

TransLateral ACL reconstruction: a technique for anatomic anterior cruciate ligament reconstruction

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Received: 9 March 2011 / Accepted: 21 October 2011 / Published online: 18 November 2011
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Abstract Anatomic placement of the femoral tunnel in anterior cruciate ligament (ACL) reconstruction confers biomechanical advantages over the traditional tunnel position. The anteromedial portal technique for anatomic ACL reconstruction has many well-described technical challenges. This paper describes the TransLateral technique. The technique produces anatomic femoral tunnel placement using direct measurement of the medial wall of the lateral femoral condyle and out to in drilling. All work is carried out through the lateral portal with all viewing via the medial portal. There is no need for an accessory medial portal or hyperflexion of the knee.

Level of evidence Expert opinion, Level V.

Keywords Anatomic · Anterior cruciate ligament · All inside · FlipCutter · TransLateral

Introduction

Transtibial drilling remains the most popular way for creating the femoral tunnel in anterior cruciate ligament reconstruction. The position of the femoral tunnel is dictated by the tibial tunnel, which invariably results in a relatively vertical position of the femoral tunnel [15]. Although this technique has good clinical outcomes the procedure has been shown to be non-anatomic [1, 14]. This fails to restore normal knee kinematics [9, 16], which in turn may lead to early onset osteoarthritis [6].

An alternative technique for femoral tunnel preparation is anteromedial portal drilling. Independent drilling of the femoral and tibial tunnels is performed. Traditionally viewing is undertaken through the lateral portal, which can make distinguishing between the resident's (intercondylar) ridge and the over the top position difficult. This may lead to anterior placement of the graft [7].

Recently the concept of “anatomic” or “footprint” ACL reconstruction has been introduced. This has been shown to confer a biomechanical advantage over non-anatomic reconstruction [9, 12, 17]. In its current form, anatomical femoral preparation makes use of an accessory medial portal [2, 3, 5], which allows simultaneous medial viewing, and preparation of the femoral tunnel. This can be technically challenging due to problems such as instrument crowding and hyperflexion [4, 10].

Technical note

The TransLateral technique requires special instruments. These instruments have been designed by the senior author to navigate around the distal aspect of the lateral femoral condyle laterally and avoiding impingement on the patella tendon medially. They include: a specially shaped Opes radiofrequency (RF) probeTM (Arthrex Ltd, Naples, Florida, USA) for soft tissue debridement; a modified curette; a curved marking/measuring device (Fig. 1) and an anatomical aiming arm for a retrograde drill. The author uses the FlipCutterTM (Arthrex). The creation of a retro-socket by outside-in drilling with a retrograde drill has previously been described by others including Lubowitz et al. [8, 11, 13].

The patient is positioned supine with the knee flexed to 90°. A side support and footrest are employed. A thigh tourniquet is used throughout. A modified lateral portal

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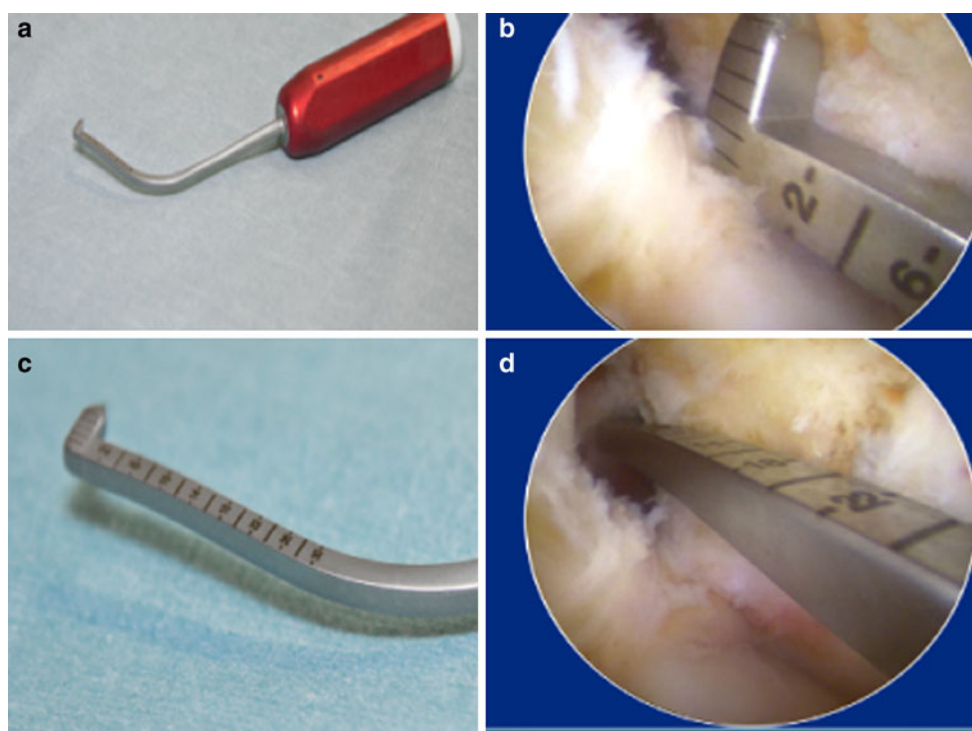


