

CASE REPORT

Symptomatic Vertebral Artery Stenosis Secondary to Cervical Spondylolisthesis

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Study Design. Case report.**Objective.** To present a rare case of vertebrobasilar insufficiency (VBI) syndrome secondary to the C6 level isthmic spondylolisthesis.**Summary of Background Data.** VBI associated with voluntary head movements is known as the bow hunter syndrome. It may manifest in temporary symptoms of dizziness, syncope, nausea, or motor and sensory deficits in certain head positions. The present syndrome is rare and difficult to diagnose. The authors describe a VBI case caused by vertebral artery compression due to the C6 level isthmic spondylolisthesis (to date, the authors have not found any other similar case described in the literature).**Methods.** The patient was a 27-year-old male with a 12-month history of vertigo and dizziness in relation to head movements. These problems interfered with his day-to-day activities. With other causes of neurological and cardiac origin dismissed, the patient was sent for an orthopedic evaluation.

Radiological imaging showed spondylolysis, spondylolisthesis, and spina bifida between the facets of the C6 and C7. Dynamic radiographies evidenced C6 and C7 cervical instability.

Angio-MRI indicated an anomalous trajectory of the right vertebral artery at the C6 level upon entering the foramen transversarium. However, there were no signs of stenosis. Dynamic angiography confirmed partial stenosis of the right vertebral artery upon rightward head rotation. The substantial suspicion of positional VBI after rejecting other diagnoses and the significant disability of the patient led to treating the patient with anterior cervical arthrodesis at the C6–C7 level.

Results. The patient was symptom free for more than 15 months' monitoring and returned to all his daily work and life activities.**Conclusion.** Isthmic spondylolisthesis must be considered as a cause within VBI. Surgery presents good results.

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Vertebrobasilar insufficiency (VBI) associated with voluntary head movements is known as the bow hunter syndrome (BHS).¹ BHS and cervical spondylolisthesis are rare.² The authors describe a case of VBI caused by isthmic spondylolisthesis.

The patient was a 27-year-old male with a 12-month history of vertigo and dizziness in relation to head movements. He occasionally fell but remained conscious. These problems interfered with his day-to-day activities.

The patient was studied in neurosurgery, internal medicine, and cardiology. Other causes of a neurological and cardiac origin were dismissed. Therefore, the patient was referred to orthopedic surgery for determine whether the vertigo was of cervical origin.

There was no history of cervical trauma or a family history of cervical pathology.

Radiological imaging showed spondylolysis, spondylolisthesis, and spina bifida between the facets of the C6 and C7 (Figure 1A). Dynamic radiographies evidenced a potential instability³ between C6 and C7 (Figure 1B). Cervical computed tomography confirmed listhesys between the C6 and C7 levels.

VBI secondary to cervical instability at the C6–C7 level was suspect due to this isthmic spondylolisthesis.

Angio-MRI indicated an anomalous trajectory of the right vertebral artery (VA) at the C6 level upon entering the foramen transversarium. However, there was no sign of stenosis. Dynamic angiography confirmed partial stenosis of the right VA upon rightward head rotation (Figure 2).

The suspicion of positional VBI after rejecting other diagnoses and the significant disability of the patient led to treatment with anterior cervical arthrodesis at the C6–C7 level, carried out through an anterior approach by placing an interbody cage over a plate secured by screws (Figure 3A, B).

The patient was symptom free for more than 15 months' monitoring and returned to all his daily work and life activities.

