Technical Note

Three-Portal Technique for Anterior Cruciate Ligament Reconstruction: Use of a Central Medial Portal

Steven B. Cohen, M.D., and Freddie H. Fu, M.D., D.Sc.

Abstract: Standard endoscopic reconstruction of the anterior cruciate ligament (ACL) is performed with the use of 2 arthroscopic portals. The surgical error most commonly associated with ACL reconstruction is improper positioning of the tunnel. Errors in femoral tunnel position may be related to poor visualization of the lateral wall. When anatomic double-bundle ACL reconstruction is performed, proper visualization of the lateral wall is essential to ensure correct placement of both tunnels. We propose the use of a central portal, in addition to more standard anterolateral and anteromedial portals, to enhance visualization of the lateral wall. In addition, the arthroscope can be moved interchangeably throughout the portals during the procedure for improved viewing during specific steps. An accessory anteromedial portal placed inferiorly and medially allows placement of the femoral tunnels while providing a high central anteromedial portal for best visualization of the lateral wall. As a result, no notchplasty is required, and a more anatomic reconstruction can be performed. **Key Words:** ACL Reconstruction—Double bundle—Knee arthroscopy.

Traditional endoscopic anterior cruciate ligament (ACL) reconstruction is performed with the use of 2 standard portals. The anterolateral portal is used as the viewing portal, and the anteromedial (AM) portal is used as the working portal. When ACL reconstruction is performed, however, the posterior aspect of the lateral intercondylar notch may be difficult to view entirely through the lateral portal. Numerous descriptions have been published regarding portal locations for knee arthroscopy, but no article has identified optimal locations for specific portals in relation to ACL reconstruction.[1-6] Many surgeons use only 2 portals during the procedure. In fact, the use of multiple other portals, including a central portal, has been described by Gillquist et al.[7] for examination of the patellofemoral and posteromedial compartments.

Conventionally, the anterolateral portal is positioned above the joint line just lateral to the lateral border of the patellar tendon. Likewise, the AM portal can be created by direct visualization with the use of a spinal needle, but it is located slightly above the joint line and just off of or nearly 1 cm medial to the medial border of the patellar tendon. Our experience suggests that these portals limit anatomic placement of tibial and femoral tunnels during ACL reconstruction by preventing proper visualization of the tibial plateau and the lateral wall of the intercondylar notch. Our current technique for endoscopic anatomic double-bundle ACL reconstruction has been well described and involves the use of 3 portals[8,9] that are used interchangeably as viewing and working portals, according to the specific task that is being performed. Use of 3 portals allows proper placement of 4 tunnels

From the Center for Sports Medicine, University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania, U.S.A.

The authors report no conflict of interest.

Address correspondence and reprint requests to Steven B. Cohen, M.D., Rothman Institute, Department of Orthopaedic Surgery, Thomas Jefferson University, 925 Chestnut St, Philadelphia, PA 19107, U.S.A. E-mail: Steven.Cohen@rothmaninstitute.com

Cite this article as: Cohen SB, Fu FH. The 3-portal technique for anterior cruciate ligment reconstruction: Use of a central medial portal. Arthroscopy 2007;23:325.e1-325.e5 [doi:10.1016/j.arthro.2006.07.030].

