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A fabricated chimeric SCIP flap with end-to-side anastomosis: A case report

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Abstract

Superficial circumflex iliac artery perforator flap (SCIP) is one of the most convenient flaps to cover distal extremity defects because it conceals the scar of the donor area well and can be raised as a thin or super-thin flap. In recent years, various chimeric SCIP flaps were reported, including the sartorius muscle, the lateral femoral cutaneous nerve, and the iliac bone. However, chimeric SCIP flap is sometimes difficult to be raised on one pedicle, because of the absence of communication between a skin branch and a branch to a chimeric tissue. We present a case in which end-side anastomosis of a sartorius muscle perforator to a SCIP flap pedicle is made to form a fabricated chimeric SCIP flap due to variation in the pedicle. This design aims to fill cavitary spaces and supply better perfusion for infection control.

Keywords: SCIP flap, Fabricated chimeric flap, Supermicrosurgery

Introduction

The heel and dorsum of the foot are vital in ambulation. Reconstruction of the tissue defects in these areas includes critical difficulties owing to the insufficiency of local tissue, the requirement of three-dimensional reconstruction, the presence of weight-bearing areas, and poor skin blood flow. Among the etiologies of the defects are trauma, vascular diseases, tumor excision, and osteomyelitis. Skin graft, medial plantar artery perforator flap, reverse sural artery flap and free flaps are among the alternatives of heel reconstruction. Free flaps can cope with the limitations caused by pedicled flaps [1]. Koshima et al. [2] described the superficial circumflex iliac artery-based perforator flap (SCIP) in 2004. SCIP flap has become popular in various reconstructive approaches due to a longer pedicle compared to the free groin flap and concealable donor flap. Particularly, it is one of the most beneficial flaps in the reconstruction of distal extremity soft tissue defects. In the literature, there are certain variations of the SCIP flap, such as the super-thin SCIP flap, SCIP flap sensitized by the 12th intercostal nerve, supercharge SCIP flap using intercostal artery perforator flaps, vascularized iliac bone use with SCIP flap, and vascularized inguinal lymph nodes combined with SCIP flap [3, 4]. We present the fabricated chimeric SCIP flap that is used in the reconstruction of heel defects. The end-to-side anastomosis of the free sartorius muscle flap perforator to the SCIP flap pedicle by super microsurgical technique makes this case unique.

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Case presentation

A fourteen-year-old male patient who was paraplegic due to meningomyelocele was admitted to our clinic for a tissue defect because of an atonic wound. Written consent was obtained from the patient's parents. Laboratory studies revealed the following values: Hemoglobin: 10.4 mg/dl, WBC:12960, CRP:75.2. There was a tissue defect of 3x2 cm on the calcaneus bone, which could also be seen in the inspection (Figure 1). MR imaging showed osteomyelitis in the talus, tarsal bones, and tenosynovitis in the tibialis posterior and flexor digitorum longus muscles (Figure 2). Doppler USG revealed normal arterial and venous blood systems. Reconstruction with SCIP flap was scheduled due to the absence of infection signs in the bone and soft tissue, which were seen during the last tissue debridement.

Surgical technique

The first surgical marking was done from the pubic tubercle to the ASIS. The second marking was made parallel to this line and 2.5 cm long. Afterward, the superficial circumflex iliac artery (SCIA) perforators were marked on the skin with 8 MHz hand Doppler USG. First, the superficial branch of SCIA and its accompanying branch were dissected by a medial skin incision. Then a deep branch of SCIA, located below the deep fascia, and the accompanying vein were dissected until the sartorius muscle, guided by the previous medial skin incision. A 5x3cm muscle segment was elevated by keeping the perforator in the middle. A 6x4cm SCIP skin flap was dissected from lateral to medial and superior to inferior above the fascia. Deep branch-based sartorius muscle flap SCIA and superficial branch-based skin flap SCIA were elevated separately due to shortness of the common trunk (less than 2 mm) in the dissection of both the deep and superficial branches until the femoral artery (Figure 3). The diameter of the superficial and deep branches of SCIA were about 2 mm and 0.4 mm, respectively. The end-to-side anastomosis of the deep branch to the superficial branch was performed by 10/0 polypropylene sutures (Figure 4). The superficial branch of SCIA, which was the pedicle of the chimeric flap, was sutured with the medial plantar artery and vein with 9/0 polypropylene sutures. The anastomosis line was covered with STSG above to prevent vascular suppression which could occur postoperatively due to flap congestion. Leech treatment was performed for the venous congestion that occurred on the first postoperative day. On the third postoperative day, the venous congestion had completely regressed. In the third and fourth postoperative weeks, full weight-bearing, and ambulation were allowed, respectively (Figure 5).

