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The severity of coronary artery disease evaluated by central systolic pressure and fractional diastolic pressure

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Abstract

Background: Central pulse pressure, pulse pressure index and fractional pulse pressure have been confirmed to be associated with increased risk of cardiovascular disease, but if the severity of cardiovascular disease, specifically for the coronary artery disease, is evaluated by central systolic pressure and fractional diastolic pressure has been not well studied. **Aims**: This study was designed to examine if central systolic pressure and fractional diastolic pressure could act as a predicting factor for the severity of coronary artery disease. **Patients and Methods**: A total of 310 patients were included in this study. 154 patients were diagnosed with coronary artery disease, and 156 with non-coronary artery disease, which was confirmed with diagnostic coronary angiography. The average age and sex in the two groups were same. **Results**: Age, peripheral and central systolic blood pressure, fractional systolic pressure, and fractional diastolic pressure were significantly higher in the patients with coronary artery disease ($P<0.05$). The central fractional systolic pressure and fractional diastolic pressure were abnormal in the patients with coronary artery disease. Central fractional systolic pressure and fractional diastolic pressure presented a positive correlation between them and coronary Gensini Score ($P<0.05$), in the patients with coronary artery disease. **Conclusions**: The severity of coronary artery disease may be predicted by examination of central fractional systolic pressure and fractional diastolic pressure.

Keywords: Fractional systolic pressure, fractional diastolic pressure, coronary artery disease, severity, predicting factor.

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Introduction

Although the established risk factors such as smoking [1], high blood cholesterol levels [2] and hypertension [3] have shown to be associated with the development of coronary artery disease (CAD), defining the role of blood pressure changes for predicting CHD remains clinically challenging. A report indicated that fractional pulse pressure (FPP) [4] was closely related to cardiovascular diseases. However, it is little known about the relationship between fractional systolic pressure (FSP)/fractional diastolic pressure (FDP) and CAD.

Therefore, the present study was to study whether FSP and FDP in central aorta were associated with CAD, and acted as a predication indicator for the severity of CAD.

Patients and Methods

The study was approved by review body of the Henan Province Hospital, and informed consent was obtained from each subject or patient. A retrospective chart review of all patient records with diagnostic coronary angiography between January 2000 and December 2007 was performed. A total of 310 patients were included in this study, and all patients were undertaken with diagnostic coronary angiography. According to the findings of coronary angiography, the patients were divided into two

groups: CAD and non-CAD (Table 1).

The diagnoses of CAD using coronary angiography were based on the angiographic study, in which at least one of major coronary artery was shown to be 50% or more stenosis in diameter. Gensini Score was used for determination of the severity of CAD.

Table 1 Mean age and groups of the study population

Group	CAD	Non-CAD
N (M/F)	154 (76/78)	156 (81/75)^{NS}
Yrs	54.7±9.4	38.2.±11.4*

NS: no significance; *: P<0.05; N：number; M/F：male/female; Yrs：years; CAD: coronary artery disease

Angiography

Coronary angiography was performed by femoral or transradial approaches. The left anterior descending artery, circumflex artery and right coronary artery were studied. 50% or more stenosis in diameter in one or more of the arteries was defined as CAD.

Measurement of central blood pressures

While an angiographic catheter was positioned at the ascending aorta, and connected to a fluid-filled system pressure transducer, the pressure curve was record by a multipurpose lead system. Central systolic blood pressure (SBP), central diastolic blood pressure (DBP) and mean blood pressure were obtained from the recorded curve. The SBP and DBP were recorded upon the 1st and 5th Korotkoff sound, respectively.

The mean arterial pressure (MAP) and pulse pressure (PP) were obtained for calculation of FSP and FDP, in which the equation was: FSP=SBP/MAP, and FDP=DBP/MAP.

Determination of Gensini Score

The Gensini Score was determined according to the previously described menthols [5]: 0 = 25%; 1 = 25 to 49%; 2 = 50 to 74%; 3 = 75 to 99%, and 4 = 100%.

Measurement of blood lipids

All individuals in the present study were tested with their blood lipid, including total cholesterol, triglycerides, apolipoproteins, and high/low lipoprotein.

Statistical analysis

Quantitative data was expressed by mean ± SD. One-way ANOVA and t-test were used to analyze the differences between the groups. A value of P <0.05 was considered statistically significant.

Results

310 patients were successfully undergone with coronary artery angiography. 154 patients (54.7 years ± 9.4) were categorized as CAD, and 156 (38.2 years ± 11.4) as non CAD (Table 1). There were 157 males and 153 females. No significant difference was observed in the female-to-male ratio. The age was significantly lower in CAD patients than non-CAD.

There was a significant difference in central SBP/FSP and FDP between the two groups (P<0.01). The elevated FSP increased the risk of CAD, while elevated FDP decreased the risk of CAD. The level of the blood lipid did not show a significant difference between the two groups.

Discussion

CAD remains the leading cause of death, and early detection of CAD allows optimal therapeutic management. The gold standard for diagnoses of CAD has always been invasive coronary angiography. Ascending aortic fractional pulse pressure and fractional systolic pressure were demonstrated to differentiate patients with and without coronary artery disease [6]. In addition, central FSP and FDP were shown to be related to risk of CAD [7], and a higher central FSP or lower central FDP will increase the risk of CAD [8, 9]. However, there is no study available on the relationship between FSP/FDP and the extent of coronary artery disease,

We identified 154 patients with CAD. Our results showed that central FSP and FDP are independent risk factors for CAD with higher FSP and lower FDP, and act as an indicator of higher risk for CAD. In addition to the central FSP and FDP as an independent factor for risk and severity of CAD, the Gensini Score is also demonstrated to be a risk factor for evaluation of CAD. The present findings demonstrated that FSP and FDP combined with Gensini Score were not only a satisfied examination of patients with and without CAD, but provided with a much reliable predicting indicator for the risk of CAD.

Atherosclerotic vascular disease is common in elderly patients. Even though a high incidence of CAD was demonstrated to be associated with atherosclerosis [10], which was studied by coronary artery angiography [2], our results showed that the level of blood lipid was not an independent factor for the prediction of CAD. This might be due to the test carried out at the different stages of disease. Therefore, we do not recommend the blood-lipid test alone to be an independent factor for the severity of CAD.

Conclusion

Our results reported here show that central FSP and FDP combined with Gensini Score were an independent risk factor for CAD. This is of significant importance for the diagnosis and severity of CAD.

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