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# Retropharyngeal Carotid Artery: An Important Anatomic Variation for the Anesthesiologist

**To the Editor:**—Recently, a patient was discovered to have a markedly aberrant right carotid artery. A subsequent informal survey of our colleagues revealed that many anesthesia providers are unaware of the origins and incidence of this anatomical variant, and do not routinely assess patients for a symptomatic or clinically silent finding.

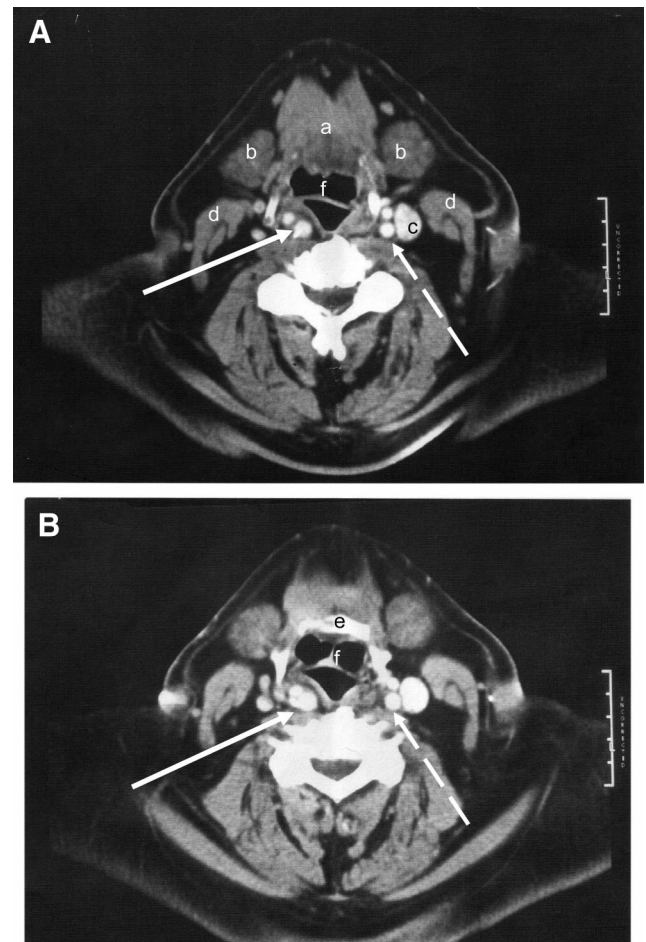
Our patient was a 73-yr-old male with a history of hypertension, diabetes mellitus, and obstructive sleep apnea requiring the use of continuous positive airway pressure at night, who was seen in our anesthesia preoperative clinic. He was scheduled for wide local excision and partial left auriclectomy, sentinel lymph node biopsy, and possible parotidectomy and left neck dissection because of recurrent lentigo malignant melanoma of the left ear. He had few subjective complaints, with the notable exception of difficulty swallowing both liquids and solids and intermittent episodes of choking. The airway exam revealed a Mallampati III status. No pulsatile mass was seen, but the patient had notable and asymmetric fullness to his right posterior and lateral pharyngeal wall.

Because of the planned procedure, there was a fortuitous opportunity to review computed tomographic studies of the head and neck (fig. 1). A markedly retropharyngeal course of the right carotid artery causing ventral and medial displacement of the tissues of the palate was noted.

The internal carotid arteries have their embryonic origination in the third aortic arch and the dorsal aorta. During normal embryonic development, the dorsal aortic root descends into the chest during the eighth week of fetal life, which lengthens and straightens the course of the carotid artery. It has been suggested that incomplete straightening and persistence of the embryonic angulation can result in the presence of aberrant carotid arteries in the retropharyngeal space.<sup>1</sup> A variety of anatomic presentations are possible, which tend to become more pronounced with the physiologic effects of aging. These include simple medial displacement of the artery, as well as kinking and outright coiling of the vessel. In older patients, the incidence has been estimated to be as high as 2%. This corresponds to our experience, as we have been confronted with a midline or retropharyngeal carotid artery three times in several hundred dissections of the head and neck for cancer.

Although there are several reviews of the retropharyngeal carotid artery in both the radiology and laryngology/head and neck literature going back to the 1920s<sup>2-6</sup>, we could find no information on the subject in the anesthesia literature, which perhaps explains the lack of awareness on the part of our colleagues. This is unfortunate, as a retropharyngeal carotid artery has a number of clinically relevant implications for the anesthesiologist as well as the surgeon.

First, rupture of the oropharyngeal mucosa as well as lacerations to the submucosal soft tissue as a complication of tracheal intubation is



**Fig. 1.** Axial computed tomography scans with contrast at the level of (A) the base of the tongue and (B) the vallecula. At the level of the base of tongue the carotid artery (white solid arrow) has bifurcated into the internal and external branches. The internal carotid artery is the larger of the two branches. At the level of the vallecula, the two branches are seen just superior to the bifurcation (white solid arrow). Additional structures seen include the tongue (a), the submandibular glands (b), the left internal jugular vein (c), the sternocleidomastoid muscles (d), the hyoid bone (e), the epiglottis (f), and the normal left carotid arteries (white dashed arrow). These images are superior to the level of the trachea and esophagus.

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well-described.<sup>7,8</sup> The implications of this untoward event with respect to massive hemorrhage are obvious. Second, an aberrant midline or retropharyngeal carotid artery could pose a significant additional risk of arterial puncture or arterial injection of local anesthetics when performing the transoral approach to blocking the gloss pharyngeal nerve in the pharynx. Third, prominent forward and medial displacement of the pharyngeal tissues by an aberrant carotid artery (or other carotid anomaly causing a mass effect) will disrupt the anatomical balance of the pharyngeal orifice and can be a causative or potentiating factor in obstructive sleep apnea, as it almost certainly was for this patient.<sup>9,10</sup>

Mishaps not directly caused by anesthesia-related actions to secure and maintain the airway are also possible. Acute as well as chronic disruption of the mucosa and underlying soft tissues of the pharynx because of placement of nasogastric tubes has been described.<sup>11</sup> Similarly, disruption of the pharynx and hypopharynx is a recognized complication of placement of a transesophageal echocardiography probe, especially using the blind technique.<sup>12-14</sup> Devastating surgical bleeding might also occur during operative cases involving the tonsils and pharynx, such as tonsillectomy, adenoidectomy, and uvulopalatopharyngoplasty.<sup>15,16</sup> Finally, we believe that a midline retropharyngeal carotid artery might predispose the patient to vascular insufficiency injuries in several ways: As a result of tortuosity and kinking should the patient's head be positioned in a position of extreme forward or lateral flexion or extension, and because of its course relative to the esophagus and trachea during manual cricoid pressure in the operating room or emergency department.

Anesthesia providers and perioperative clinicians can take simple actions to rule out a retropharyngeal carotid artery. First, ask the patient about fullness or a pulsatile mass in the back of the mouth, as well as difficulty swallowing. Second, note the symmetry of the palate or lack thereof when examining the patient's mouth and determining the Mallampati classification. Finally, gently palpate the neck for the presence of bilateral carotid pulses—a markedly aberrant carotid artery will be characterized by the absence of a pulse in the typical anterolateral position in the neck.

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