

REVERSED-FLOW SUPERIOR THYROID ARTERY: AN ALTERNATIVE RECIPIENT VESSEL IN HEAD AND NECK RECONSTRUCTION

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In neoadjuvant intra-arterial infusion chemotherapy patients, the common recipient arteries are frequently damaged owing to preoperative chemotherapy-induced intima injury. When antegrade arterial inflow to the free flap is not available, end-to-side carotid arterial anastomosis or exploration of another recipient artery may be an appropriate solution. However, reversed arterial flow is an alternative to such a situation. We report a case with squamous cell carcinoma on the right buccal area, which was successfully reconstructed using a free anterolateral thigh flap with reverse superior thyroid arterial inflow. This alternative method might shorten the operation time and also reduce further exploration injury in the operation field.

Key Words: anterolateral thigh flaps, head and neck reconstruction, reverse artery flow
(*Kaohsiung J Med Sci* 2008;24:598–601)

Preoperative neoadjuvant intra-arterial infusion, followed by wide excision and free anterolateral thigh flap reconstruction, is commonly performed in our institute for head and neck cancer patients [1–3]. However, patients receiving intra-arterial infusion may suffer from intima injury or even further arterial occlusion. The most commonly used arteries for chemotherapy are the facial artery and superior thyroid artery, which are also commonly used recipient arteries for free flap reconstruction. This has necessitated end-to-side anastomosis to the carotid artery [4] or exploration of another recipient artery, such as the ipsilateral transverse cervical artery or contralateral recipient arteries [5]. Further exploration of the vessel will add one more wound and may require vein grafts, which prolong

the operation times. This is laborious compared with end-to-end anastomosis to the branch artery. We report a case using reversed flow of the superior thyroid artery for free anterolateral thigh flap reconstruction. After appropriate anastomosis, the flap was viable and the patient was discharged 7 days after the procedure.

CASE PRESENTATION

A 50-year-old man presented with a right-side buccal cancer. He received neoadjuvant intra-arterial infusion chemotherapy with methotrexate 50 mg/day for 10 days about 1 month before the operation. After wide excision of the buccal cancer and modified radical neck dissection by the Oral and Maxillofacial Surgery team, plastic surgeons took over for reconstruction. The inner lining defect was 5 × 4.5 cm, and the outer lining defect was 8 × 7 cm. A fasciocutaneous anterolateral thigh flap was planned to cover the operative defect. The skin island was 8 × 15 cm. Neck exploration revealed an acceptably sized superior thyroid artery



ELSEVIER

Received: Mar 4, 2008 Accepted: May 26, 2008
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and internal jugular vein. After clamping the distal superior thyroid artery and controlling bleeding with a microsurgical clamp over the proximal side, we found no antegrade flow. Fortunately, we observed an adequate reversed flow incidentally when the clamp was temporarily released. The anastomosis was then performed between the pedicle of the flap and the reverse flow of the superior thyroid artery and the internal jugular vein. The anastomosed anterolateral thigh flap showed adequate blood flow, manifested by bleeding from the flap margin and accompanying veins, one of which was anastomosed end-to-side to the internal jugular vein. Final inseting of the flap was performed. The postoperative course was uneventful and the patient was discharged 7 days after the procedure.

DISCUSSION

In our institute, neoadjuvant intra-arterial infusion chemotherapy following wide excision of the cancer and reconstruction is a standard protocol for advanced oral cancer cases [1,2]. When implanting the intra-arterial infusion port system, catheter insertion is performed from a preauricular incision through the superficial temporal artery retrograde to the external carotid artery up to the level of the facial artery, lingual artery or superior thyroid artery, according to the cancer location [6] (Figure). However, one of the intra-arterial infusion chemotherapy complications is intima injury around the catheter tip area. This causes a lack of antegrade flow vessels in the case of microvascular free flap reconstruction.

Microsurgical reconstruction of the head and neck is based on free flap transfer and flap pedicle anastomosis with an appropriate recipient vessel. The most commonly used recipient vessels are the branches of bilateral external carotid artery systems, the internal jugular and the external jugular veins. In general practice, observation of continuously pulsating arterial spurting from an antegrade arterial stump has been considered to be a reliable sign of adequate arterial flow to supply the free flap [7]. Thus, this spurting of the stump from the reverse flow of superior thyroid artery can be regarded as a suitable recipient vessel as well. The use of the distally based reverse-flow skin flaps and muscle flaps is widely accepted for resurfacing the upper extremity [8] or distal lower extremity [9,10]. Furthermore, the use of a reversed arterial

