

J-curve revisit: Target of HT control

Chern-En Chiang, MD, PhD, FACC, FESC

General Clinical Research Center and Division of Cardiology, Taipei Veterans General Hospital,
National Yang-Ming University School of Medicine, Taipei, Taiwan

The J-curve (or U-curve) phenomenon was first mentioned in 1979. A study conducted in 169 patients with severe hypertension disclosed a relative 5-fold risk of myocardial infarction in those who had achieved a DBP < 90 mmHg compared with a DBP in the range of 100-109 mmHg. Coronary blood flow, which occurs predominantly in the diastole, may cease at a myocardial perfusion pressure < 40 mmHg. More recently, there have been some data on the J-curve phenomenon for SBP. It is generally believed that the "J-curve" phenomenon is true, and there must be a lowest value of BP (nadir), which represents a point at which BP is too low to maintain perfusion of vital organs, particularly the heart. The precise question remains-where is the nadir?

In general, data from large-scaled epidemiological studies did not support the concept of the J-curve phenomenon. In 1 million subjects with or without risk factors, but free from cardiovascular diseases, both CHD and stroke mortality appeared to begin at around 115/75 mmHg, without any J-curve phenomenon. In a cohort of 1.25 million subjects, initially free from cardiovascular disease, the lowest risk for cardiovascular disease was in people with SBP of 90-114 mmHg and DBP of 60-74 mmHg, without any evidence of J-curve phenomenon. In the Multiple Risk Factor Intervention Trial (MRFIT) which enrolled 332,554 subjects without end organ damage, the lowest risk of ESRD was found in subjects with a BP of < 120/80 mmHg, without any J-curve phenomenon. In the UK prospective diabetes study (UKPDS) 36, the lowest risk of all-diabetes related macro- and micro-vascular endpoints were in those patients with SBP less than 120 mm Hg, without any J-curve phenomenon. In the Asia Pacific Cohort Studies enrolling 425,325 subjects, the lowest risk of CHD and stroke was found in patients with a BP <120/80 mmHg, without a J-curve phenomenon.

Among RCTs, it is also uncommon to find any J-curve phenomenon if cardiovascular endpoints were evaluated prospectively, though the BP levels obtained in RCTs were generally higher than what we have mentioned in the epidemiological studies. In the three most important RCTs in isolated systolic hypertension (SHEP, Syst-Eur, Syst-China), stroke risk was significantly decreased in the treatment group compared to the placebo group. No J-curve phenomenon was observed. In fact, the DBP in the treatment group in the SHEP trial was only 68 mmHg, and the risk of myocardial infarction was still significantly decreased by 33%.

Most of the data suggesting a J-curve phenomenon came from post-hoc analyses of RCTs. One should be aware that these RCTs were not designed to compare the effects of different BP targets, and they were mostly comparing different drugs.

In a recent press release from NIH regarding the findings from the SPRINT, those with BP targeting at < 120 mmHg have lower totality mortality and lower MACE, compared with those with a BP target of < 140 mmHg. The final report of the SPRINT trial will be presented and it will support the current BP targets of the Taiwan HT guidelines.