Original Article

The Predictive Value of Brachial-Ankle Pulse Wave Velocity in Coronary Atherosclerosis and Peripheral Artery Diseases in Urban Chinese Patients

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Coronary artery disease (CAD) is one of the most common diseases throughout the world. To investigate the relationship between brachial-ankle pulse wave velocity (baPWV) and arterial atherosclerosis and peripheral artery disease (PAD) and its potential diagnostic value in diagnosing arterial sclerosis, a self-designed questionnaire and special machine designed by Colin Corp., Ltd. were implemented to measure the level of baPWV and the ankle-brachial index (ABI) and their relations to coronary and peripheral artery atherosclerosis. The results showed that baPWV and ABI were equally effective at predicting stenosis of the coronary arteries and stenosis of the arteries of the lower extremities. Different levels of baPWV with corresponding ABI can express different degrees of arterial sclerosis and peripheral artery lesion to a certain extent. Measurement of both baPWV and ABI is thus highly recommended in clinical investigation. Arterial wave reflection is a major determinant of left ventricular function, coronary perfusion, and cardiovascular risk. We investigated whether arterial wave velocity can detect atherosclerosis of the coronary arteries and peripheral arteries in patients with documented coronary artery diseases. Our goal was to investigate the relationship between baPWV and arterial atherosclerosis and PAD and their potential diagnostic value. Two hundred and seventy-two patients ranging in age from 45–92 years (mean: 66.87±11.42 years) were selected from the Department of Cardiology of our hospital. A carefully designed questionnaire was used to gather baseline data for each patient. All patients underwent cardioangiography and were divided into four groups according to their Gensini scores: a control group, and groups with a mild, moderate, or severe degree of stenosis. One hundred and five of these patients simultaneously underwent angiography of the lower extremities and were divided into four groups according to the degree of artery stenosis: a control group, and groups with a mild, moderate, or severe degree of stenosis. Grouping of baPWV levels was made according to Japanese surveys. Bilateral baPWV and ABI were measured using non-invasive arterial atherosclerosis measuring equipment. In the coronary artery groups based on Gensini score, ABI in the group with a high degree of stenosis was significantly lower than that in the control and moderate stenosis groups, while the baPWV was significantly higher than that in the control and mild stenosis groups. In the grouping of baPWV levels, it was indicated that the ABI level was significantly different between each group. The ABI<0.9 in groups with baPWV<1,400 cm/s and >2,100 cm/s was higher than that in other groups. In the grouping by angiography of the lower extremities, the ABI level was decreased with increasing degree of artery stenosis while the baPWV levels were increased under the same circumstance ($p<0.05$ or $p<0.01$). Logistic regression analysis indicated that relatively low ABI, high baPWV, abnormal fasting blood glucose, and smoking were independent risk factors for the development of cardiovascular diseases. The simultaneous measurement of bilateral baPWV and ABI using the newly developed equipment presented herein is

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highly recommended, and should play an important role in predicting the possibility of cardiovascular diseases and the degree of coronary artery lesions. It is important to note that baPWV is not only one of the risk factors in the presence of coronary stenosis, but also a substitute index of target-organ damage, another parameter in predicting PAD. The current study indicated that a baPWV > 1,800 cm/s often follows a severe coronary artery event, while baPWV > 2,100 cm/s may be related to potential PAD. baPWV measurement is helpful to make new standard of diagnosing PAD in Chinese cohorts. (*Hypertens Res* 2008; 31: 1079–1085)

***Key Words*: brachial-ankle pulse wave velocity, arterial atherosclerosis, peripheral artery disease**

Introduction

Pulse wave velocity (PWV), which reflects arterial stiffness, is a predictor of future cardiovascular events in a general population or in patients with hypertension, diabetes mellitus (DM) or end-stage renal failure. The carotid-femoral PWV measurement is a conventional method of PWV measurement but requires a high degree of technical expertise. In recent years, the concept of brachial-ankle pulse wave velocity (baPWV) has been put forward and its measurement has become more convenient than other invasive methods. It can be widely used in large-scale populations and has become available in clinical settings (*1*). baPWV is related to carotid intima media thickness and is also a marker of arterial atherosclerosis assessment. However, baPWV measurement is also a muscular arterial component (*2*, *3*). Therefore, the usefulness of baPWV as a predictor of cardiovascular events has yet to be decisively established. It is crucial to introduce baPWV as a marker of atherosclerosis severity and arterial stiffness increase. Abnormal PWV causes increased left ventricular afterload and impaired coronary artery supply. These pathophysiological changes are thought to be involved in the underlying mechanism of the development of coronary artery disease (CAD). The higher the PWV level is, the more CAD risk may arise. PWV measurement associated with angiography of the lower extremities is an important method to investigate peripheral artery stiffness in older people and to detect the occurrence of carotid arterial plaques in patients with atherosclerotic risk factors (*4*, *5*). However, the relationship between baPWV and coronary artery atherosclerosis and the relationship between baPWV and ankle-brachial index (ABI) have not been fully defined in Chinese urban patients.

