POSTERIOR INTEROSSEOUS FLAP WITH DISTAL PEDICLE: A SERIES OF 12 CASES

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ABSTRACT

Posterior interosseous flap is an island fascio-cutaneous flap located on the dorsal forearm surface. Based on a. interossea posterior it can be lifted by a distal pedicle thanks to the anastomosis with a. interossea anterior in the wrist area. In the present paper 12 clinical cases are reported. This flap has been used to cover various interesting hand defects such as ulnar and dorsal as well as lesions in the area of the first commissural. The role of the application of this particular flap in hand reconstruction has been outlined.

Keywords: posterior interosseous flap, distal pedicle, hand defects, hand reconstruction

INTRODUCTION

The first report on the clinical application of the posterior interosseous flap belongs to Zancolli and Angrigiani (1988). In their anatomic investigation they prove a choke anastomosis between the recurrent dorsal branch of the anterior interosseous artery and the posterior interosseous artery at the level of the middle third of the posterior forearm (Zancolli and Angrigiani, 1993). This flap can reliably be transferred to different skin defects of the hand such as those created by correction of an adduction contracture of the first web space, or on the back or front of the wrist level. According to these authors, its principal advantages are that it is a thin flap with excellent circulation and that it is possible to close the donor area primarily provided the island flap is not wider than 3 to 4 cm. They use the flap to form the first commissural after correction of thumb adduction contractures. However, they do not incorporate any fascia into this cutaneous flap at all. Based on an anatomical study on dissections of fresh specimens Masquelet and Penteado (1987) consider this flap a new fasciocutaneous flap designed on the postero-lateral aspect of the forearm. It was used as a proximally based pedicled flap or as a distally based one thanks to the anastomosis at the level of the wrist, with the anterior interosseous artery and with the dorsal arch of the carpus thus employed as a fascial flap. Costa and Soutar (1988) demonstrate the vascular anatomy of the posterior interosseous artery and its contribution to the fascial plexus. They describe the number, caliber and fre-

quency of the small septocutaneous branches of the main branch of the a. interossea posterior as well as the possibility for basal location of the flap thanks to the distal anastomosis between the posterior and anterior interosseous arteries that is, however, not always persistent (Fig. 1).

![Fig. 1. Anastomosis between a. interossea posterior and a. interossea anterior](image)

The objective of the present paper was to assess the effectiveness and role of the posterior interosseous flap with a distal pedicle in cases with traumatic hand defects.

MATERIAL AND METHODS

Our clinical observations covered 12 patients aged between 25 and 49 years. They were 10 males and 2 females (Table 1). All the flaps were distally pedicled. The flap was delineated on the dorsal forearm. Its centre was near to the point between the proximal and middle third of the line from the lateral epicondyle towards the distal radioulnar joint as a. interossea posterior gave the greatest perforating branches here (Fig. 2).

After establishing the anastomosis between the posterior and anterior interosseous arteries the flap was lifted on a distal vascular pedicle (Fig. 3), rotated at 180° (Fig. 4) and thus it covered the defect (Fig. 5). Donor site was covered
by a free graft (Fig. 6). A good adaptation of the graft on the defect was achieved (Fig. 7).

Fig. 2. Ulnar defect (amputation of the fourth and fifth finger) and flap delineation

Table 1. Patients’ characteristics

<table>
<thead>
<tr>
<th>No</th>
<th>Sex</th>
<th>Age (years)</th>
<th>Localization of hand defect</th>
<th>Complications</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>male</td>
<td>33</td>
<td>dorsal effect</td>
<td>-</td>
<td>good</td>
</tr>
<tr>
<td>2</td>
<td>male</td>
<td>40</td>
<td>dorsal effect</td>
<td>-</td>
<td>good</td>
</tr>
<tr>
<td>3</td>
<td>male</td>
<td>25</td>
<td>first commissura</td>
<td>-</td>
<td>good</td>
</tr>
<tr>
<td>4</td>
<td>female</td>
<td>30</td>
<td>volar effect</td>
<td>-</td>
<td>good</td>
</tr>
<tr>
<td>5</td>
<td>male</td>
<td>46</td>
<td>dorsal effect</td>
<td>-</td>
<td>good</td>
</tr>
<tr>
<td>6</td>
<td>male</td>
<td>49</td>
<td>dorsal effect partial necrosis</td>
<td>satisfactory</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>male</td>
<td>35</td>
<td>first commissura</td>
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<tr>
<td>8</td>
<td>male</td>
<td>36</td>
<td>dorsal effect</td>
<td>-</td>
<td>good</td>
</tr>
</tbody>
</table>

Fig. 3. Lifting of the flap on distal vascular pedicle

As recommended by Buchler and Frey (1991), the indications for these flaps can be grouped into two major categories: composite injury with hand defect (ensuring the adequate coverage of remnants from amputated fingers, dorsal hand and anterior wrist defects as well) and inadequate cicatrix or contracture of the cicatrix (most commonly in the first commissural). The flap can also be applied after skin excision on the occasion of a neoplasm of the dorsal surface of the hand.

Fig. 4. Rotation of the flap at 1800 to the defect

Fig. 5. Ligation of the flap to the defect

Fig. 6. Cover of the donor site by a free flap

In one case the distal anastomosis between both interosseous arteries was absent that hampered us to lift the flap. That is why we passed to the lifting of a radial forearm flap.
RESULTS AND DISCUSSION

The survival rate of our flaps was 91.6%. A marginal necrosis occurred in one flap. After its removal a secondary granulation emerged. In another flap a complete necrosis was established due to edema and venous congestion. A debridement of the necrotic area was carried out and after the superficial granulation a free graft was placed. The posterior interosseous artery is a suitable donor vessel for harvesting autogenous arterial grafts which are often necessary for thumb or finger revascularization or replantation (3). It is a reliable procedure that brings in vascularised tissue, thereby contributing to reduced scarring of the underlying structures. It also permits immediate osteosynthesis thus avoiding the problems of external fixation (1). This flap may be used in coverage of children's limb. The diameter of the vessels is not a difficulty in the flap dissection. As the adults, the viability of the flap is excellent and allows to cover most of the skin defect of the dorsal hand or elbow (6).

In our opinion, the posterior interosseous flap deserves a particular place in the panoply of regional flaps designed to cover the hand defects. Its merits are undoubted because an insignificant artery is sacrificed only and its use warrants a qualitative and aesthetic cover. Its opportunities are, however, not significant. The small transversal dimensions determine its indications in cases with restricted defects where the radial and ulnar forearm flap could not be warranteable, e.g. on the dorsal part and on the ulnar part of the hand, in cases with defects in the first commissural and on the anterior wrist surface.

REFERENCES