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CASE REPORT

Partially failing ALT flap salvaged using its own distal run-off vessel

Kao-Ping Chang [a,b,*], **Chung-Sheng Lai** [a,b]

[a] *Division of Plastic and Reconstructive Surgery, Department of Surgery, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan*
[b] *Department of Surgery, Faculty of Medicine, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan*

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KEYWORDS
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Abstract This case report presents salvage of a partially failing anterolateral thigh flap. A 37-year-old male, a victim of head and neck squamous cell carcinoma, received tumor ablation and a chimeric anterolateral thigh skin and vastus lateralis muscle flap reconstruction. Before ligation of pedicle, both skin and muscle portions had robust blood supply; however, only the vastus lateralis muscular component remained revascularized rather than the skin paddle with some underlying muscle 30 minutes after patent microanastomosis with recipient vessel. The skin paddle flap was then salvaged by perfusion from a new anastomosis between the distal run-off of the pedicle artery and the perforator artery of this skin flap. From this experience, we recommend to preserve longer distal run-off of the pedicle in chimeric anterolateral thigh flap harvest for necessary "self-revascularization" in similar cases.

Introduction

Free flap failure can happen as a consequence of various etiologies, such as donor vascular intima injury, recipient vessel atherosclerosis, internal anastomotic disturbance, and external anastomotic compression. Most of the flap failure involves the entire flap, but some can be partial, especially in muscle perforator flap. Partial free flap failure can sometimes be more confusing than total failure. It has several disadvantages, such as unknown etiology, violated potential recipient site, and the extenuating risk of undertaking a mandatory second free flap [1].

This article presents a case of salvaging a partially failing anterolateral thigh flap using its distal run-off artery with patent microanastomoses to the recipient vessels.

* Corresponding author. Division of Plastic and Reconstructive Surgery, Kaohsiung Medical University Hospital, 100 Shih-Chuan 1st Road, Kaohsiung 807, Taiwan.
E-mail address: kapich@kmu.edu.tw (K.-P. Chang).

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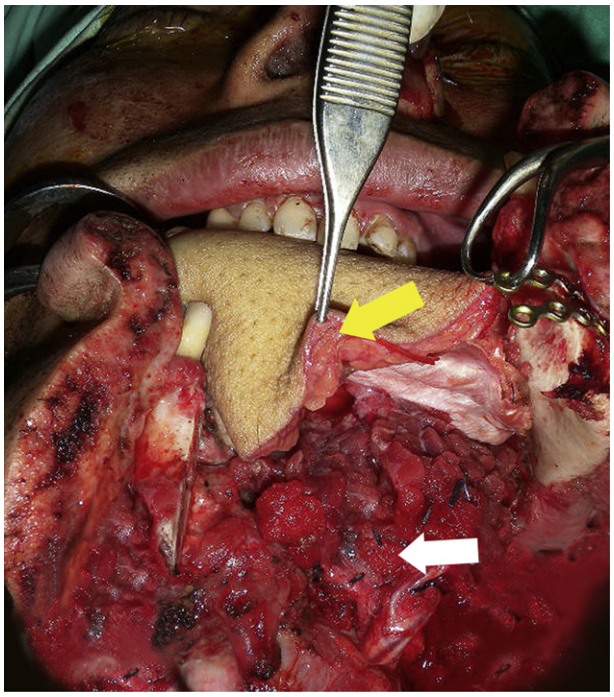

Figure 1. Only vastus lateralis muscular bulk (white arrow) remained well revascularized 30 minutes after patent microanastomoses, but the skin paddle and underlying muscle tissue (yellow arrow) turned pale with ischemic appearance.

Case report

A 37-year-old male, a victim of head and neck squamous cell carcinoma, received tumor ablation and simultaneous free flap reconstruction. After ablative excision, an anterolateral thigh flap with vastus lateralis muscle was harvested in a chimeric fashion based on a common source vessel-descending branch of the circumflex femoral vessels. Before ligation of the pedicle, both skin and muscle portions had robust blood supply. Immediately after microanastomosis to the recipient vessel (superior thyroid artery and external jugular vein), both portions of this chimeric flap regained reperfusion well. However, only vastus lateralis muscular bulk remained revascularized (Fig. 1, white arrow) rather than the skin paddle with its underlying muscle (Fig. 1, yellow arrow) after 30 minutes have passed.

At that time, primary thrombosis at the anastomotic site was ruled out due to the well-revascularized vastus lateralis muscular component. In order to salvage the failing skin flap, we used the distal run-off artery of the source vessels to anastomoses with the divided perforator artery of the skin paddle in an end-to-end fashion (Fig. 2). The skin flap regained circulation and survived totally (Fig. 3). Owing to only arterial thrombosis being present in this case, we performed no procedure for distal run-off veins.

