Risk factors for vertebral artery steno-occlusive disease.

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BACKGROUND

- We performed a case control study to identify the effects of multiple comorbidities as potential risk factors for developing vertebral artery occlusive disease (VAOD).

METHODS

- We identified 56 patients with angiographically confirmed VAOD from a prospective registry. A total of 747 control subjects were selected who were matched for age, sex, and race/ethnicity from a nationally representative cohort of adults who participated in the Third National Health and Nutrition Examination Survey (NHANES) 2015 - 2016. None of the control population had any history of stroke. The demographic and clinical characteristics that were collected are shown in **Table 1**.

- Statistical analysis:** We used chi-squared and ANOVA for categorical and continuous variables, respectively. Case control matching function was utilized to exactly match age, sex and ethnicity variables with controls at a ratio of 50:1. A step wise logistic regression analysis was performed for risk factors.

Table 1. Demographics and clinical characteristics of patients with vertebral artery occlusive disease compared with age, sex and ethnicity matched stroke free controls from National Health and Nutrition Examination Survey 2015-2016.

	Controls	Patients with VAOD	p-value
Overall number (%)	747	56	
Gender			
Men	409 (54.8%)	29 (55.4%)	1.0
Women	316 (45.2%)	23 (44.6%)	
Race/ethnicity			
Hispanic	57 (7.6%)	4 (7.1%)	1.0
White	645 (86.3%)	47 (83.9%)	
African American	45 (6.0%)	4 (7.1%)	
Blood pressure (mmHg)			
Systolic	132.9 ± 20.7	134.2 ± 16.8	0.7
Diastolic	67.3 ± 14.9	76.1 ± 12.5	<.0001
Body weight			
Weight (kg)	82.4 ± 20.7	85.2 ± 17.0	0.3
BMI (kg/m ²)	29.4 ± 6.5	30.3 ± 6.0	0.3
Laboratory values			
Total serum cholesterol	190.8 ± 41.2	152.4 ± 85.7	<.0001
Medication use			
Using antihypertensive medication	378 (50.6%)	44 (78.5%)	<.0001
Using oral hypoglycemic medication	115 (15.3%)	12 (21.4%)	.001
Using stains	296 (39.6%)	40 (71.4%)	<.0001
Using insulin	39 (5.2%)	14 (25.0%)	<.0001
Cigarette smoking status			
Past	272 (36.4%)	20 (35.7%)	.01
Active	113 (15.1%)	17 (30.4%)	
Never	362 (48.5%) [†]	19 (32.1%)	
Cardiovascular risk factors			
Hypertension	404 (54.1%)	47 (83.9%)	<.0001
Diabetes mellitus	156 (20.9%)	26 (46.4%)	<.0001
Hyperlipidemia	383 (51.3%)	40 (71.4%)	.004
Coronary artery disease	81 (10.8%)	20 (35.7%)	<.0001

Abbreviations: SD, standard deviation

Table 3 Multivariate analysis evaluating the effect of various risk factors for vertebral artery occlusive disease

Cardiovascular risk factors	Multivariate adjusted odds ratio (95% CI)	p-value
Hypertension		
No	Reference	Ref
Yes	3.0 (1.4 -6.5)	.004
Diabetes mellitus		
No	Reference	Ref
Yes	2.5 (1.4 – 4.6)	.002
Coronary artery disease		
No	Reference	Ref
Yes	3.2 (1.7 – 6.0)	<.0001
Cigarette smoking		
Never	Reference	Ref
Active	3.1 (1.5 – 6.3)	.002
Past	1.2 (0.6 – 2.3)	0.7

Abbreviations: CI, Confidence interval.

Also entered in the stepwise logistic regression model was hyperlipidemia which was not significant.

RESULTS

- The demographic and clinical characteristics of controls matched according to age, sex and ethnicity are listed in Table 2. The frequency of hypertension was higher in VAOD group (83.9%) compared with controls (54.1%, p-value <.0001). The frequency of diabetes mellitus was higher in VAOD patients (46.4%) compared with NHANES matched controls (20.9%, p-value <.0001). The proportion of patients with hyperlipidemia, and those with coronary artery disease was also significantly higher in the VAOD compared with controls. (Table 2). The serum total cholesterol concentrations were significantly lower in patients with VAOD. The proportion of patients using antihypertensive medication and insulin was significantly higher among patients with VAOD.
- In the multivariate model, hypertension (odds ratio [OR], 3.0; 95% confidence interval [CI], 1.4-6.5; p-value- .004) diabetes mellitus (OR, 2.5; 95% CI, 1.4 – 4.6; p-value .002), coronary artery disease (OR, 3.2; 95% CI, 1.7-6.0; p-value <.0001) and active cigarette smoking (OR, 3.1; 95% CI, 1.5 – 6.3; p-value .002) were independently associated with increased risk of VAOD. There was no increased risk associated with past cigarette smoking (OR, 1.2; 95% CI, 0.6 – 2.3; p-value 0.7).

CONCLUSION

Hypertension, diabetes mellitus, coronary artery disease, and active cigarette smoking were significantly associated with occurrence of VAOD.