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# The posterior interosseous flap – a prime technique in hand reconstruction. The experience of 100 anatomical dissections and 102 clinical cases

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## KEYWORDS

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**Summary** Based on our experience of 102 clinical cases and 100 anatomical dissections, we have assessed the indications for the posterior interosseous flap in reconstruction of the hand. Large fasciocutaneous island flaps can be harvested, even when the radial or ulnar pedicles are damaged. One real advantage is that the posterior interosseous artery is a vessel of secondary importance for hand vascularisation. Fasciocutaneous and osteofasciocutaneous island distally based flaps can be tailored. The major indications are reconstruction of the first web space up to the interphalangeal joint of the thumb, dorsal hand defects up to the metacarpal joints and large defects on the palm-ulnar border of the hand. It is, therefore, a primary weapon amongst hand reconstruction techniques.

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The posterior interosseous flap is a fasciocutaneous flap, which can be proximally or distally based as an island flap. It was described by Zancolli,<sup>1</sup> Penteado et al.,<sup>2</sup> Masquelet and Penteado<sup>3</sup> and Costa and Soutar<sup>4</sup> for hand reconstruction. An osteofasciocutaneous flap was also described by Costa et al. (1988),<sup>5</sup> which was used for reconstruction of a thumb post. Costa et al.<sup>6</sup> reported a series of 50 anatomical dissections and 21 clinical cases of distally based island flaps. In that paper, the authors reinforced the theoretical advantage of the anatomical basis of the retrograde flow of this flap from the dorsal carpal arch, via the anastomoses

between the posterior and anterior interosseous arteries; this allows the flap to be used even with damage of the radial or ulnar arteries or palmar arches.

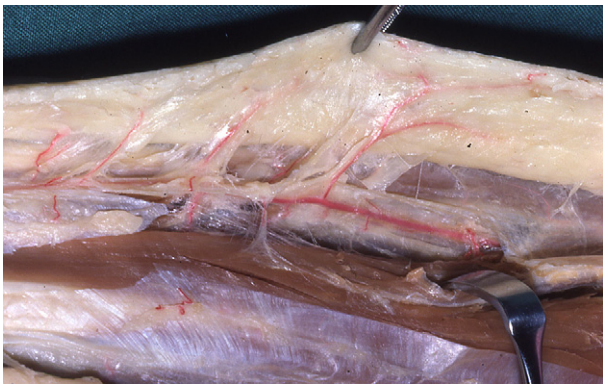
In this paper, the authors present an assessment of indications for using this flap in hand reconstruction, based on the experience of 100 fresh cadaveric dissections with 20 methylene blue injection studies and 102 clinical cases with 3 in vivo fluorescein injection studies.

## Materials and methods

### Anatomical study

The posterior interosseous flap is a fasciocutaneous flap based on the posterior interosseous artery, which lies

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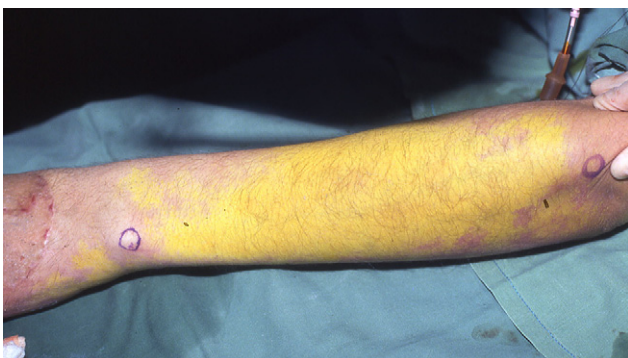
**Figure 1** Fresh anatomical dissection with coloured latex showing the PI artery and a row of fasciocutaneous perforators.

invested by the fascial septum between the extensor carpi ulnaris and the extensor digiti minimi. The artery gives off septocutaneous branches that spread out on the deep fascia to form longitudinal fascial arcades, as well as further branches that pass through the deep fascia to supply the underlying deep extensor muscles. In the lower third of the posterior forearm, direct septoperiosteal branches to the ulna are also present.

In 100 fresh cadaveric limbs the posterior interosseous artery at the upper third of the anterior forearm was dissected, catheterised and injected with coloured latex. A selective injection of the posterior interosseous artery with methylene blue was performed in 20 cases, after the whole skin of the forearm had been raised subfascially, via circumferential incisions at the level of the inter-epicondylar line and at the wrist joined by a longitudinal incision in the middle of the volar surface of the forearm. In this way, the fasciocutaneous unit was left attached only by the fascial septum between the extensor carpi ulnaris and the extensor digiti minimi, where the posterior interosseous artery and its septocutaneous branches lie.

**Results**

In 82 cases the artery originated from the common interosseous artery and 18 cases it originated from the

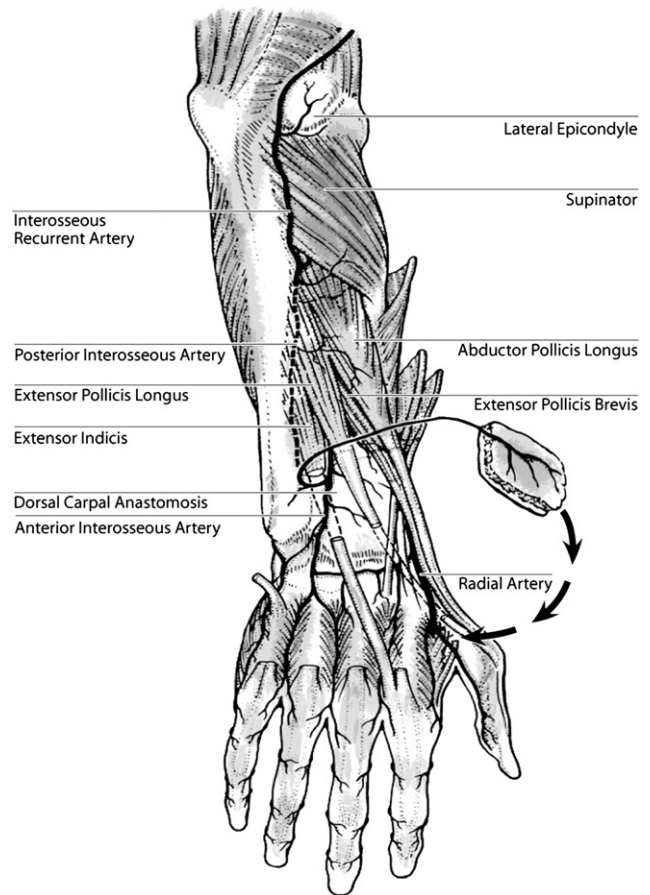


**Figure 2** Fresh cadaveric dissection with methylene blue injection study showing staining across the whole width of the posterior skin of the forearm, extending from 4 cm below the inter-epicondylar line to the wrist.



**Figure 3** In vivo intra-posterior interosseous artery fluorescein injection study showing staining across the whole width of the posterior skin of the forearm, extending from the elbow to the wrist.

ulnar artery. After passing between the chorda oblique and the interosseous membrane, the artery emerged in the deep extensor compartment of the forearm, underneath the supinator at an average distance of 7.9 cm (range: 7.4 cm–9.8 cm) from the lateral epicondyle of the humerus and 14.5 cm (range: 12.1–17 cm) from ulnar styloid. The interosseous recurrent artery originated at this level, ran proximally and was present in 91 dissections. The posterior



**Figure 4** Anatomy of the distally-based posterior interosseous artery flap with its possible arch of rotation (Jorge Castro).

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