Fig. 1 Curved marking/measuring device, **a** curved marking/measuring device, **b** measuring from low position, **c** close up of measuring arm, **d** measuring deep to shallow or front to back of notch

(Fig. 2) is used which is slightly lower and more medial than the traditional high anterolateral (AL) portal position. A 30° side viewing arthroscope is inserted through the AL portal. A low anteromedial (AM) portal is then made under direct vision. Routine arthroscopic assessment is made and appropriate surgery carried out to address any chondral or meniscal pathology.

The Gracilis and Semitendinosus tendons are harvested and prepared in the standard fashion. The arthroscope is then swapped to the medial portal for the remainder of femoral preparation. All preparation of the medial wall of the lateral femoral condyle is carried out, as described

below, with the knee flexed to 90° and no hyper flexion is required.

The medial wall of the lateral femoral condyle is prepared using the curved radiofrequency probe. The use of RF is essential to allow soft tissue debridement whilst preserving the footprint of the native ACL and to allow identification of the bony anatomy, namely the intercondylar and bifurcate ridges. Once the important anatomical landmarks have been determined, the centre of the footprint is marked with the RF probe. Figure 3 demonstrates the anatomical footprint with the relevant measurements annotated.

The curved marking device (Fig. 1) is then inserted through the lateral portal to verify the premarked position and determine the centre of the ACL footprint. Two measurements are made, the first by use of the long axis of the measuring tool that measures from deep to shallow with the centre of the ACL footprint being at the midpoint. A second measurement is then made using the calibrated tip that determines the height of the centre of the footprint from the low position. Figure 4 shows the arthroscopic view during direct measurement of the medial wall of the lateral femoral condyle. The measuring/marketing device has a sharp point, which allows the surgeon to mark the correct femoral tunnel position. The FlipCutter aiming device is inserted through the lateral portal and positioned at the premarked anatomical femoral origin (Fig. 5). Outside to in

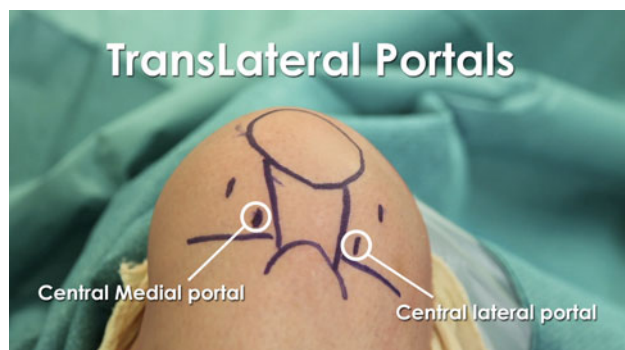


Fig. 2 TransLateral portal positions

Fig. 3 Diagram of medial aspect of lateral femoral condyle. Anatomical footprint is shown. Graft tunnel and measurements are demonstrated

