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Incidental detection of high-riding innominate artery : Radiological findings and clinical relevance

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ABSTRACT

The high-riding innominate artery is an uncommon anatomical variant that is often discovered incidentally, sometimes during the evaluation of a pulsatile neck mass. Although usually asymptomatic, its atypical course can pose a risk of vascular injury during anterior neck procedures such as tracheostomy or thyroid surgery. Awareness of this variant, supported by careful clinical examination and imaging when indicated, is essential for safe surgical planning. Recognizing such variations early can prevent complications and guide clinicians in adapting their approach to each patient. We report the case of a 30-year-old woman who presented with a pulsatile mass in the lower neck, in whom imaging revealed a high-riding innominate artery, and discuss the radiological findings and clinical implications of this rare vascular variant.

KEYWORDS

High-riding innominate artery, aberrant brachiocephalic artery, pulsatile neck mass, vascular variant, tracheostomy, computed tomography angiography

MAIN ARTICLE

INTRODUCTION

The high-riding innominate artery is an uncommon anatomical variant in which the artery runs higher than usual in the lower neck. While usually asymptomatic, it can increase the risk of vascular injury during procedures such as tracheostomy or thyroid surgery. Recognizing this variant preoperatively through appropriate imaging is critical, as it directly informs safe operative planning.

CASE PRESENTATION

We report the case of a 30-year-old woman who presented for evaluation of a pulsatile mass involving the lower cervical region, noticed incidentally by the patient and associated with a palpable thrill. On physical examination, the mass was soft, mobile, non-tender, and demonstrated a clear arterial pulse. No neurological deficits or other abnormalities were observed. Given the vascular character of the lesion, the patient was referred to a specialized imaging center for a contrast-enhanced cervical CT scan. The scan revealed a high-riding innominate artery, running unusually high in the lower neck, in close proximity to the thyroid gland (Figure 1). No other vascular anomalies or masses were identified. This case illustrates the need to consider vascular variants in the differential diagnosis of pulsatile neck masses. Awareness of such variations is essential to avoid misdiagnosis and to guide further evaluation, as imaging provides a definitive assessment of the vascular anatomy in these unusual presentations.

DISCUSSION

The innominate (brachiocephalic) artery represents the largest vessel arising from the aortic arch [1]. During embryonic development, it originates from a combination of the aortic sac and the proximal segment of the right fourth aortic arch. Its course takes it superiorly and rightward along the thoracic trachea, before it terminates behind the sternoclavicular joint by dividing into the right common carotid and right subclavian arteries [2].

While variations in the branching pattern of the aortic arch are relatively common and well described in the literature, an innominate artery (IA) that ascends unusually high, reaching the level of the thyroid gland, remains a rare finding [3]. One proposed explanation for this high-riding course is the persistence of an abnormally long segment of the proximal right fourth aortic arch during embryogenesis [4].

Awareness of this anatomical anomaly carries significant clinical importance, since unrecognized cases expose patients to the risk of severe, potentially fatal bleeding during neck procedures such as needle biopsy, percutaneous vascular catheterization, or

tracheostomy. Furthermore, even when tracheostomy is performed without immediate complication, the rigid cannula may progressively erode into the adjacent vessel as a result of repetitive neck motion, posing a delayed but serious risk [5].

A retropharyngeal course of the internal carotid artery (ICA) has similarly been implicated as a potential contributor to obstructive sleep apnea, and may place patients at increased risk of cerebrovascular insufficiency [6]. Regarding the high-riding IA itself, its clinical presentation is variable: many cases remain entirely asymptomatic, while others manifest as a pulsatile neck mass or, less commonly, as respiratory difficulty resulting from tracheal compression. Likewise, a retropharyngeal ICA may go unnoticed or may reveal itself through an abnormal pulsation of the posterior pharyngeal wall, sometimes accompanied by dysphagia or a sensation of throat fullness [3].

Doppler ultrasonography constitutes a readily accessible and reliable first-line investigation. Sonographically, the bifurcation of the brachiocephalic artery into the right common carotid and right subclavian arteries is identified above the right sternoclavicular joint, rather than posterior to it as is anatomically expected. In certain instances, this bifurcation may extend as proximally as the inferior pole of the right thyroid lobe [1]. In this case, the patient was referred directly for a cervical CT scan; therefore, no ultrasound data were obtained.

Cross-sectional imaging modalities, including CT, MRI, and conventional angiography, provide more detailed anatomical characterization, demonstrating the artery's ascent above the thoracic inlet prior to its bifurcation [7]. Data regarding the true incidence of an aberrant or high-riding innominate artery remain limited, and this figure has yet to be firmly established [8-9]. Several authors, including Upadhyaya et al., have described instances where a high-riding brachiocephalic trunk was identified unexpectedly during unrelated surgical procedures [10]. Comparable incidental findings have also been documented during imaging work-up for suspected thyroid disease, as reported by Gil-Carcedo et al., and Mishra et al. [11-12].

