




# Vertebral Artery Stenosis Caused by Cervical Osteophyte: A Rare and Reversible Cause of Vertebrobasilar Insufficiency. Case Report

## *Estenose da artéria vertebral causada por Osteófito Cervical: Uma causa rara e reversível de insuficiência vertebrobasilar. Relato de caso*

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### Abstract

Bow Hunter syndrome manifests when the vertebral artery is compressed following head rotation. Symptomatic compression with vertebral artery stenosis due to cervical osteophytes is a rare cause and occurs due to a progressive degenerative process. In most cases, compression originates anteromedially from the uncinat process and is asymptomatic due to the competence of the contralateral vertebral artery. In the described patient, compression presented superomedially due to osteophytes in the superior articular facet of the C5 vertebra, and the contralateral vertebral artery was obstructed. Careful evaluation with imaging, mainly preoperative 3D angiotomography, is necessary to determine the most beneficial approach for decompression. The treatment of choice for symptomatic compression induced by cervical spondylosis is decompression surgery.

### Keywords

- ▶ vertebral artery
- ▶ vertebrobasilar insufficiency
- ▶ osteophyte
- ▶ Bow Hunter's Syndrome

### Resumo

A síndrome de Bow Hunter se manifesta quando a artéria vertebral é comprimida após a rotação da cabeça. A compressão sintomática com estenose da artéria vertebral devido a osteófitos cervicais é uma causa rara e ocorre devido a um processo degenerativo progressivo. Geralmente, a compressão se origina anteromedialmente do processo uncinado e é assintomática devido à competência da artéria vertebral

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**Palavras-chave**

- ▶ artéria vertebral
- ▶ insuficiência vertebróbasiar
- ▶ osteófito
- ▶ Síndrome de Bow Hunter

contralateral. No paciente descrito, a compressão se apresentou superomedialmente devido a osteófitos na faceta articular superior da vértebra C5, e a artéria vertebral contralateral estava obstruída. Uma avaliação cuidadosa com imagens, principalmente angiotomografia 3D pré-operatória, é necessária para determinar a abordagem mais benéfica para a descompressão. O tratamento de escolha para compressão sintomática induzida por espondilose cervical é a cirurgia de descompressão.

**Introduction**

Vertebral artery stenosis (VAS) can be caused by intrinsic lesions (such as atherosclerosis, vascular dissection, and vasculitis) and extrinsic lesions (including neoplasia, infections, fractures, fibrosis, and osteophytosis).<sup>1,2</sup> Approximately a quarter of ischemic strokes occur in the territory of the posterior cerebral circulation, and 20-25% of these are caused by VAS.<sup>1,3</sup>

Symptomatic compression with stenosis of this vertebral artery due to cervical osteophytes is a rare cause and occurs due to a progressive degenerative process affecting cervical vertebral bodies and intervertebral discs. This condition can lead the patient to present with ischemic strokes and/or Transient Ischemic Attacks (TIAs), also described as Vertebróbasiar Insufficiency (VBI).<sup>4-7</sup>

In most cases, compression originates anteromedially from the uncinat process and is asymptomatic due to the contralateral vertebral artery's competence.<sup>7,8</sup> In the described patient, compression presented superomedially due to osteophytes from the superior articular facet of the C5 vertebra, and the contralateral vertebral artery was obstructed.

**Case Report**

A 76-year-old male patient, hypertensive, diabetic, and with chronic atrial fibrillation, sought medical attention due to multiple falls associated with vertigo for 2 months, worsening with rotation and extension of the head. Cardiovascular etiologies were ruled out, and he underwent cranial and cervical vessel angiotomography (ATC), showing complete occlusion of the right VA and stenosis of the left VA at the level of C4-C5 due to an osteophyte originating from the superior facet of the C5 vertebra with a superolateral direction, invading the vertebral foramen, with 80% occlusion (▶ Fig. 1).

