Dorsalis pedis arterial pulse: palpation using a bony landmark

A Mowlavi, J Whiteman, B J Wilhelmi, M W Neumeister, R McLafferty

Introduction: The unreliability of the pulse examination of the foot has primarily been due to variability of technique between examiners. Whereas the groove between the medial malleolus and the Achilles tendon more readily defines the location of the posterior tibial pulse, the location of the dorsalis pedis pulse remains vague. In this paper a novel method of locating the dorsalis pedis pulse by physical examination is described.

Methods: Forty one consecutive patients admitted to a general surgery service of a tertiary medical centre within a two month period were examined. Using the dorsal most prominence of the navicular bone as a landmark, the distance to the dorsalis pedis pulse in bilateral lower extremities was measured by palpation and compared to Doppler ultrasound. Measurements were confirmed by two separate examiners blinded to each others’ results.

Results: The dorsalis pedis artery was palpable in 78% of extremities and present by Doppler ultrasound in 95%. The location of the left dorsalis pedis artery was a mean (SD) 9.8 (1.4) mm by palpation and 11.1 (2.1) mm by Doppler ultrasound from the dorsal most prominence of the navicular bone. The right dorsalis pedis artery was 10.4 (3.4) mm by palpation and 11.5 (0.7) mm from the dorsal most prominence of the navicular bone. No significant differences in location of the dorsalis pedis artery were observed bilaterally between Doppler ultrasound and palpation; No significant differences were observed comparing contralateral dorsalis pedis arteries nor any differences between the examiners’ results.

Conclusion: The dorsal most prominence of the navicular bone provides a bony landmark to readily locate the dorsalis pedis artery. Reliability of the examination may be increased as to the patency of the dorsalis pedis artery by using this dependable anatomic landmark.
The posterior tibial artery is carried out following an arc from the anterior tibial artery distal to the ankle anteriorly. Distal to the ankle, the dorsalis pedis artery travels lateral to the extensor hallucis tendon and along its course to the great toe. Previous studies have reported the dorsalis pedis pulse impalpable in 3.1% to 13.8% of healthy patients. Sensitivity of palpation has been proposed to be increased by avoidance of plantar flexion. Plantar flexion of the foot is believed to increase tension of the skin along the extensor hallucis tendon thus obliterating an underlying pulse. Alternatively, it is possible that tensing the skin with plantar flexion results in raising of the vessel within the subcutaneous tissue from its immediate contact with the bony dorsum making palpation more difficult. Doppler examination of pedal pulses is generally accepted as more accurate than pulse palpation. As such, Doppler ultrasound examination typically demonstrates increased sensitivity with an absent signal over the presumed location of the dorsalis pedis artery in only 1.9% of patients.

Discrepancy of pedal pulse detection and with regards to its accuracy persists among clinicians. Since the location of the posterior tibial artery is well delineated by a bony landmark, it is more reliably detected by Doppler ultrasonography. One study demonstrated increased interinvestigator agreement among 78% of posterior tibial pulses versus only 58% of the dorsalis pedis pulses when identified by Doppler ultrasonography. Paradoxically, the posterior tibial artery is believed to be more difficult to palpate in comparison with the dorsalis pedis artery. This is felt to be secondary to the deeper location of the posterior tibial artery especially when compounded by ankle swelling. In contrast, the dorsalis pedis arterial pulse is felt to be more accessible to finger palpation since it lies in the immediate subcutaneous tissue on the dorsum of the foot.

Pedal pulse detection remains a mainstay for lower extremity perfusion assessment; thus, establishing exact pulse detection techniques are necessary. Although the dorsalis pedis arterial pulse detection is relied upon for perfusion assessment, its location is vaguely described and not associated with a definitive bony landmark. We present a quick and reliable method for locat

**DISCUSSION**

We have demonstrated a quick and reliable method for locating the dorsalis pedis arterial pulse by palpation and/or Doppler ultrasound. The dorsalis pedis artery is a continuation of the anterior tibial artery distal to the ankle anteriorly. Distal to the ankle, the dorsalis pedis artery travels lateral to the extensor hallucis tendon along its course to the great toe. Previous studies have reported the dorsalis pedis pulse impalpable in 3.1% to 13.8% of healthy patients. Sensitivity of palpation has been proposed to be increased by avoidance of plantar flexion. Plantar flexion of the foot is believed to increase tension of the skin along the extensor hallucis tendon thus obliterating an underlying pulse. Alternatively, it is possible that tensing the skin with plantar flexion results in raising of the vessel within the subcutaneous tissue from its immediate contact with the bony dorsum making palpation more difficult. Doppler examination of pedal pulses is generally accepted as more accurate than pulse palpation. As such, Doppler ultrasound examination typically demonstrates increased sensitivity with an absent signal over the presumed location of the dorsalis pedis artery in only 1.9% of patients.

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Pedal pulse detection remains a mainstay for lower extremity perfusion assessment; thus, establishing exact pulse detection techniques are necessary. Although the dorsalis pedis arterial pulse detection is relied upon for perfusion assessment, its location is vaguely described and not associated with a definitive bony landmark. We present a quick and reliable method for locating the dorsalis pedis pulse utilising the dorsal most prominence of the navicular bone. The dorsalis pedis pulse can be detected to within 1 to 1.5 cm of this bony landmark using palpation or Doppler ultrasonography. We feel that utilising our presented technique will facilitate a more efficient means of detecting pedal pulses.

**REFERENCES**


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