Case Report

A Technical Tip to Avert Meniscal Rotation and Dislocation in a Mobile Bearing Unicompartmental Knee Arthroplasty

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Keywords

Knee · Mobile bearing dislocation · Unicompartmental knee replacement · Complication

Abstract

The Oxford (Oxford® partial knee; Biomet) mobile bearing medial unicompartmental knee replacement (OUKR) is a preferred choice by surgeons due to minimal blood loss, reduced pain, and better range of motion. Commonly observed complications include aseptic loosening, polyethylene wear, bearing dislocation, and periprosthetic fractures. A bearing dislocation can be prevented by ensuring that there is correct tracking of bearing during the trial reduction as well as no loss of entrapment. We present a case report in a 50-year-old patient undergoing bilateral OUKR wherein it was observed that the meniscal bearing upon the flexion of the knee joint had the tendency to dislocate. Upon revising the vertical tibial recut according to the anterior superior iliac spine, the meniscus was found to have a normal excursion. Mobile bearing dislocation is a unique complication of mobile bearing OUKR. Surgical technique is of paramount importance in ensuring a successful OUKR. The vertical tibial cut is made to accommodate the vertical wall of the tibial component. Meniscal displacement is quite a common

complication and can occur due to multiple causes. Inaccurate vertical tibial cut may be one such reason leading to tibial dislocation.

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Introduction

Unicompartmental knee replacement (UKR) replaces only the diseased compartment preserving the native ligaments and soft tissue stabilizers of the knee joint. The Oxford (Oxford® partial knee; Biomet) mobile bearing medial UKR (OUKR) is a successful alternative to total knee replacement in patients suffering from medial compartmental osteoarthritis [1–4]. Good mid-term and long-term functional outcomes have been reported in the literature [5]. In addition to the usual complications associated with an UKR such as aseptic loosening, polyethylene wear, and periprosthetic fractures [6, 7], a bearing dislocation is a unique complication associated with a mobile bearing OUKR. A bearing dislocation can be prevented by ensuring that there is adequate entrapment and proper tracking of bearing during the trial reduction. We present a technical tip to ensure normal tracking of the meniscal bearing and thereby avoid meniscal dislocation.

Case Report

A 50-year-old lady diagnosed with anteromedial osteoarthritis in both knees was taken up for bilateral cemented UKR (Oxford® partial knee, Biomet). The height of the patient was 152.5 cm. The Oxford knee score was 24 for the left knee and 26 for the right. There was a fixed flexion deformity of 5° on the left and 5° on the right with 5° of correctable varus on both the sides (Fig. 1). The knee range of motion was 5–130° on both sides. The left knee was operated first as it was more painful. The patient was positioned on a leg holder and was draped free. The knee was approached by a minimally invasive medial parapatellar approach. The femur was prepared with jigs for the extra small femoral component. A spigot size 4 was used. Equality of 90° and 20° flexion gaps was confirmed with a size 4 feeler gauze and trial implants in situ.

The tibial plateau was prepared, and final trial reduction was done using an extra small size 4 left meniscus. During trial reduction on flexion and extension of the knee joint, it was seen that the meniscus was not tracking properly. While flexing the knee there was a tendency of the meniscus to rotate medially and subluxate, whereas on extension the meniscus realigned to its normal position (Fig. 2). We tried using the same trial meniscus from another set of implants, thinking that there may be physical damage to the bearing, ensured that there was no soft tissues impingement or any posterior osteophytes and no damage to the medial collateral ligament. We could not find any obvious cause for this subluxation. Thereafter we revised the vertical tibial cut and realigned it to the anterior superior iliac spine (ASIS) by directing the saw along the cautery wire placed from the ASIS to the medial aspect of the trochlear groove. After realignment we again performed trial reduction and found that there was adequate entrapment as well as normal excursion and tracking of the meniscus (Fig. 3–5). The postoperative scannogram showed well-seated implants with acceptable alignment (Fig. 6)

Discussion

The mobile bearing medial OUKR (Oxford knee) involves replacing the medial compartment with a spherical femoral component, a flat tibial component, and congruous polythene meniscal bearing [8]. The advantage of UKR is that it results in a knee which has close to normal kinematics [9] as this procedure preserves the native ligaments, the original joint level, and the meniscal function in the form of mobile bearing.

