Case report

Simultaneous posterior dislocation of primary total knee arthroplasty with ipsilateral tibial shaft fracture: A case report and review of literature

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ABSTRACT

Dislocation following total knee arthroplasty (TKA) is a rare but serious complication. Here, a 74-year-old woman with posterior dislocation of her right cruciate-retaining TKA and ipsilateral tibia diaphysis fracture was presented. She only slipped down on the ground with a quick twist of her right leg. She underwent revision semiconstrained TKA and osteosynthesis of tibial fracture with plate and screw. Her partially avulsed patellar tendon was repaired as well. She was ambulatory with a cane and satisfied with revision operation at last control. Extensor mechanism and functional posterior cruciate ligament is especially important in patients receiving cruciate-retaining TKA. As far as we know, simultaneous dislocation of TKA with fracture of tibia diaphysis has never been reported before.

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1. Introduction

Dislocation of a total knee arthroplasty (TKA) is a rare but serious complication that may lead to even amputation.¹ Flexion-extension mismatch with greater laxity in flexion than extension,² malposition of tibial component,³ valgus deformity which requires extensive soft-tissue release,^{4,5} extensor mechanism deficiency,^{6,7} neurologic disorders,⁸ fracture of polyethylene insert itself⁹ and small insert usage in mobile-bearing revision TKA¹⁰ are among reported etiologies. But, none of the cases in the literature is with the fracture of tibia. Here, we report a case of ipsilateral closed fracture of right tibial diaphysis and posterior dislocation of cruciate retaining TKA with partial avulsion of patellar tendon from tibial tuberosity.

2. Case report

A 74-year-old woman with varus gonarthrosis in her right knee underwent cruciate-retaining TKA (Groupe Lépine, Lyon, France) in

another institution 8 months ago. From the history, it was learned that her postoperative course was uneventful and she was discharged 1 week after surgery. After 6 months following the index operation she admitted to our emergency unit with gross deformity of her right knee and leg that was externally rotated. She said that she had only slipped down on the ground with a quick twist of her right leg. Plain films revealed posterior dislocation of the prosthesis, tibial midshaft spiral fracture and patella was dislocated and locked laterally (Fig. 1a, b). Distal pulses were palpable with Doppler ultrasonography and neurologic examination revealed no abnormality with common peroneal nerve. Closed reduction of knee joint was unsuccessful. After revision instruments and prosthesis were prepared she was taken to the operating room. First, fracture of tibia was fixated with plate and screws. After midline vertical incision over the old one, we saw that the arthrotomy repair site was ruptured and femoral component was in view. The joint itself was examined and reduced but the reduction was easily lost due to lack of extensor mechanism and anterior support. The mechanism of dislocation was thought to be the ruptured arthrotomy repair site and lateral dislocation of patella with partially avulsed patellar tendon from tibia and subsequent tear of posterior cruciate ligament (PCL). Revision of cruciate retaining prosthesis was seen to be needed. First the femoral and tibial components were extracted (Fig. 2).

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Fig. 1. Anteroposterior (a) and lateral (b) radiographs of the right knee when she admitted to emergency unit.

Fig. 2. The image of the removed components.

Revision femoral and tibial components were applied (Permedica, Via Como, Italy). Patellar alignment was controlled and avulsed segment was attached to the tuberositas tibia with a suture anchor (DePuy Mitek). Lateral retinacular release was needed because

patella had a tendency to dislocate. Intraoperative range of motion (ROM) of knee joint was 0–100°. There was no problem dealing with the surgery.

For 2 weeks after surgery, ROM of knee joint was restricted and gradually increased up to 90° with CPM in a period of one month. Full weight-bearing was not allowed for 6 weeks postoperatively there after she was ambulatory with a PTB brace. She used it for 3 months.

After 24 months follow-up, the patient had 0–90° active range of motion and was able to do her daily activities without any help (Fig. 3a, b). She was ambulatory with a cane. Radiographies showed good position of prosthesis, no abnormality with the extensor mechanism and total consolidation of tibial fracture (Fig. 4). The KSS knee and function score were 83 and 65 respectively. Insall-Salvati ratio was 0.5 meaning patella alta.

