Microvascular free tissue transfer is one of the most common techniques for reconstruction of complex head and neck surgical defects. The selection of suitable recipient vessels for microvascular anastomosis is crucial for successful free tissue transfer. Generally, venous thrombosis is more likely to occur than arterial thrombosis in vascular anastomosis. Therefore, it is necessary to choose recipient veins carefully. Internal and external jugular veins are usually available for use as recipient veins in head and neck reconstruction. The internal jugular vein has several advantages over the external jugular vein. For example, it has multiple branches, which are suitable and easy to use for end-to-end anastomosis, thereby increasing the freedom in deciding anastomotic position and caliber. Moreover, several studies have shown that venous thromboses are less likely to occur in the internal jugular vein than in the external jugular vein.\(^1\,^2\) Given these advantages, the internal jugular vein tends to be selected over the external jugular vein in head and neck microvascular reconstruction. However, internal jugular vein thrombosis has also been reported to occur after functional neck dissection, and thus its use is not free of problems.\(^3\) Here, we present 2 cases of free flap survival despite internal jugular vein thrombosis following microvascular head and neck reconstruction, in which the external jugular vein was selected as the recipient vein.

**CASE REPORT**

**Case 1**

A 69-year-old woman with a hypopharyngeal mass was diagnosed with T4aN0M0 squamous cell carcinoma and underwent total laryngopharyngoesophagectomy and bilateral functional neck dissection. Immediate reconstruction was performed with a free jejunal flap with 2 anastomosed veins: 1 to the left internal jugular vein in an end-to-side manner and the other to the left external jugular vein in an end-to-end manner (Fig. 1). A small segment of the jejunum was exteriorized through the neck incision to monitor flap viability. On postoperative day 7, computed tomography (CT) images revealed complete thrombosis of the left internal jugular vein, including the anastomosed site, although the monitoring flap seemed viable, apparently because the external jugular vein had been patent as the drainage vein (Fig. 2). On postoperative day 11, the wound was explored due to pharyngeal fistula. The complete thrombosis of the left internal jugular vein was confirmed (Fig. 3), but the free jejunal flap survived completely.

**Case 2**

A 78-year-old man with a hypopharyngeal mass was diagnosed with T4aN2bM0 squamous cell carcinoma and underwent total laryngopharyngoesophagectomy and bilateral functional neck dissection. The defect was reconstructed with a free jejunal flap, and venous anastomosis...
mosis was performed with the left external jugular vein in an end-to-end manner. The monitoring segment of the jejunal flap was exteriorized through the neck incision. On postoperative day 18, CT images revealed complete thrombosis of the left internal jugular vein (Fig. 4). However, the free jejunal flap had survived during the entire postoperative course because the external jugular vein was patent as the recipient vein.

**DISCUSSION**

Several studies have compared the reliability of the internal and external jugular veins as recipient veins in head and neck reconstruction. Some of these studies reported a lower rate of thrombosis with the internal jugular vein, and many surgeons believe that the internal jugular vein is more reliable. On the other hand, recent studies, including a systematic review, showed no significant difference in the rate of thrombosis between the internal and external jugular veins. After neck dissection, the external jugular vein is occasionally dissected extensively and seems unreliable as a recipient vein. However, in most cases, the internal jugular vein maintains its large diameter and rich blood flow. The internal jugular vein is also suitable for end-to-end anastomosis when a branch exists, and end-to-side anastomosis with freedom regarding the anastomosis site and size, even in the absence of branches. This would indicate a preference for the internal jugular vein over the external jugular vein as the recipient vein.

Although previous studies have reported a relatively high thrombosis rate (eg, 25%) of the internal jugular vein after functional neck dissection, recent studies have reported a moderate total occlusion rate. Although
internal jugular vein flow after functional neck dissection decreases in the early postoperative stage, the flow normalizes with the passage of time. Therefore, although the internal jugular vein is rarely occluded completely, the risk for free flap failure caused by internal jugular vein thrombosis remains.

Here, we reported on 2 cases of internal jugular vein thrombosis diagnosed by postoperative CT after microvascular head and neck reconstruction. In our cases, the external jugular vein was used as the recipient vein alone or in combination with the internal jugular vein. If only the internal jugular vein had been used for anastomosis, the free flap transfer might have failed. Therefore, we believe that the external jugular vein is still a workhorse in head and neck microsurgical reconstruction. Quraishi et al. described several possible factors contributing to internal jugular vein thrombosis, for example, the compression by a bulky pedicled musculocutaneous flap, thrombophlebitis secondary to the oropharyngeal infection, radiation therapy; and intraoperative factors such as the length of the procedure or estimated blood loss. However, it is still difficult to predict the occurrence of internal jugular vein thrombosis before the surgery. Moreover, as shown in the previous reports by Chung et al. and Li et al. in most cases, the external jugular vein can be preserved during neck dissection. Therefore, when considering the possibility of flap failure due to internal jugular vein thrombosis, we believe it is better to perform multiple vein anastomoses with 2 different venous systems (eg, internal and external jugular systems as seen in our case 1) than with the same venous system (eg, multiple end-to-side anastomoses with the internal jugular vein). Microsurgeons should recognize the possibility of internal jugular vein thrombosis after functional neck dissection and adopt a procedure that increases the success rate of microvascular reconstruction.

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