masseter muscle (Fig. 10.8). A handheld Doppler may confirm its location and course over the face. It can be accessed through a 2–3 cm transverse neck incision placed 1.5–2 cm below the inferior border of the mandible. After skin incision, dissection is carried through the subcutaneous fat and the superficial cervical fascia. The platysma muscle is then bluntly undermined from underlying fascia (Fig. 10.8) and incised, exposing the SLDCF). The marginal mandibular branch of the facial nerve is within or deep to the SLDCF. The nerve is retracted and protected superiorly. The facial artery and vein run deeper to the nerve. Because this vessel is located under the border of the mandible, access can be difficult for a microvascular anastomosis, particularly when doing a mandibular reconstruction. Also, the nearest acceptable recipient vein may be some distance away, particularly in patients who have had a neck dissection since the anterior facial vein is often divided in a neck dissection. Preoperative planning and communication with the extirpative head and neck team is important to preserve valuable recipient vessels for microvascular anastomosis.

SUBMENTAL ARTERY

The submental artery is a branch of the facial artery that arises from its medial side and runs towards the midline of the neck in the submental region. Though not used as a recipient vessel for free tissue transfer, it is the source vessel for the submental flap,[7] which is extremely useful for reconstruction of the lower face. The vascular pedicle can be lengthened further proximally, taking advantage of the reverse venous flow between the retromandibular vein and the facial vein allowing this flap to be transferred as a free flap.[8] The advantages of this flap include excellent skin characteristics with good texture and color match to the lower face, and a minimal donor defect that can be closed to result in an imperceptible submental scar. This flap can also be transferred to include the submental lymph nodes in the treatment of lymphedema.[9] The submental artery diameter ranges from 1.0 mm to 2.3 mm with a mean of 1.7 mm at its origin. Care to protect the marginal mandibular branch of the facial nerve should be taken during submental flap harvest. In addition, attention to preserve the nerve to the mylohyoid muscle, which is usually located approximately 1.6 cm deeper to the submental artery at its origin in the submandibular triangle.[4]

Advantages and Disadvantages

The submental artery is small and dissection of the submental flap is challenging. The venae comitantes are also small and easily injured and therefore temporary venous congestion in the flap is not unusual in the immediate postoperative period. There is a separate vein, a branch of the anterior facial vein, which runs parallel to the submental artery and care should be taken to incorporate this vein in the dissection. In some cases, the pedicle may be too short to allow the flap to reach the defect. However, dividing the facial artery distal to the submental branch take off and dissecting it proximally can significantly increase the pedicle length.

SUPERIOR THYROID ARTERY

The superior thyroid artery (Figs 10.4, 10.7) is commonly used for vascularization of head and neck free flaps. Its position in the neck, arising as the first branch of the external carotid artery, makes it useful for this purpose. Although sometimes small in caliber, it generally has excellent flow and there is usually a vein in close proximity to facilitate both arterial and venous anastomoses.

Advantages and Disadvantages

As with many other vessels in the face, the superior thyroid artery has the capacity to sustain an anastomosis from either proximal or distal directions.[10] Also, because of its close proximity to the internal jugular vein, setting up the appropriate pedicle geometry for both arterial and venous anastomoses is favorable in patients who have had a neck dissection.

Exposure of the Superior Thyroid Artery

When a neck dissection has been performed, the superior thyroid artery is easily accessible. Otherwise, an existing neck incision can be extended along the anterior border of the sternocleidomastoid muscle, which is then retracted laterally, exposing the carotid sheath. Once the carotid sheath is entered, the superior thyroid artery is usually found arising from the common carotid artery or from the front of the external carotid artery below the hyoid bone. It courses downward and forward, deep into the infrahyoid muscles to the superior lobe of the thyroid gland, where it divides into infrahyoid, superior laryngeal, cricothyroid, and glandular branches. The external branch of the superior laryngeal nerve supplies the cricothyroid muscle and lies deeper to the superior thyroid artery and should be preserved. The artery is typically isolated close to its take off from the external carotid artery, where it measures 2.3–3.5 mm in diameter.[11]

SUPERFICIAL TEMPORAL ARTERY

The superficial temporal artery (STA) (Figs 10.4–10.6) is one of two terminal branches of the external carotid artery. It supplies the temporalis muscle and the scalp and, as a donor artery, it supplies vascularity to the temporoparietal fascia. For reconstruction within the head and neck region, the temporoparietal fascia has many applications, including recent use in reconstruction of the hemilarynx.[12] In this reconstruction, it is used as a carrier for a mucosal graft that lines the reconstructed larynx and the fascia is wrapped around a cartilaginous strut to give structural support to the construct. However, the superficial temporal artery is more frequently used as a recipient vessel for free flap reconstruction of the scalp and midface. While some authors tend to avoid the superficial temporal artery, it has been our experience that both the artery and vein are acceptable for this indication.

