

Decreased Vertebral Artery Hemodynamics in Patients with Loss of Cervical Lordosis

Medical Science Monitor
February 15, 2016; Vol. 22; pp. 495-500

Mehmet Deniz Bulut, Mahmut Alpayci, Emre ŞenkoÅNy, Aydin Bora, Levent Yazmalar, Alpaslan Yavuz, İsmail Gulsen:

From Yuzuncu Yıl University, Medical Faculty, Van, Turkey; Dicle University, Medical Faculty, Diyarbakir, Turkey

This is the first study to focus on the status of the vertebral artery in patients with loss of cervical lordosis. The authors evaluated the values of the vertebral arteries in patients with loss of cervical lordosis compared to strictly matched control subjects without loss of cervical lordosis.

Thirty patients with loss of cervical lordosis and 30 carefully matched controls were assessed bilaterally (60 arteries each group) with Doppler ultrasonography.

Vertebral artery hemodynamics, including lumen diameter, flow volume, peak systolic velocity were measured, and values were statistically compared between the patient and the control groups.

The cervical lordosis was assessed on lateral cervical radiographs using the posterior tangent method; the lordosis was defined as the angle between the posterior margins of the vertebral bodies C2 and C7.

KEY POINTS FROM THIS ARTICLE:

- 1) The natural cervical lordotic curvature is considered to be an ideal posture for the cervical spine. "Loss of cervical lordosis leads to disrupted biomechanics." "This natural lordotic curvature of the cervical spine is considered to be an ideal posture in terms of biomechanical principles."
- 2) "Loss of cervical lordosis causes disrupted biomechanics, triggering a degenerative process in the cervical spine."
- 3) Unfavorable clinical outcomes are expected in persons with loss of cervical lordosis.
- 4) "The normal cervical spine has a lordotic curve. Abnormalities of this natural curvature, such as loss of cervical lordosis or cervical kyphosis, are associated with pain, disability, and poor health-related quality of life."

- 5) "The loss of cervical lordosis is associated with neck, upper thoracic, and shoulder pain, tension and cervicogenic headaches, and poorer health-related quality of life outcomes." **[Important]**
- 6) Loss of cervical lordosis adversely affects vertebral artery hemodynamics.
- 7) "Deviations from the natural curvature may originate from disrupted biomechanics, because axial load is shifted from posterior to anterior column as lordosis is lost, and the increased compressive forces trigger and accelerate the degenerative process." **[Important]**
- 8) In addition to bony structure changes in the cervical spine, when the "natural cervical curvature is disturbed, the normal distribution of neck muscle loads is also disrupted and a larger workload is placed on the supportive soft tissues across cervical segments to maintain biomechanical integrity." **[Important]**
- 9) The vertebral arteries proceed in the transverse foramen of each cervical vertebra. "The vertebral arteries are the major source of blood supply to the cervical spinal cord and brain stem." **[Important]**
- 10) "The aim of this study was to compare the vertebral artery values between subjects with and without loss of cervical lordosis."
- 11) METHODS:
- Vertebral artery hemodynamics were measured in the supine position with the head rotated 45 degrees to the contralateral side.
 - The evaluation parameters included lumen diameter (LD), flow volume (FV), and peak systolic velocity (PSV), at the C5–6 intertransverse segment of the vertebral artery.
 - All measurements were repeated 3 times.
- 12) "The means of diameter, flow volume, and peak systolic velocity in patients were significantly lower as compared to controls."
- 13) "The present study revealed a significant association between loss of cervical lordosis and decreased vertebral artery hemodynamics, including diameter, flow volume, and peak systolic velocity."
- 14) The results of the study revealed that vertebral artery parameters were "significantly different between groups, with patients with loss of cervical lordosis showing lower values in comparison to controls."

- 15) "Our findings demonstrate preliminary evidence that loss of cervical lordosis may play a role in the development of changes related to vertebral artery hemodynamics."
- 16) When the cervical curve flattens, the vertebral arteries "are also in danger of being stretched or compressed."
- 17) There is a "strong association of cervical spondylosis with decreased vertebral artery flow." Yet, individuals in this study were aged 18–45 years and without spondylosis, eliminating the effects of cervical spondylosis on the vertebral arteries.
- 18) These authors evaluated the vertebral arteries with the head rotated 45 degrees to the contralateral side because the vertebral artery is "vulnerable to stenosis with head rotation caused by stretching and compression." "The rotation of the flattened cervical spine, stretching and compression increases, causing marked luminal narrowing and reducing blood flow through the vertebral arteries."
- 19) Studies have revealed that loss of cervical lordosis is associated with cervico-dorsal pain, headaches, and poor life quality.
- 20) "The results of this study indicate that loss of cervical lordosis is associated with decreased vertebral artery values in lumen diameter, flow volume, and peak systolic velocity."
- 21) These authors suggest that loss of cervical lordosis may influence the "rates of transient ischemic attack/strokes, aneurysm rupture, and risks of vertebral artery injury in trauma."
- 22) These authors suggest that loss of cervical lordosis may influence the safety of the vertebral artery to manipulation.

COMMENTS FROM DAN MURPHY

I liked this article, but I see a problem with one of the strengths of this article:

Vertebral artery values in lumen diameter, flow volume, and peak systolic velocity, are most likely compromised when the artery is stressed during rotation. Consequently, these authors performed their Doppler hemodynamics with the subjects in 45° rotation. Such rotation would primarily stress the vertebral artery at C1-C2, yet they assessed C5-C6. I would ask, would an even greater compromise of blood flow be noted had they assessed C1-C2 in these subjects with loss of cervical lordosis?

This article increases the awareness of the adverseness of loss of cervical lordosis. It also highlights the importance of improving and/or correcting cervical lordosis.