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## **Ultrasound Guided Blocks of the Lower Extremity**

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One aspect of regional anesthesia that becomes immediately apparent with the addition of ultrasound guidance is an increased awareness and understanding of anatomy. It is only natural that even the most experienced regional anesthetist will understand normal as well as variant anatomy on a new level after visualizing these structures using high frequency ultrasound. Because this understanding of anatomy is so critical to the ability to perform peripheral nerve blocks safely and successfully, we will discuss each relevant structure in detail.

#### The Femoral or “Three in One Block”

A detailed examination of the inguinal region will demonstrate the importance of the fascia iliaca for successful blockade of the femoral nerve. The tissue plane defined by the fascia iliaca extends from the anterior superior iliac spine laterally to the pectineus muscle medially. This fascial layer overlies the femoral nerve but is deep to the femoral artery and vein. The continuous nature of this tissue plane will allow large volumes of local anesthetic injected deep to the fascia iliaca to spread medially and laterally from a single injection point. Thus, using a single injection in this tissue plane, it is possible to access the femoral nerve, lateral femoral cutaneous nerve, and sensory branches of the obturator nerve. Another important structure in this region is the profunda femoris artery, which is lateral and posterior to

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the femoral artery. A needle advanced lateral to the femoral artery may inadvertently puncture this vessel.

### The Sciatic Nerve at the Popliteal Fossa

Despite much confusion surrounding the techniques required to successfully block both the peroneal and tibial divisions of the sciatic nerve in the popliteal fossa, the technique is relatively simple. The sciatic nerve travels in a fascial compartment that is defined medially by the semimembranosus/semitendinosus muscles and laterally by the biceps femoris muscle. The popliteal artery and vein are also contained in this compartment. Large volumes of local anesthetic injected into this fascial compartment will spread proximally and distally in the popliteal space to reach both divisions of the sciatic nerve. The popliteal artery is readily visible using U/S in this popliteal space and can be a reliable landmark to locate the sciatic nerve. After identifying the popliteal artery, the nerve will be consistently visible in a position, which is superficial and lateral to the popliteal artery.

### Saphenous Nerve at the Knee

It is often useful to perform saphenous nerve block at the knee for analgesia after major foot and ankle surgery. At the level of the inferior pole of the patella, the saphenous nerve lies in close proximity to the saphenous vein on the medial aspect of the knee. This is a particularly effective location for blockade of the saphenous

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nerve because considerable branching of the nerve occurs more distally and proximal to the patella, the nerve leaves the saphenous vein and pierces the investing fascia of the thigh. In addition, the saphenous vein can be readily visualized on U/S after application of a tourniquet to the thigh. Injection around the saphenous vein at the level of the inferior pole of the patella will surround the saphenous nerve as well.

### Tibial Nerve at the Ankle

Once again, a fascial plane can be used to facilitate delivery of local anesthetic to a nerve without contacting the nerve. The tibial nerve lies immediately posterior to the tibial artery at the ankle and can also be readily located using U/S. By using the pulsatile tibial artery as a landmark, the tibial nerve can be differentiated from other soft tissues located posterior to the medial malleolus. The flexor retinaculum at the medial aspect of the ankle can also be visualized. Successful tibial nerve block can be performed by seeing injectate spread deep to the flexor retinaculum and around the tibial nerve. This can be accomplished without contacting the nerve.

### The Deep Peroneal Nerve

The deep peroneal nerve can be blocked by injection at the level of the distal tibia using US guidance. The nerve is deep to the extensor retinaculum of the ankle and lateral to the anterior tibial artery. This artery is readily visible using US. The needle

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is inserted lateral to the artery until the anterior tibia is contacted. Injection results in medial and lateral spread of local anesthetic deep to the extensor retinaculum. The nerve will usually be more readily visible after it is surrounded by local anesthetic.