

Atherosclerotic Disease and Its Relationship to Lumbar Degenerative Disc Disease, Facet Arthritis and Stenosis Using CT Angiography

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Funding: none



INTRODCUTION

The intervertebral disc is the largest avascular structure in the body. It relies on passive diffusion from arteries at the periphery of the disc for nutrition.¹ Thus, the disc may be an at risk area in those with atherosclerotic disease. Computed tomography angiograms (CTAs) offers good visualization of lumbar artery atherosclerosis.

PURPOSE

The objective of this study was to look at lumbar artery and aortic atherosclerosis on CTAs and evaluate its relation to not only lumbar degenerative disc disease (DDD) but also facet arthritis and spinal I stenosis.

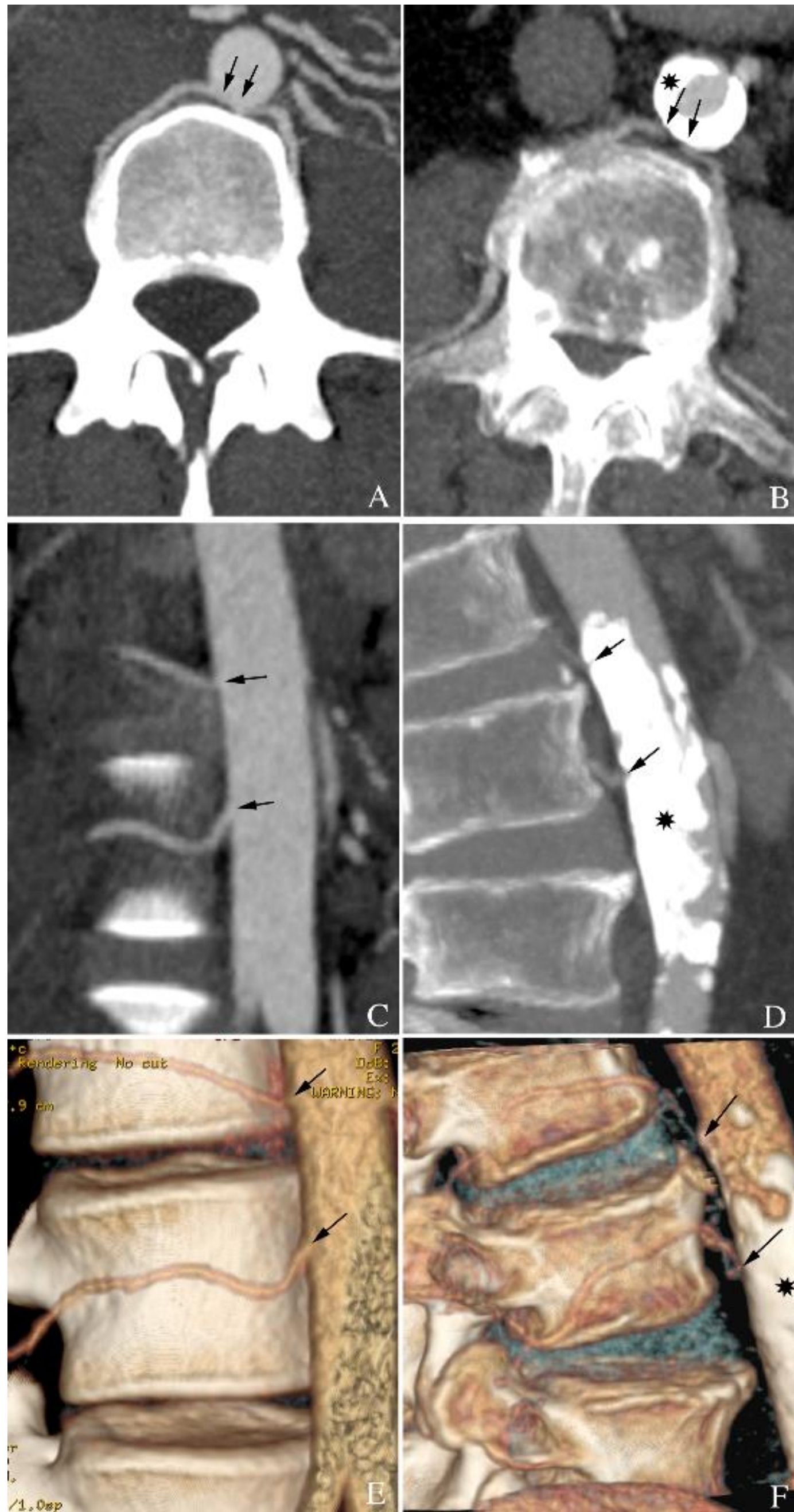
METHODS

A neuroradiologist reviewed 300 total lumbar arteries (150 lumbar artery pairs) on 30 consecutive CTAs done for various reasons at a university hospital. Severity of vascular disease of the lumbar arteries and aorta (at opening of lumbar arteries) was evaluated. The association between vascular disease with DDD, facet arthritis and spinal canal stenosis was evaluated

