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CASE REPORT
Reconstructive

The Transverse Facial Artery as a Recipient Artery in Neuroplastic Surgery Microvascular Reconstruction

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Summary: Microvascular reconstruction in the craniofacial region is particularly challenging due to a paucity of adequate recipient vessels. The facial vessels are commonly utilized; however, in neurocranial reconstruction, the distance from the defect to the vessels may require the use of interposition vein grafts. The superficial temporal vessels, which have the benefit of closer proximity, are often compromised or injured in patients with previous neurosurgical procedures or radiation therapy. Here, we describe the use of the transverse facial artery as a recipient for a latissimus dorsi free flap for scalp reconstruction in a 63-year-old man with a compromised scalp from multiple surgeries and radiation therapy for glioblastoma multiforme. The patient had extensive scarring, temporalis muscle wasting, thinning of the overlying scalp, and notable alopecia. On surveillance imaging, he was found to have an area on the brain concerning for tumor recurrence, for which a surgical biopsy was recommended, with a significant risk of postoperative wound healing complications. We present the use of the transverse facial artery in this case as a recipient artery for free flap reconstruction of the scalp. *(Plast Reconstr Surg Glob Open 2022;10:e4577; doi: 10.1097/GOX.0000000000004577; Published online 11 October 2022.)*

Microvascular reconstruction of the scalp and/or cranium is often necessary to provide tissue coverage, reestablish brain protection, restore adequate intracranial circulation, and facilitate patient recovery. The superficial temporal artery (STA) is a reliable and safe recipient artery and is commonly utilized.[1] The STA has a diameter ranging from 0.8 to 1.5 mm, which makes it a reasonable size match for the thoracodorsal artery (0.5 to 2 mm diameter) supplying the latissimus dorsi free flap.[2,3] Even so, the thoracodorsal artery (and especially the vein) is often significantly larger than the STA, particularly when the flap is harvested with a longer pedicle. In cases where the STA is unavailable due to inadequate flow, short length, size mismatch, or injury due to previous surgery, the facial vessels or more proximal neck vessels are used. This may require additional vein grafts or extended flaps reaching into the preauricular region for free tissue transfers to the upper craniofacial vault. This increases the number of microvascular anastomoses needed, and thereby the case duration, complexity, and risk of complications.[4,5]

The transverse facial artery (TFA) is a branch of the STA originating from the external carotid artery bifurcation. It perfuses the lateral facial muscles, facial nerve, parotid gland, and skin (Fig. 1).[6–8] The vessel courses ventrally for a total length of 51.9 mm and has an average diameter of 1mm, ranging from 0.4 to 2.2 mm.[6,7] Thus, in patients where the TFA is present and of adequate vessel caliber, understanding the size and anatomy of the artery can be very helpful when considering free tissue transplants. Despite this, there is a paucity of reports in the literature describing this option. Here, we describe a case of a patient with glioblastoma multiforme (GBM) who underwent scalp reconstruction using a latissimus dorsi free flap anastomosed to the TFA with no complications.

CASE REPORT

The patient is a 63-year-old man with a history of GBM who was found on screening magnetic resonance imaging to have a lesion on his left temporal lobe concerning for tumor recurrence. He had been diagnosed with GBM 5 years before presentation and underwent surgical resection, radiotherapy, and chemotherapy. He was also enrolled in a clinical trial for a transcutaneous device that creates tumor treating electrical fields to disrupt cancer cell divisions.[8] Although the treatment had excellent outcomes, he had multiple areas of scalp compromise at the treatment sites, which limited local flaps in any future scalp reconstruction. Given the possibility of tumor recurrence, surgical biopsy of the new lesion was recommended with neuroplastic surgery consult for scalp and cranial reconstruction.