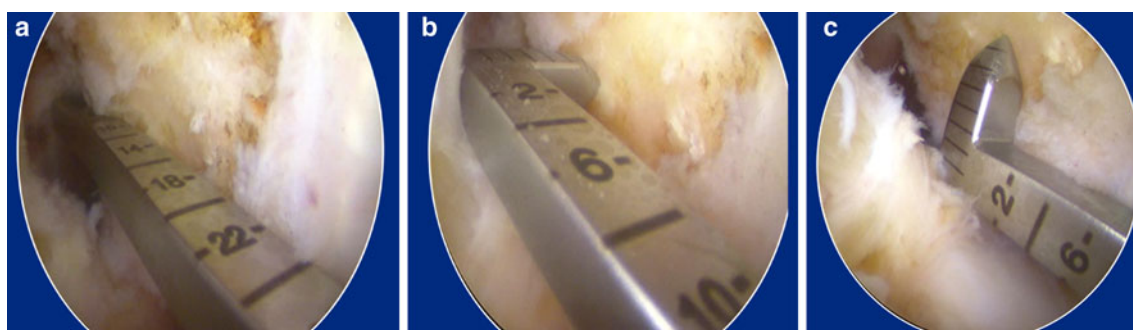
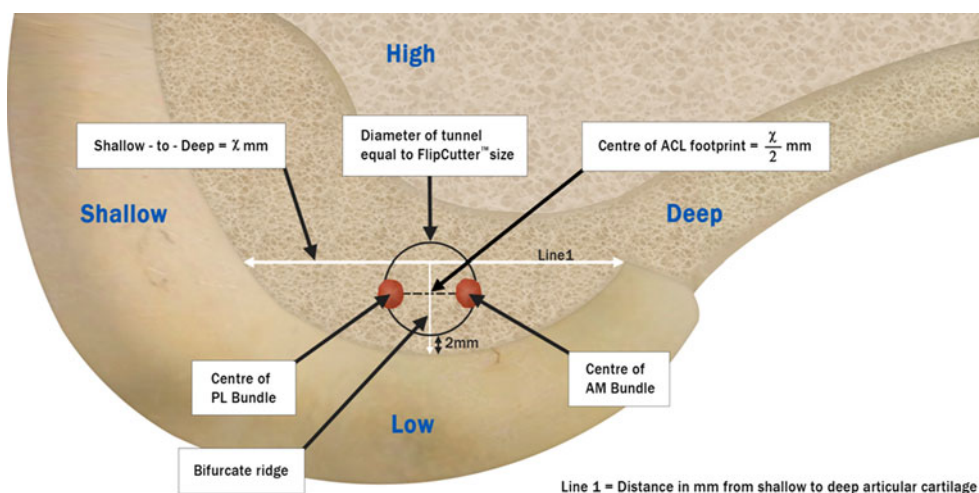


Fig. 4 Arthroscopic view of direct measurement of the medial aspect of the lateral femoral condyle with the marking/measuring tool. **a** Measuring deep to shallow, **b** measuring shallow articular cartilage

to centre of femoral footprint, **c** measuring from low articular cartilage along line of bifurcate ridge

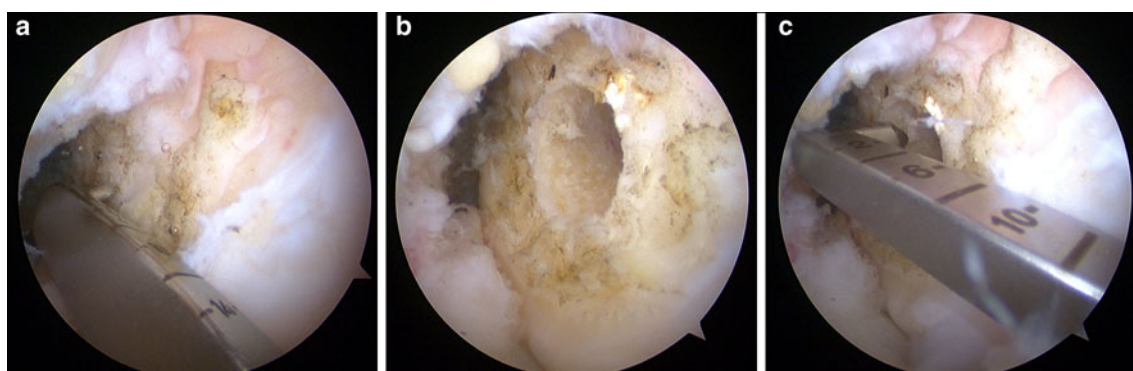


Fig. 5 Arthroscopic images of femoral tunnel preparation. **a** Aiming jig in position, **b** view of tunnel, **c** confirming tunnel position with measuring tool

drilling is then carried out with the knee at 90° of flexion, entering the joint under direct vision. The guide pin end is flipped to create a retrograde drill and a retrosocket is produced. The tibial tunnel is then made in the standard fashion. The graft is then introduced positioned and fixed with a suspensory device on the femur and an interference screw on the tibia. The suspensory device used by the author is a femoral ACL TightRope (Arthrex).

Discussion

There are many advantages to the TransLateral technique. The instruments allow all preparation of the lateral wall to be carried out through a single anterolateral portal with the knee at 90°. This includes soft tissue debridement, identification of the centre of the ACL footprint and the creation of the tunnel. Anatomical placement of the femoral tunnel

is achieved whilst avoiding the “pitfalls” of the antero-medial portal technique identified by Lubowitz [10]. These include: a short or bicortical femoral tunnel and common peroneal nerve injury secondary to Beath pin exit. Lubowitz further showed that hyperflexion required in anteromedial portal drilling can lead to disorientation, mal-positioning of the femoral aiming jig, “portal tightening”, iatrogenic damage to the articular cartilage of the medial femoral condyle and increased fat pad ingression [8].

Acknowledgments We would like to acknowledge the support of Arthrex Ltd, Naples, Florida, in helping with the development of this technique.

Conflict of interest The senior author (AJW) works as a consultant for Arthrex.

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