

Medial Plantar Artery Common Origin to Determine Incision Placement for the Fasciocutaneous Flap: a Cadaveric Study

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Statement of Purpose

Medial plantar artery-based flaps have great value in healing full-thickness wounds of the foot and ankle. The goal of this study was to identify a common location for the origin of the medial plantar artery. Recognition of this anatomical marker will help improve incision placement and increase the success of preserving the artery when performing the medial plantar artery (MPA) fasciocutaneous flap.

Methodology

The outcome of this study was determined by physical examination of 40 lower extremity cadavers. After the MPA was dissected from each cadaver, the distance from the medial malleolus to the origin of the MPA was measured in centimeters (cm). The mean distance was calculated and hypothesized to represent the common origin of the MPA in the general population. The standard error of the mean was then calculated which measures the accuracy with which a sample represents a population. A low value indicates a high statistical probability that the mean from our sample study is a reliable location for the origin of the MPA in the general population.

Procedures

Literature Review

Harrison and Morgan¹ first described the MPA fasciocutaneous flap in 1981. It has proven to have long-term satisfactory results, especially for wounds of the hindfoot as it preserves sensation and similar texture for the plantar skin. However, the dissection for the flap is difficult and requires meticulous surgical technique in order to avoid

Figure 1. (Below) MPA fasciocutaneous flap

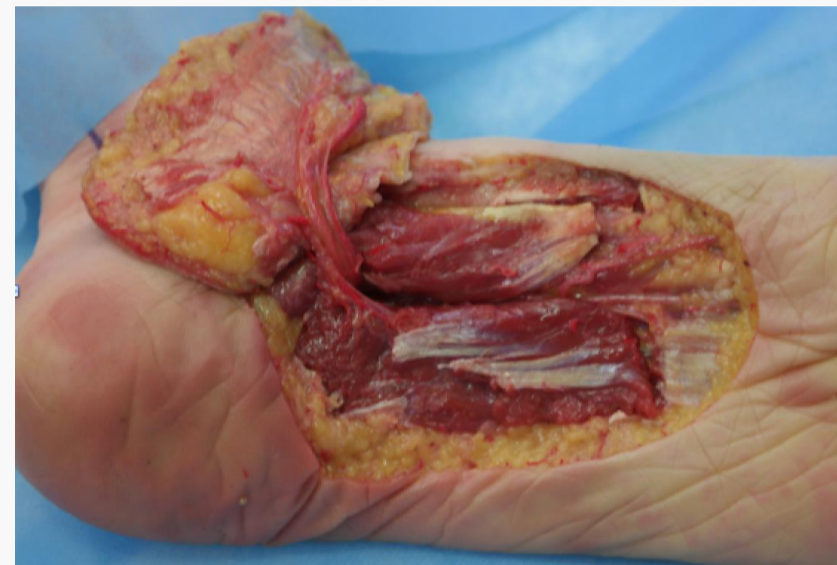


Figure 2. (Right) The arrow points to the origin of the MPA from the medial malleolus.

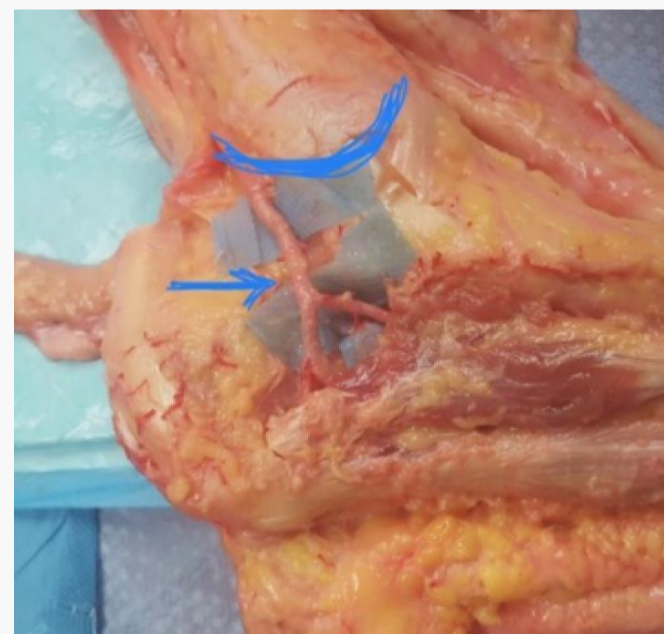


Figure 3. (Left) A Flap being complicated by partial necrosis 2 weeks post-operatively.

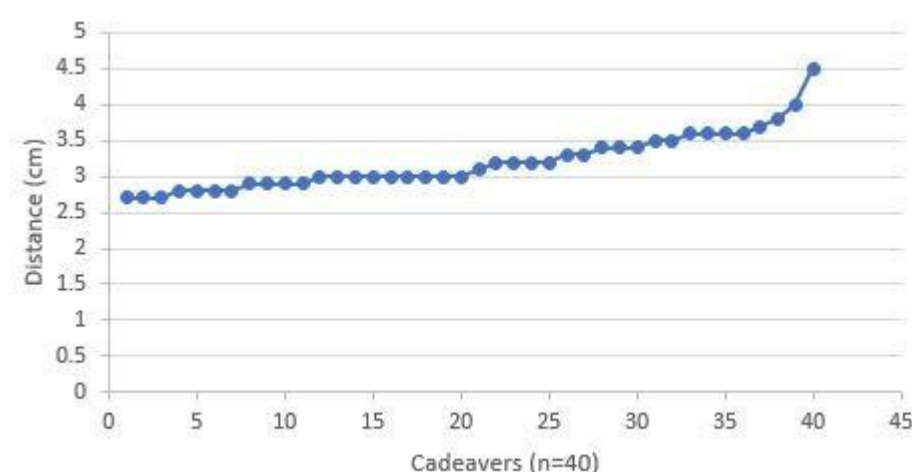
Literature Review Continued

damaging the MPA that can ultimately result in necrosis of the flap. Reading et al.² reported four of the six MPA flaps in his case study developed partial necrosis due to ischemia – all requiring split-thickness skin graft. Chaudhry et al.³ did a literature review of all published English-language series (8) on MPA flaps, which revealed a prevalence of total or partial necrosis due to ischemic complication to range from 0-67%, with a mean average of 10.7%. Despite possible complications, Rashid et al.⁴ compared the MPA flap and the reverse sural flap for the weight-bearing heel and found the MPA fasciocutaneous flap had less complications and overall satisfactory long-term results.

Results

The mean, median, and mode values for the origin of the MPA were 3.2 cm, 3.05 cm, and 3.0 cm respectively with a range of 2.7-4.5 cm (Table 1). The standard deviation was 0.3928 and the standard error of the mean (SEM) calculated to be a low value of 0.0621.

Table 1. Cadaver Measurements



Analysis & Discussion

The low SEM value indicates that the mean from our sample study is in fact a reliable measurement for the origin of the MPA in the general population. Thus, our hypothesis can be accepted. Through this discovery, we provide guidance in incision planning that can help surgeons avoid potential arterial ischemic complications as previously discussed. A common origin for the MPA has not been previously discussed in medical literature. It is our hope that, through the identification of the common origin of the MPA, the rate of ischemic complications for future MPA fasciocutaneous flaps will continue to decrease. As surgeons become more vigilant and careful with their dissections in the area 3.2 cm distal to the medial malleolus, this positive outcome can be achieved.

References

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Financial Disclosures

None