendon and the patellar tendon was measured (Fig. 2). The possible malalignment of lower extremity was evaluated by cable method under the fluoroscopy intraoperatively.<sup>[6]</sup> We observed the alignment of lower extremities within the normal limits. Then, proximal soft tissue realignment surgery previously described by Insall *et al*<sup>[7]</sup> and Efe *et al*<sup>[8]</sup>, and MPFL reconstruction were conducted. Medial parapatellar incision was performed around the patella from the upper edge of the tendo vastus medialis in the quadriceps tendon, to the tibial tubercle. During the examination of patella, we noticed that the central and medial facets of the patella were crushed (Fig. 1b). The thickness of the patella was measured as 17 mm with the help of calipers intraoperatively.

The patella was placed into the groove. A fresh frozen allograft (Community Tissue Services, USA) of tibialis anterior tendon was prepared in “Y” shape (Fig. 2). A tunnel was opened under fluoroscopy in the femur between the adductor tubercle and medial collateral ligament in accordance with inserting the medial collateral ligament. Two tunnels were opened to the patella for fixing it by the branches of the tendon allograft. The tendon allograft was fixed in the femoral tunnel with a bioabsorbable screw (Biorci screw, 10 mm X 25 mm, Smith&Nephew, USA). The branches of the tendon were passed through the tunnels opened in the patella and fixed with a nonabsorbable polyethylene multifilament suture (no:2, Smith&Nephew, USA). MPFL reconstruction was performed with tibialis anterior tendon allograft. Then

medial retinaculum and tendo vastus medialis were pulled laterally and distally for at least 1-1.5 cm. Tendo vastus medialis repair was done via one 6.5 mm titanium anchor (Smith&Nephew, USA) to the patella and nonabsorbable polyethylene multifilament suture (no:2, Smith&Nephew, USA) (Fig. 3). It was observed that the patella was in the groove, no maltracking was seen, and there was no lateral or medial tilt (Fig. 3). After surgery, rehabilitation involved an angle adjustable brace. After the surgery, knee ROM were free for rehabilitation except while walking. He was able to walk with a walker while the brace was locked at knees in extension. After the 6th week, the angle-adjustable brace was removed and he was able to walk with the walker.

Two months after the operation, the patient was referred to the polyclinic after falling on his right knee. The patient had swelling, redness and inability to lift a straight leg of the right knee. Radiological tests revealed patella fracture. The fracture line of the patella was observed to be at the tunnel level opened for the graft (Fig. 4a). A tension band surgery was performed for the patella (Fig. 4a, b). After the surgery, free ROM of knee was allowed. The patient was mobilized with a brace while the knee is in extension, and with a walker. After 6 weeks, the angle-adjustable knee brace was removed.

After 2 year follow-up, the patient was ambulating with a walker. Passive knee ROM was 0-110 degrees, and the active knee ROM was 10-100 degrees. On the last follow-up, Knee Society Score was 52 and Womac Score was 52.3.

## DISCUSSION

In the present case, medial retianculum, tendo vastus medialis, and MPFL, those ensure that the patella remains in the trochlear groove, were separated from the patella, after bilateral TKA surgery. Based on laboratory and radiological findings, there was no malalignment of lower extremity, malposition of components, and infection. Our patient had idiopathic PD for 12 years. PD is known for muscle weakness and imbalance.<sup>[4,10]</sup> Because medial parapatellar approach was used in TKA surgery of our patient, the force of medial vectors depended on the sutures only until the medial retinaculum and vastus medialis tendon healed.

According to discharge summary, the used suture in the TKA surgery for closing the medial structures was no:2 vicryl, and it is absorbed before complete wound healing. The patient was operated twice previously because of patellar dislocation. The used technique in previous patella reduction surgeries was only medial retinacular repair those done with no:2 vicryl. The cause of fail at these surgeries may be because the no:2 vicryl was resolved before the healing of medial retinaculum and tendo vastus medialis. But in patella reduction surgeries, non-absorbable no:2 Ethibond which is known to be biomechanically stronger than vicryl<sup>[11]</sup> was used. The cause of fail at the patella reduction surgeries may be related to the soft tissue problems as decreased soft tissue volume is not enough for tightening. Another possible cause of fail at medial retinaculum repair may be the short intervals (1 month) between surgeries because at the early period of tissue repairs, the soft tissue weakens and its quality decreases.<sup>[12]</sup> We did not face any tissue quality decrease because we did patellar realignment surgery 7 months after the last patella reduction surgery.

