Clinical Research

Relationship between coronary atherosclerotic stenosis and cerebral atherosclerotic stenosis

Jiaping Wei¹, Kang Li¹, Hong Zhao¹, Jifang He¹, Liqing Xu¹, Jing Wen¹, Chunyan Zhou¹, Xiaoguang Wu¹, Jiarui Wang¹, Shenmao Li², Zhiyong Zhang², Feng Ling²

1. Department of Cardiology, Xuanwu Hospital, Capital University of Medical Sciences, Beijing, China
2. Lab of Cerebrovascular Intervention, Xuanwu Hospital, Capital University of Medical Sciences, Beijing, China

Objective To investigate the relationship between severity of cerebrovascular atherosclerosis stenosis and that of coronary atherosclerosis stenosis. Methods Cerebral angiography and coronary angiography were performed in 34 patients who had coronary disease with cerebral ischemia. Patients were divided into 3 subgroups according to the degree of stenosis on angiography, concomitant diseases, risk factors and biochemical data. Results The follow-up study showed that the incidence of cardiac and cerebrovascular death increased significantly in patients with moderate to severe stenosis of coronary and cerebral arteries; the severity of stenosis in the coronary artery parallels that in the solitary carotid artery, or dual carotid and vertebral arteries. Conclusions Patients with coronary and cerebral artery stenosis, especially those with multi-risk factors, such as hypertension, diabetes and cigarette smoking, should receive intensive treatment to reduce cardiac and cerebrovascular events. (J Geriatr Cardiol 2008; 5:227-229)

Keywords Carotid atherosclerotic stenosis; prognosis; coronary artery stenosis; aortocranial angiography; carotid angiography; coronary angiography

Introduction

Current epidemiology shows that atherosclerosis is a common disease in China, and the leading cause of cardiac and cerebrovascular disorders. We should thoroughly evaluate the degree and extent of atherosclerosis and give effective intervention to reduce cardiac and cerebrovascular events. In recent years, researchers worldwide reported that coronary involvement was closely related to cerebrovascular involvement.¹ We reported 34 patients with coronary heart disease undergoing both coronary and cerebral angiographies, and discuss the relationship between coronary atherosclerosis and cerebrovascular atherosclerosis.

 Patients and methods

Patients

From October 2002 to October 2006, 34 patients with coronary atherosclerosis suffering from chest distress, chest pain, myocardial infarction, paroxysmal dizziness, fainting or suspected transient ischemic attack (TIA), were assessed by selective coronary arteriography and cerebral arteriography meeting Judkins’ criteria. Of all the patients (25 male and 9 female, mean age 64.6±9.8 years), 3 had acute myocardial infarction, 8 old myocardial infarction, and 29 angina pectoris.

Study protocol

All cases were divided into three subgroups on the basis of coronary arteriographic findings: (1) subgroup with normal/mild stenosis (n=5, mean age 60.8±11.9 years): the stenosis ratios of left anterior descending branch (LAD), left circumflex branch (LCX) and right coronary artery (RCA) were all less than 50%; (2) subgroup with moderate stenosis (n=4, mean age 69.3±2.6 years): the stenosis ratios of LAD, LCX and RCA were 50% to 75%; (3) subgroup with severe stenosis(n=25, mean age was 64.6±10.1 years): the stenosis ratios of LAD, LCX and RCA were no less than 75%, or the stenosis ratio of left main coronary artery (LM) was no less than 50%. Age variances were similar among the 3 subgroups (F=0.810, P=0.454). The stenotic arteries in the three subgroups were scored according to the Califf’s Risk Score²,³ as follows: if the stenosis ratio of any of the LAD, diagonal branch (D), first septal branch (S1), LCX, OM, RCA and posterior descending branch (PDA) was no less than 75%, the stenosis ratio of left main coronary artery (LM) was no less than 50%, Age variances were similar among the 3 subgroups (F=0.810, P=0.454). The stenotic arteries in the three subgroups were scored according to the Califf’s Risk Score²,³ as follows: if the stenosis ratio of any of the LAD, diagonal branch (D), first septal branch (S1), LCX, OM, RCA and posterior descending branch (PDA) was no less than 75%, a score of 2 was awarded, and the total score of each subgroup was calculated. After coronary arteriography, some patients were performed aorticranial angiography instantly by putting the pig-tail catheter into the ascending aorta and injecting diatrizoate at 30ml/s with a high-pressure syringe. The rest patients underwent aorticranial angiography according to...
Seldinger’s method. The arteriographs showed clearly the carotid, vertebral, anterior cerebral, middle cerebral, posterior cerebral and basilar arteries. We divided all the cases into three subgroups according to the angiographic findings \( (1) \) subgroup with mild stenosis \( (n=6, \text{mean age } 63.5\pm12.1 \text{ years}) \); the stenosis ratio of LAD, D, S1, LCX, OM, RCA and PDA was less than 40\%, respectively; \( (2) \) subgroup with moderate stenosis \( (n=4, \text{mean age } 61.5\pm11.9 \text{ years}) \); the stenosis ratio of LAD, D, S1, LCX, OM, RCA and PDA was 40\% to 75\%, respectively; \( (3) \) subgroup with severe stenosis \( (n=24, \text{mean age } 65.4\pm9.3 \text{ years}) \); the stenosis ratio of LAD, D, S1, LCX, OM, RCA and PDA was no less than 75\%, respectively. Age variances were among the 3 subgroups \( (F=0.305, P=0.7390) \).