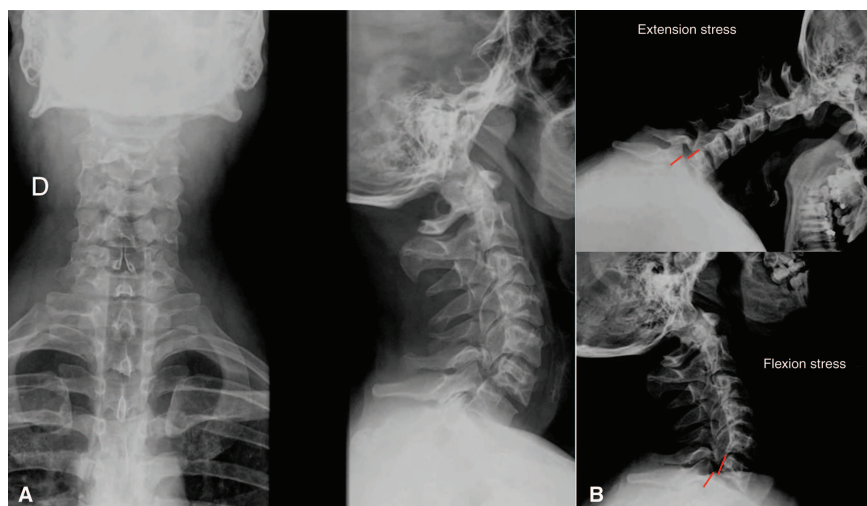


Figure 1. A, Spondylolysis and spondylolisthesis between the facets of C6 and C7. B, Dynamic radiographies evidenced a potential instability criteria in between C6 and C7 (displacement greater than 3.5 mm).³

DISCUSSION

Vertigo of a cervical origin is an often-discussed clinical entity. Its etiology is multiple and calls for discarding any other cause so as to get a correct diagnosis. VBI is found among its possible causes.⁴

The VBI clinical signs may be asymptomatic on many occasions due to collateral flow compensation.⁵ Whenever VBI produces symptoms, a great variety of them are produced. They may be dizziness, vertigo, diplopia, ataxia, dysarthria, numbness, or motor weakness due to the transitory ischemia of the brainstem and/or cerebellum.^{6,7} The most frequent cause of VBI tends to be innate due to either arteriosclerosis, dissecting aneurysms, or thromboembolisms.⁷ Other less frequent causes that produce an extrinsic compression are osteophytes, spinal disc herniation, tumors, or other musculoskeletal factors.⁶⁻¹³

BHS was first described by Sorensen, in 1978, in a male practicing archery.¹ The most common place where the VA is compressed is between the C1 and C2.⁵ The second most frequent place for VA stenosis is found at the level of the foramen entrance of the C6.⁹ Anomalies in development, such as rachischisis, can alter the anatomy of the vertebral vessels,

and in this way, they can act as cofactors for VA stenosis.¹² This is a rare and difficult to diagnose syndrome.^{2,6} The complementary tests used to diagnose VBI are still controversial. As a consequence of the fact that VA stenosis is transitory, the use of these tests in asymptomatic patients is usually negative. Osseous imaging can be helpful so as to throw out extrinsic causes of compression, and vascular imaging helps in confirming the location of the stenosis.⁶ If tests are carried out in the symptomatic position of the head, the sensitivity of the tests increases. The Doppler ultrasound and the stress angiography under sedation can be used for this purpose, although they are not always diagnostic because they do not produce exactly the same conditions that cause the VA stenosis.^{6,14}

A variety of treatments have been described for VBI of a cervical origin. Surgery (VA decompression and/or fixation of affected segment) becomes an option whenever conservative treatment fails.

Cervical spondylolysis/spondylolisthesis is an infrequent illness, with some 100 cases described in the literature.¹⁵ Cervical listhesis is even more infrequent. It occurs in only 25% of the cervical spondylolysis cases.¹⁶ Generally, it is diagnosed