Based on the anamnesis and discharge summary, we decided to use MPFL reconstruction and proximal realignment surgery at the presurgical planning period as previously described<sup>[7,9]</sup> by using nonabsorbable polyethylene multifilament suture. Additionally, we used anchor for the fixation of vastus medialis tendon to patella. After the surgery, the anchor was failed and dissociated from patella as seen on X-ray films (Fig. 4 a-b). This dissociated anchor may be related to the muscle imbalance at PD.

TKA is not commonly suggested for the PD patients with Modified Hoehn and Yahr scale score over 3.<sup>[6]</sup> In our case, however, Modified Hoehn and Yahr scale score was 4 and the surgery for reconstruction was indicated because of the extensor mechanism failure. In this case report, we present two years follow-up of the treatment of a patient with bilateral patellar dislocation after bilateral TKA in the presence of muscle imbalance accompanied by PD. Patellar dislocation or refracture of patella did not occur. The patient was able to move with a walker. A clear improvement was observed in Knee Society Score (from 6 to 52) and Womac knee score (from 5.5 to 52.3). PD is a serious disease that if the patient has this diagnosis, TKA surgery decision must be taken both by the patient and by the neurologist. A previous case report from Croatia presented a periprosthetic knee recurrent dislocation at a PD patient, 9 months after surgery.<sup>[4]</sup> Erceg et al. interpreted the dislocation of knee due to muscle weakness caused by PD and authors treated patient by a revision surgery.<sup>[4]</sup> We could not find any information about what sutures were used in primary and revision surgeries for closing the wound in their case report.

In our literature search, we did not encounter any report of a patient with both patella dislocated after TKA linked to muscle weakness after the neurodegenerative disease of PD and the surgical treatment results. We believe our report of the bilateral patella dislocation after TKA is a rare case presentation comparing to currently accessible literature. This case emphasizes the importance of soft tissue balance and the sturdy repair with nonabsorbable sutures in TKA surgery with PD.

## CONCLUSION

Using nonabsorbable polyethylene multifilament sutures for repairing the medial patellar structures such as retinaculum/tendon during TKA surgeries on patients with neurodegenerative diseases such as PD, may be more helpful during healing process.

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Conflicts of interest: The authors declare no conflict of interest.

Author contributions in the manuscript:

KA: Treatment, writing

CZE: Treatment, critical revision

## REFERENCES

- 1) Rozell JC, Voleti PB, Israelite CL. Patellar Dislocation after Total Knee Arthroplasty for Neglected Chronic Post-traumatic Patellar Dislocation: A Case Report. University Of Pennsylvania Orthopaedic Journal. 2015;25,75-8

