

Preserving the PCL during the tibial cut in total knee arthroplasty

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Abstract

Purpose Previous studies have shown that the PCL insertion may be damaged during the tibial cut performed in total knee arthroplasty. We investigated the maximum thickness of a tibial cut that preserves the PCL insertion and to what extent the posterior slope of the tibial cut and that of the patient's tibial plateaus affect the outcome.

Methods MR images of 83 knees were analysed. The maximum thickness of a tibial cut that preserves the PCL using a posterior slope of 0°, 3°, 5° and parallel to the patient's slope of the tibial plateau, was evaluated. Correlations between the results and the degrees of the posterior slope of the patient's tibial plateaus were also investigated.

Results The maximum thickness of a tibial cut that preserves the entire PCL insertion was, on average, 5.5, 4.7, 4.2 and 3.1 mm when a posterior slope of 0°, 3°, 5° and parallel to the patients' tibial plateaus was used, respectively. When the 25th percentile was considered, the maximum thickness of a tibial cut that preserved the PCL was 4 and 3 mm with a tibial cut of 0° and 5° of posterior slope, respectively. The maximum thickness of a tibial cut that preserved the PCL was significantly greater in patients with a sagittal slope of the tibial plateaus more than 8° than in those with a sagittal slope less than 8°.

Conclusion In cruciate retaining implants, the PCL insertion may be spared in the majority of patients by performing a tibial cut of 4 mm, or even less when a posterior slope of 3°–5° is used. The clinical relevance of our study is that

the execution of a conservative tibial cut, followed by a second tibial resection to achieve the thickness required for the tibial component to be implanted, may be an alternative technique to spare the PCL in CR TKA.

Level of evidence II.

Keywords Total knee arthroplasty · Knee replacement · Cruciate retaining · Posterior cruciate ligament · Knee kinematics · Femoral rollback

Introduction

Long-term results of total knee arthroplasty (TKA) have shown high rates of satisfactory results in both cruciate retaining (CR) and posterior stabilized (PS) total knees [25, 34]. While some investigations have reported a similar functional score in CR and PS knees [4, 9, 15, 18], others have found that knee flexion and femoral rollback are significantly greater in PS than in CR implants [6, 10, 13, 22, 33, 36]. The reduced femoral rollback in CR TKA has been attributed to degenerative changes of the PCL [1, 16], which may cause an excessive tightness or laxity of the ligament and prevent its normal biomechanical function, which is to limit anterior femoral translation during knee flexion [2, 29, 37]. However, recent investigations have also shown that a standard tibial cut performed en bloc may result in the detachment of most of the PCL fibres from their insertion in the proximal tibia [11, 19, 24, 32]. In particular, tibial cuts with a posterior slope of 0° and 5°–7°, simulated on sagittal MR scans, resulted in the detachment of between 45 and 63 % and between 68 and 76 % of the PCL fibres, respectively [24, 32], while a preservation of 100 % of the PCL fibres insertion was observed in only 9 % [19] and 23 % [35] of cases. Likewise, in a cadaveric

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