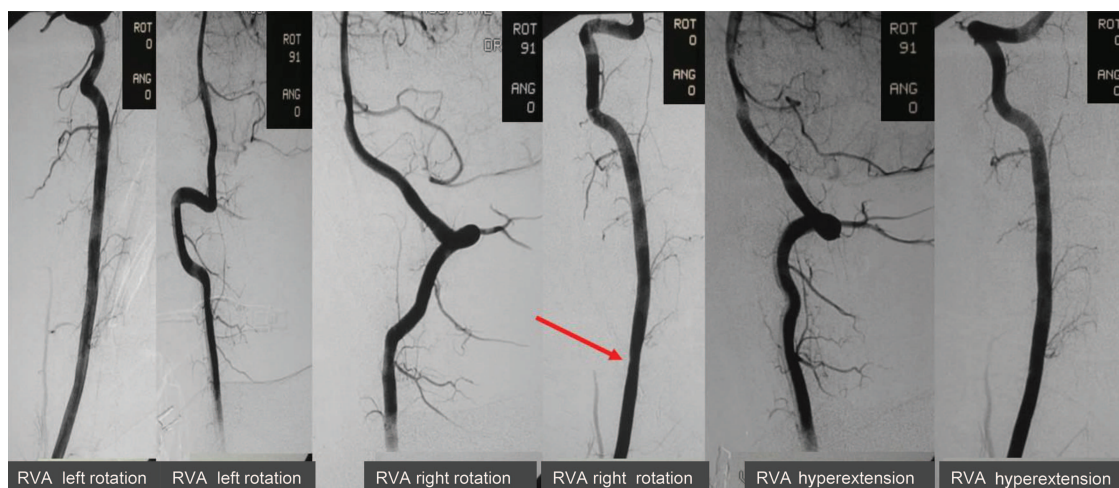


Figure 2. Dynamic angiography showed partial stenosis of the RVA upon rightward head rotation. RVA indicates right vertebral artery.

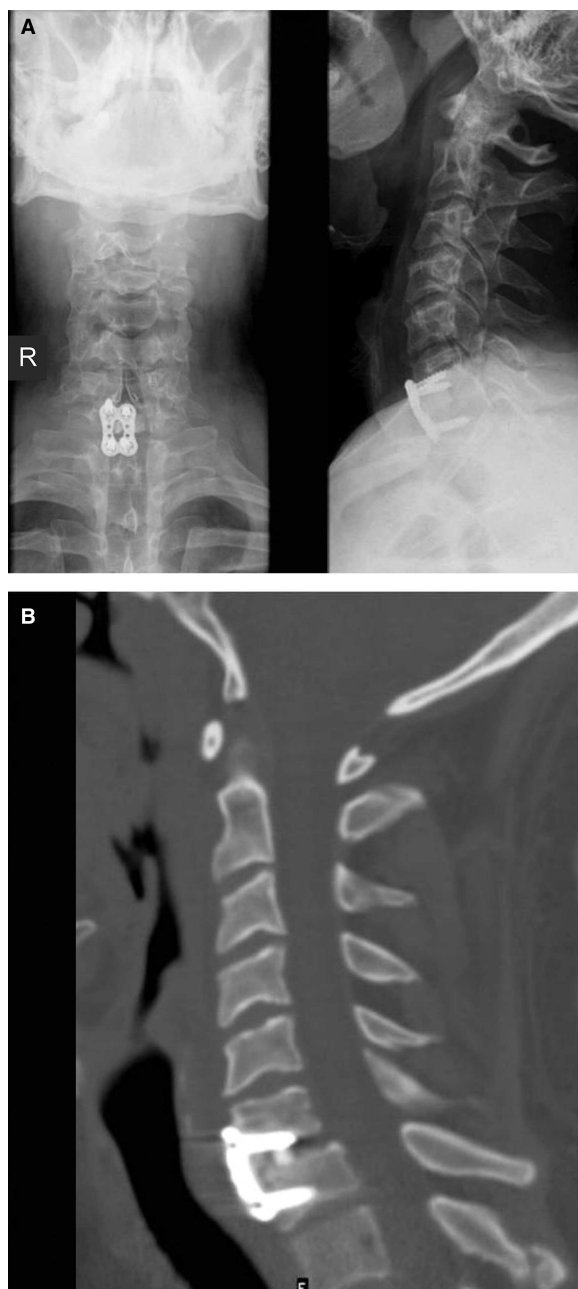


Figure 3. Anterior cervical arthrodesis at the C6–C7 level with a plate secured by screws. Simple radiograph (A) and sagittal CT scan (B). CT indicates computed tomography.

in either patients who have experienced a minor trauma or as a spontaneous finding in a routine radiograph. Cervical pain, radiculopathy, or polyneuropathy can appear in some patients.^{17,18} It usually affects males and most frequently involves the vertebral notch of the C6.¹⁹

CONCLUSION

In our knowledge, this is the first case of VBI secondary to cervical spondylolisthesis.

With other causes of the symptoms dismissed, surgery for spondylolisthesis may be the solution to VBI secondary to it.

➤ Key Points

- ❑ Isthmic spondylolisthesis must be considered as a cause of the bow hunter syndrome, a symptomatic VBI caused by stenosis or occlusion of the VA with physiological head rotation.
- ❑ This is a rare and difficult to diagnose syndrome. The complementary tests used to diagnose VBI are still controversial.
- ❑ Other causes of the symptoms dismissed, surgery becomes an option whenever conservative treatment fails.

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