Figure 1: Preoperative view. A 14-year-old male patient sustained a 4x3 cm^2 soft tissue defect over his right heel

Figure 2: MR imaging which shows osteomyelitis in the talus, tarsal bones, and tenosynovitis in tibialis posterior and flexor digitorum longus muscles

Figure 3: A schematic illustration of the intraoperative vascular variation (left), A schematic illustration of the anastomoses (right)

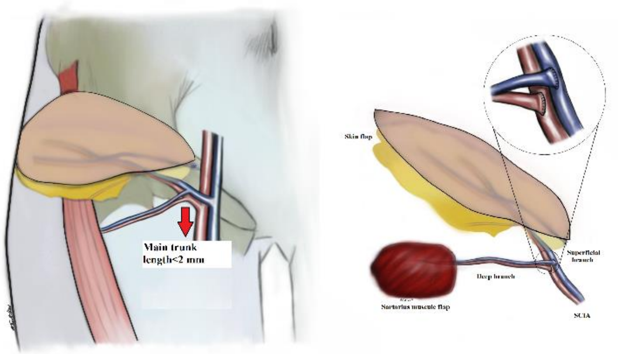

Figure 4: An intraoperative view showing the end-to-side anastomosis

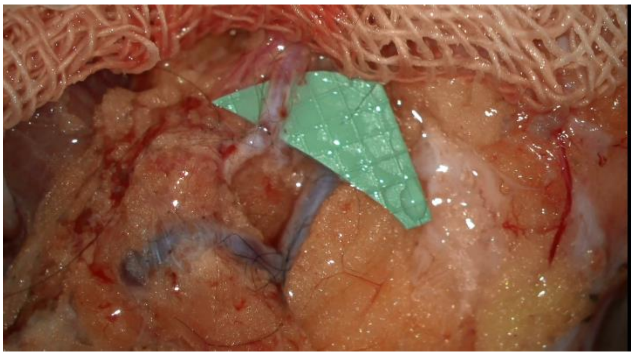

Figure 5: View of the right heel reconstructed by fabricated chimeric SCIP flap in the 3rd postoperative week

Discussion

The aim in the reconstruction of the weight-bearing areas like the heel is to restore normal foot outline, provide a sufficient amount of soft tissue, and choose an appropriate donor area. Free flaps are the best choices for defects of more than 3 cm and when local flaps cannot be used [1].

Free muscle flaps performed on the defects that originated after osteomyelitis are resistant to infections. Buona et al. [5] have shown that fasciocutaneous flaps have provided 84.6% recovery in infection markers whereas this rate was 90.9% in muscle flaps. Also, muscle flaps minimize the risk of nonunion of fractures within the defects that occur after fractures. Another advantage of muscle flaps is that they prevent ulceration that can occur afterward by increasing the volume in the weight-bearing areas. Free muscle flaps that are used in heel reconstruction are rectus abdominis muscle skin flap, latissimus dorsi muscle skin flap, chimeric anterolateral thigh flap, and chimeric SCIP flap [1,4]. In this case, we aimed to treat osteomyelitis damage with the muscle flap. The most significant factor in choosing free flaps in the pediatric population is the growth retardation that flaps can cause rather than the donor site morbidity. For instance, the use of rectus abdominis and latissimus dorsi muscle flap in the pediatric population can cause scoliosis in the future. Therefore, perforator flaps are more preferable in pediatric patients. However, muscle atrophy and nonfunction may occur during the intramuscular dissection of the perforator [6]. SCIP flap is safer in the pediatric population because intramuscular dissection is not performed, and scar tissue is in an area that does not impede the growth of extremity. In the chimeric SCIP flap in our case, the use of sartorius muscle with the skin island caused minimal functional morbidity. Although a SCIP flap has many advantages, its pedicle often has variations. Berish et al. [7] have indicated that the superficial branch of SCIA may be occasionally hypoplastic or aplastic. However, the deep branch is almost always present. In their study on ten cadavers, Yoshimatsu et al. [8] have shown that the distance between the origin and bifurcation of the SCIA was 2 mm in four cadavers. If the distance between the origin and bifurcation points of SCIA is less than 2 mm, flaps should be transferred separately not to risk the safety of the anastomosis. In recent years, the difficulties in reconstruction are surpassed by the novel techniques in super microsurgery. Anastomosis in vessels below 0.8 mm in diameter, such as perforator-perforator anastomosis, can be performed. As in this case, super microsurgical anastomosis techniques are used in cases where anatomic fabricated chimeric flaps will be created. Chimeric flaps are divided into four types defined by Kim et al. [9] Type 1: Classical Chimerism, Type 2: Anastomosis Chimerism, Type 3: Perforator Chimerism and Type 4: Mixed Chimerism. The advantages of chimeric flaps include three-dimensional reconstruction, acceptable aesthetical appearance, and diminished donor area morbidity. The disadvantages are an increased number of anastomoses, variations in the perforators, and second venous drainage need. Type 2 chimeric flap studies are limited in the literature. Kim et al. [10] described jejunum and Latissimus Dorsi flap, jejunum and ALT flap, ALT and lateral arm flap. Huang et al. have formed a chimeric medial femoral condyle with an end-side anastomosis. In our case, classic chimerism was planned first, then the type 2 chimeric flap was decided on intraoperatively due to the pedicular variation.

