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Case Presentation

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Severe Valgus Deformity and Advanced Gonarthrosis in Multiple Hereditary Exostoses: Surgical Pitfalls in Ligament Balancing with Medial Parapatellar Approach

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Abstract

The case report presents a 56-year old female with a severe valgus deformi and advanced arthrosis of her left knee.

The presentation should demonstrate a pitfall in ligament balancing by using a medial parapatellar approach and emphasizes the amazing benefit of needling of the LCL and that you should always consider the parapatellar lateral approach.

Keywords: Severe valgus deformity; Pitfall; Parapatellar lateral approach; Needling

Abbreviations: MHE: Multiple hereditary Exostoses; TKA: Total knee arthroplasty; CCK: Condylar constrained knee; ROM: Range of motion; MCL: medial collateral ligament; LCL: lateral collateral ligament; KSS: Knee Society Score

Introduction

Multiple Hereditary Exostoses (MHE) is a genetic disorder characterized by the formation of multiple osteochondromas, frequently affecting the metaphyseal regions of long bones and often leading to limb deformities such as genu valgus. Especially the Knee deformity is common in patients with HME, with nearly a third of patients developing genu valgus. When advanced osteoarthritis develops in the presence of severe valgus deformity, Total Knee Arthroplasty (TKA) becomes a challenging procedure requiring careful preoperative planning and intraoperative adaptation [1]. This report presents a case of advanced gonarthrosis and severe valgus deformity in MHE, detailing technical challenges and surgical pitfalls related to ligament balancing via the medial parapatellar approach.

Case Presentation

A 56-year-old female with a longstanding MHE diagnosis consulted for progressive right knee pain and valgus instability. Radiographs showed multiple exostoses at the distal femur and proximal tibia, significant joint space narrowing laterally, and a 23° valgus axis deviation. Clinically, she had a fixed valgus alignment, medial laxity grade 2-3, and lateral soft tissue contracture, with limited mobility and lateral patellar maltracking. Past conservative therapies had

failed. The preoperative ROM was restricted to extension/flexion: 0/15/90. There was no sign of neurovascular disorders. The preoperative Knee Society Score (KSS) was 30, and Function Score was 35. A preoperative evaluation was done on long-leg standing radiograph and lateral radiograph of the affected knee. In the first step we did a 3D analysis but it wasn't technical possible to do the re-alignment properly with a Custom made TKA. The Reason was because the deformity was out of indication for a custom made TKA. The FMA value was 104°, and for a custom made TKA we do not exceed 100° in the planning matrix. As we weren't able to guarantee a balanced knee with a 183° HKA alignment a condylar constrained TKA (CCK by Depuy Synthes Attune Revision) was indicated, with the aim of correcting deformity and restoring function.

Surgical Technique for primary surgery

A standard medial parapatellar approach was chosen. Intraoperative findings included extensive osteochondromatous bone alterations and severe lateral soft tissue contracture. Multiple steps of lateral structure release (including iliotibial band and lateral collateral ligament) were performed from the medial approach, but due to abnormal exostotic ligament insertions, balancing was difficult to achieve. A 10mm CCK inlay (Depuy Synthes Attune Revision CCK) was used **(Figure 1).**

Figure 1: Postoperative X-ray a.p. after the primary surgery showing the medial instability.

Postoperative Course

Radiographic alignment was restored to almost neutral, but the patient reported a medial instability under full weight bearing. Postoperative X-Rays shows the asymmetrical joint space even with the use of a CCK system. A revision surgery was done immediately and a lateral approach was chosen for an extended release of the lateral structures: extended release of the capsule, Release of the ITB and especially after removing the inlay to gain more space the needling of the LCL on the femoral origin and slightly put some tension on the LCL in a figure of four position led to a hearable "crack" of the LCL. After that a symmetrical joint space was achieved and a 16mm Inlay was chosen to provide a stable knee joint. Postoperative the patient improved immediately in stability, pain and mobility at 6 months follow-up. Knee scores improved

significantly, and there were no signs of component loosening **(Figure 2).**

Figure 2: Postoperative X-ray after the revision surgery and inlay exchange after extended lateral release.

Discussion

Ligament balancing in severe valgus knees, especially in MHE, is hampered by:

- Abnormal bone and ligament anatomy distorting conventional surgical landmarks **[2,3].**
- Medial parapatellar approach limitations: restricted access to tight lateral structures, increasing risk for incomplete release or medial over-release.
- High risk of postoperative instability if both medial and lateral sides are not addressed systematically.
- If the Surgeon is not confident with the lateral approach, you should consider at least a needling of the LCL and a release of the ITB at the Tuberculum gerdii.
- But it's recommended in severe valgus deformity to use a primary lateral parapatellar approach, as it facilitates sequential controlled release of contracted lateral soft tissues **[4,5].**

Conclusion

Total knee arthroplasty in patients with multiple hereditary exostoses and severe valgus deformity requires advanced planning and flexible intraoperative decision-making. In most cases a custom made TKA should be considered njtbits only possible in mild cases of deformity. Typically in cases of severe deformity nevertheless if it's a virus or valgus a CCK TKA is used. The medial parapatellar approach to which most surgeons are confident presents specific pitfalls for ligament balancing due to poor access to lateral structures and risk of persistent instability. In these cases you should consider the needling of the LCL as often or think about using the parapatellar lateral approach at first. And if you don't achieve a balanced knee no matter what technique was used, a hinged TKA would be the Implant of choice.

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