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Case Report

Anterior dislocation in a total knee arthroplasty: A case report and literature review

Antonella Conti, Lawrence Camarda*, Salvatore Mannino, Liliana Milici,
Michele D'Arienzo

Dipartimento di Discipline Chirurgiche, Oncologiche e Stomatologiche (Di.Chir.On.S.),
Università degli Studi di Palermo, Clinica Ortopedica, 90127 Palermo, Italy

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ABSTRACT

Dislocations of a total knee arthroplasty (TKA) are an uncommon injury and only few cases of anterior dislocations have been reported.

We report a rare case of anterior dislocation of a 10-year-old posterior stabilized total knee arthroplasty in a 74-year-old woman. The patient was successfully treated by close reduction of the dislocation followed by immobilization in full extension with a long leg cast.

Because of a high risk of neurovascular complications, a high index of suspicion for vascular injury must be maintained. For this reason, a proper diagnosis is required and immediate reduction is recommended.

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1. Introduction

Traumatic dislocations of a total knee arthroplasty (TKA) are really uncommon.^{1–3} Generally, they can occur following low energy trauma and are usually associated with various ligament injuries. Different risk factors have been reported such as tibial component malalignment, polyethylene wear, extensor mechanism dysfunction and flexion-extension gap mismatch.^{1,4,5}

Furthermore, vascular and nerve injuries such as popliteal artery and peroneal nerve impairment can also be present on a dislocation of a TKA.^{6,7} Because of a high incidence of related neurovascular complications, early recognition and proper treatment are required by physicians.

Authors described a rare case of traumatic anterior knee dislocation in a patient with a TKA that was successfully treated without long-term complication.

2. Case report

A 74-year-old woman, was accepted to our emergency department because of left knee pain, deformity and incapacity to walk, occurred after a sudden fall in her home. The anamnestic research revealed that the patient was affected by Alzheimer's disease (AD) for about 4 years. Neuropsychological examinations performed in our institution confirmed the diagnosis of AD and it showed: MMSE (Mini Mental State

* Corresponding author. Tel.: +39 338 7770999.

E-mail address: lawrence.camarda@unipa.it (L. Camarda).

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Examination) = 16/30; Clinical Dementia Rating Scale = 2.5; Global Deterioration Score = 5 (range 0–7); ADL = 2 (range 0–6); IADL = 2/8. Because of her dementia, it was impossible to describe the mechanism of the trauma. Ten years earlier the patient underwent a bilateral primary TKA (Nexgen, PS, Zimmer, Warsaw, US). Postoperative recovery was uneventful and during the following 10 years she did not report any problems with the knee such as pain or instability. The clinical examination at the time of admission showed deformity of the knee that was locked in extension with immediate pain when attempting passive movements. No signs of neurovascular deficit were present. Even though the lower extremity was cold, the pedis artery pulse was present and active movements of the foot and ankle were possible.

The X-ray examination showed a complete anterior TKA dislocation. On the lateral view the tibia was displaced anteriorly without any medial or lateral displacement (Fig. 1). Under general anesthesia, a closed reduction was performed by longitudinal manual foot traction. Keeping the knee flexed at 90°, and a countertraction applied to the leg, the reduction was achieved by displacing the femur anteriorly and the tibia posteriorly with the knee in flexion. Under anesthesia, the posterior drawer test was negative. However, a slight instability was observed at the valgus test and the anterior drawer test of the tibia. Post-reduction radiographs revealed a congruent reduction of the tibial and femoral components (Fig. 2). No sign of neurovascular compromise was noted after the reduction.

The lower extremity was immobilized in full extension with a long leg cast for 30 days. The cast was then removed and physical therapy treatment started with passive range-of-motion exercises followed by active knee and ankle ROM exercises. At the 6th week the patient started partial weight-bearing, progressing to full weight-bearing by the 8th week. After six months from the trauma the patient was able to walk without any help. At the final follow-up (12 months), the

Fig. 1 – X-ray showing an anterior dislocation of the tibia on the femur.

Fig. 2 – Post-reduction AP and lateral radiographs showing a congruent reduction of the tibial and femoral components.

patient's knee range-of-motion was from 0° to 100° and no sign of instability was present.

3. Discussion

Dislocation of TKA is a rare, but severe complication. Generally, it occurs in a posterior direction in association with a posterior stabilized knee prosthesis (PS).^{8,9} In 1979, Insall et al reported 4 cases of posterior subluxation of the tibia after 220 total condylar TKAs.¹⁰ Since then, several cases of posterior dislocation were reported in literature. In contrast, anterior dislocation of the knee as a complication after TKA is exceptional. The majority of cases reported to date are anterior subluxation, while only five cases of complete anterior dislocation have been described so far in literature.^{3,6,7,11,12}

Several risk factors that could increase the risk of dislocation were reported such as tibial component malalignment, polyethylene wear, extensor mechanism dysfunction and flexion-extension gap mismatch with suboptimal soft tissue balance.^{1,4,5} Furthermore, because of small number of cases, it is still not clear if there is an association with PS or CR prosthesis. According to literature, dislocations of a TKA can occur following low energy trauma as well as in high energy ones. For an anterior dislocation, the mechanism of injury is similar to that associated with anterior dislocation of the native knee, such as violent knee hyperextension with a rotational component. This could result in an anterior subluxation of the tibia first and then a complete dislocation of the knee prosthesis. Our patient suffered from Alzheimer's disease and it was not possible to define the mechanism of the trauma. However, post-reduction X-ray showed a slight polyethylene insert wear. This was observed comparing a previous X-ray of the knee performed 7 years earlier. In addition, no sign of malpositioning of tibial and femoral component were noted such as malalignment or increasing tibial slope. This suggests

that in our patient, the polyethylene insert wear could be a possible cause of knee instability that brought to the anterior TKA dislocation.