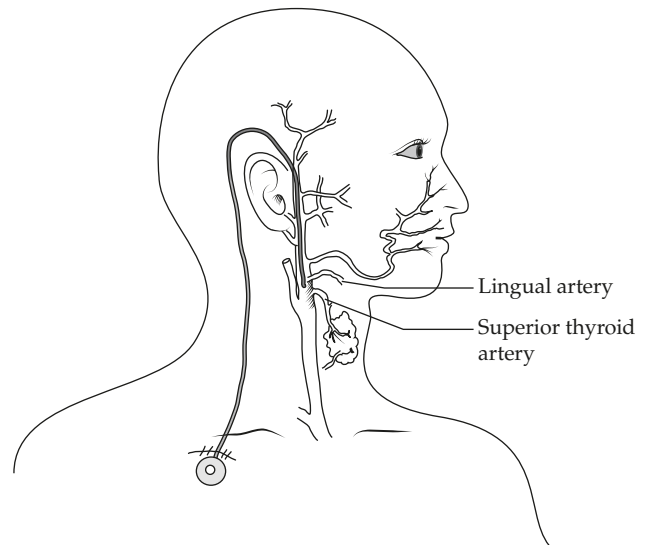


Figure. Catheter route of intra-arterial infusion chemotherapy. The tip was located between the lingual artery and the superior thyroid artery; this will cause intima injury and artery stenosis or even occlusion.

flow in the free flap for leg reconstruction has also been reported [7,11].

Several authors have reported that reverse flow is workable. Hallock reported that the blood flow in the reversed flap runs from the distal flap regions to the proximal regions by means of the communicating arches in the arterial system [9]. Lin et al [8] stated that no significant change takes place in the pressure and blood flow in the radial artery of the reverse forearm flap after ligation of the proximal end. However, Neligan et al [12] revealed that the reverse flow arterial pressure is reduced by 40%. The major blood supply to the thyroid gland is from the bilateral superior and inferior thyroid arteries, and all the arteries anastomose with each other over the surface of the gland [13]. Thus, reversed superior thyroid arterial flow is able to nourish the free flap. According to the above theory, we reconstructed this case using reverse flow as recipient vessel.

We seldom have difficulties in the selection of appropriate recipient arteries for microvascular free flap reconstruction in the head and neck area, because many sizable branches of the bilateral external carotid artery and transverse cervical artery are available. However, this results in longer operation time and creates another wound, possibly even requiring the harvesting of vein grafts. End-to-side arterial anastomosis to the external carotid artery is an option, but it

is toilsome compared with end-to-end anastomosis. Furthermore, the external carotid artery was almost immobile and the space on the operative site was limited because the mandible and submandibular gland are obstacles [4]. We introduce this alternative method to reduce operation time and minimize wound exploration in cases who received neoadjuvant intra-arterial infusion chemotherapy.

Okazaki [4] described the following risk factors for arterial thrombosis in microvascular anastomosis: previous surgery, therapeutic irradiation, severe arteriosclerosis, marked arterial spasm and atrial fibrillation. Based on our observations, we can add one more risk factor, namely intra-arterial infusion chemotherapy. Neligan et al [12] indicated that under the condition of vessel caliber mismatch and kinking of the pedicle, reverse flow may be a useful option. When antegrade flow is obstructed, reverse flow technique is also applicable.

Reversed arterial inflow can be an alternative treatment for patients in whom the vessel intima injury is located in the proximal superior thyroid artery scheduled to be the recipient vessel; we can check if the reversed flow of artery is adequate and initiate reconstruction without any further recipient vessel exploration.

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逆流性上甲狀腺動脈：頭頸部腫瘤切除術後 重建接受區供血動脈的另一選擇

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利用前外側股皮瓣來修復頭頸部腫瘤切除後組織的缺損為目前重建手術的主流。但是在術前合併動脈內化學治療的患者，常因化學治療造成血管內皮受損，使得接受區供血動脈阻塞。當這些順流的供血動脈無法使用時，吾人常用頸動脈端一側吻合術或探查另一供血動脈來重建。然而，利用逆流性動脈是另一項可以選擇的方法。我們成功的使用前外側股皮瓣來重建一位右側鱗狀細胞頰癌切除術後的患者，並且使用的供血動脈為逆流性上甲狀腺動脈。因此這種替代方法可以減少手術時間及減少探查血管的傷害。

關鍵詞：前外側股皮瓣，頭頸部腫瘤切除術後重建，逆流性動脈
(高雄醫誌 2008;24:598-601)

收文日期：97年3月4日

接受刊載：97年5月26日

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