



HETERODIGITAL NEUROVASCULAR ISLAND FLAP FOR VOLAR PULP DEFECTS OF THUMB

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ABSTRACT To observe the results of Littler heterodigital island flap utilized in the treatment of pulp defects of the thumb. Twenty four patients who presented to our emergency department with defects on the distal tissue of the thumb, between December 2015 and December 2017 were included in the study. Twenty of the patients were male, four were female. Mean age was 40 (range, 30-55) years. Sixteen patients had tissue defects on their right thumb and eight on their left thumb. The sensory and functional outcomes and wound healing on the receiving site were evaluated. Additionally, we determined 2-point discrimination and cortical re-orientation. In all patients, the flap was healthy and no necrosis was observed. Mobility and stability of the thumb was optimal in all cases. In 2 patients, scar tissue development was observed at the donor site, but there was no functional deterioration. Sensory examination was normal in all patients. Mean value of 2-point discrimination was determined as 7 (range, 4-10) mm's. Littler neurovascular island flap is an effective mode of treatment which re-establishes sensory ability in distal thumb injuries.

KEYWORDS : Littler, heterodigital, neurovascular, flap

INTRODUCTION

Trauma to the hand may result in soft tissue defects which cause functional loss (1). The thumb is crucial in hand function. Daily activities such as holding, gripping, opposition, circumduction and motions involving the manipulation of the hand are possible because of the unique anatomical properties of the thumb. Thus, damage to the thumb results in greater loss of function compared to the other fingers (2).

Various flaps are used to repair pulp defects of the thumb. Local V-Y flaps establish good sensory function; however, their size and transfer distance are limited (3). Neurovascular island advancement flaps can be utilized in relatively larger defects; but, they may cause dorsal skin necrosis (4). Cross-finger flaps may be used for the same purpose, but this method requires 2-step surgery (5). The Littler flap is widely used in the tip and pulp defects of the thumb because this method flawlessly restores sensory function (6).

Our aim with this study was to report the results we obtained with the Littler island flap technique in our patients.

MATERIAL AND METHOD

Twenty four patients who were admitted in our emergency department with defects on the pulp of the thumb distal to interphalangeal joint between December 2015 and December 2017 were included in the study. In all patients, a crushing trauma was the cause of defect. Among the patients, 20 were male and 4 were female, mean age was 40 (30-55). Mean duration of follow-up was 6 months. Sixteen patients had tissue defects on their right thumb and four on their left thumb. In all patients, 2-point discrimination and cortical re-orientation were determined in addition to evaluation of sensory and functional outcome and wound healing on the receiving site.

FLAP DESIGN AND DIMENSIONS

The ulnar aspect of long finger is the donor area. A digital Allen's test (7) is used to confirm perfusion of the finger adjacent to the donor finger by the contralateral digital artery that will not be divided in dissection of the flap.

The flap should include the skin of the distal segment of the donor finger nearly to the hyponychial ridge, in order both to transfer the domain of critical sensibility and to avoid occurrence of a painful neuroma at the distal end of a too proximally based flap. The most volar edge of the flap should be the digital volar midline, with darts at the interphalangeal flexion creases. The most dorsal edge of the flap should be determined by flap size requirements and may extend to the dorsal digital midline, without darts.

OPERATIVE TECHNIQUE

The palmar incisions radiate in zigzag fashion from the central palm to the bases of the flap and recipient sites. Dissection begins in the palm. The common digital artery and nerve to the flap are identified. At the bifurcation to proper digital arteries, the proper artery to the adjacent

finger is isolated. (8) Care must be taken to avoid denuding the digital artery and nerve of the small vein-bearing soft tissue loosely attached to them.

After the initial palmar dissection has verified suitability of the neurovascular anatomy for transfer, the margins of the flap are incised. The flap is elevated by sharp dissection from its distal end proximally, leaving the thin areolar layer over the extensor tendons and the flexor sheath. The dorsal branch of the proper volar digital nerve is preserved with the flap.

On reaching the proximal end of the flap, the nerve-vessel pedicle is dissected into the palm, preserving the adherent fatty areolar tissue. The identity of the proper digital artery to the adjacent finger is reconfirmed, and this vessel is then severed and ligated.



The proper digital nerve is carefully separated from the common nerve by epineurial incision using loupe magnification. The digital nerve and artery with their attendant areolar investment are thus mobilized to the central palmar rotation point from the superficial arterial arch. Beneath the zigzag flaps, a straight subcutaneous course at least 1 cm in width is prepared for the neurovascular pedicle.

The flap is transferred to the recipient site. If any tension, torsion, or kinking of the pedicle occurs, it must be corrected. The flap is sutured in place. The palmar and digital incisions are closed, taking care to ensure that the neurovascular pedicle is not compressed or kinked. The donor defect is resurfaced with a skin graft. A longitudinally oriented dressing with plaster or splint support is applied.

RESULTS

We did not observe necrosis of the flap or donor-site wound problems in any of the patients. None of the patients developed restriction of mobility or contractures in the thumb or donor finger. Only 2 of the patients developed scar tissue at the donor site without any functional loss. Four patients had cold intolerance. Sensory examination was normal in all patients. Mean value of 2-point discrimination was determined as 7 (range, 4-10) mm's. cortical re-orientation was found to be satisfactory in all patients.



DISCUSSION

The thumb plays a very important role in hand function. It is important to take any kind of measure to restore the mobility, stability, length and sensory properties of the thumb after hand trauma.

Peraut et al., reported the results of Littler flap in 2 patients who had ring avulsion trauma. Both patients were reported to have satisfactory 2-point discrimination and cortical re-orientation (9).

The primary complications of heterodigital neurovascular island flaps have been identified as: cold intolerance, low somatosensory cortical integration, and weakened sense of discrimination (10).

In a study by Hashem et al., the results of 6 patients who received Littler flaps were presented and all flaps were reported to remain healthy. Two-point discrimination was found as 8.3 mm's and 3 of the patients had cold intolerance (11).

In the present study, no flap or donor site necrosis was found in any of the patients. Two-point discrimination was found as 7 mm's and 4 patients had cold intolerance.

CONCLUSION

The Littler heterodigital neurovascular island flap is effective in treating volar pulp defects of the thumb because it can sufficiently restore distal sensory ability and help preserve crucial hand function.

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