SUBDIVISION OF CUTANEOUS AREA OF THE PALM: POSSIBILITY OF VASCULARIZED FLAP DONOR-SITE FOR FINGER RECONSTRUCTION.

Purpose: Recent advancements of microsurgical techniques allowed new flap innovation and surgical refinement in flap surgery. The purpose of this study was to explore vascular and neural anatomy of the palm of the hand in order to assess the possibility of vascularized flap transfers from this area. The palm including thenar, hypothenar and midpalmar region was divided into several subdivisions based on vascular and neural distribution, and potential advantages of vascularized flaps from the selected divisions are discussed.

Methods: Sixty-seven fresh frozen cadaver hands were used for this study. Fourty-seven hands were perfused with a silicone compound from the brachial artery. In the other twenty specimens, the injection was made into the selected arteries of the palm to determine skin territory supplied by each artery. The arterial pattern and size of the superficial palmar arch, superficial palmar branch of the radial artery and the common and proper palmar digital artery were examined. Connection of these arteries with the deep arterial system was recorded. The cutaneous perforating arteries and nerve branches that supply the palm were dissected, and the number, location and diameter of these branches was measured to an accuracy of 0.06 mm.

Results: Cutaneous vascularity of the thenar and hypothenar eminence was supplied by blood vessels perforating the underlying muscles or fascia. Midpalmar fasciocutaneous area including the palmar aponeurosis was nourished proximally by thin and sparse cutaneous perforators through a dense aponeurosis and distally by abundant perforating branches that arised between loose aponeurotic tissue. The palmar cutaneous area was divided into seven subdivisions based on the distribution of nutrient artery and its cutaneous territory. Of these, four subdivisions were proposed as a new vascularized flap donor-site for finger reconstruction. The radial aspect of the thenar eminence and the distal ulnar aspect of the hypothenar eminence were nourished by fasciocutaneous perforators from the superficial palmar branch of the radial artery and the ulnar palmar digital artery of the little finger and supplied by nerve branches from the superficial radial nerve and the dorsal ulnar nerve. Potential flap size from these divisions determined by selective injection technique was 4 x 3 cm and 3 x 2 cm, respectively. The other two possible flap candidates were from the radial and distal aspect of the midpalmar area. The terminal branch of the superficial palmar arch supplied the radial aspect of the midpalmar area, which was located over the ulnar half of the adductor pollicis muscle. The distal aspect was supplied by the common and proper palmar digital artery. Neural supply came from small branches of the palmar digital nerve. Possible flap size determined by the same technique was 3 x 2 cm and 2 x 5 cm, respectively. The results of anatomical measurements were demonstrated in Table 1.

Conclusion: Four new vascularized flaps may be elevated from the palm of the hand; these flaps could be transferred as reverse flow island flaps to cover finger pulp defects. These flaps are also transferrable as sensory or free flaps, possibly providing a feasible treatment option for palmar skin and soft tissue defects of the fingers.

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