Combined Retrojugular Approach To Common Carotid-Distal Vertebral Artery Bypass: An Anatomical Study

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INTRODUCTION

Performing a common carotid-distal vertebral artery (CCA-VA) bypass for symptomatic proximal atherosclerosis requires a long incision along the anterior border of sternocleidomastoid (SCM), as well as extensive exposure and retraction of critical neurovascular structures. We propose a combined (anterior and posterior) SCM, retrojugular approach for the revascularization of the extra-cranial VA at C1-C2, providing a stepwise anatomical description of the approach and its key anatomical landmarks.
METHODS

The feasibility of a combined retrojugular approach for CCA-VA bypass was assessed in 4 cadaveric specimens (8 sides). The “carefree” superior part of the posterior triangle of the neck was approached through an incision along the superior-third of the posterior border of SCM. The carotid triangle was approached through an incision along the skin tension line passing through the thyroid prominence and intersecting the middle-third of the anterior border of SCM. The CCA was accessed using the retrojugular route, followed by tunneling of the graft under the SCM and performing the CCA-VA bypass.
The described approach was successfully performed in all specimens. The key landmark common for both safe triangles was SCM. The key landmarks for the superoposterior triangle were: mastoid tip, transverse process of atlas and lesser occipital nerve, while those for the antero-inferior triangle were: the thyroid prominence, omohyoid muscle and carotid bifurcation. The described surgical windows provide adequate access to both the donor and recipient with ample maneuverability to perform the bypass. Being mindful of fascial planes and using the retrojugular route allows reduced traction on the graft and surrounding neural structures while ensuring their safety.
Figure 1. Cadaveric dissection, showing dissection along the anterior portion of the long sternocleidomastoid muscle and retraction of posterior neck muscles.
Figure 2. Cadaveric dissection of the neck showing extensive retraction of neck muscles and exposure of the vertebral arteries
**Figure 3.** Cadaveric dissection showing full exposure of the vertebral artery.
The feasibility and the potential surgical relevance of the proposed approach for CCA-VA bypass for proximal VA disease is shown. This technique allows a successful and targeted exposure of the donor and recipient for the bypass with less retraction of the surrounding critical neurovascular structures.