3. Discussion

Insall et al.¹¹ reported 4 cases of posterior subluxations after 220 TKAs with two patterns of instability of TKA at sagittal plane, one with posterior translation of the tibia and the other with anterior translation of tibia. Generally, it occurs in a posterior direction in association with a posterior stabilized TKA.^{12,13} Anterior dislocation after TKA has been reported very rarely. The majority of cases reported to date are anterior subluxation, while only few cases of complete anterior dislocation have been described so far in literature.^{2,6,11,14–16} Wang and Wang¹⁷ also defined these two instability patterns mentioning that posterior translation of the tibia occurring mainly in the postoperative period usually resulting from trauma and the other with anterior translation of tibia occurring 6 months to 7 years postoperatively with no preceding trauma, in the latter group instability was manifested gradually as a lengthening of the PCL and the posterior capsule, leading to a recurvatum deformity of the knee. In the current case, the mechanism that caused posterior dislocation of TKA and tibia fracture was the posteriorly directed force during flexion causing dislocation of patella with ruptured arthrotomy healing site and tear of PCL leading to subsequent posterior translation of tibia and twisting thereafter producing shear force fracturing the tibia and fibula at the same time. Similarly, Chu et al.,¹⁴ presented a case with a posterior dislocation of a cruciate-retaining TKA following an acute bacterial infection. They mentioned that their case had been exposed to a minor sprain giving rise to patellar subluxation. The subsequent loss of patellar barrier gave rise to laceration of PCL and knee dislocated posteriorly. Contrary to their case, the twisted leg that was locked posteriorly in the knee joint lead to tibia and fibula fracture in our case.

Acute knee joint dislocations are the most severe injuries causing extensive ligamentous damage with often limb

Fig. 3. Photographs of patient showing full extension (a) and 90° of flexion (b) at last follow-up.

Fig. 4. Anteroposterior and lateral radiographs of the right knee at last follow-up showing good positioning of revision prosthesis; anteroposterior and lateral radiographs of the right tibia showing healing of fracture at last follow-up.

threatening neurovascular lesions and the mechanism for this combination of injury was a high-energy in type.¹⁸ But, it is uncommon for a TKA dislocation being together with arterial damage probably because of the low-energy nature of the trauma required and only one case with arterial injury has been reported necessitating an above knee amputation.¹³ The presenting case is also without neurovascular injury that is consistent with the literature.

In the current case, both tibial and femoral components were revised with a PCL substituting revision prosthesis due to torn PCL seen in revision surgery. The avulsed patellar tendon and absence of PCL necessitated semi-constrained prosthesis. In the same way, Mine et al.⁶ reported anterior dislocation of TKA due to ruptured patellar tendon emphasizing the importance of protective effect of extensor mechanism in TKA. They also had revised the presenting cruciate-retaining TKA with a semi-constrained revision prosthesis, constrained total knee arthroplasty dislocation of the patellar tendon rupture after minor trauma by Vaishya et al.⁷ reported in 2015. Sharkey et al.,⁵ highlighted the importance of stable and functional knee extensor mechanism and of ligamentous balance in flexion for adequate anteroposterior stability after TKA in their report of 7 posteriorly dislocated cases as well. In that report, all the dislocated cases have a variety of knee extensor mechanism problem, patellar dislocation in 5, patellar tendon rupture in 1 and fracture of patella in 1. They performed lateral retinacular release in 5 of the cases. We also examined the patellar movement through the ROM during surgery and observed the patella had a tendency to dislocate necessitating lateral retinacular release.

In the current case, tibia fracture was fixated with plate and screws. It might be fixated with a long stemmed tibial component intramedullary. Gupta et al.¹⁸ also managed fracture of tibia by plate and screws in their case accompanied with knee dislocation.

Different treatment options for management of patellar tendon ruptures including primary suture, repair using fixation materials, autograft and allograft augmentation procedures have been reviewed and only 4 of the reconstructions by primary suture and 1 reconstruction using the semitendinosus tendon were successful.¹⁵ We preferred to repair the avulsed part of patellar tendon with a suture anchor to the tibial tuberosity. Our patient had 0–90° active ROM of knee joint with no sign of instability.

4. Conclusion

The patellofemoral congruency is very important for good function of TKA. If anyone sees there presents a tight lateral retinaculum it should be released until patella always be in its place throughout the ROM of knee joint.

Conflicts of interest

The authors have none to declare.

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