New Diagnostic Criterion of Ankle Brachial Index for Peripheral Arterial Disease in type 2 diabetes mellitus patients.

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Background:

The ankle brachial index (ABI) is a simple, inexpensive diagnostic test for peripheral arterial disease (PAD) in type 2 DM(diabetes mellitus) patients. However the diagnostic criterion 0.9 has shown variable accuracy for identification of stenosis. This article studied more specific and sensitive diagnostic criterion of ABI for the diagnosis of PAD in type 2 DM patients.

Methods:

Among 4006 patients, aged from 19 to 80, who received ABI test with VP2000 (Colin Medical Technology company, Komaki, Japan) from 2010 to 2016 in DAEDONG hospital, 390 patients who had abnormal ABI results (<0.9) or PAD symptoms underwent computed tomography angiography (GE Light speed Plus, USA) to confirm PAD.

The diagnostic criteria of PAD were any of below : stenosis more than 50% in common iliac artery, external iliac artery, common femoral artery, superficial femoral artery, anterior and Posterior tibial artery and peroneal artery.

The diagnostic accuracy of ABI values were analyzed using ROC curve and crosstabs.

Results:

Patients who abnormal ABI result (<0.9) or PAD symptoms and underwent CT angiography were 390 persons and the characteristics are shown in table 1.

The result of ROC curve is shown in figure 1 and sensitivity, specificity, positive predictive value, negative predictive value and diagnostic correspondent rate of each ABI values (from 0.80 to 0.90) are shown in table 2.

Among total 390 patients who underwent computed tomography angiography due to abnormal ABI results (<0.9) or PAD symptoms, Pad patients, confirmed by computed tomography angiography, were 261 patients.

The mean age of patients with PAD was 70.3 years and significantly higher than the mean age of patients without PAD, 60.8 years. The mean DM duration of patients with PAD was significantly higher than that of patients without PAD, 12.7 vs. 8.3 years. The mean BMI of patients with PAD was 24.2 kg/m² and significantly higher than the mean BMI of patients without PAD, 21.9 kg/m². In HbA1c, there was no significant difference between the two groups.

The sensitivity, specificity and diagnostic correspondent rate of ABI 0.90 were 91.6%, 38.8% and 0.341 on crosstabs and sensitivity and specificity on ROC curve were 90.4% and 42.6%.

ABI of 0.83 showed sensitivity 80.5%, specificity 73.6% and diagnostic correspondent rate 0.524 on crosstabs and on ROC curve, sensitivity and specificity were 80.5% and 73.6%.

ABI of 0.82 showed sensitivity 78.2%, specificity 79.8% and diagnostic correspondent rate 0.547 on crosstabs and on ROC curve, sensitivity and specificity were 78.2% and 79.8%.

The traditional criteria for PAD of ABI value, 0.90 had very low specificity and diagnostic correspondent rate but ABI value 0.82 had more high specificity and diagnostic correspondent rate with suitable sensitivity.

Conclusion:

The ABI criterion 0.82 can be more accurate and useful diagnostic criterion to identify PAD in type 2 DM patients.

Fig.1. Receiver Operating Characteristic(ROC) curve of ABI for diagnosing peripheral arterial disease.
The cutoff value of ABI was 0.82.

Table 1. Characteristics of the patients

	Total	PAD	Non PAD
Total No. (Male / Female)	390 (291 / 99)	261 (202 / 59)	129 (89 / 40)
Mean Age (years)	67.2 ± 10.4	70.3 ± 7.1*	60.8 ± 12.9*
Mean BMI	22.7 ± 3.8	24.2 ± 4.3*	21.9 ± 3.3*
Mean HbA1c (%)	8.77 ± 0.79	9.07 ± 0.68	8.16 ± 0.64
Mean Duration (years)	11.2 ± 3.4	12.7 ± 2.8†	8.3 ± 2.3†

Mean ± Standard deviation
 *p<0.001 PAD versus Non PAD
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 PAD ; peripheral arterial disease, BMI; body mass index

Table 2. Sensitivity, Specificity, Positive predictive value, Negative predictive value (%), Diagnostic correspondent rate of ABI 0.8 to 0.9

ABI	Sensitivity	Specificity	Positive Predictive value	Negative Predictive value	Diagnostic Correspondent rate
0.80	74.7	82.9	89.9	61.8	0.531
0.81	76.6	82.2	89.7	63.5	0.547
0.82	78.2	79.8	88.7	64.4	0.547
0.83	80.5	73.6	86.1	65.1	0.524
0.84	82.0	71.3	85.3	66.2	0.523
0.85	84.3	65.1	83.0	67.2	0.498
0.86	86.2	59.7	81.2	68.1	0.474
0.87	88.5	55.8	80.2	70.6	0.468
0.88	89.3	49.6	78.2	69.6	0.419
0.89	90.4	42.6	76.1	68.8	0.366
0.90	91.6	38.8	75.2	69.4	0.341