

# The Simplified Posterior Interosseous Flap

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Several technical modifications have been described to avoid complications and simplify dissection. The authors describe some technical tips that make posterior interosseous flap dissection safer and more straightforward. (*J Hand Surg Am.* 2016;41(9):e303–e307. Copyright © 2016 by the American Society for Surgery of the Hand. All rights reserved.)

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**S**KIN COVERAGE OF MODERATE TO LARGE defects of the hand usually can be performed using pedicle island flaps from the forearm. The reverse radial forearm flap is popular owing to its reliability and straightforward technique. Although of little functional consequence in most cases, the need to sacrifice the radial artery is a drawback.

The posterior interosseous flap (PIOF) was described by Penteadó et al<sup>1</sup> and Zancolli and Angrigiani<sup>2</sup> in the mid-1980s as an alternative to the reverse radial forearm flap that does not need the sacrifice of major arteries. The originally described surgical technique involved a tedious and time-consuming pedicle dissection.<sup>3</sup> Several technical modifications have been described to avoid complications and simplify dissection.<sup>4,5</sup> The authors describe some technical tips that make PIOF dissection safer and more straightforward.

## SURGICAL ANATOMY

The anatomy of the posterior interosseous arterial axis of the forearm is well known<sup>3,6–8</sup> and only relevant details will be highlighted here. The course of the posterior interosseous artery (PIA) and its distal anastomosis with the recurrent dorsal branch of the

anterior interosseous artery (AIA) are well described, although the incidence of an absent or hypoplastic distal segment of this axis may have been overestimated.<sup>8–10</sup> In the authors' experience, in over 150 clinical cases of pedicle, distally based PIOF, the distal portion of the axis and the recurrent branch of the AIA were constant. However, continuity between the PIOA and the recurrent branch of the AIA may be precarious. This is relevant for dissection of free antegrade PIOF, not for distally based pedicle flaps. The difference in thickness of the radial and ulnar sides of the septum between the extensor digiti quinti tendon (EDQ) and the extensor carpi ulnaris (ECU) may at least partly explain this inconsistency (see subsequent discussion). The recurrent branch of the AIA lies superficially within the septum between the EDQ and the ECU. This septum is thicker in its ulnar side than it is in its radial side (Figs. 1, 2). The vascular axis is not visible from the ulnar side, whereas it is always clearly visible from the radial side. The fact that initial exploration of the pedicle is usually done from the ulnar side may explain this overestimation of its anatomical absence.

The distribution of the cutaneous perforators along the axis has also been well studied. Roughly, there are 3 groups: proximal, midpoint, and distal. The proximal perforators were considered important in the initially described technique, although their dissection is tedious. The distal cluster is relevant only for antegrade free PIOF. The dominant perforators (usually 1 or 2) about the midpoint of the forearm are the basis of the distally based PIOF.<sup>4</sup> They are located slightly distal to the midpoint of a line connecting the lateral epicondyle and the distal radioulnar joint (DRUJ).

The branches of the posterior antebrachial cutaneous nerve course under the dorsal skin of the forearm

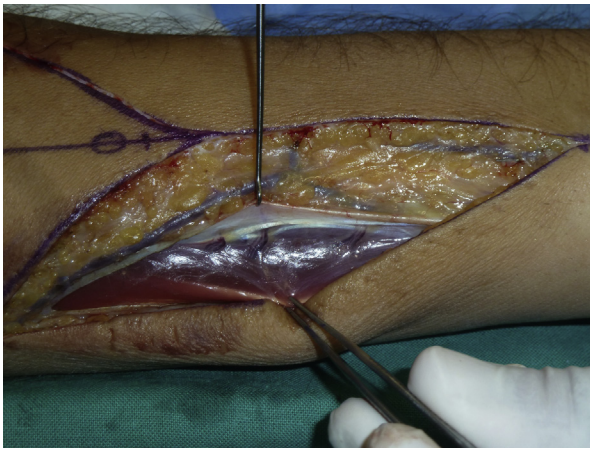
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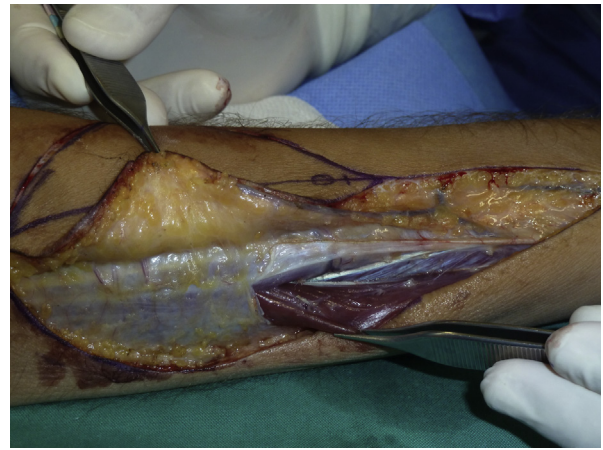
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**FIGURE 1:** Dissection begins distally, incising the fascia over the ECU tendon. The interosseous axis is not visible, but the branches to the ECU (held with forceps) indicate its presence (right side, hand to the left).



**FIGURE 3:** The dominant perforator is identified and the fascia is incised around it. The skin island is elevated suprafascially. Note the eccentric location of the dominant perforator in the skin island (right side, hand to the left).



**FIGURE 2:** The fascia over the EDQ has been incised and the septum is explored from the radial side. The septum is held with skin hooks. The vascular axis is clearly visible.

and carry a well-developed arterial perineural network with connections with the septal perforators off the interosseous axis, the so-called neurocutaneous circulation.<sup>11</sup> Its inclusion in the flap optimizes blood supply.

### SURGICAL TECHNIQUE

The classic line connecting the DRUJ and the lateral humeral epicondyle is drawn. The pivot point is marked proximal to the DRUJ. The predicted location of the dominant perforator is marked about 2 cm distal to the midpoint of this line. Because it is constant, Doppler exploration is unnecessary. The skin island is drawn over this line, including the dominant perforator in its proximal corner (relative to the pedicle).

The perforator does not need to be centered on the skin island as long as the branches of the posterior antebrachial cutaneous nerve are included. The skin island can safely be extended up to 3 finger breadths distal to the epicondyle.

#### Step 1

Dissection is begun distally incising directly down to the fascia. Distal septocutaneous perforators are noted and cauterized with bipolar energy. The subcutaneous veins of the distal third of the forearm are ignored. The ECU tendon is easily identified and its fascia is incised. The septum is preliminarily explored from the ulnar side. The interosseous axis is rarely visible from the ulnar side, although branches to the ECU muscle are clearly seen, reliably indicating the presence of the axis (Fig. 1). These branches are cauterized with bipolar energy. The septum is explored proximally until the dominant cutaneous perforator is identified (Fig. 3).

#### Step 2

The EDQ tendon is identified radial to the ECU and the fascia is incised over it. The septum is explored from the radial side. The vascular axis is always clearly visible from this side (Fig. 2). Branches to the EDQ and extensor indicis proprius are bipolar-cauterized. The dominant perforator is dissected. The motor nerve branch to the extensor indicis proprius is preserved.

#### Step 3

The PIA is dissected only a few millimeters proximal to the midpoint perforator, ligated, and divided (Fig. 4).

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