

Fibular Head as a Landmark for Identification of the Common Peroneal Nerve: A Cadaveric Study



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Purpose: The purpose of this study was to identify the relationship between the common peroneal nerve (CPN) and the fibular head. **Methods:** Sixteen cadaveric dissections were performed. The distance from the fibular head to the center of the CPN as it exits beneath the biceps femoris (BF) was measured in 0°, 30°, 60°, and 90° of flexion and was averaged on the first 8 specimens. Based on those measurements, a needle was placed on the second 8 dissections before the fascial incision was made to assess reliability. All measurements were repeated after needle removal, distances were recorded, and 95% confidence interval (CI) and correlation coefficients were calculated. **Results:** The distance from the posterior border of the fibular head to where the CPN nerve center emerges from the BF was 62.3 mm (95% confidence interval [CI], 58.2 to 66.4), 56.3 mm (95% CI, 51.9 to 60.8), 46.8 mm (95% CI, 43.6 to 50.0), and 45.3 mm (95% CI, 43.2 to 47.3) in 0°, 30°, 60°, and 90° of knee flexion, respectively. The correlation coefficient between knee flexion and measured distance was nearly linear: $r = -0.97$. The correlation coefficients were 0.62, 0.32, and 0.01 for height, weight, and body mass index (BMI), respectively. The CPN crossed the posterior border of the fibula 21.9 mm (95% CI, 20.2 to 23.7) from the fibular styloid at 90° of flexion. **Conclusions:** With the knee in 90° of flexion, the CPN center crosses the long head of the BF (LHBF) tendon 45.3 mm from the posterior border of the fibula, where the direct arm of the BF inserts, and the posterior border of the fibula 21.9 mm from the tip of the fibular styloid. There is a near linear correlation between knee flexion and the distance to the CPN as it exits the BF. No correlation exists between the distance to the CPN and weight or BMI, whereas a moderate correlation with height exists. **Clinical Relevance:** These relationships allow for efficient and safe identification of the CPN proximal to the zone of injury when operating around the posterior lateral corner (PLC) of the knee.

The common peroneal nerve (CPN) and its branches innervate the muscles in the anterior and lateral compartments of the leg and allow dorsiflexion of the ankle and extension of the toes, both of which are key components of normal gait. Injury of the CPN can lead to gait disturbances and overall decreased function of the limb.¹ A thorough knowledge of the anatomy of the CPN and its branches is essential for surgeons operating within and around the knee joint. Previous studies have named Gerdy's tubercle,² the fibular head,²⁻⁴ and the long head of the biceps femoris (LHBF) tendon as

important landmarks in determining the location of the CPN in the lateral aspect of the knee. Injury to the CPN occurs in 14% to 40% of knee dislocations⁵ and is commonly encountered in posterior lateral corner (PLC) injuries.⁶ The zone of injury in PLC injuries often includes the previously described anatomic landmarks, so understanding another site where the CPN may safely be identified outside of the zone of injury can assist the surgeon in PLC reconstructions. The purpose of this study was to identify the relationship between the CPN and an easily palpable landmark, the fibular head. We hypothesized that quantification of this distance would be useful in identifying the CPN when the zone of injury has made tissue identification more difficult and that this will be a reproducible and reliable measurement.

Methods

Cadaveric lower extremities (mid femur to mid tibia) were obtained. Eight right and 8 left cadaveric limbs from 8 donors were used. After thawing the specimens, the extremities were placed in the lateral position with the knee flexed to approximately 60° to 70°. A lateral curved incision was made parallel to the femur

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Fig 1. The incision used for posterior lateral corner (PLC) reconstruction of the right knee.

