
The Association Between Carotid Intima-Media Thickness and Sciatica

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Objective: Both clinical and epidemiologic studies have shown an association between atherosclerotic changes in the aorta or lumbar arteries and lumbar disc degeneration. However, the association between atherosclerosis and sciatica remains unknown. The aim of this study was to investigate the association between carotid intima-media thickness and sciatica.

Methods: The target population consisted of people aged 45 to 74 years, who had participated in a Finnish nationwide population study during the period 2000 to 2001 and lived within 200 km of the 6 study clinics. Of the 1867 eligible subjects, 1386 (74%) were included in the study. We used high-resolution B-mode ultrasound imaging to measure intima-media thickness, and local or radiating low back pain was determined by a standard interview and clinical signs of sciatica through a physician's clinical examination.

Results: Carotid intima-media thickness was associated with continuous radiating low back pain and with a positive unilateral clinical sign of sciatica among men only. After adjustment for potential confounders, each standard deviation (0.23 mm) increment in carotid intima-media thickness showed an odds ratio of 1.6 (95% confidence interval 1.1-2.3) for continuous radiating low back pain and 1.7 (95% confidence interval 1.3-2.1) for a positive unilateral clinical sign of sciatica. Carotid intima-media thickness was not associated with local low back pain.

Conclusion: Sciatica may be a manifestation of atherosclerosis, or both conditions may share common risk factors.

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Keywords: *atherosclerosis, low back pain, sciatic nerve, sciatic neuropathy*

Sciatica, a clinical entity with low back pain (LBP) radiating down the leg along the distribution of the sciatic nerve, is a common health problem (1,2). It is most often caused by the compression or irritation of the lower spinal nerve roots (2). The most common

source for the irritation of the nerve roots is a lumbar disc herniation. Several clinical tests are used to examine the involvement of the lumbar nerve roots such as the straight leg raising test, ankle or big toe dorsiflexion strength, plantar flexion strength, and the Achilles tendon reflex.

The etiology of sciatica involves multiple factors. In addition to mechanical factors, impairment in vascular supply may lead to lumbar disc degeneration (3). Sciatica and cardiovascular diseases may share common risk factors. Indeed, several studies have shown associations between obesity (1,4), smoking (5), serum cholesterol (6,7), and sciatic pain. In addition, a higher risk of lumbar disc degeneration or herniation has been reported among overweight people than among those with normal weight (8-10).

There is as yet no evidence to support an association between atherosclerosis and sciatica. Clinical and autopsy studies have shown an association between occlusion or

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stenosis of the lumbar arteries and lumbar disc degeneration (7,11). Furthermore, a longitudinal population study found that severe aortic wall calcifications predict lumbar disc degeneration (12). Atherosclerosis may accelerate disc degeneration due to decreased nutrition. Disc herniation, while requiring the presence of disc degeneration to occur, is an uncommon manifestation of disc degeneration. Atherosclerosis may also decrease lumbar nerve root circulation. Nerve root ischemia is believed to be an important component in the pathogenesis of sciatica (13,14).

In this population study, to test whether atherosclerosis is associated with sciatica, we ultrasonically assessed carotid artery intima-media thickness (IMT) as a proxy measure of general atherosclerosis.

METHODS

Patients

We studied a subsample of the Finnish Health 2000 Survey, a national health examination survey (<http://www.ktl.fi/terveys2000/index.uk.html>). The main emphasis of the Health 2000 Survey was to obtain up-to-date information on cardiovascular, respiratory, musculoskeletal and mental diseases and disability, their determinants, and treatments in Finland. The target population of the Health 2000 Survey consisted of men and women aged 30 or over, residing in Finland between the fall of 2000 and the spring of 2001. Information was obtained by means of a home interview, clinical health examination, and laboratory tests. The local ethics committee accepted the study plan, and study subjects gave their written informed consent.

The original Health 2000 sample comprised 8028 subjects aged 30 years or over. Of them, 6354 (80%) participated in the health examination. Ultrasound assessments of the carotid IMT were performed in a subsample of men and women aged 45 to 74 years, who resided within 200 km of the 6 study clinics. These clinics were located in 4 hospitals and 2 research institutions, which all had cardiovascular ultrasound equipment with a linear array transducer. The 6 study clinics cover 6 Finnish towns and surrounding areas located in southern (Helsinki), southwestern (Turku), central (Tampere), eastern (Kuopio and Joensuu), and northern (Oulu) parts of the country. Of the subjects aged 45 to 74 years ($N = 4195$); those ($N = 1867$) who fulfilled these eligibility criteria were invited and 1526 (82%) of them participated in the carotid artery ultrasound assessment study. The current study sample consisted of 1386 (74%) subjects with available data on carotid artery ultrasound assessment and physical examination of the low back.

Clinical Assessment

For the comprehensive health examination, specially trained nurses performed a symptom interview of muscu-

loskeletal complaints, and physicians performed a standardized physical examination. Information was obtained on the presence and duration of local or radiating LBP. The questions on radiating LBP were "Have you ever had LBP radiating to the leg?" The alternative responses were as follows: (1) No; (2) Yes. If yes, a second question was asked, "Have you had LBP radiating to the leg more than once?" The alternative responses were as follows: (1) No; (2) Yes, 2 to 5 times; (3) Yes, 6 times or more; (4) Yes, I have continuous radiating pain.

A positive clinical sign of sciatica during the physical examination was any of the following unilateral signs: restricted straight leg raising test, decreased ankle dorsiflexion, big toe dorsiflexion or plantar flexion strength, or abnormal Achilles tendon reflex.

In the presence of chronic (>3 months) low back complaints, sciatica was clinically diagnosed by the field physicians if the patient had a history of LBP radiating down to the leg and findings of either lumbar nerve root compression (a positive clinical sign) or lumbar disc herniation that had previously been confirmed by radiographic examination or required surgery (2).

Quality Assessment

We performed 2 pilot studies 7 and 3 months before the field work started, to test and improve the methods. Detailed written instructions for the assessment of physical status were provided before the field examination. All staff members, including physicians, attended a 3-week training course. Other quality control measures included observation, video recording with feedback on examination technique, and repeated and parallel measurements.

To study the repeatability of the clinical signs of sciatica, a subsample of 94 randomly selected subjects underwent the standard clinical examination performed by 2 field physicians on the same day. The agreement between the 2 examiners was moderate (kappa coefficient 0.49) for a positive clinical sign of sciatica.

Determinants

Carotid Intima-Media Thickness

We performed a high-resolution B-mode carotid ultrasound examination of the right carotid artery, using a 7.5- or 10-MHz linear array transducer with the patient lying in a supine position. The sonographer focused first on the distal 1 cm of the common carotid artery (CCA) and recorded a cine loop for 4 to 5 seconds thereafter storing the recording on a super VHS tape. The sonographer then focused on the carotid artery bulb and similarly recorded and stored a cine loop. All sonographers were centrally trained and certified in Kuopio before carrying out the study examinations.

To assess intrasonographer repeatability, 3 of the sonographers performed repeated carotid ultrasound examinations. They scanned 4 to 6 subjects twice, with an

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