- 2) Motsis EK, Paschos N, Pakos EE, Georgoulis AD. Review article: Patellar instability after total knee arthroplasty. *J Orthop Surg (Hong Kong)*. 2009;17(3):351-7
- 3) Pećina M, Djapić T, Haspl M. Survival of Cementless and Cemented Porous-coated Anatomic Knee Replacements: Retrospective Cohort Study. *Croat Med J*. 2000;41(2):168-72
- 4) Erceg M, Maricević A. Recurrent Posterior Dislocation Following Primary Posterior-stabilized Total Knee Arthroplasty. *Croat Med J*. 2000;41(2):207-9.
- 5) Ashraf M, Priyavadhana S, Sambandam SN, Mounasamy V, Sharma OP. Total Knee Arthroplasty In Patients With Parkinson's Disease- A Critical Analysis of Available Evidence. *Open Orthop J*. 2017;30;11:1087-1093.
- 6) Chan CK, Shanmugam R. A Simple Cable Method for Intraoperative Limb Alignment Assessment. *Malays Orthop J*. 2016;10(1):69-70
- 7) Insall J, Falvo KA, Wise DW. Chondromalacia patellae. A prospective study. *J Bone Joint Surg Am*. 1976;58(1):1-8.
- 8) Efe T, Seibold J, Geßlein M, Schüttler K, Schmitt J, Schofer MD, et al. Non-Anatomic Proximal Realignment for Recurrent Patellar Dislocation Does Not Sufficiently Prevent Redislocation. *Open Orthop J*. 2012;6:114-7
- 9) Zaffagnini S, Dejour D, Grassi A, Bonanzinga T, Muccioli GM, Colle F, et al. Patellofemoral anatomy and biomechanics: current concepts. *Joints*. 2013;24;1(2):15-20.
- 10) Kakinuma S, Nogaki H, Pramanik B, Morimatsu M. Muscle Weakness in Parkinson's Disease: Isokinetic Study of the Lower Limbs. *Eur Neurol*. 1998;39:218–222
- 11) Vavken P, Proffen B, Peterson C, Fleming BC, Machan JT, Murray MM. Effects of suture choice on biomechanics and physeal status after bioenhanced anterior cruciate ligament repair in skeletally immature patients: a large-animal study. *Arthroscopy*. 2013;29(1):122-32.
- 12) Dargel J, Gotter M, Mader K, Pennig D, Koebke J, Schmidt-Wiethoff R. Biomechanics of the anterior cruciate ligament and implications for surgical reconstruction. *Strategies Trauma Limb Reconstr*. 2007;2(1):1-12.

**Table 1:** Modified Hoehn And Yahr Scale. Staging of Parkinson's disease<sup>[5]</sup>

STAGE	DESCRIPTION
0	No sign of disease
1	Unilateral disease
1.5	Unilateral plus axial involvement
2	Bilateral disease without involvement of balance
2.5	Mild bilateral disease, with recovery on pull test
3	Mild to moderate bilateral disease, some postural instability, physically independent
4	Severe disability, still able to walk or stand unassisted
5	Wheel chair bound or bed ridden unless aided

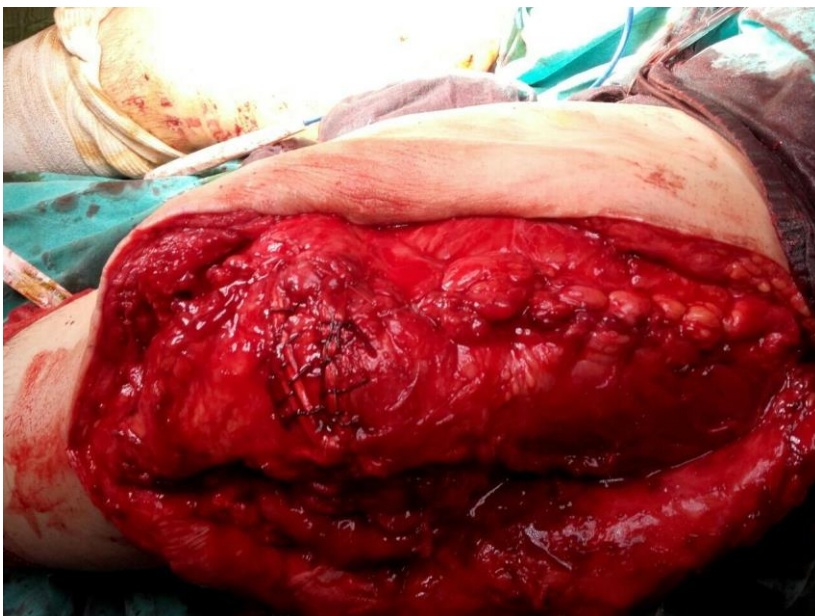
**Fig. 1a-b.** Bilateral patellar lateral dislocation. Arrows show the dislocated patellas. a) Preop clinical appearance b) Radiology images.



**Fig 2.** Intraoperative image. Lateral retinaculum loosened, patella groove reduced and tendon allograft prepared in “Y” form



**Fig 3.** Intraoperative image. Reconstruction of the MPFL and repaired vastus medialis





**Fig 4a-b.** White arrows show the dissociated anchors from patellas in both views. a) Lateral X-ray image of patella fracture treated with tension band technique after surgery. Blue arrow shows the fracture line of the patella passes through the tunnel. b) Anteroposterior view of the knees.