Surgical treatment was proposed for AV decompression with posterior cervical arthrodesis using lateral mass screws at the level of C3-C4, C4-C5, and C5-C6, sparing the fourth and fifth left cervical vertebrae. Decompression of the left vertebral foramen at the level of C4-C5 was performed, with confirmation of arterial patency with intraoperative ultrasound.

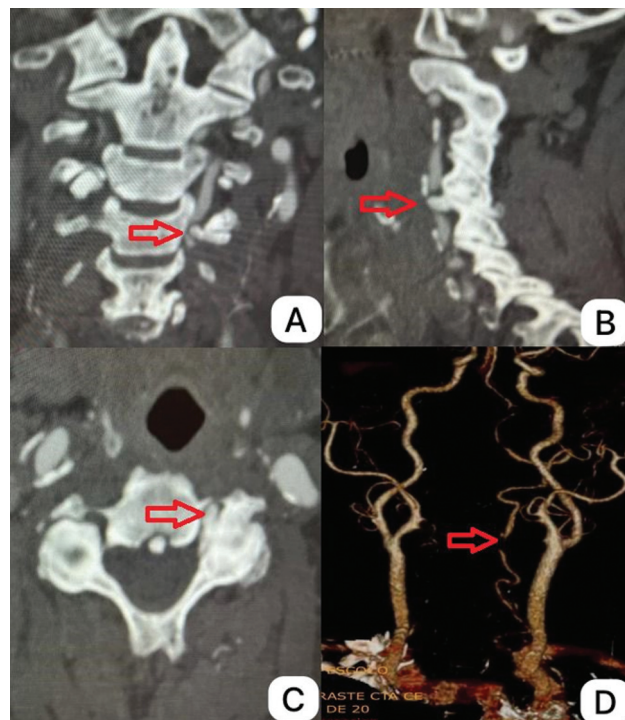
The patient was discharged on the second postoperative day, with complete improvement of vertigo and falls. Follow-up angiotomography showed complete decompression of

the vertebral foramen and removal of the osteophyte, with patent VA (▶ Fig. 2).

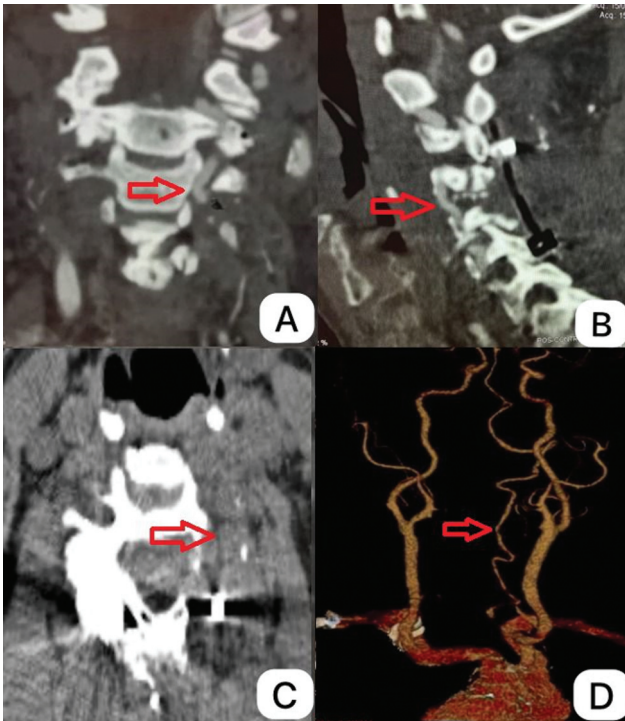
**Discussion**

VA compression due to cervical spondylosis is an uncommon cause of VBI. When the symptomatology is generated by specific head movements, it is called Bow Hunter syndrome, described by Sorensen in 1978.<sup>8-12</sup>

Arterial blood flow can be impaired by intrinsic lesions (60%), with atherosclerosis being the most common cause, and extrinsic lesions (40%). Extrinsic compression due to osteophytes originating from the superior facet joint is rare and accounts for 6% of cases. The primary level of cervical involvement is C5-C6, with only 18% of cases at the C4-C5 level. More than 60% of patients with VBI experience at least



**Fig. 1** CT of cervical vessels - coronal (A), sagittal (B), and axial (C) views showing osteophyte invading the vertebral foramen, with 80% occlusion of its diameter and compression of the left vertebral artery. Originating from the superior articular facet of the fifth cervical vertebra. Image D, 3D reconstruction showing interruption of flow through the left vertebral artery (red arrow).