Although a previous study (*6*) demonstrated a relationship between ABI and PWV in subjects with a high risk of atherosclerotic cardiovascular disease by using the oscillometric method and CAD definition in this study is macroscopic. In the present study we used a slightly different method. Little is known regarding the influence of PWV on CAD patients and the further association between this relationship and all-cause and CVD mortality, particularly in Chinese elderly. We therefore conducted a community-based study to determine the distribution of baPWV in order to provide baseline data for a prospective study, and to determine the possible clinical significance of PWV levels for the choice of anti-atherosclerosis therapy. We examined different levels of baPWV and ABI of patients with CAD risk factors simultaneously using newly-developed non-invasive arterial atherosclerosis measuring equipment with the aim of determining the possible relationship between baPWV and the severity of coronary artery sclerosis microscopically and to further analyze the association of baPWV and peripheral artery disease (PAD) according to lower extremities angiography. We also examined whether enhanced arterial wave reflection assessed by baPWV analysis may detect the presence and severity of CAD and PAD so as to stipulate a moderate normal range and classification of abnormal baPWV in the Chinese population. It is hoped that our findings will help to improve the longevity of patients with PAD.

Methods

Study Population

Two hundred and seventy-two consecutive patients, aged 45 to 92 years, of the Department of Cardiology of our hospital were enrolled between May and September 2006. All subjects had typical or clinically suspected CAD and were referred for elective coronary angiography (CAG). Subjects were disqualified if they had cachexia, multiple system organ failure, hypertension crisis, ketoacidosis, or any other condition that was thought to contraindicate CAG. All patients gave informed consent before entering the study and the local ethics committee approved the protocol.

Coronary Angiography

CAG was performed in all patients using a standard Judkins technique *via* the right femoral artery. The percentage diameter stenosis was evaluated by one observer who was unaware of the results of vascular studies. Subjects were assigned to the zero, one, two or three vessel disease group based on the presence of a 50% or greater diameter narrowing for each of the three main coronary arteries (left anterior descending coronary artery [LAD], left circumflex coronary artery [LCX] and right coronary artery [RCA]). The Gensini score (GS) was used for estimation of the extent and severity of coronary atherosclerosis. Angiography of arteries of the lower extrem-

Table 1. Risk Factors of CAD in All Groups (%, Mean±SD)

	N	EH	CI	DM	Dyslipidemia	PAD	Smoking	Age	Male (%)
GS grouping									
Control	38	55.0	5.0	15.0	30.0	0.0	20.0	61.61±15.62	55.0
Mild	47	75.9	13.8	17.2	37.9	3.4	51.7	63.31±9.98	62.1
Moderate	75	58.9	17.9	19.6	30.4	8.9	53.6	67.27±11.52	66.1
Severe	112	72.3	16.0	26.6	40.4	14.8*	62.2*	68.88±10.31**	71.3
χ^2 value		5.212	2.019	4.792	1.925	7.676	9.726		2.412
F value								3.457	
p value		0.157	0.569	0.571	0.588	0.019	0.029	0.017	0.491
baPWV grouping									
Control	56	61.9	19.0	7.1	50.0	9.5	41.7		
Borderline	75	59.0	6.6	11.5	32.8	3.3	44.3		
Mild	39	80.0	16.0	28.0	40.0	8.0	44.0		
Moderate	50	83.3	25.0	33.3	38.9	16.7	36.1		
Severe	52	63.9	16.7	41.7†	22.2	11.1	78.6††		
χ^2 value		8.709	6.651	25.58	7.053	5.262	26.160		
p value		0.069	0.156	<0.001	0.133	0.261	<0.001		

*Compared with control group, $p<0.05$; **compared with control and mild atherosclerotic group, $p<0.05$; †compared with control group, $p<0.001$; ††compared with control borderline, mild, and moderate stiffness groups, $p<0.001$. CAD, coronary artery disease; EH, essential hypertension; CI, cerebral infarction; DM, diabetes mellitus; PAD, peripheral artery disease; GS, Gensini score; baPWV, brachial-ankle pulse wave velocity.

ities was also undertaken in 105 of these participants because of severe or multilevel coronary artery lesions.

