Vol 7 | Issue 1 | Pages 570-571

Journal of Orthopedic Surgery and Techniques

ISSN: 2578-7187

Case Report

DOI: 10.36959/453/612

A Case Report of Reverse Flow of SPBRA Free Flap

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We would like to report an alternative way to harvest the free thenar flap, which is based on reverse flow of SPBRA that connects to the superficial palmar arch. This was used to resurface a middle finger pulp defect.

A 41-year-old, right handed male construction worker sustained a crush injury by a heavy metal structure to his left middle finger during his work, resulting in left middle finger crush injury. The pulp was not viable and was severely crushed. Bone was exposed, but the flexor and extensor tendon insertion were still intact, and 6 mm of nailbed was preserved. The estimated defect involved the entire pulp.

We discussed free thenar flap as a treatment option as the patient was keen for a single stage procedure. The surgery was done in Emergency operating theatre under general anaesthesia. Veins were identified using AccuVein before surgery. Post-debridement, the soft tissue defect was 2 × 3 cm, and a corresponding 2 × 3 cm free thenar flap was designed based on the SPBRA. We elevated the flap from radial aspect of thenar crease. 2 donor arteries were identified: 1) Superficial branch of radial artery; 2) One branch from superficial palmar arch.

The recipient region was debrided and irrigated, and recipient vessels were identified. The short arterial pedicle from superficial palmar arch was a good size match in comparison to the recipient ulnar digital artery. Decision was made to coapt the ulnar digital artery to the short pedicle from superficial palmar arch instead of SPBRA. End to end coaptation was done using Ethilon 11.0, and one vein was coapted to dorsocentral vein over dorsal middle phalanx of middle finger. The flap immediately pinked up and was well perfused post coaptation. The donor site over the palmar aspect was primarily sutured. Anastomosis of artery was covered with subcutaneous tissue and dressed with mepitel. It took us 7 hours to complete the operation. The middle finger along with the wrist was immobilized (5 days) to reduce postoperative pain and to help with initial wound healing. There was a small raw area over the arterial anastomosis which healed with dressings. The patient subsequently underwent flap debulking 2 months after the initial operation. He recovered well and there were no complications.

In 1971, Melone, et al. [1] described a pedicled thenar flap that was used for coverage of glabrous skin defects of the fingertips. In 1993, Kamei, et al. [2] presented the thenar free flap based on the superficial palmar branch of the radial artery (SPBRA), and was used on patients with serious finger injuries. In 1997, Omokawa, et al. [3] described the vascular and neural anatomy of the thenar area of the hand. Findings from this study showed that the SPBRA is present consistently and of rather large diameter (0.8 to 3.0 mm), suggesting that a flap containing this vessel can be transferred as a free flap. In 2009, Orbay, et al. [4] reported that there was a perforating branch that connects the terminal branch of the superficial palmar artery with the superficial palmar arch. They used the proximal pedicle (SPBRA) to raise a free thenar flap and the same cutaneous territory was raised as a reverse-island pedicled flap perfused by the distal perforator (perforating branch from superficial palmar arch).

We would like to share our experience of harvesting the free thenar flap based on the reverse flow of the SPBRA distal perforator that connects to superficial palmar arch. In our experience, the thenar region has an abundant blood supply. This same cutaneous territory is supported by branches of SPBRA, and is also supported by branches from superficial palmar arch or thumb digital arteries. However, the caliber of SPBRA tapers off sharply as many perforators branch off over the thenar region. In this case, the palmar cutaneous branch of the superficial radial artery connects to the superficial palmar arch. The length of the proximal arterial pedicle (SPBRA) is about 2 cm, and the proximal caliber of the vessel is about 1.4 mm, while the distal caliber of the vessel connected to superficial arch is about 0.7 mm. Although the distal arterial pedicle is short, its length is usually sufficient for coaptation to the digital vessel at the level of the DIPJ, and the caliber of the vessel is suitable for microsurgical anastomosis.

In order to minimize restrictive scarring during reconstruction of the pulp, we aimed to perform the coaptation near DIPJ. This reduced the need for a long pedicle, and we ligated the proximal arterial pedicle (SPBRA), allowing us to coapt the distal arterial pedicle to the stump of ulnar

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Accepted: September 09, 2024

Published online: September 11, 2024

Citation: Fang L, Lin JT (2024) A Case Report of Reverse Flow of SPBRA Free Flap. J Orthop Surg Tech 7(1):570-571

digital artery near the DIP joint. The distal arterial pedicle and ulnar digital artery were a good size match.

In Orbay's study, the distal arterial pedicle was only used to raise a pedicled reverse-island flap. Utilising the same basic principles and understanding of anatomy, we present our experience of using this distal arterial pedicle to raise a reverse flow free thenar flap. The anastomosis is more distal, but the vessel caliber and length are still satisfactory for anastomosis (Figure 1).

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DOI: 10.36959/453/612