Advantages and Disadvantages

The major advantage of the STA is its ease of access. A simple preauricular incision provides easy access to both the artery and vein. The proximity of these vessels to the scalp and midface makes them ideal for revascularizing flaps for scalp resurfacing, orbital, and midface reconstruction. The proximity to the STA to the defect usually obviates the need for vein grafts. However, the vessels can be susceptible to spasm and the vein tends to be thin walled and friable. In terms of caliber, it is frequently necessary to dissect the vessels back to the pretragal region where the

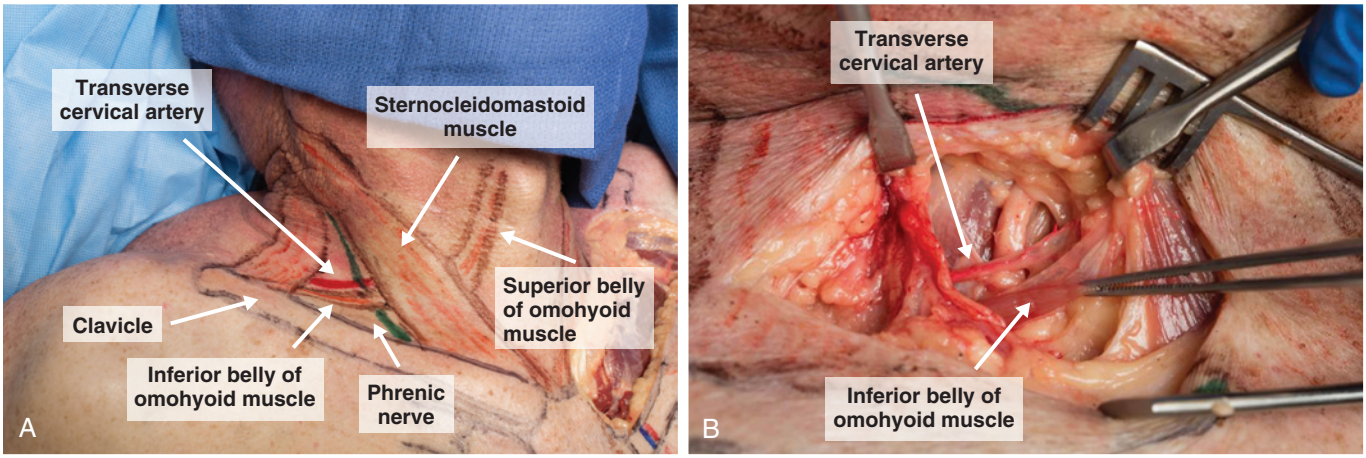

Figure 10.9 The transverse cervical artery. (A) Topography of the transverse cervical artery. (B) Exposure of the transverse cervical artery.

deep branch of the superficial temporal artery is given off. Proximal to this branch, the caliber of both artery and vein is superior.

Exposure of the Superficial Temporal Artery

The STA can be palpated as it crosses the zygomatic arch anterior to the tragus. Doppler examination easily delineates its course and bifurcation above the zygomatic arch. The superficial temporal vessels are approached through a preauricular incision. The mean depth of STA at the level of tragus was found to be 11.9 mm from the skin.[13,14] To obtain vessels of adequate caliber, the dissection must occasionally be extended proximal to the take-off of the deep branch. However, if the caliber of the vessels distally is adequate, then a straightforward anastomosis may be performed. The STA ascends from its origin off the external carotid artery within the parotid gland, traveling behind the mandibular ramus and then piercing the superficial fascia at the level of the tragus. The STA usually takes on a tortuous course and release of this tortuosity may add an extra 1–2 cm of vessel length to the pedicle. The mean diameter of the STA at the zygomatic arch is 2–3 mm. The STA bifurcates into a frontal and parietal branch 1–3 cm above the zygomatic arch in 60% of dissected specimens. The STA is found approximately 0.5–1.5 cm anterior to the tragus, approximately 1 cm deep to the preauricular skin.[13,14] The STA usually lies anterior to the superficial temporal vein. The auriculotemporal nerve travels posterior to the STA in the preauricular crease and supplies the adjacent scalp region. Special attention should be paid to the frontal branches of the facial nerve, which course obliquely across the zygomatic arch. The frontal branch of the facial nerve may have up to three branches at the level of zygomatic arch, with the most posterior branch reported at 24 mm from the tragus and the most anterior branch at 42 mm from the tragus.[14] When dissection is limited to within a 24-mm distance from the tragus above the zygomatic arch, the frontal nerve branches can be protected. Dissection of the vessel can be done with loupe magnification or preferably under the operating microscope. Small side branches of the STA system can then be easily identified and ligated.

TRANSVERSE CERVICAL ARTERY

The transverse cervical artery (TCA) (Fig. 10.9) arises from the thyrocervical trunk and can be located at the root of the neck accompanied by the transverse cervical vein (TCV). The artery courses laterally across the anterior scalene muscle and the brachial plexus. It passes across the posterior triangle of the neck to provide the dominant blood supply to the trapezius muscle. When the external carotid arterial system is not suitable for microvascular anastomosis, the transverse cervical vessels are invariably available. Previous neck dissection, or radiation therapy pose a significant challenge in exposing the heavily scarred neck tissues around the carotid system. As many as 36% of explored necks with prior neck dissection and radiation therapy have no usable external carotid system.[15] Lack of an identifiable plane of dissection increases the risk of inadvertent carotid injury. The left TCA is in proximity to the thoracic duct, therefore care must be taken to avoid injury to this structure during exposure of TCA on the left side to avoid a chyle leak. More recently, the TCA has been used as a source vessel for vascularized lymph node transfer using the supraclavicular nodes.[16]

Advantages and Disadvantages

The transverse cervical artery is often spared after a neck dissection. The vessel has been reported to be less prone to atherosclerotic disease than extremal carotid artery branches. Distal ligation of the TCA can help provide adequate recipient vessel length to reach the mid-neck area for pedicle anastomosis. This vessel has been reported to be prone to vasospasm. Knowledge of the pertinent anatomy in the area of the TCA system is paramount to avoid injury to the phrenic nerve, brachial plexus and the thoracic duct, especially on the left neck.

Exposure of the Transverse Cervical Artery

When a neck dissection has been performed by the extirpative surgeon, an inferior extension of the neck incision will allow access to the ipsilateral TCA system. Otherwise, a transverse incision 2 cm cephalad to the mid-clavicle is made. The landmarks for the TCA are the mid-clavicle, lateral