The Evaluation of Methods in Determination of the Arterial Compliance for Real-Time Applications

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Using pulse wave velocity (PWV) to determinate the arterial stiffness was generally accepted. However, using the arterial system relaxation constant with the Windkessels model to index the arterial stiffness may simplify the procedure. To accurate evaluation of arterial compliance is importance in its common index for the determination the arterial stiffness. In comparison the indexes of arterial stiffness such as pulse wave velocity (PWV) and the arterial system relaxation constant using Windkessels model, the compliance is a common dominator. There were two locations that were generally used to acquire the blood pressure waveform noninvasively. One is at carotid artery with the tonometry device or at the brachial artery with pressure volume relation method. There were two methods of calculating the compliance. One was using the area proportion under pressure waveform (C1). And, the other method could be using the formulas of arterial system relaxation constant (C2). Both methods have assumed a hypothetical stoke volume and using a mean arterial pressure. We have acquired and examined blood pressure waveform using tonometry at carotid artery and pressure volume relation at brachial artery from 581 subjects. The pulse velocity has also acquired at the same situation. The compliance of carotid artery calculated using area method was 1.41 ± 0.548. And, the compliance using relaxation constant was 1.41 ± 0.527. The correlation was 0.8 and the R2 was 0.7. For brachial artery, the compliance calculated from area proportion was 1.14 ± 0.4288. And, the compliance calculated using relaxation constant was 0.97 ± 0.36. The correlation of compliance was 0.76 and R2 was 0.82. The correlation of compliance between two pressure locations was 0.64 and R2 was 0.68 using area proportional methods. The correlation of compliance using relaxation constant was 0.5 and R2 was 0.58. The correlation of compliance at both locations and the methods of calculation were high. This result means that the measurement of compliance could be carried out at brachial artery with a simpler instrument such as using oscillometric blood pressure method.