Pulse Pressure Amplification and Its Determinants

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Background

Peripheral (e.g., brachial) pulse pressure (pPP) exceeds central pulse pressure (cPP) corresponding to the first (cPP1) or second (cPP2) peaks in the central waveform. However, the determinants of pPP are not well understood.

Aim

To examine whether the haemodynamic determinant of pPP relates more closely to cPP1 rather than cPP2.

Methods

Transfer function (TF)

Peripheral (e.g., brachial) pulse pressure (pPP) exceeds central pulse pressure (cPP) corresponding to the first (cPP1) or second (cPP2) peaks in the central waveform. However, the determinants of pPP are not well understood.

Central (left) and peripheral (right) pressure waveforms for the invasive study (solid line: baseline; red dashed line: after GTN). Varied cPP2 would not influence pPP.

Central (left) and the corresponding peripheral (right) pressure waveforms generated by TF. Top: varied cPP2 would not influence pPP; middle: varied cPP1 would influence pPP; bottom: varied slopes of up to cPP1 would also influence pPP.

Virtual population

Central (left) and the corresponding peripheral (right) pressure waveforms for the invasive study (solid line: baseline; red dashed line: after GTN). Varied cPP2 would not influence pPP.

Correlation of peripheral pulse pressure with central pressure elements for virtual population (top left), invasive study (top right), non-invasive study (bottom left) and hypertensive patients.

Conclusion

This study suggests that the peak value of peripheral pulse pressure is determined by cPP1 and the rate of rise of central pressure up to the time of cPP1.