Discussion

Most flap failure research has focused on primary thrombosis and thrombotic occlusion at the site of vessel anastomosis [2—7]. However, according to Acland et al.'s study [8—10], significant emboli disturbances of capillary perfusion were divided into two distinct risk zones (I, anastomotic site; II, microcirculation) after microsurgical procedures. In their reports, after release of vascular clamps, risk zone I was at highest risk of occlusion and, then, microemboli continually showered the distal microcirculation (risk zone II) for the following hours. Therefore, occlusion at Acland's risk zones I and II was responsible for clinically primary and secondary thrombosis, respectively. Immediately after release of the microvascular clamps and restoration of blood flow, primary thrombosis is at greatest risk to occur. Even in the absence of total occlusion on the anastomosis site, however, the anastomosis serves as the source to cause secondary thrombosis. Weinzweig and Gonzalez [11] reported that it could be developed as short as 1 hour after restoration of blood flow; however, Acland et al. [8] found such emboli were clearly observed during the 1st 30 minutes after clamp release. This might explain be why our case showed a patchy flap ischemia gradually after 30 minutes of patent perfusion.

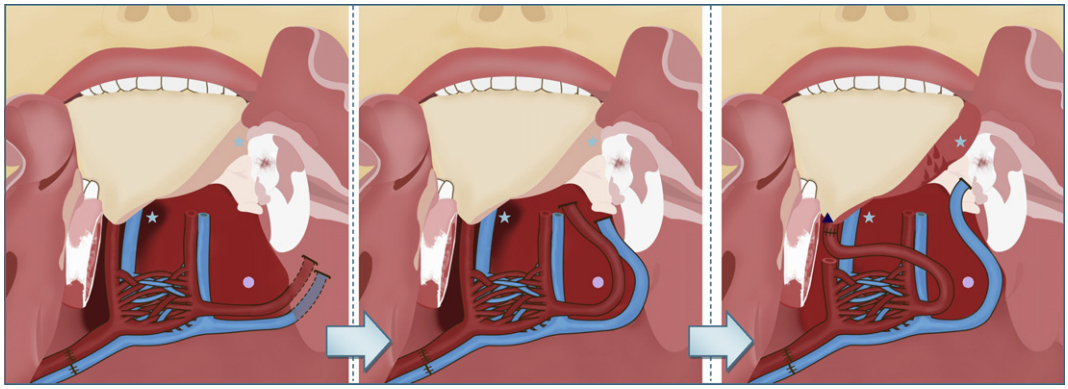

Figure 2. The distal run-off artery of flap source vessels was then used to revascularize the ischemic skin paddle to the divided perforator artery in an end-to-end fashion. There was no extra procedure for the distal run-off veins. ●, well-vascularized vastus lateralis muscle. ★, skin paddle which revealed pale appearance initially and turned bleeding post-revascularization with its distal run-off artery. ▲, secondary anastomosis between the distal run-off artery of flap source vessels and the divided perforator artery in an end-to-end fashion.

Figure 3. The flap survived totally: the appearance of the flap on the 10th postoperative day.

Our case demonstrated that this entire chimeric flap resumed abundant blood flow immediately after successful microanastomosis between the pedicle and recipient vessels. However, after 30 minutes had passed, only the vastus lateralis muscle remained vascularized rather than the skin paddle, which showed a pale and ischemic appearance. The viability of vastus lateralis muscle directly proved the microvascular patency to rule out primary thrombosis formation. In such a possible secondary thrombosis situation, simultaneous secondary free flap could be taken into consideration, but it imposed additional suffering to the patient which included another donor site morbidity, one more unpredictable flap risk, and longer anesthesia time. At that time, we found that the diameter of the distal run-off of the pedicle artery was approximately equal to the middle part of the perforator artery to the ischemic skin flap, and the length of the distal run-off artery was long enough to reach the perforator artery. Therefore, we used this distal run-off end of the pedicle artery to serve as a second recipient site as "self-revascularization" to divided perforator artery of the skin flap in an end-to-end fashion.

Although some authors [12,13] reported some "first aid" techniques available to salvage failing flaps, including administration of heparin and recombinant tissue plasminogen activator [14], they were used primarily for improving venous thrombosis, not for arterial thrombosis. Therefore, these solutions might not work as well as the method we used to resolve this situation.

In our case, there were still some other possible etiologies, such as insidious pedicle injury during flap harvest, microthrombi formations before anastomosis, stasis in "choke" vessels, and progressive subendothelial damage due to prolonged ischemia—reperfusion injury [5] except for possible secondary thrombosis.

Conclusion

The failing chimeric anterolateral thigh flap can be salvaged with arterial perfusion of the perforator vessels to the skin paddle by the distal run-off of the flap source artery. Therefore, during flap harvest, preservation of a longer distal source vessel is recommended for possible self-revascularization in similar cases.

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