Revision of A Hinged Total Knee Arthroplasty Due to Persistent Instability: A Case Report

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Abstract

We report a case of a 69 year old woman who has been submitted to three total knee arthroplasty revisions and still complained of posterior instability. The last revision she had was a rotating-hinge knee. We discuss the reasons of this instability, how to correct it, and how to prevent this situation.

Keywords: Rotating-Hinge; Knee Arthroplasty; Revision

Introduction

Total knee arthroplasty revision is a common procedure, and there are studies which show 38000 cases were performed in 2003 in the USA, with projections of an increase of six times, reaching 268000 cases in 2030 [1,2].

We relate here a case of a patient who, from 59 to 71 years of age, underwent three total right knee arthroplasty revision surgeries due to arthrosis associated with severe instability. The last arthroplasty was done with a “Rotating-Hinge” prosthesis. Despite the use of this prosthesis, the patient persisted with a recurvatum on the operated knee, which impaired her gait. The objective of this report is to demonstrate the technical details which can lead to a situation like this one and how to correct them.

Case Report

A female patient, 69 years of age, came to our Service referring that her right knee would bend too far backwards, which made walking difficult. In the last 10 years she had already undergone three revision arthroplasties, being that her initial complaint before the first arthroplasty was pain and instability. According to the patient, a specially constructed prosthesis was used in the last arthroplasty to specifically treat the instability that had not been resolved in the previous surgeries. In the physical examination, the patient presented a limping gait with the use of a cane, and we were able to observe a dynamic recurvatum of the operated knee, which impaired her gait. That same knee was stable in the frontal plane, presenting, however, a 10 degree recurvatum in the sagittal plane.

The x-ray showed the presence of a “Rotating-Hinge” prosthesis in her knee, well positioned in the anteroposterior incidence. However, a profile view revealed a posterior deviation of the tibial shaft in relation to the diaphyseal axis of the tibia, which in our view would explain the recurvatum. We also observed the presence of a screw distal to the tibial shaft and signs of fracture in the diaphysis, which likely occurred intra-operatively during the last surgery. In the profile x-ray we had the impression that the tip of the tibial shaft had caused a fracture in the posterior cortex of the tibia (Figure 1).

An axial computerized tomography (CT) was performed, showing details of the tibial fracture along the tibial shaft, besides the presence of cement distal to that fracture (Figure 2).

Taking into account the clinical presentation, the x-ray and CT images, we planned a prosthesis revision with a "Rotating-Hinge" type prosthesis, which constituted of the following: anterior access of the prosthesis through the osteotomy of the anterior tuberosity of the tibia; removal of the tibial prosthesis; polyethylene and medullar cement; removal of the tibial screw; removal of the cement distal to the tibial shaft through small window distal to the tip of the stem; implant of a new "Rotating-Hinge" tibial component with the longest available stem, restoration the proximal tibia with an inverted femoral tantalum cone, due to the extensive loss of bone mass, which in our view would not be filled with a tibial tantalum cone; use of a blocked plate at the medial aspect of the tibia with cerclages and screws to protect
the previous fracture and bone window, distal to the longest available tibial stem. We tested the range of motion checking the stability of the prosthesis and observed an immediate absence of recurvatum (Figure 3 and 4).

**Figure 3:** A- Anterior access to the prosthesis through the osteotomy of the anterior tuberosity. B- New tibial component implanted after the removal of the cortical screw and of the cement from the medullar canal, restoring the proximal tibia with a femoral tantalum cone due to extensive loss of bone mass; a plaque was added to the medial cortex of the tibia due to the confection of the distal bone window for the removal of the cement and to ensure the stabilization of the previous fracture. C- Final aspect after the fixation of the anterior tuberosity with cerclage and cementation of the prosthesis.

**Figure 4:** Final clinical aspect; the recurvatum is no longer observed.

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The post-operative x-ray showed a good positioning of the implant and of the plaque (Figure 5).

![Post-operative x-rays demonstrating good positioning of the prosthesis and of the plaque.](image)

The patient had a good post-operative evolution, and her last evaluation was done in the 6th post-operative month, when she considered herself satisfied, no longer referring any pain and instability, and relating a considerable improvement in her gait. She also referred she had recently returned to water aerobics.

**Discussion**

The “Rotating-Hinge” prosthesis is used in cases of knee arthroplasty revision in patients with severe ligament instability and extensive bone loss [3]. These patients generally have already had a revisional arthroplasty with the presence of the medullar stems in the femur and tibia. In the re-revision of a total knee arthroplasty one must have in mind the removal of the cement in the medullar canal in its entirety for the implantation of the knew prosthesis shaft, otherwise the stem will be impacted in the remaining cement, diverting from it and causing a false trajectory, which was observed in this case. Although the rotating prosthesis was well positioned in the femur, it was posteriorly diverted by the cement in the tibia, even causing a fracture in the diaphysis. This posterior deviation was responsible for the continued recurvatum of the patient’s knee despite this type of prosthesis. To remedy this situation, we had to therefore remove the cement from the distal tibial diaphysis through the opening of a small bone window. Having done that, we were able to adequately position the tibial component in the frontal and sagittal planes using the longest available stem, protected by cerclage wires and a blocked tibial plate, as the previous fracture and bone window were still distal to the stem tip. The use of blocked plate is a good alternative in the treatment of peri-prosthetic fractures [4].

In the restauration of the proximal tibia we used a femoral tantalum cone instead of a tibial one due to the extensive bone loss. We had never before used this operating tactic, however after testing the femoral cone on the tibia we observed a good fit and stability. We did not find any citation related to this technical alternative in literature.

This case therefore shows us that in total knee arthroplasty re-revision cases the cautious and meticulous removal of the cement from the medullar canal in its entirety is fundamental with the objective of placing the new implant in a safe and adequate manner, hence avoiding further complications. We also learned that it is possible to use the femoral tantalum cone in the proximal tibia in cases of extensive bone loss in which the tibial tantalum cone is not adequate due to the local bone deficiency.

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Conclusion

This case showed us that in revisions of already revised knees one must pay attention on taking off all the cement of the entire medular canal to prevent impact of the new stem with any remanescnt cement what can cause fractures of the femoral or tibial shaft. We also had a new experience using an inverted femoral tantalum cone to reconstruct the proximal tibia in a case where even the largest tibial tantalum cone was insufficient, and using a blocked plate to protect fractures distal to the longest available stem.

Bibliography


