



Plantar-Flexion Induced Entrapment of the Dorsalis Pedis Artery in a Teenaged Cross-Country Runner

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BACKGROUND:

- Symptomatic peripheral artery disease [PAD] rarely affects young adults and, when present, typically has a non-atherosclerotic etiology.
- Anatomic variants are another documented cause of PAD in young adults in the literature.

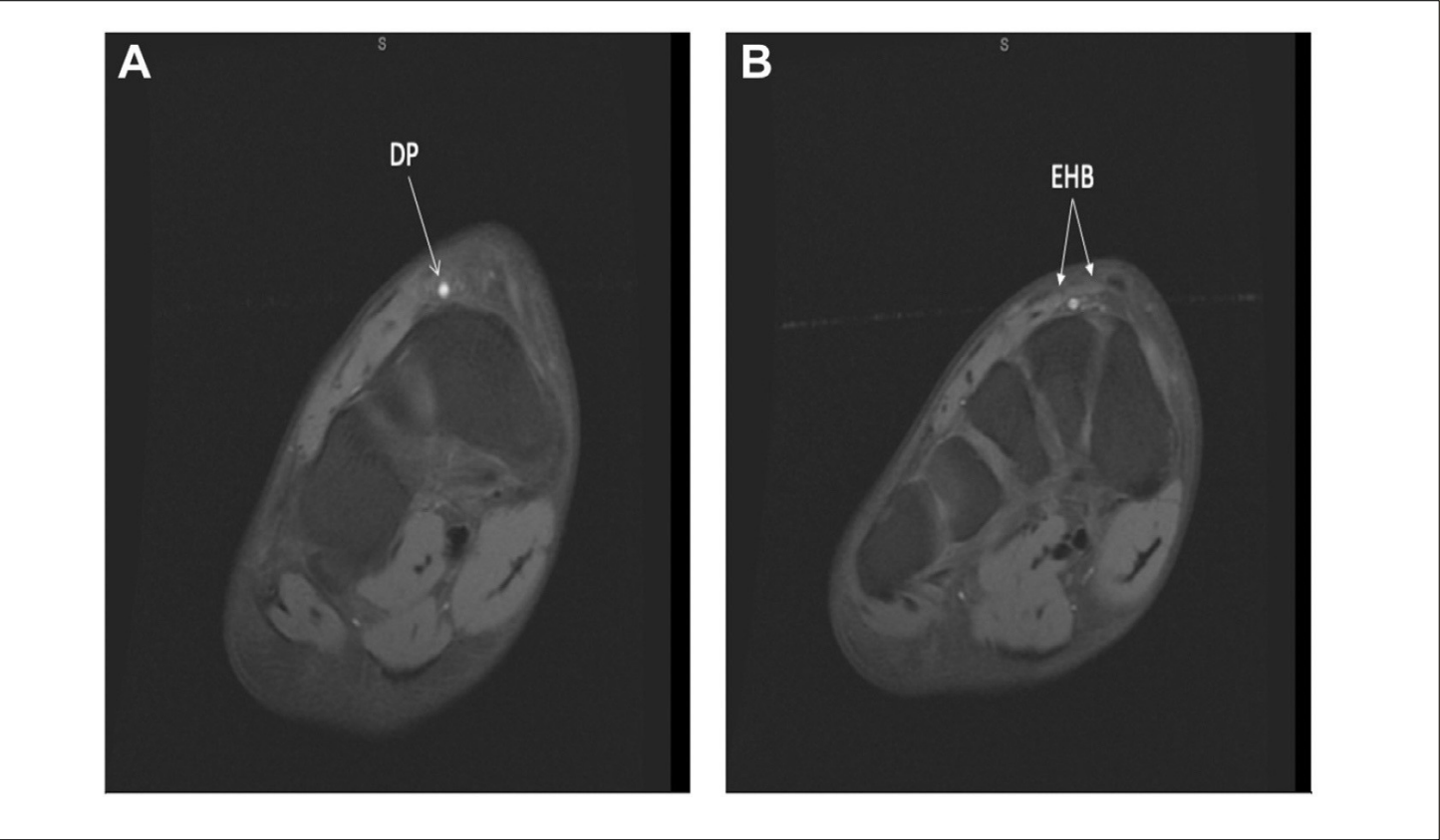
CASE PRESENTATION AND WORKUP:

- A 17 year old girl presented with a four month history of plantar flexion-dependent right foot pain that resolved upon returning to neutral position.
- The affected foot also demonstrated cold intolerance over this time period.
- She had palpable dorsalis pedis [DP] and posterior tibial pulses bilaterally with feet in a neutral position.
- Arterial duplex showed accelerated velocities (295 cm/s) in the right DP over the navicular bone at rest with total flow obliteration upon plantar flexion. Flow was uninterrupted in dorsiflexion.
- A magnetic resonance arteriogram [MRA] identified a potential compression site where the DP ran deep to the extensor hallucis brevis [EHB] tendon suggesting an anatomical obstruction.

Figure 1. Preoperative DP arterial duplex during (A) plantar flexion and (B) neutral position



Figure 2. MRA with an intact DP in the proximal foot (A) and compression by the EHB more distally (B)



OPERATIVE MANAGEMENT:

- An incision was made over the right DP in the area of compression with incomplete compression noted intraoperatively.
- The redundant EHB muscle was confirmed as the site of compression, transected, and transferred to the extensor hallucis longus tendon.
- Abnormal fibrous bands were also identified in the area of compression and were lysed.
- A completion angiogram showed the DP remained widely patent with plantar flexion.

DISCUSSION:

- Nonatherosclerotic causes of symptomatic PAD is a likely etiology in young adults and adolescents presenting with intermittent claudication.
- A differential diagnosis should include chronic compartment syndrome, popliteal artery entrapment, tarsal tunnel syndrome, and less frequently anatomical anomalies.
- Intermittent and/or position-dependent vascular symptoms should raise concern for musculoskeletal anomalies.

- While the more common presentation in a young athlete of popliteal artery compression would be treated with surgical bypass, our patients mechanical nature of obstruction can effectively be treated with tendon transposition.
- Surgical tendon release also allows athletic patients such as ours the ability to quickly return to their normal daily activities.

Figure 3. The EHB crossing over the DP prior to transection and transposition. Fibrous bands not visualized here.



EDUCATIONAL TAKEAWAYS:

- Symptomatic PAD is rare in young adults and, when present, is often **nonatherosclerotic in nature**.
- Differential diagnoses of PAD in the young adult should include **anatomical anomalies**, especially if bilateral in nature.
- Surgical release is an effective treatment strategy for mechanical obstructions, particularly in athletes.