Conclusion

Anatomic variations which may be encountered during the creation of chimeric flaps can be managed by super microsurgical methods. This case is essential because it presents a new technique with the use of perforator-to-perforator end-side anastomosis.

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References

1. Fox CM, Beem HM, Wiper J, Rozen WM, Wagels M, Leong JC. Muscle versus fasciocutaneous free flaps in heel reconstruction: systematic review and meta-analysis. Journal of reconstructive microsurgery. 2015;31(01):59-66.
2. Goh TL, Park SW, Cho JY, Choi JW, Hong JP. The search for the ideal thin skin flap: superficial circumflex iliac artery perforator flap—a review of 210 cases. Plastic and Reconstructive Surgery. 2015;135(2):592-601.
3. Iida T, Narushima M, Yoshimatsu H, Yamamoto T, Araki J, Koshima I. A free vascularised iliac bone flap based on superficial circumflex iliac perforators for head and neck reconstruction. Journal of Plastic, Reconstructive & Aesthetic Surgery. 2013;66(11):1596-9.
4. Yamamoto T, Saito T, Ishiura R, Iida T. Quadruple-component superficial circumflex iliac artery perforator (SCIP) flap: A chimeric SCIP flap for complex ankle reconstruction of an exposed artificial joint after total ankle arthroplasty. Journal of Plastic, Reconstructive & Aesthetic Surgery. 2016;69(9):1260-5.
5. Buono P, Castus P, Dubois-Ferrière V, Rüegg EM, Uçkay I, Assal M, et al. Muscular versus non-muscular free flaps for soft tissue coverage of chronic tibial osteomyelitis. World Journal of Plastic Surgery. 2018;7(3):294.
6. Yamamoto T, Yamamoto N, Kageyama T, Sakai H, Fuse Y, Tsuihiji K, et al. Definition of perforator flap: what does a "perforator" perforate? Global Health & Medicine. 2019;1(2):114-6.
7. Flaps G, Strauch B, Yu H-L, Chen Z-W, Liebling R. Atlas of microvascular surgery: anatomy and operative approaches. New York: Thieme Medical Publishers. 1993:120-2.
8. Yamamoto T, Yamamoto N, Kageyama T, Sakai H, Fuse Y, Tsuihiji K, et al. Supermicrosurgery for oncologic reconstructions. Global Health & Medicine. 2020:2019.01019.
9. Kim JT, Kim YH, Ghanem AM. Perforator chimerism for the reconstruction of complex defects: a new chimeric free flap classification system. Journal of Plastic, Reconstructive & Aesthetic Surgery. 2015;68(11):1556-67.
10. Huang YC, Loh CYY, Lin CH, Lin YT, Hsu CC. Intraflap anastomoses for separated bone and cutaneous pedicle vascular anomaly in a chimeric medial femoral condyle flap. Microsurgery. 2017;37(8):954-5.

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