Research Article

A New Anatomical Reconstruction of the Posterolateral Corner of the Knee

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Received 6 October 2016; Revised 24 June 2017; Accepted 30 June 2017

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Abstract Reconstruction of the posterolateral corner (PLC) of the knee remains controversial. Anatomical reconstruction is a key aspect of modern approaches. The work of previous authors recommend repair of the PLC of the knee using the “LaPrade” technique. We suggest that this reconstitution may not address the whole issue of PLC instability and fails to reconstruct the popliteofibular ligament. The popliteofibular ligament has been demonstrated to be of vital importance, providing the main restraint to rotational instability. We suggest a modification to this technique that results in a more anatomical and dynamic reconstruction of the popliteofibular ligament component of the PLC of the knee.

Keywords posterolateral corner; ligament; LaPrade; popliteofibular ligament; reconstruction; technique

1. Introduction

Reconstruction of the posterolateral corner (PLC) of the knee remains controversial. Anatomical reconstruction is a key aspect of modern approaches. The work of previous authors recommend repair of the PLC of the knee using the “LaPrade” technique, a modification of the Warren technique [1,2,3]. We suggest that this reconstitution may not address the whole issue of PLC instability and fails to reconstruct the popliteofibular ligament. The popliteofibular ligament has been demonstrated to be of vital importance, providing the main restraint to rotational instability [4,5,6,7]. We suggest a technique that results in an anatomical and dynamic reconstruction of the popliteofibular ligament component of the PLC of the knee.

2. Technique

The patient is positioned supine, knee flexed to 90 degrees. A second support is used to allow extension to 30 degrees. The future incisions are marked out (see Figure 1).

The first is a small longitudinal incision over the lateral epicondyle and the second posterolaterally and in line with the fibula; extending from the posterolateral joint line to just proximal to the fibula neck. These incisions are targeted to be either side of the iliotibial band, as opposed to the

Figure 1: Incisions for PLC reconstruction.

alternative traditional longer scar connecting these two anatomical areas of interest. As these areas are at different sagittal locations on the limb, a much larger curved incision is traditionally required to gain adequate expose of both areas through the inflexible iliotibial band. Fluoroscopy and the arthroscopic stack are positioned as in Figure 2.

Figure 2: The setup used for the PLC repair.

Figure 4: Fibular tunnel.

Figure 3: Dissection down to the lateral epicondyle (note previously performed ACL Endobutton sutures).

Figure 5: Fibula tunnel with passing wire.

The hamstrings are harvested using semitendinosus and gracilis autograft from the ipsilateral or contralateral knee depending on whether it is being done in isolation or as a combined procedure. We recommend tensioning and fixation of extra-articular reconstructions, before intra-articular reconstructions are completed.

The combined conjoined portion and two separate limbs are prepared with sutures and sized. This construct creates a “trouser graft”, the conjoined portion of the graft (comprising the semitendinosus and gracilis tendons) and separate tendons. The conjoined portion is attached via a blind pull through tunnel to the femur. This serves as the femoral attachment, allowing reconstruction of the femoral attachment of the lateral collateral and popliteus insertions. Care is taken to orientate the graft such that the future popliteus portion (semitendinosus) is kept relatively

anteriorly and the future lateral collateral portion (gracilis) kept relatively posteriorly.

The lateral epicondyle is identified (Figure 3) and a guide wire is placed using the Acufex ACL guide aiming more proximally to avoid tunnel conflict if the anterior cruciate ligament (ACL) or the posterior cruciate ligament (PCL) is also being reconstructed.

The guide wire is then overdrilled with a 4.5 mm cannulated drill and then a suitably sized drill to accommodate the proximal end of the hamstrings trouser graft to the depth of 25–30 mm. The fibula head is dissected out so that it is readily visible both anteriorly and posteriorly. A tunnel is made centrally in the fibula head, drilling from anterior to posterior.

Flexible suture passing wires (Figure 5) are used to pass the sutures of the lateral collateral limb through the fibula head from anterior to posterior.

Figure 6: Tibial tunnel.

Figure 7: Graft passage.

This is secured under tension with the limb at 30 degrees of flexion with internal rotation (avoiding varus) using a screw.

The posterolateral tibia is exposed to reveal the natural position of the popliteus tendon. A drill guide is used to drill a wire-guided tunnel for the popliteal tenodesis.

Care is taken to protect important structures. A suture passer allows the popliteal limb to be passed through the tibial tunnel. Figure 7 demonstrates the graft passage.

Before tension is applied, the remaining fibula limb is passed beneath the popliteal limb. The limb is positioned in 30 degrees of flexion with internal rotation (avoiding varus) as before fixation with a screw from anterior to posterior to provide aperture fixation posterolaterally.

The remaining fibula limb is folded back on itself and sutured to the popliteal limb and itself under tension with nonabsorbable sutures. This forms an anatomical and more

Figure 8: Diagram illustrating the repair.

dynamic construct of the popliteofibular ligament. It should be noted that previous authors produce a “fibulotibial” rather than popliteofibular ligament [1,2].

This fibula limb is then brought round the posterior aspect of the fibula underneath the tibial limb. This allows the tibial limb to be tightened and the fibula limb brought over the top of the tibial limb and stitched back down using fiber wire. The finished reconstruction should appear as in Figure 8.

This provides a dynamic reconstruction of the PLC. We then recommend a hinged knee brace unlocked 0–90° for four weeks, with touch weight-bearing for two weeks and then partial weight-bearing for a further four weeks. This technique has been performed routinely by the senior surgeon for the past five years with subjectively better clinical outcome.

3. Discussion

Injury to the PLC of the knee is becoming a more frequently diagnosed problem. The literature would tend to suggest that the best outcome for multiple injured knees is for surgical repair of all ligaments in a timely fashion in the acute stage [8,9,10].

Repair of the popliteofibular ligament is important especially in restoring the moment arm avoiding rotational instability, and it should be reconstructed along with the lateral collateral ligament and popliteotibial ligament.

The proposed modification of the traditional LaPrade technique results in a more anatomical and dynamic reconstruction of the popliteofibular ligament with good clinical outcome.

Conflict of interest The authors declare that they have no conflict of interest.

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