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Cephalic Vein Transposition in the Vessel-Depleted Neck

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Reconstructive techniques following ablative therapy in head and neck surgery have evolved substantially. The untreated neck provides multiple vessels for arterial and venous anastomosis. Challenges tend to arise, however, in previously operated and/or radiated necks where salvage surgical therapy is undertaken. The cephalic vein has become more widely utilized as a suitable recipient vein due to its length and location outside the radiation treatment field. As one would expect, the increased use of this vein has been accompanied by an increasing number of salvage surgical candidates. In this retrospective review, we present our experience, technical approach, and outcomes utilizing cephalic vein transposition in free tissue transfer.

Materials and Methods

The John Peter Smith Hospital Institutional Review Board approved this retrospective review. Patients included in this review underwent cephalic vein transposition between September 1997 and September 2014. We detail the technique and outcomes. Patient demographic data, pathology reports, surgical reports, and follow-up information were analyzed.

Description of Technique

The deltopectoral groove is identified, as it approximates the location of cephalic vein. An incision is marked 1 to 2 cm medial or lateral to the groove to avoid directly incising over the vein. Long incisions directly over superficial veins may lead to inadvertent injury, especially in older, thin patients. This incision is then connected to the neck incision proximally. Distally, the length of the incision depends on the reach required for microvascular anastomosis, accounting carefully for inset and free flap pedicle length. The incision is made through skin and subcutaneous fat. Near the deltopectoral groove, the cephalic vein is identified and dissected distally. Side branches are clipped to allow mobilization of the vein. Once enough length is achieved, then deep dissection is carried proximally, freeing the vein. As the dissection approaches the clavicle, a small soft tissue cuff should be maintained around the proximal turn, as this will lessen the risk of kinking when the vein is transposed superiorly into the neck (**Figures 1** and **2**). Free fat grafts or rolled Surgicel/Gelfoam can also be used as a spacer to support a gentle turn at the proximal end. Enough length can be obtained to reach the parotid region in most patients, with a cephalic vein harvest just proximal to its variable region in the antecubital fossa. Due to the numerous valves within the

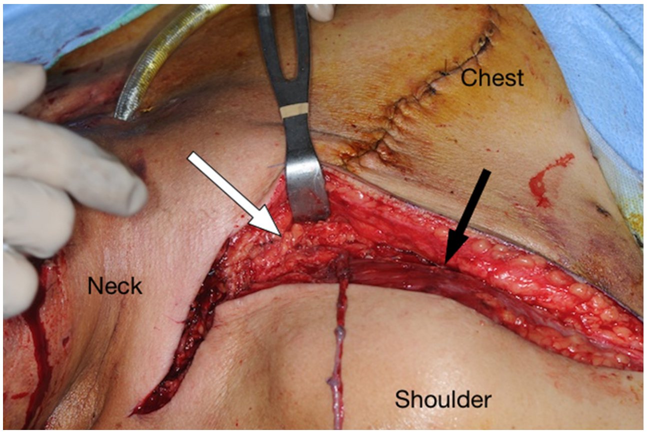

Figure 1. Cephalic vein dissection with soft tissue mound over clavicle (white arrow). The deltopectoral groove is designated by the black arrow.

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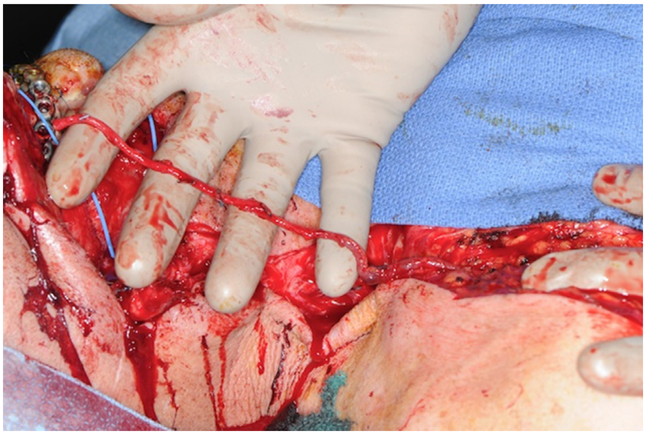

Figure 2. Cephalic vein is completely dissected and transposed to the neck.

Table 1. Distribution of Free Tissue Transfer.

Type of Flap	Number of Flaps
Rectus abdominis	6
Scapula	3
Anterolateral thigh	1
Fibula	10
Iliac crest	3
Radial forearm	4

cephalic vein, backflow may not be seen when the vein is cut—heparin saline irrigation flush can show patency.

Results

A total of 29 patients were identified where the cephalic vein transposition was performed. All these patients had undergone an ipsilateral radical neck dissection with low-lying sacrifice of the internal jugular vein. External jugular vein was also not available. Of these 29 patients, 21 were men and 8 women, with an average age of 67.6 years (range, 34-83 years). Squamous cell carcinoma represented a majority of the pathology (n = 26), with mucoepidermoid carcinoma (n = 1) and soft tissue sarcoma (n = 2) completing the subset. Many of these patients had undergone radiation or chemotherapy. Nineteen patients had undergone primary radiation therapy (minimum, 60 Gy) and failed; 8 had received postoperative radiation therapy after ipsilateral radical neck dissection; and 2 refused adjuvant therapy after radical neck dissection. Fifteen patients had prior chemotherapy. Four patients had received radiation to the ipsilateral neck on 2 occurrences with a minimum of 95 Gy additively before presenting for surgery.

All patients required free tissue transfer after resection. **Table 1** shows the distribution of the free flaps. No complete flap failures were encountered; however, the skin paddle of 1 fibula free flap did not survive, while the bone and deeper tissues did. Another patient required leech therapy for venous congestion, totaling 5 days, without loss of viability. Of note, both these patients had been radiated twice preoperatively. Both were explored on the discovery of venous congestion, showing a negative exploration with intact Doppler signal and strippable flow in the cephalic vein. There were no issues with raising the cephalic vein or establishing flow through the above technique.

Discussion

Conventionally, robust vessels are selected for microvascular anastomosis. The most common vessels utilized for venous anastomosis are the internal jugular vein, external jugular vein, and the facial vein. Hanasono et al reported absent ipsilateral internal and external jugular veins in 20.0% in cases with a history of neck dissection and 38.9% in cases with a history of both neck dissection and radiation therapy.[1] In a smaller previous series, Kim and Chandrasekhar reviewed the advantages of the cephalic vein transposition in 11 patients.[2] As described here, the cephalic vein allows for a relatively simple, consistent dissection, providing adequate donor vein length. Compression from skin closure, clavicle position, or direct external pressure remains a consideration for potential obstruction.

Conclusion

Utilizing the cephalic vein transposition can provide a healthy vascular anastomosis for previously treated cases. In our series of 29 patients, cephalic vein transposition was used successfully for free tissue transfer in the head and neck. We had no flap failures. The cephalic vein is a reliable and effective route for venous outflow in free tissue transfer and should be considered for any irradiated vessel-depleted neck in salvage therapy.

Author Contributions

David Chan, design of the work, data analysis, writing and revisions, final approval; **Cyrus C. Rabbani**, design of the work, data analysis, writing and revisions, final approval; **Jared C. Inman**, design of the work, data analysis, writing and revisions, final approval; **Yadranko Ducic**, design of the work, data analysis, writing and revisions, final approval.

Disclosures

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