A 23-year-old man presented to the Prince of Wales Hospital with wound dehiscence 20 days after open reduction and internal fixation of the left heel. The initial injury was a closed, comminuted fracture of the left calcaneus secondary to a fall from a height of 6 feet onto concrete. It was managed with a wave plate (Fig. 1). The plastic and reconstructive surgery team was consulted 1 week after readmission: examination revealed a circular wound overlying the left lateral malleolus, measuring 5 × 4 cm, with the metal plate visible at the inferior margin. Given the difficulty of local reconstruction in the foot and ankle region, a gracilis free flap was initially planned for coverage of the ankle defect. Multislice helical computed tomography angiogram (CTA) of the lower limbs was organized to ensure the integrity of the 3 vessels (anterior tibial, posterior tibial, and peroneal arteries). Incidentally, it uncovered an unusual anatomical variant: an extra anterior tibial artery (ATA) branch in the left leg, arising at the midtibial level (Fig. 2). At this point, the possibility of a local extensor digitorum brevis (EDB) muscle flap was discussed, provided the dominant pedicle was positioned favorably. After wound debridement, an incision was made over the dorsum of the foot extending anteromedially from the defect. The skin was carefully lifted to expose the extensor tendons; those of extensor digitorum longus were retracted to allow access to the EDB muscle. It became evident during surgery that the EDB muscle had 2 dominant pedicles (Fig. 3): an unusual proximal branch originating from the lateral extra ATA branch, and the lateral tarsal artery (LTA) from the dorsalis pedis artery (DPA). LTA was temporarily clamped and subsequently divided after ensuring EDB flap viability.

The flap was transposed laterally and covered with a meshed, split-thickness skin graft harvested from the right thigh (Fig. 4).

Summary: Lower limb reconstruction after a traumatic event has always been a challenge for plastic surgeons. The reliability of vessel integrity postinjury often drives us away from a local reconstructive option. With the advancement of computed tomography angiogram, it can not only demonstrate the continuation of major vessels but also helps to map the vascular supply at a perforator level. We hereby report an incidentally identified anatomical variant with dual dominant blood supply to the extensor digitorum brevis muscle from an extra branch of anterior tibial artery originating at midtibial level. This variant was picked up preoperatively by computed tomography angiogram and confirmed intraoperatively to be one of the dominant supply. We took advantage of this unusual anatomy by basing our reconstruction on this branch and hence spared the need to terminalize distal dorsalis pedis artery. (Plast Reconstr Surg Glob Open 2016;4:e673; doi: 10.1097/GOX.0000000000000608; Published online 6 April 2016.)

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DISCUSSION

The foot and ankle present a complex region for local reconstruction due to thin skin, limited muscle size, and terminal vasculature. Thus, it is common for reconstructive surgeons to opt for a free flap as their first preference. However, the disadvantages of donor site morbidity, recipient site disfigurement, and venous congestion of the lower limb after free flap reconstruction constantly prompt us to consider an alternative option if available.

The EDB muscle flap has been a selection for local soft tissue reconstruction since the 1970s.1-3 EDB is located on the dorsum of the foot and supplements the action of extensor digitorum longus and extensor hallucis longus in extending the medial 4 toes. As such, it is expendable and may be used in reconstructions. However, variation exists in EDB anatomy, and the pattern of vascular supply is particularly pertinent when considering a flap. The EDB muscle generally has a Mathes and Nahai type II vascular supply,1 with the dominant pedicle being the LTA branching from the DPA at or immediately distal to the extensor retinaculum.2-5 Smaller branches from the DPA may provide minor pedicles. Nonetheless, the perforating branch of the peroneal artery has been reported to be the dominant vascular source in some individuals.6,7 In this case, there were 2 dominant pedicles supplying the EDB, making it a type III muscle. This variation was first identified on CTA. With the advancement of modern technology, we have the luxury of visualizing anatomy preopera-

Fig. 1. Prereconstructed exposed plate.

Fig. 2. Computed tomography angiogram showing an extra anterior tibial artery branch in the left leg (arrowhead).

Fig. 3. Intraoperative demonstration of 2 dominant pedicles to EDB: arrow on the clamped lateral tarsal artery; arrowhead, the proximal perforating branch from the lateral extra anterior tibial artery branch.

Fig. 4. Final view postreconstruction.
tively, helping us assess surgical options and making flap dissection safer and faster. We therefore advocate utilizing CTA where possible in all major lower limb trauma reconstruction.

The use of a regular EDB flap with its dominant pedicle at the LTA would require ligation of the distal DPA and mobilization of the entire neurovascular bundle,\textsuperscript{2-5} potentially jeopardizing blood supply to the distal foot. This case illustrates a serendipitous variation in arterial supply, with 2 dominant pedicles to the left EDB muscle. As a result, the perforating branch from a superfluous ATA branch was utilized as an ideal axis for transposition to the lateral ankle. This afforded the patient a favorable cosmetic outcome without the morbidity associated with free flap reconstruction.

References

1. Mathes SJ, Nahai F. Classification of the vascular anatomy of muscles: experimental and clinical correlation. \textit{Plast Reconstr Surg}. 1981;67:177–187.
2. Chattar-Cora D, Pederson WC. Experience with the extensor digitorum brevis muscle flap for foot and ankle reconstruction. \textit{Ann Plast Surg}. 2006;57:289–294.
3. Leitner DW, Gordon L, Buncke HJ. The extensor digitorum brevis as a muscle island flap. \textit{Plast Reconstr Surg}. 1985;76:777–780.
4. del Piñal F, Herrero F. Extensor digitorum brevis free flap: anatomic study and further clinical applications. \textit{Plast Reconstr Surg}. 2000;105:1347–1356.
5. Bakhach J, Demiri E, Chahidi N, et al. Extensor digitorum brevis muscle flap: new refinements. \textit{Plast Reconstr Surg}. 1998;102:103–110.
6. Ron Belczyk DP, Sung W, Rogers L. A case report for treatment of osteomyelitis of the great toe in a patient with diabetes using the extended reverse flow extensor digitorum brevis muscle flap. \textit{J Diabet Foot Comp}. 2013;5:48–54.
7. Massin P, Romana C, Masquelet AC. Anatomic basis of a pedicled extensor digitorum brevis muscle flap. \textit{Surg Radiol Anat}. 1988;10:267–272.