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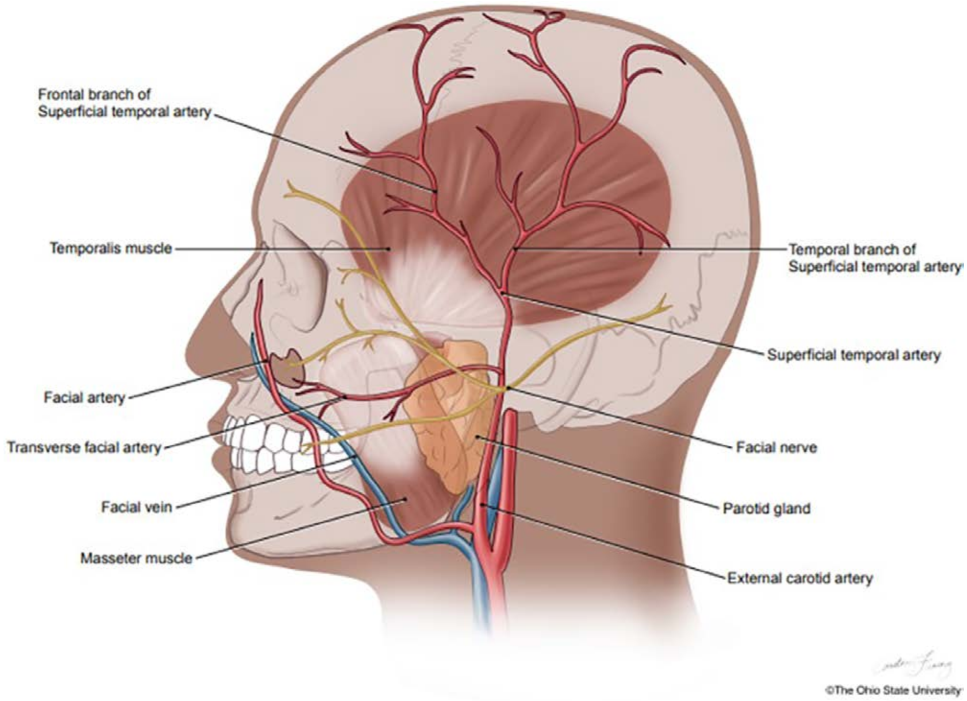

Fig. 1. Illustration demonstrating the TFA, which branches from of superficial temporal artery.

On examination, the patient presented with a widened scar over the left temporoparietal region in his previous pterional approach scalp incision, atrophy of the left temporalis major muscle, and device-related pressure ischemia resulting in patchy alopecia and thinned scalp.

Clinical history and evaluation suggested the need for scalp and cranial reconstruction with free tissue transfer after possibly recurrent brain tumor resection to avoid postoperative healing problems. A computed tomography (CT) scan with 3D reconstruction was performed to evaluate bone structures and hardware preoperatively (Fig. 2). Preoperative CT angiography was also performed which showed the bilateral STA, with truncation of the left vessel superior to the zygomatic arch. The bilateral TFA were also visualized and measured 1.5 mm in diameter. After discussing flap alternatives, a latissimus dorsi free flap was performed for scalp reconstruction.

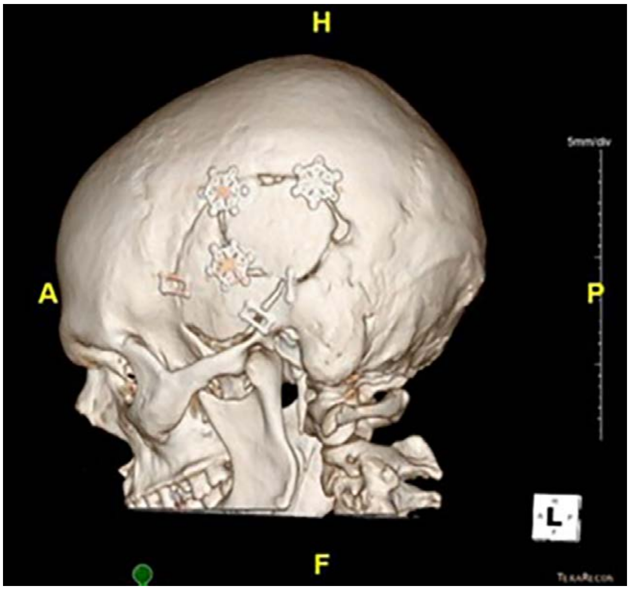

Fig. 2. Preoperative CT with 3D reconstruction showing the previous craniotomy site and reconstruction hardware.