Biochemical Studies

In the morning before cardiac catheterization, blood samples were drawn after 12 h of fasting for determination of the following parameters using standard biochemical techniques: total cholesterol (TC), triglyceride (TG), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), fasting blood glucose (FBG), and hypersensitive C-reactive protein (hsCRP).

Pulse Wave Measurement and Analysis

All participants were examined for baPWV after CAG, in the morning hours and after a 10-min rest period. Patients did not receive their medications on the day of the examination. Baseline characteristics, past history of illness and medication during hospitalization were recorded in the questionnaire. The patient lay in a supine position, wrapped with special cuffs from a newly developed non-invasive arterial atherosclerosis measuring system, VP-1000 (BP-203RPEII; Colin Corp., Ltd., Osaka, Japan) to investigate bilateral baPWV and blood pressure simultaneously. ABI was then calculated as an estimate of the atherosclerotic changes of the lower limbs. The average values of baPWV and ABI from both sides were used in the statistical analysis. A descriptive assessment of the peripheral arteries was also conducted using the machine.

Method of Grouping

Patients were divided into four groups according to the degree of coronary atherosclerosis as determined by their GS: a control group (GS=0), and a mild group (GS 0.01–3.00), moderate (GS 3.01–32.67), and severe atherosclerotic group (GS 32.68–180.00). Data from Japanese baseline epidemiological studies was used in baPWV grouping according to the majority distribution in 95% confidence interval: control group (baPWV≤1,400 cm/s), borderline stiffness group (20% above baseline, baPWV 1,401–1,680 cm/s), mild group (30% above baseline, baPWV 1,681–1,820 cm/s), moderate group (50% above baseline, baPWV 1,821–2,100 cm/s), and severe group (>50% above baseline, baPWV>2,100 cm/s). The grouping of arterial stenosis of the lower extremities was made in accordance with the CAG results: control group (no stenosis), mild stenosis group (coarse arterial wall or stenosis ≤50%), moderate group (stenosis 51–75%), and severe group (stenosis >75% or total occlusion).

Statistical Analysis

All questionnaire records and measurement data were quantified. A database was created using Epidata software. All data were presented as the means±SD. SPSS 13.0 (SPSS, Chicago, USA) software was used for the statistical analysis. Pearson χ^2 and ANOVA analysis of variance were used to analyze categorical and continuous data, respectively. The Student-Neuman-Keuls (SNK) method was used in the group comparison after analysis of variance. Values of $p<0.05$ were

Table 2. Comparison of Biochemical Indices in All Groups (Mean±SD)

	N	TC (mmol/L)	TG (log^{-1})#	HDL-C (mmol/L)	LDL-C (mmol/L)	FBG (mmol/L)	hsCRP (mg/L)
GS grouping							
Control	38	4.70±0.86	0.17±0.19	1.18±0.30	2.87±0.71	4.58±1.24	4.29±3.92
Mild	47	4.52±1.02	0.17±0.20	1.09±0.26	2.82±0.81	5.78±1.19	5.79±4.67
Moderate	75	4.41±0.95	0.12±0.22	1.06±0.25	2.73±0.79	6.05±1.99	12.58±23.23
Severe	112	5.04±4.17	0.18±0.21	1.06±0.24	2.90±1.10	7.65±2.70	19.00±32.04
F value		0.598	1.102	1.357	0.392	2.924*	3.244**
p value		0.470	0.388	0.257	0.759	0.046	0.023
baPWV grouping							
Control	56	4.95±1.15	0.18±0.09	1.05±0.21	3.28±0.93	6.21±1.94	12.07±18.15
Borderline	75	4.46±1.00	0.17±0.11	1.07±0.28	2.75±0.88	5.79±1.38	11.40±22.97
Mild	39	4.62±0.92	0.20±0.10	1.13±0.28	2.79±0.83	5.84±1.22	5.56±8.60
Moderate	50	4.30±0.92	0.26±0.23	1.06±0.25	2.65±0.76	6.43±2.87†	15.46±29.92
Severe	52	5.54±0.60	0.24±0.13	1.10±0.24	2.71±1.14	7.16±3.20†	23.35±37.02
F value		1.073	1.487	0.430	3.106	2.476	2.139
p value		0.371	0.296	0.787	0.107	0.046	0.077

