Letters to the Editor

Protection of Posterior Structures During Transtibial Tunnel Creation for Posterior Cruciate Ligament Reconstruction

To the Editor:

Makino et al.[1] describe a popliteal artery laceration in a 17-year-old patient during posterior cruciate ligament (PCL) reconstruction. Other authors have noted significant risk to the popliteal artery during tibial tunnel drilling from guidewire advancement via the transtibial technique. Cohen et al.[2] quantified this risk by measuring the distance between the artery and the guidewire used with cannulated drill bits for tibial tunnel creation. They noted the mean distance from the guidewire to the artery to be 4.2 mm on lateral radiographs and 1.6 mm on anteroposterior radiographs. They observed guidewire contact with the artery on both anteroposterior and lateral radiographs in 3 of 7 cadaveric knees in their study. They recommended removing the guidewire after initiating drilling of the tibial tunnel or obtaining repeated fluoroscopic images to ensure that the guidewire is not advancing during tunnel drilling. Once through the posterior cortex of the tibia, the drill should not be advanced any further. They also noted that, based on other previous studies, the tibial inlay technique appears to be a safer technique with less risk to the popliteal artery.

Makino et al.[1] further suggest use of a spade-tipped guidewire, oscillating drill, tapered drill bit, and direct visualization of the bit exiting bone. They also stated that the use of intraoperative radiographs helps to confirm guidewire placement and monitor guidewire and reamer positioning during drilling. They contend that the best method of neurovascular injury prevention during transtibial drilling is to use a posteromedial safety incision to protect the neurovascular structures.

We have a suggestion for the prevention of this type of injury during transtibial PCL reconstruction. A tibial tunnel drill guide assembly for the PCL known as the Tundra System (Smith & Nephew Endoscopy, Andover, MA) is presently available on the market, which we helped design and for which we receive

FIGURE 2. Tundra guide positioned on tibia with trephine drilled to backsplash. It should be noted that there is no guidewire because the coring reamer is externally guided with an outer sleeve known as a bullet.

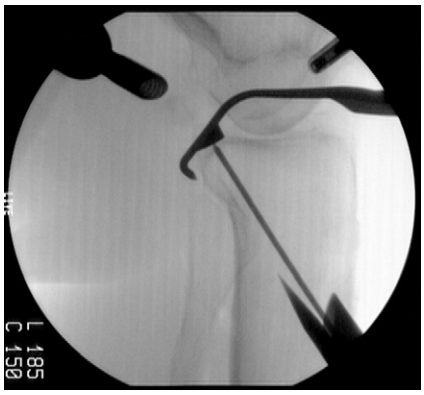

FIGURE 1. Intraoperative radiograph with Tundra guide positioned on tibia. The guidewire was drilled to the point of contact with the backsplash, a plate that prevents passage of guidewires or trephines.

FIGURE 3. The trephine is removed, the Tundra guide is still in place on the tibia, and the bored tunnel is shown. The bone core is easily removed from the trephine and may be used for grafting.

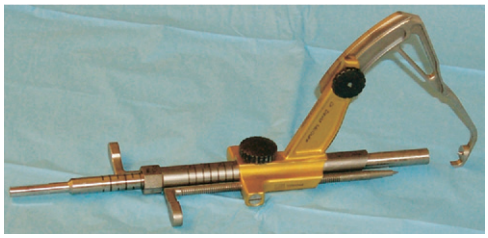

FIGURE 4. Tundra guide assembled with all required PCL components: body, PCL arm, ratcheting outriggers, concentric bullets, and trephine. For an anterior cruciate ligament reconstruction, an anterior cruciate ligament arm and eccentric bullet are selected, replacing their PCL counterparts. When assembled with these components, the Tundra guide is ready to drill an anterior cruciate ligament tibial tunnel.

royalties. The system uses coring reamers (trephines) that are externally guided (with "bullets") instead of using internal cannulation. A guidewire is not required for the accurate placement of the tibial tunnel with this system. The manufacturer does include inserts so that a guidewire may be used for tunnel reference if preferred by the surgeon.

The intraoperative radiograph illustrates guidewire use with the included insert (Fig 1). It should be noted that the point of contact of the Tundra PCL guide arm by the guidewire is a small plate. In the lateral view it looks like a triangular wedge. It is round, 11 mm in diameter, and is called a backsplash, and it prevents a trephine (or guidewire) from passing beyond it. In Fig 2 the Tundra guide is shown with the reamer in place (without a guidewire) completing the drilled tunnel. The completed tunnel is shown in Fig 3; the reamer has been removed, and the Tundra guide is still in place. Because the backsplash makes contact with the fovea near the center of the tibial footprint, the bone core is removed cleanly. The trephine is designed so that the soft-tissue attachments are cleanly removed with the bone core. Further soft-tissue debridement is not required for graft passage.

One reason for the popularity of the inlay technique for PCL reconstruction may be because of the risk of popliteal artery or vein or tibial nerve damage during transtibial techniques. If the Tundra guide is used in accordance with the manufacturer's instructions, its rigidity and backslash design, as well as the smoothness of the posterior aspect of the guide arm, make it virtually impossible to cause damage to posterior structures. The Tundra guide assembled on the side table is shown in Fig 4.

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Authors' Reply

We thank Dr. McGuire and Mr. Hendricks for their letter regarding our case report, "Popliteal Artery Laceration During Arthroscopic Posterior Cruciate Ligament Reconstruction," published in volume 21, issue number 11, of this journal. We agree that the tibial tunnel drill guide assembly for the posterior cruciate ligament that they suggested might reduce the risk of vascular injury but not eliminate it at all. As a matter of fact, we do not have experience with this guide. Finally, we maintain our conclusion that if popliteal artery injury is suspected, the vascular surgeon should be immediately consulted and arteriography and vascular repair should be performed.

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