0749-8063/07/2303-6100$32.00/0

doi:10.1016/j.arthro.2006.07.030

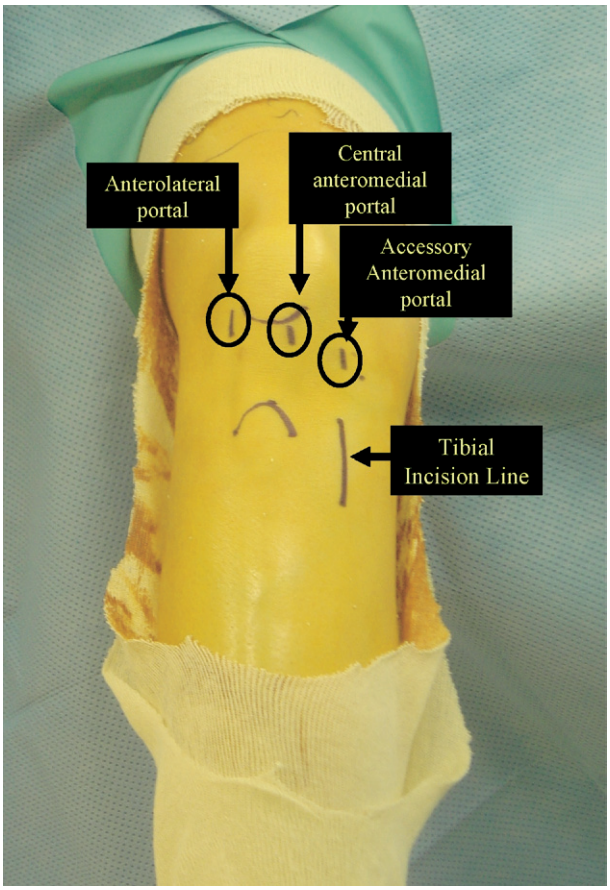

Figure 1. Portal locations marked on skin for ACL reconstruction.

during double-bundle reconstruction by ensuring optimal visualization of anatomic landmarks, especially those on the lateral wall of the intercondylar notch.

PORTAL LOCATION

"High" Anterolateral Portal

The anterolateral portal is initially used as the viewing portal. It is located just lateral to the patellar tendon, and the most inferior portion of the portal is located at the level of the inferior pole of the patella when the knee is flexed to 60° (Fig 1). The portal is created with a No. 11 scalpel blade, with care taken to avoid damage to the articular cartilage when the capsule is penetrated. Use of this portal avoids penetration into the fat pad; the portal is used for diagnostic arthroscopy because it allows complete viewing of the patellofemoral, medial, and lateral compartments of the knee without significant resection of the fat pad. Additionally, the anterolateral portal is used to determine the precise position of the AM and posterolateral (PL) bundles of the ACL at its insertion on the tibia. These sites are marked in preparation for drilling of the 2 tibial tunnels for ACL reconstruction (Table 1). The superior position of the portal allows a wider view of the tibial insertion of the ACL.

Central Anteromedial Portal (Central Portal)

The central AM or "central" portal is used as a working and a viewing portal. It is placed nearly 1 cm lateral to the medial border of the patellar tendon (intratendinous) just inferior from the inferior pole of the patella when the knee is flexed to 60° (Fig 1). Again, the portal is created with a No. 11 scalpel blade, with care taken to avoid the articular cartilage of the trochlea. This portal is specifically used for viewing the wall of the lateral intercondylar notch and marking the insertion sites of the AM and PL bundles of the ACL (Table 1). When this portal is used for viewing, the accessory AM portal becomes the working portal. In this way, no "notchplasty" or "wallplasty" is required because nothing obstructs viewing of the notch, and each bundle is placed in its anatomic insertion while impingement of the posterior cruciate ligament (PCL) is avoided. Additionally, the central AM portal is used to place the ACL tibial guide (which is set at 45°) for drilling of the AM tibial tunnel.

Accessory Anteromedial Portal

The accessory AM portal is used mainly as the working portal for PL bundle femoral tunnel place-

Table 1. *Specific Portal Use for Anatomic Double-Bundle ACL Reconstruction*

Tunnel for ACL Reconstruction	Viewing Portal	Instrument Portal
Tibia–Anteromedial bundle	Anterolateral	Central anteromedial
Tibia–Posterolateral bundle	Anterolateral	Accessory anteromedial
Femur–Anteromedial bundle	Central anteromedial	Transtibial or accessory anteromedial
Femur–Posterolateral bundle	Central anteromedial	Accessory anteromedial

Abbreviation: ACL, anterior cruciate ligament.