*Compared with control group, $p<0.05$; **compared with control and mild atherosclerotic group, $p<0.05$; †compared with borderline and mild stiffness groups, $p<0.05$. #log^{-1} was specifically used in the TG parameter due to skewed distribution of TG value and transformed into normal distribution. The lower the value, the higher the basic data (mmol/L) is. TC, total cholesterol; TG, triglyceride; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; FBG, fasting blood glucose; hsCRP, hypersensitive C-reactive protein; GS, Gensini score; baPWV, brachial-ankle pulse wave velocity.

considered to indicate statistically significant differences. Multivariables logistic regression analysis was also used in our investigation. We took ABI (<0.9 and >1.0), baPWV, age, smoking, FBG, hsCRP, serum lipid, history of essential hypertension (EH), cerebral infarction (CI), and PAD as variables. We defined CAD in the analysis as either a history of typical angina pectoris or infarction, apparent myocardial ischemia in ECG when at rest or a positive result in the ECG exercise test, and the most important gold standard for diagnosing CAD—artery angiography (when stenosis of the coronary artery was more than 50%).

Results

Baseline Characteristics

The average age among the 272 participants was 66.87±11.42 years. There were 170 males (62.5%) and 102 females (37.5%). There was no significant difference in the gender ratio among the GS groups, while the average age in the severe atherosclerotic group (68.88±10.31) was older than that in the control and mild groups ($p<0.05$ for each). With respect to the CAD risk factors, a history of PAD (14.8%) and smoking (62.2%) were more prevalent in the severe atherosclerotic group than in the other groups. In the groups classified by baPWV level, history of DM (41.5%) and smoking (78.6%) were more prevalent in the severe stiffness group than in the control group ($p<0.01$ and $p<0.05$, respectively) (Table 1).

Biochemical Indices Comparison

In the GS groups, the hsCRP level of the severe atherosclerotic group (19.00±32.04 mg/L) was significantly higher than that in the control group (4.29±3.92 mg/L) and mild group (5.79±4.67 mg/L) ($p=0.023$). The FBG level of the severe atherosclerotic group (7.65±2.70 mmol/L) was significantly different from that of the control group (4.58±3.92 mmol/L) ($p=0.046$). In the baPWV groupings, compared with the borderline and mild stiffness groups, the FBG level in the severe stiffness group (7.16±3.20 mmol/L) and moderate group (6.43±2.87 mmol/L) differed significantly ($p=0.046$) (Table 2).

baPWV and ABI Comparison

In the GS groups, the ABI of the severe atherosclerotic group (1.04±0.22) differed significantly from that in the control group (1.14±0.16) and moderate group (1.17±0.17) ($p=0.036$). The baPWV level of the severe atherosclerotic group (1,822.18±433.64 cm/s) was significantly higher than those of the control or mild group ($p<0.05$ for both). In the groups of baPWV, the ABI of the control group (0.98±0.29) and moderate (1.08±0.17) and severe stiffness group (1.09±0.17) were significantly lower than those of the other two groups. The ratio of ABI<0.9 was higher in the severe stiffness group than in the control or moderate stiffness group ($p<0.05$ and $p<0.01$, respectively) (Table 3).

Table 3. Comparison of baPWV and ABI Levels in All Groups (Mean±SD)

	N	ABI	ABI<0.9 (%)	baPWV (cm/s)
GS grouping				
Control	38	1.14±0.16		1,598.75±246.67
Mild	47	1.11±0.09		1,644.76±371.51
Moderate	75	1.11±0.17		1,723.57±398.09
Severe	112	1.04±0.22*		1,822.18±433.64**
F value		2.625		2.716
p value		0.036		0.046
baPWV grouping				
Control	56	0.98±0.29†	28.6††	
Borderline	75	1.11±0.14	8.2	
Mild	39	1.13±0.10	4.0	
Moderate	50	1.08±0.17	8.3	
Severe	52	1.09±0.17†	13.9††	
F value		3.804	12.757	
p value		0.005	0.013	

*Compared with control and moderate atherosclerotic groups, $p<0.05$; **compared with control and mild atherosclerotic groups, $p<0.05$; †compared with borderline and mild stiffness groups, $p<0.01$; ††compared with borderline, mild, and moderate stiffness groups, $p<0.05$. baPWV, brachial-ankle pulse wave velocity; ABI, ankle-brachial index; GS, Gensini score.