CONCLUSION

A high-riding innominate artery constitutes an uncommon anatomical variant, one that carries a heightened risk of complications during anterior neck procedures if not recognized. Identifying it beforehand, especially with imaging, helps guide safer management. Surgeons and clinicians should be aware of this variation to adjust their approach and reduce potential risks. Its recognition is a small step that can make a significant difference in patient safety.

FIGURES:



Figure 1: Contrast-enhanced CT demonstrating a high-riding brachiocephalic artery (TABC). (a) Axial CT at the level of the thoracic inlet showing the artery already divided into its right common carotid and right subclavian branches at this unusually cephalad level, in contrast to the normal, still-undivided vascular anatomy on the contralateral (left) side. (b) Sagittal reformatted CT confirming the abnormally high, vertical course of the artery ascending well above the thoracic inlet, closely applied to the anterior aspect of the trachea.

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REFERENCES

1. Dugas BA, Samra NS. Anatomy, Thorax, Brachiocephalic (Right Innominate) Arteries. Treasure Island (FL): StatPearls Publishing; 2024.
2. Snell RS. Clinical Anatomy by Regions. 8th ed. Philadelphia: Lippincott Williams & Wilkins; 2007. p. 126.
3. Dua SG, Purandare NC, Pramesh CS. Incidental detection of high-riding innominate artery and bilateral retropharyngeal carotid arteries: radiological findings and clinical relevance. Clin Radiol. 2011;66(7):685-687. doi:10.1016/j.crad.2010.10.007
<https://doi.org/10.1016/j.crad.2010.10.007>
4. Maldjian PD, Saric M, Tsai SC. High brachiocephalic artery: CT appearance and clinical implications. J Thorac Imaging. 2007;22(2):192-194. doi:10.1097/01.rti.0000213574.94032.9d
<https://doi.org/10.1097/01.rti.0000213574.94032.9d>
5. Mukadam GA, Hoskins E. Aberrant brachio-cephalic artery precluding placement of tracheostomy. Anaesthesia. 2002;57(3):297-298. doi:10.1111/j.1365-2044.2002.2520_23.x
https://doi.org/10.1111/j.1365-2044.2002.2520_23.x
6. Marcucci C, Thomas P, Sewell DA. Retropharyngeal carotid artery: an important anatomic variation for the anesthesiologist. Anesthesiology. 2009;111(2):454-455.

doi:10.1097/ALN.0b013e3181ab675e

<https://doi.org/10.1097/ALN.0b013e3181ab675e>

7. Wannitta Wong ET, Saniasiaya J, Tharek A, Sallehuddin NS. High-riding innominate artery: challenge during tracheostomy. *Indian J Otolaryngol Head Neck Surg.* 2023;75(4):3878-3882.

doi:10.1007/s12070-023-03944-6

<https://doi.org/10.1007/s12070-023-03944-6>

8. Vaiman M, Bekerman I. Preoperative detection of anomalies of carotid arteries in the neck surgery. *Eur Arch Otorhinolaryngol.* 2015;272(10):2979-2983. doi:10.1007/s00405-014-3270-5

<https://doi.org/10.1007/s00405-014-3270-5>

9. Subasi ID, Yoruk O, Sipal S, Karakaya AD, Şengöz F. Brachiocephalic artery anomaly at the neck: importance during minimally invasive video-assisted parathyroidectomy. *J Craniofac Surg.* 2013;24(6):e750-e773. doi:10.1097/SCS.0b013e31829ad242

<https://doi.org/10.1097/SCS.0b013e31829ad242>

10. Upadhyaya PK, Bertellotti R, Laeeq A, Sugimoto J. Beware of the aberrant innominate artery. *Ann Thorac Surg.* 2008;85(2):653-654. doi:10.1016/j.athoracsur.2007.08.044

<https://doi.org/10.1016/j.athoracsur.2007.08.044>

11. Gil-Carcedo E, Gil-Carcedo LM, Vallejo LA, Herrero D. High-riding innominate artery in neck surgery. *Acta Otorrinolaringol Esp.* 2012;63(5):396-398. doi:10.1016/j.otorri.2011.03.006

<https://doi.org/10.1016/j.otorri.2011.03.006>

12. Mishra T, Raj G, Dwivedi S. High riding innominate artery: an unusual pulsatile pretracheal mass. *Radiol Case Rep.* 2021;16(7):1732-1735. doi:10.1016/j.radcr.2021.04.018

<https://doi.org/10.1016/j.radcr.2021.04.018>