A high incidence of related neurovascular complications could be observed in cases of complete anterior TKA dislocation. For this reason, closed reduction needs to be performed as soon as possible. It can be achieved with no difficulty by manual traction keeping the knee flexed at 90° and a countertraction applied to the leg. The reduction could be achieved by displacing the tibia posteriorly with the knee in flexion. In case of unsuccessful closed reduction, an open reduction is required. Because of a high risk of vascular damage, a promptly arteriography should be performed even if no pulse deficit is observed. In fact, distal pulses do not rule out arterial injury. In case of evidence of vascular injury, a promptly surgical exploration is mandatory within 8 h from the trauma.¹³ Of five cases of complete anterior dislocation described so far in literature three cases presented a neurovascular complication. Pao⁶ and Aderinto¹¹ reported respectively two cases of anterior TKA dislocation complicated by a popliteal artery injury that required vascular repair. In one case, an above-knee amputation was performed because of persistent cyanosis of the affected limb, unstable hemodynamic status and elevated CK isoenzyme level that indicated sepsis and failure of the revascularization procedure.⁶ Villanueva et al reported a case of complete anterior dislocation with occlusion of the ascending genicular artery associated with a peroneal palsy, from which the patient recovered.⁷ Besides neurovascular complications, concurrent structural knee joint damage, including PCL rupture or combined medial and lateral collateral ligament and PCL rupture could be observed in case of complete anterior dislocation.^{6,11} Our patient did not show signs of neurovascular compromise. Active movements of the foot and ankle were possible. Furthermore, physical examination and arteriography excluded vascular injuries. However, at the post-reduction evaluation, an instability of the knee was observed at the valgus test indicated a slight medial collateral ligament insufficiency, from which the patient recovered.

Post-reduction immobilization in a nonweight-bearing cast is required for TKA dislocation. The lower extremity should be immobilized in extension at least for 30 days. After removal of the cast, physical therapy is recommended starting with active knee and ankle ROM exercises. At the 6th week the patient needs to start partial weight-bearing, progressing to full weight-bearing by the 8th week.

Conflicts of interest

All authors have none to declare.

REFERENCES

1. Galinat BJ, Vernace JV, Booth Jr RE, Rothman RH. Dislocation of the posterior stabilized total knee arthroplasty. A report of two cases. *J Arthroplasty*. 1988;3:363–367.
2. Sharkey PF, Hozack WJ, Booth Jr RE, Balderston RA, Rothman RH. Posterior dislocation of total knee arthroplasty. *Clin Orthop Relat Res*. 1992;128–133.
3. Lee SC, Jung KA, Nam CH, Hwang SH, Lee WJ, Park IS. Anterior dislocation after a posterior stabilized total knee arthroplasty. *J Arthroplasty*. 2012;27:324.e17–324.e20.
4. Gebhard JS, Kilgus DJ. Dislocation of a posterior stabilized total knee prosthesis. A report of two cases. *Clin Orthop Relat Res*. 1990;225–229.
5. Bargren JH. Total knee dislocation due to rotatory malalignment of tibial component: a case report. *Clin Orthop Relat Res*. 1980;271–274.
6. Pao JL, Jiang CC. Above-knee amputation after recurrent dislocations of total knee arthroplasty. *J Arthroplasty*. 2003;18:105–109.
7. Villanueva M, Rios-Luna A, Pereiro J, Fahandez-Saddi H, Perez-Caballer A. Dislocation following total knee arthroplasty: a report of six cases. *Indian J Orthop*. 2010;44:438–443.
8. Lombardi Jr AV, Mallory TH, Vaughn BK, et al. Dislocation following primary posterior-stabilized total knee arthroplasty. *J Arthroplasty*. 1993;8:633–639.
9. Ochsner Jr JL, Kostman WC, Dodson M. Posterior dislocation of a posterior-stabilized total knee arthroplasty. A report of two cases. *Am J Orthop (Belle Mead NJ)*. 1996;25:310–312.
10. Insall J, Scott WN, Ranawat CS. The total condylar knee prosthesis. A report of two hundred and twenty cases. *J Bone Joint Surg Am*. 1979;61:173–180.
11. Aderinto J, Gross AW, Rittenhouse B. Non-traumatic anterior dislocation of a total knee replacement associated with neurovascular injury. *Ann R Coll Surg Engl*. 2009;91:658–659.
12. Sato Y, Saito M, Akagi R, Suzuki M, Kobayashi T, Sasho T. Complete anterior knee dislocation 16 years after cruciate-retaining total knee arthroplasty. *Orthopedics*. 2012;35:e585–e588.
13. Stannard JP, Sheils TM, Lopez-Ben RR, McGwin Jr G, Robinson JT, Volgas DA. Vascular injuries in knee dislocations: the role of physical examination in determining the need for arteriography. *J Bone Joint Surg Am*. 2004;86-A:910–915.