Table 4. Comparison of baPWV and ABI Levels in Lower Extremity Artery Angiography (Mean±SD)

	N	ABI	baPWV (cm/s)
Control group	43	1.12±0.09	1,617.04±358.77
Mild stenosis	36	1.03±0.17*	1,839.02±377.25**
Moderate	18	0.68±0.29*	1,830.69±633.52
Severe	8	0.46±0.40*	2,153.00±341.27**
F value		44.870	6.350
p value		<0.001	<0.001

*Compared with control group, $p<0.001$; **compared with control group, $p<0.001$. ABI, ankle-brachial index; baPWV, brachial-ankle pulse wave velocity.

Relations between baPWV, ABI and Lower Extremities Angiography

Among the 105 patients who underwent angiography of the lower extremities during CAG, baPWV and ABI both had statistical significance in all groups. The ABI level showed a decreasing trend when stenosis of the arteries of the lower extremities became more severe (from 1.12±0.09 to 0.46±0.39), while baPWV increased gradually (from 1,617.04±358.77 cm/s to 2,153.00±341.27 cm/s). baPWV of the mild and severe stenosis groups differed significantly from that of the control group (both, $p<0.001$) (Table 4).

Table 5. Logistic Regression Analyses of Various Factors in the Presence of Coronary Stenosis

Factors	*p* value	Odds ratio	95% confidence interval
ABI>1.0	0.024*	0.116	0.820–0.910
ABI<0.9	0.037**	0.583	1.170–1.894
baPWV	0.048**	1.001	1.050–1.970
Age	0.025**	0.620	1.320–2.454
TG (log^{-1})	0.280	0.651	0.763–1.258
HDL-C	0.227	0.217	0.018–2.584
LDL-C	0.859	0.857	0.156–4.694
EH history	0.250	0.499	0.153–1.631
CI history	0.258	0.257	0.024–2.703
hsCRP	0.325	0.498	0.124–1.995
Smoking	0.048**	0.135	1.340–4.980
FBG	0.007**	0.240	1.172–3.698

*Considered as protective factors in CAD; **considered as risk factors in CAD. ABI, ankle-brachial index; baPWV, brachial-ankle pulse wave velocity; TG, triglyceride; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; EH, essential hypertension; CI, cerebral infarction; hsCRP, hypersensitive C-reactive protein; FBG, fasting blood glucose.

Logistic Regression Analysis

The results indicated that in the process of evaluating the presence of coronary stenosis, low ABI (<0.9), relatively high baPWV, FBG, age and smoking were risk factors while high ABI (>1.0) was a protective factor (Table 5).

Discussion

In the present study we demonstrated that enhanced arterial wave reflection as measured by augmentation of the central aortic pressure is associated with the severity of atherosclerosis in the coronary arteries and arteries of the lower extremities in patients with CAD. These findings suggest that atheromatous changes of the peripheral arterial tree may influence arterial baPWV and thus the systemic arterial stiffness.

Arteries are organs with the function of transmission and allocation. Their mechanical characteristics are important determinants of the cycle physiology in patients and the general population. It is difficult to focus studies on arterial mechanics due to its pulsing, complicated structures and continuously changed tension of smooth muscle. Pulse wave analysis is a reproducible non-invasive method for assessing stiffness of the arterial system (*7*, *8*). Previous researches have suggested that descending ABI (ABI<0.9) is related to PWV; that is, severe PAD was correlated with continuously increasing arterial wave reflection. However, the relation of PWV to atherosclerosis is not yet clear. Our current study

aimed to determine the possible relation of ascending baPWV to CAD risk factors and atheromatous changes in the coronary and lower extremity arteries (*9*).

Baseline characteristics and biochemical results indicated that in the groups of baPWV, patients with a history of DM and smoking were more prevalent in the severe stiffness group, which was in agreement with previous reports. Tanokuchi *et al*. (*10*) found that PWV was significantly related to DM morbidity. Both DM patients and subjects with a family history of DM had relatively high PWV values; PWV was related to rapid blood glucose level, insulin level and insulin resistance (IR). Other studies have also assessed the influence of smoking on arterial hemodynamics. Nakamoto *et al*. (*11*) measured adults with different levels of arterial atherosclerosis, and found that smoking was related to increasing PWV, and PWV could be considered an indicator of atherosclerosis. DM and smoking, as the two main risk factors of CAD, expressed precisely here the reason why more people are smoking in the severe atherosclerotic group of GS grouping and more people have high blood glucose level in severe group of both GS and baPWV grouping.

