

Original Article

Total Vascular Resistance, Augmentation Index and Augmentation Pressure increase in patients with peripheral artery disease

Rika Takemoto, BS^{1,2}, Haruhito A. Uchida, MD, PhD^{1,3},
Hironobu Toda, MD, PhD⁴, Ken Okada, MT⁵, Fumio Otsuka, MD, PhD^{2,6},
Hiroshi Ito, MD, PhD⁴, Jun Wada, MD, PhD¹

1. Department of Nephrology, Rheumatology, Endocrinology and Metabolism, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama, Japan
2. Ultrasound Diagnostics Center, Okayama University Hospital, Okayama, Japan
3. Department of Chronic Kidney Disease and Cardiovascular Disease, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama, Japan
4. Department of Cardiovascular Medicine, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama, Japan
5. Department of Medical Support, Okayama University Hospital, Okayama, Japan
6. Department of General Medicine, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama, Japan

Corresponding author:

Haruhito A. Uchida, M.D., Ph.D.

Department of Chronic Kidney Disease and Cardiovascular Disease, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, 2-5-1 Shikata-cho Kita-ku, Okayama, 700-8558, Japan

Phone: (+81) 86-235-7235 Fax: (+81) 86-222-5214

E-mail: hauchida@okayama-u.ac.jp

Abstract

Background: Peripheral arterial disease (PAD) is one of major vascular diseases which frequently coexists with coronary arterial disease and cerebrovascular disease. The patients with PAD have a poor prognosis when it progresses. A new blood pressure testing device enables to simultaneously measure brachial blood pressure (BP), central BP, and several vascular parameters, with easy and non-invasive, in a short time. Here, we aimed to evaluate these arterial stiffness parameters in patients with PAD.

Methods: In this study, 243 consecutive patients who were suspected of having PAD and referred to our hospital from September 2016 to June 2019, were registered. Several parameters, such as brachial BP, central BP, aortic pulse wave velocity (aPWV), total vascular resistance (TVR), augmentation index (AI) and augmentation pressure (AP), were determined by Mobil-O-Graph. Ankle-brachial pressure index (ABI) was used to define PAD ($ABI \leq 0.9$ as PAD). The relationship between PAD and central BP, aPWV, TVR, AI or AP were investigated.

Results: One hundred sixty-two patients (67%) were categorized as the PAD group and 81 patients (33%) as the non-PAD group. In the PAD group, the systolic brachial BP and central systolic BP were significantly higher than those in the non-PAD group (138 ± 24 mmHg vs 131 ± 19 mmHg, $p < 0.05$, 125 ± 22 mmHg vs 119 ± 18 mmHg, $p < 0.05$, respectively). TVR, AI and AP were significantly higher in the PAD group (1785 ± 379 dyn*s/cm⁵ vs 1661 ± 317 dyn*s/cm⁵, $p < 0.05$, 26.2 ± 13.0 % vs 22.2 ± 13.3 %, $p < 0.05$, 13.5 ± 9.4 mmHg vs 10.7 ± 7.2 mmHg, $p < 0.05$, respectively). No significant differences in diastolic BP, central diastolic BP, and aPWV were found between the groups. Multivariate logistic regression analysis revealed that PAD was significantly associated with TVR, AI, and AP ($p < 0.05$, respectively).

Conclusions: TVR/AP/AI were significantly higher in the PAD group than in the non-PAD group.

(290 words)

Keywords:

peripheral arterial disease, total vascular resistance, augmentation index, augmentation pressure,