**Fig. 2** Postoperative CT - coronal (A), sagittal (B), and axial (C) views showing decompressed left VA with preserved diameter. Image D, 3D reconstruction showing resumption of flow through the left vertebral artery with preservation of its diameter (red arrow).

one episode of vertigo during the disease. The most frequent symptoms are visual disturbances (diplopia, visual hallucinations, and blindness); sudden falls secondary to loss of tone in the lower limbs, without loss of consciousness, incoordination, and muscle weakness.<sup>13-19</sup>

Symptomatology is evident when the contralateral VA is congenitally atretic or hypoplastic, terminates as the posterior inferior cerebellar artery, or is occluded or stenosed by acquired processes. Neck movement to the ipsilateral side of the compression and neck extension typically intensify symptoms. ATC is widely used due to its availability and speed in obtaining a diagnosis, and when performed with 3D reconstruction, it can clearly show the extent of osteophyte formation and its relationship with the VA, facilitating appropriate surgical planning.<sup>15,20,21</sup>

The treatment of choice for symptomatic compression induced by cervical spondylosis is decompression surgery. There are reports of antiplatelet therapy and other conservative therapies, but they are less effective. Regarding surgical strategies, some authors advocate the resection of non-bony tissues, such as muscle tendon, bone membrane, and other perivascular fibrous bands, in addition to osteophyte removal, to allow the VA to regain its initial caliber.<sup>21-24</sup>

In a recent systematic review of VAS caused by osteophytosis, which evaluated 214 articles on the subject, surgical management with osteophyte resection was achieved in 45% of cases through anterior discectomy with fusion, followed by anterior decompression without fusion (28%), posterior decompression without fusion (21%), and only 3% with posterior decompression with fusion as described in our case.<sup>25</sup>

The posterior surgical approach is indicated for the resection of osteophytes originating from the superior articular facet due to direct visualization of compression and complete resection thereof. We chose to perform arthrodesis of the affected levels in our patient due to the aggressiveness of the decompression and excision of the inferior articular facet of C4 and superior articular facet of C5 to access the vertebral artery located anterior to the nerve root.<sup>17,26,27</sup>

During surgery, we utilized pre- and post-decompression osteophyte ultrasound to assess vascular patency, which proved to be an easy, instantaneous, effective, reliable, and cost-effective procedure, particularly considering the high cost of neuroimaging exams. Additionally, we avoided using electrical bipolar during vertebral artery and venous plexus manipulation to preserve vascularization.<sup>28</sup>

Other surgical approaches may be used depending on osteophyte origin for better visualization and decompression. The anterior approach is suitable for marginal osteophyte resection, typically compressing the VA medially, while the anterolateral approach provides a better operative field for safely removing both superior articular and anterior transverse process osteophytes.<sup>17,26,27</sup>

Solo decompressive surgery preserves the cervical range of motion, which is an important factor in the patient's functional ability to return to daily activities and quality of life. However, some authors report that isolated decompression carries a higher risk of postoperative recompression, leading authors to conclude that fusion is the safer option for patients.<sup>21,29,30</sup>

## Conclusion

Compression and insufficiency of the vertebral artery (VA) resulting from cervical spondylosis are relatively uncommon occurrences. Typically, they remain asymptomatic owing to the compensatory function of the contralateral VA. Therefore, patients experiencing persistent vertigo and sudden drop attacks despite normal cardiological evaluations should undergo a thorough examination to investigate the possibility of vertebral artery occlusion and vertebral basilar insufficiency. Precise preoperative evaluation, notably with the aid of 3D angiotomography, becomes imperative to ascertain the optimal approach for decompression.

## Conflict of Interests

The authors have no conflict of interest to declare.

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