Mobile bearing dislocation is a unique complication of mobile bearing UKR. Lewold et al. [10] found that it was the most common cause of failure in OUKR phase 1 and 2. Most of these dislocations occurred early, in the first year after surgery [10]. Normally, the mobile bearing passively follows the track of the medial femoral condyle in the anteroposterior and the mediolateral direction relative to the tibial plateau. However, there is a very superfluous rotational movement along with it owing to the ball-and-socket femoromeniscal and flat-on-flat meniscotibial interface, thus enhancing the entrapment of the bearing [11]. Deviation from such pattern of movement may lead to dislocation. Dislocation of the meniscal bearing can be classified into three types according to the causes [12]: primary dislocations (due to inadequate entrapment of the bearing), secondary dislocations (due to loss of entrapment secondary to loosening of the metal components), and traumatic dislocations (when the unicompartmental knee arthroplasty (UKA) has been forced to extreme posture and the medial collateral ligament has been stretched momentarily). Primary dislocations are the commonest type of dislocation and are due to surgical errors. The common surgical errors are inequality of flexion and extension gaps, femoral component implanted too far away from the lateral wall, damage to anterior cruciate ligament or medial collateral ligament, failure to remove osteophytes from the back of the femoral condyle, and cement protruding above the tibia surface [12]. Thus, primary dislocation is an avoidable cause of failure of UKR.

The vertical tibial cut is made to accommodate the vertical wall of the tibial component. It is an important bone cut which influences the tracking of the meniscus. If the cut is directed medially from front to back, then on flexion, the bearing following the path of the femoral condyle will hit the vertical wall and would have a tendency to rotate and subluxate (Fig. 4, 5).

In our case we faced a similar situation, wherein revising the vertical tibial cut improved the translational movement of the bearing and minimized rotational movement. Normally, the vertical tibial cut is made with a reciprocating saw blade pointing towards the femoral head, lying against the medial femoral condyle in the intercondylar notch [11] (Fig. 4). The chances of error while performing the tibial cut are high as this step has no specific guide and has to be dependent on the landmark shown (ASIS) by the assistant. Therefore, there is always a chance of making an error in the direction of the cut.

Conclusion

The number of OUKR being performed is increasing. Surgical technique is of paramount importance in ensuring a successful OUKA. Surgeons need to be aware of the need for an accurate vertical tibial cut as it has a significant bearing on ensuring proper meniscal entrapment and preventing any bearing dislocation.

Statement of Ethics

Since this is a case report, no prior ethical clearance was obtained. However, consent was obtained from the patient which was later submitted to the institute's ethics board.

Disclosure Statement

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Author Contributions

Dr. Rajan Panthee and Dr. Rahul Yadav prepared the primary manuscript, which was corrected by Dr. Mayur Nayak and Dr. Siddhartha Marendupaka. This entire work was done under the supervision of Prof. Vijay Kumar.

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Fig. 1. Preoperative radiographs of the patient. **a** Bilateral lower limb scannogram. **b** Anteroposterior and lateral views of both knees with anvil osteophytes (arrows). Varus (**c**) and valgus (**d**) stress views of both knees.

Fig. 2. With the trial implant in situ, abnormal excursion of the meniscus can be seen as the joint is flexed gradually.

Fig. 3. Normal excursion and tracking of the meniscus after realigning the vertical tibial cut according to the anterior superior iliac spine as the knee is flexed gradually.

Fig. 4. **a** The vertical tibial saw cut should be directed towards the anterior superior iliac spine. **b** Oblique tibial saw cut.

Fig. 5. **a** Tracking of the meniscus in a proper oriented vertical cut towards the head of the femur. **b** When the cut is oblique, while following the femur, the meniscus impinges upon the lateral vertical wall and spins out.

Fig. 6. Postoperative scannogram of the bilateral lower limb and anterior superior and lateral view of the left knee with UKR in situ.