SURGICAL TECHNIQUE

The patient was positioned in the right lateral decubitus position, with the head, neck, and torso prepared and draped to expose the operative sites. The compromised scalp skin was resected and submitted for pathological evaluation. The neurosurgical team performed craniotomy and biopsy, including removing and discarding prior cranial fixation hardware. The dura was repaired with collagen-based dural graft, and the bone was fixated with new titanium plates and screws.

Following the biopsy, the neuroplastic surgery team then proceeded to perform recipient vessel identification and dissection. During the proximal STA dissection, it was noted that the vessel was truncated near the trunk and not usable. However, the TFA was more than 1.5 mm in diameter with good blood flow and a good size match to the thoracodorsal artery. This would allow the use of the TFA for anastomosis. Therefore, the vessel was prepared for microvascular anastomosis, along with an accompanying vein.

The latissimus dorsi muscle was harvested through a curvilinear back incision extending into the axilla, in keeping with previously described techniques.[9,10] The thoracodorsal vessels were identified and ligated. The flap was transferred to the scalp and the thoracodorsal vein was anastomosed to the superficial temporal vein using a 2.5-mm venous coupler. The thoracodorsal artery was then anastomosed to the TFA using a 9-0 nylon end-to-end interrupted suture technique (Fig. 3). Good flow was identified to the artery. The flap was inset in a vest-over-pant fashion with the residual scalp using 3-0 nylon sutures and covered with a skin graft taken from the skin of the latissimus dorsi muscle. The patient tolerated the procedure well with no complications. Immediate postoperative CT scan showed stable cranial fixation and no acute intracranial abnormalities. The patient was admitted to the inpatient unit for flap monitoring and postoperative care for 5 days, after which he was discharged home.

In long-term follow-up at 1 year, the flap remained viable and healed with stable skin graft (Fig. 4).

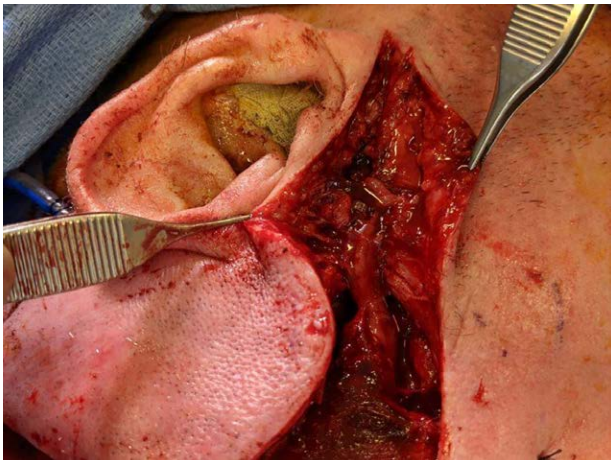

Fig. 3. Intraoperative photographs showing TFA dissection in the preauricular region, with the thoracodorsal artery and vein anastomosed to the TFA and STV, respectively.

Fig. 4. Postoperative photographs at 1 year follow-up demonstrating well healed flap and skin graft.

SUMMARY

We report the use of the TFA as a potential recipient artery for free tissue transfer for scalp reconstruction. This procedure is best suited for patients in whom the TFA is larger in diameter than the STA as identified during donor vessel exposure. This demonstrates that the TFA can be a useful alternative donor artery to the STA in scalp free tissue transfer with good patient outcomes. Proper anatomical knowledge and assessment of the vessel diameter would allow surgeons to properly dissect the vessel and use it for free flap transplantation. Preoperative CT angiogram may be a useful adjunct for evaluating vessel caliber and providing patient specific anatomical knowledge for vessel dissection. To our knowledge, this is the first report describing the TFA as recipient artery in neurocranial microsurgical reconstruction. Further studies are needed to assess the anatomy and surgical outcomes in additional patients.

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