The main risk factors of atherosclerosis were recorded, including age, gender, hypertension, myocardial infarction, angina pectoris, TIA, diabetes, cigarette smoking and hyperlipemia. Phone call follow-up was carried out in November 2006.

Statistical analysis

All data were analyzed with SPSS11.5 software. Because of the small sample size and heterogeneity of the variance, nonparametric tests were used: the relationship between the severity of coronary/cerebral artery stenosis and the risk factor scores was evaluated by one-way analysis of variance in the Kruskal-Wallis test, the association and the risk factor scores was evaluated by one-way analysis of variance, nonparametric tests were used: the relationship between the severity of coronary/cerebral artery stenosis and cerebral artery stenosis by one-way analysis of variance, nonparametric tests were used: the relationship between the severity of coronary/cerebral artery stenosis and cerebral artery stenosis by one-way analysis of variance. The severity of coronary artery stenosis was detected in the three main branches of coronary artery. Through Jonckheere-Terpstra test, the number of branches involved and their degrees of stenosis were recorded. The mean rank of branches involved was 3.0 in the subgroup with normal/mild stenosis, 13.0 in the subgroup with moderate stenosis, 21.1 in the subgroup with severe stenosis (all \( P=0.000 \)). The Califf’s Risk Scores in the subgroup with severe stenosis \( (4.5\pm1.8) \) was higher than those in the subgroups with normal/mild and moderate stenosis (both were 0). The severity of cerebral artery stenosis was related to the extent of disease in the carotid and vertebral arteries: greater extent in subgroups with moderate or severe stenosis than that in the subgroup with normal/mild stenosis.

There were 17 cases (50\%) with mild, 3 with moderate (8.8\%) and 14 with severe (41.2\%) carotid artery stenosis. There were 18 cases with mild (52.9\%), 2 with moderate (5.9\%) and 14 with severe (41.2\%) vertebral artery stenosis (nonparametric paired-sample Wilcoxon signed-rank test, \( Z=0.247, P=0.873 \)). The results showed that the severity of carotid stenosis was coincident with that of vertebral artery stenosis.

The severity of coronary artery stenosis paralleled that of cerebral artery stenosis, as determined by the nonparametric paired-sample Wilcoxon signed-rank test (Table 2).

The higher the Califf’s Risk score of the coronary artery, the greater the stenotic degree of the cerebral artery. As high as 92\% cases with moderate and severe the cerebral artery stenosis in the groups had no less than 2 scores. Thirty-one patients of all the 34 suffered from coronary artery stenosis complicated with cerebral artery stenosis, of which 12 were of moderate/severe, 9 of severe coronary and cerebral artery stenosis. There was no death in the normal/
mild subgroup, 1 death in the moderate/severe subgroup (4-year follow-up) and 3 in the severe subgroup (2 in the 1st year, and 1 in the 4th year). Of the 4 death cases, 2 died of angiocardiopathy, and the other 2 of cerebral vascular disease.

Discussion

Atherosclerosis is a chronic progressive systemic disease, affecting both cerebral and coronary arteries, especially medium-sized, elastic muscular arteries. Involvement of both arteries concurrently is not uncommon, and correlates with incidence of hypertension, smoking, hyperlipemia and diabetes. At present, angiography is still the “gold standard” to determine the locations of major vascular lesions and their severity. In many previous researches, results of arteriography were not always consistent with those of ultrasonography. Therefore, to investigate the relationship between coronary and cerebral atherosclerosis, arteriography was the only method to evaluate the extent of atherosclerosis in our study.

One-way analysis of variance showed that only angina pectoris was closely correlated to the severity of coronary and cerebral artery stenosis, but no relationship between its severity and other risk factors, which may result from the small sample size of the study. However, if the data were examined by nonparametric tests, the severity of coronary and cerebral artery stenosis corresponded closely with the number of risk factors, which are now regarded as independent ones for atherosclerosis.

We demonstrated that the higher the Califf’s Risk Score, the greater the severity of stenosis of the cerebral arteries. The details were as follows: one of 5 with mild, all of four with moderate, and 23 of 25 with severe coronary artery stenosis also suffered from cerebral arterial stenosis. The degree and extent of coronary artery stenosis corresponded with those of cerebral arteries stenosis. Consequently, the severity of coronary artery atherosclerosis reflects a similar condition in the cerebral arteries, as suggested by other authors.

Our follow-up revealed that the mortality rate was strikingly high in patients with concurrent moderate and severe stenosis of coronary and cerebral arteries.

In conclusion, we assessed that coronary artery stenosis was closely related to carotid artery or vertebral artery stenosis, and the severity predicted cardiac and cerebral events as well as mortality risk. Thus, it is helpful to identify high-risk patients and reduce cardiac and cerebral events.

References