

Hemodynamic and Volume Changes During Intensive Treatment (Rx) for Resistant Hypertension (ResHTN)

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Introduction

Hypertension (HTN) resistant to multiple agents continues to pose a dilemma to clinicians.

Methods

We characterized systemic hemodynamics and volume markers in 63 patients with ResHTN at entry and after 3 months of intensive drug adjustment. CV risk was high (32% diabetic, 46% hyperlipidemic) with multiple comorbidities. BP, noninvasive hemodynamics (thoracic bioimpedance TBI), renal function (Screat) and circulating volume markers (atrial natriuretic peptide ANP, plasma renin activity, PRA) were measured. An RN changed drug Rx at monthly visits under HTN specialist direction.

Mean age was 66 ± 2 yrs. BP fell from $171 \pm 2 / 88 \pm 2$ to $142 \pm 2 / 76 \pm 1$ mm Hg ($p < 0.01$) with an increase from 3.6 ± 0.1 to 4.1 ± 0.1 meds/pt ($p < 0.01$).

Results

Elevated ANP levels and rise in TBI ($p < 0.01$) during Rx demonstrate occult volume excess despite diuretic Rx. During intensive Rx, diuretic doses increased ($p < 0.01$) as did dihydropyridine calcium blocker use ($p < 0.01$). Serum creat rose (1.4 ± 0.1 to 1.6 ± 0.1 mg/dL, $p < 0.01$) without change in weight.

Results

	Entry	Final
Cardiac index (L/min/ m ²)	2.8 ± 0.1	2.9 ± 0.1
SVRI (d-sec-cm ⁻⁵ -m ⁻²)	3321 ± 96	$2905 \pm 78^*$
ANP (pg/mL)	144 ± 22	108 ± 20 p = 0.07
TBI supine (ohms)	33.5 ± 1.1	$36.7 \pm 1.0^*$

Mean \pm SEM, SVRI systemic vascular resistance index, * $p < 0.01$

Conclusion

Our results indicate that RH patients have increased systemic vascular resistance and evidence for occult volume expansion. Effective control of BP requires balanced reduction in systemic resistance and volume, as defined by hemodynamics measurements.