proximally, extending distally to a location midway between the anterior aspect of the fibular head and Gerdy's tubercle (Fig 1). A fascial incision was made posterior to the LHBF muscle as described by Terry et al.⁷ The CPN was dissected, taking care not to disturb the native position of the nerve (Fig 2). Using a digital caliper (Whitworth LCD Electronic digital calipers 0- to 6-inch hardened stainless steel, accuracy ± 0.02 mm/0.001inch [<100 mm]), the distance from where the CPN crossed under the biceps femoris (BF) tendon to the posterior aspect of the fibular head (at the level of the inferior aspect of the direct arm of the BF insertion) was measured to both the proximal and distal edges of the nerve as it exits from beneath the BF. We then took the average of the 2 measurements to find the distance to the center of the nerve as it exited beneath the BF tendon, and the distance to the center of the nerve was recorded (Fig 3). These measurements were obtained for knee flexion angles of 0°, 30°, 60°, and 90°. Additionally, the distance between the fibular styloid and the center of the CPN as it intersected the posterior border of the fibula was also measured with the knee in



Fig 2. Lateral exposure of the right knee with the Adson forcep showing the posterior border of the biceps femoris (BF) with the fibular head also identified.

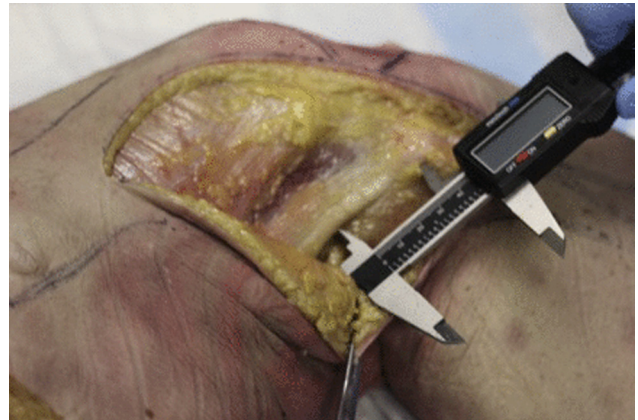


Fig 3. Caliper showing the measurement from the fibular head along the posterior edge of the biceps femoris (BF) of the right knee.

90° of flexion. After measurement of half of the specimens (4 right and 4 left legs), the average distance to the center of the nerve was determined at 90° of flexion (46 mm based on the first cohort). This distance was used to predict where the CPN would cross the BF during the measurement of the other 8 specimens with the knee flexed to 90°. To assess reproducibility, we placed a needle in the second group before incising the fascia to ensure our measurements in the first group predicted the location of the CPN. This needle was placed 46 mm from the posterior border of the fibular head at the leading edge of the BF with the knee in 90° of flexion before incising the fascia (measurement made with the Whitworth LCD electronic digital calipers). The fascia was carefully incised to avoid any disruption to the underlying soft tissues and the placement of the needle was evaluated to see if it had transected the CPN (Fig 4). Once this was recorded, the

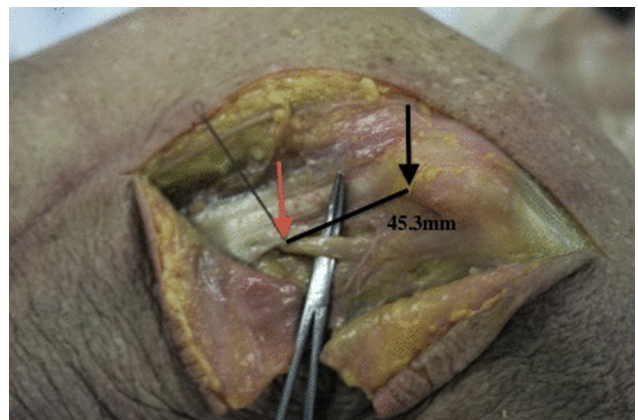


Fig 4. The needle, which was placed before opening the fascia, can be seen transecting the common peroneal nerve (CPN) of the right knee. The red arrow is located at the posterior border of the fibular head at the insertion of the LHBF, and the black arrow points to the CPN as it exits from the biceps femoris (BF). This distance averaged 45.3 mm.

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