CAD begins with large aortic lesions and aortic elastic regression was an independent factor of creating coronary artery perfusion. Hirai *et al*. (*12*) compared documented CAD patients with normal blood pressure with a control group. It was found out that among all age groups (>40 years), the PWV level of the aorta in CAD patients was higher than that in the control group with an average increasing of 168 cm/s. Other overseas researches have also suggested that the more severe the atherosclerosis present in the coronary arteries, the higher the arterial stiffness becomes. Artery dilatation changes were found in CAD patients with 2 or 3 main coronary artery atherosclerosis. Our current study drew almost the same conclusion, that baPWV in a severe atherosclerotic group based on GS grouping (including three main coronary arteries and a left main trunk) differed significantly from that in the control and mild atherosclerotic groups. There are two mechanisms that can potentially explain this finding: atherosclerosis may cause arterial stiffness, as demonstrated by the finding of Farrar *et al*. (*13*) that monkeys with an atherogenic diet showed increased PWV and aortic intima area, while an atherosclerotic regression diet decreased both parameters; on the other hand, stiffening of the arterial wall increases shear stress and leads to vessel wall damage and atherosclerosis. Then such complications as ulcer, calcification or hemorrhage of the sclerotic plagues may occur gradually.

With respect to the relationship between coronary lesions and baPWV and ABI, our current study found that ABI changed inversely with the severity of coronary atherosclerosis. Patients who had significantly high baPWV showed a decrease in ABI. These results indicated that abnormally high baPWV was related to PAD, especially to lower extremity artery diseases (ABI<0.9). In the severe atherosclerotic group with extremely high baPWV, the percentage of patients with a history of PAD was also greater than that of other groups; these findings demonstrate the important relationship between baPWV and PAD. Lekakis *et al*. (*14*) showed in his study with 184 participants that a baPWV more than 10% above normal range was associated with an 8% increase in the odds of having atherosclerosis in the peripheral arteries or even of intermittent claudication. So increase of baPWV can be considered predictive of atherosclerosis of the peripheral arteries in CAD patients. Furthermore, this relationship could exist independently of age, gender, and conventional atherosclerotic risk factors in CAD patients. In comparing the results of artery angiography of the lower extremities, more severe stenosis of the arteries usually was accompanied with a gradually ascending trend of baPWV and descending trend of ABI, and the fact that low ABI and high baPWV were risk factors for CAD events may both demonstrated the conclusions seen in the angiography of the lower extremities.

As a predictor of CAD events and marker of the severity of stenosis of the coronary arteries and lower extremity arteries in CAD patients, extreme high or low baPWV is not only a new risk factor of CAD, but also a substitute marker for target organ damage (*e.g.*, microalbuminuria and left ventricular hypertrophy are significantly related to arterial diseases) (*15–17*). baPWV can also be considered a prospective index for predicting morbidity and mortality or an independent predictor of total mortality and CAD mortality. It is an important method to recognize high-risk patients. Though the number of patients in the present study was relatively small and may not have been sufficient to provide accurate dividing points of atherosclerosis, the oscillometric measurement of baPWV and ABI in the present study may indicate that in elderly urban Chinese, baPWV>1,800 cm/s strongly indicates severe coronary atherosclerosis and stenosis of the coronary arteries while baPWV>2,100 cm/s is highly suspicious of stenosis of the arteries of the lower extremities. baPWV abnormalities were relevant to various factors, so baPWV measurement will provide evidence for preliminary intervention and therapy. Preliminary therapeutic lifestyle changes and secondary prevention with medication can be implemented to patients with clearly abnormal baPWV with the aim of reducing major adverse cardiac events and mortality (*18*). It is hoped that our present findings will also encourage future researches. For example, we could perform a long-duration follow-up in a large-scale population and calculate the relations of different baPWV levels to cumulative survival so as to formulate the upper and lower limit of baPWV and different diagnostic standards for different levels of peripheral artery abnormality of arterial atherosclerosis in urban Chinese.

Conclusion

baPWV is a simple predictor of the severity of coronary artery atherosclerosis and PAD that is independent of the influence of conventional risk factors. A baPWV of more than 1,800 cm/s seems to indicate a risk of CAD and post-hospitalization cardiovascular events. Furthermore, a baPWV of

more than 2,100 cm/s or higher seems to indicate a risk of PAD or even intermittent claudication.

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