RESULTS

After adjusting for age, lumbar artery atherosclerosis had a positive relationship with DDD, facet arthritis and spinal stenosis which was statistically significant (p<0.05). The correlation coefficient was highest in the younger age group looking at vascular disease with DDD (0.73, CI 0.50 – 0.96, p<0.0001). Similarly, aortic atherosclerosis was positively associated with DDD, facet arthritis and spinal stenosis after adjusting for age (p<0.05). The findings were most notable in the younger age group both for aortic and lumbar artery atherosclerosis.

Normal Vascular Disease



CTA in a normal patient (A) and a patient with severe atherosclerosis in the abdominal aorta (B). The lumbar artery origins are labelled (arrows) as is the atherosclerotic plaque (asterisk). Oblique reformats in the same patients (C, D) demonstrate the lumbar artery origins in profile (arrows) along with a severe atherosclerotic plaque (asterisk in D). Oblique volume rendered images also show the normal vessel origins (arrows in E) compared to the diseased vessel origins (arrows in F). Again note the severe calcified plaque (asterisk in F).

Outcome	Lumbar Artery Stenosis, Age ≤ 61 yrs			Lumbar Artery Stenosis, Age ≥ 61 yrs			p-value
	N	Median (Q1, Q3)	Polychoric Corr (95% CI)	N	Median (Q1, Q3)	Polychoric Corr (95% CI)	
DDD Score			0.73 (0.50, 0.96)			0.54 (0.34, 0.75)	<0.0001
Normal	43	0 (0, 0)		6	3 (2, 4)		
Mild	12	0 (0, 3.5)		23	6 (4, 8)		
Moderate	3	9 (0, 11)		9	6 (5, 13)		
Severe	2	5.5 (4, 7)		22	9 (8, 12)		
Facet			0.57 (0.26, 0.88)			0.20 (-0.06, 0.47)	0.0080
Normal	43	0 (0, 0)		9	4 (2, 5)		
Mild	11	0 (0, 4)		23	8 (4, 12)		
Moderate	4	0 (0, 2)		14	6 (2, 8)		
Severe	2	9 (7, 11)		14	8 (5, 11)		
Spinal Stenosis			0.42 (0.02, 0.83)			0.30 (0.05, 0.55)	0.0048
Normal	49	0 (0, 0)		12	4 (2.5, 6)		
Mild	9	0 (0, 4)		16	7 (5, 10)		
Moderate	1	0 (0, 0)		16	6 (2, 10)		
Severe	1	7 (7, 7)		16	8 (7, 11.5)		

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DISCUSSION

This study found that vascular disease, specifically atherosclerotic disease of the lumbar arteries and the aorta (at the opening of the lumbar arteries), correlated with DDD, facet arthritis and lumbar spinal canal stenosis after adjusting for age. The correlation with DDD has been reported before in autopsy and radiology studies²⁻⁶, but this study is the first to show the correlation of vascular disease with facet arthritis and lumbar spinal canal stenosis. What was also interesting is that findings were more notable in the younger age group.

This study utilized CTAs, which may be preferable in evaluating lumbar artery atherosclerosis than the MRAs used in prior studies. CTAs offer improved spatial resolution for better visualization of atherosclerotic narrowing of these small arteries.

Lifestyle factors may play a notable role in spine issues. Lifestyle factors that promote vascular disease like smoking and even diet may play an underlying role in degenerative changes and pain.

LIMITATIONS

This was a review of CTAs that were done on patients with vascular disease which may skew the data. There were a few cases grading severity of atherosclerosis was difficult. Although those could still be graded as normal, moderate or occluded

CONCLUSION

Atherosclerotic disease of the lumbar arteries and aorta (at opening of lumbar arteries) correlated with lumbar DDD, facet arthritis and spinal canal stenosis after adjusting for age