

ORIGINAL ARTICLE

## Changes in patellar height due to bone-tendon-bone graft<sup>☆</sup>



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### KEYWORDS

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### Abstract

**Purpose:** Complications related to anterior cruciate ligament (ACL) graft are common. Change in height, especially patella baja, can be a cause of anterior knee pain. Several studies have related ACL reconstruction with bone-tendon-bone graft to patella baja.

**Methods:** Forty-three patients with ACL reconstruction using a with bone-tendon-bone graft were included in this study. All patients underwent the same surgery, with closure of the paratenon of the patellar tendon. A radiological study was performed before surgery and 2 years after surgery. The Insall-Salvati index, axial view and patellar tilt were analysed in all patients. The healthy contralateral knees were used as the control group.

**Results:** No significant differences were observed from the preoperative measurements or at the 2-year follow-up.

**Conclusions:** The use of patellar tendon with closure of the paratenon in ACL reconstruction was not shown to modify patellar height within the radiological follow-up of two years.

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**PALABRAS CLAVE**

Índice de Insall-Salvatti;  
 Altura patelar;  
 Patela baja;  
 Complicaciones del ligamento cruzado anterior;  
 Reconstrucción HTH

**Modificaciones en la altura patelar por el uso del injerto hueso-tendón-hueso****Resumen**

**Objetivo:** Las complicaciones asociadas al uso de injertos del ligamento cruzado anterior (LCA) son frecuentes. Los cambios en la altura, sobre todo de la patela baja, pueden ser la razón de la aparición de dolor en la zona anterior de la rodilla. Diversos estudios han asociado la reconstrucción del LCA mediante la técnica de injerto hueso-tendón-hueso con patela baja.

**Métodos:** Cuarenta y tres pacientes con reconstrucción del LCA mediante injerto hueso-tendón-hueso fueron incluidos en el presente estudio. Todos los pacientes fueron sometidos a la misma cirugía, con el cierre del paratendón del tendón rotuliano. Se realizó un estudio radiológico antes de la cirugía y 2 años después de la misma. En todos los casos se estudió el índice Insall-Salvati, el corte axial y la inclinación patelar. Como control se utilizó la rodilla sana contralateral del paciente.

**Resultados:** No se encontraron diferencias significativas entre el estudio preoperatorio y el realizado tras 2 años de la cirugía.

**Conclusiones:** El uso del tendón patelar con cierre del paratendón en la reconstrucción del LCA no ha demostrado modificar la altura patelar en estudios radiológicos a los 2 años de seguimiento.

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**Introduction**

Central third bone-tendon-bone (BTB) (patellar tendon graft), is one of the most commonly used grafts in the world.<sup>3</sup> Since it was first described by Jones in 1963, several authors have considered this graft the gold standard.<sup>3-6</sup> The BTB donor site can suffer various complications, such as anterior knee pain with a frequency ranging from 6% to 40%, according to previous studies.<sup>7</sup> Radiological studies of the donor site have occasionally associated the use of BTB with the onset of patella infera,<sup>8-10</sup> and thus associated with anterior knee pain.<sup>9</sup>

Other situations such as fracture of the patella, patellar tendon rupture, joint stiffness, and arthrofibrosis have been widely associated by various authors with patella baja syndrome.<sup>11-14</sup> Patella infera is characterised by permanent shortening of the patellar ligament and is associated with limited articular balance at the level of the knee. It is associated with patellar tendon shortening, soft tissue contractures, quadriceps weakness, restriction of joint motion and femoropatellar incongruence. Patella baja is a multifactorial complication that can be induced acutely through trauma to the knee, iatrogenically in ligamentoplasties, osteotomies and arthroplasties, or can be chronic, secondary to inflammatory processes of the knee.<sup>1</sup>

Patella baja has been associated with knee pain after this operation, as well as the use of this graft, indicating that closure of the patellar tendon after removal of the graft might induce patella baja.<sup>7,15</sup>

This paper aims to assess whether reconstruction of the anterior cruciate ligament (ACL) with a patellar tendon graft and closure of the paratenon change the height of the patellar tendon, and thus we aim to highlight this as a possible cause of anterior knee pain. We hypothesise that paratenon defect and closure can cause a change at the height of the patella that induces patella infera.

**Materials and methods**

A consecutive series of patients with complete ACL rupture were studied prospectively that underwent surgical reconstruction in our centre, using BTB autograft, between January and December 2009. A radiological study was performed before the surgery and at the 2 months postoperative follow-up, including weight-bearing anteroposterior and lateral X-rays, at 45° flexion, and axial view of both knees at 30°.

The contralateral knee was used as the control, in the same times as the operated knees. All the patients agreed to participate in the study and we sought the approval of the Ethics Committee with file number 09/45.

The inclusion criteria were to be aged over 18 years, having a primary ACL rupture and having undergone reconstruction with a patellar tendon graft. The exclusion criteria included having undergone prior surgery to the injured knee, prior ACL injury and patients who had not completed radiological follow-up preoperatively or at 2 years after the operation.

The surgery was performed under spinal anaesthesia and a preventive ischaemic tourniquet was used. First an arthroscopic revision of the knee was undertaken to confirm rupture of the ACL. Then the patellar graft was harvested from the central third of the patellar tendon, with bone blocks 25 mm in length and 9 mm thick (the patellar and the tibial blocks were the same). The grafts were of a constant size regardless of the anatomy of the subject. The ACL reconstruction was performed using the anatomical single bundle technique. The donor site was closed by suturing the paratenon with single sutures of absorbable material (Vycril 1) with the knee in extension or slight flexion of less than 20°. In no case was the defect filled. All the patients followed the same standard physiotherapy for the anterior cruciate ligament and the same subsequent follow-up protocol.

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