

Title: BAROREFLEX SENSITIVITY AND INDUCED-HYPOTENSION

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Introduction. Deliberate hypotension with sodium nitroprusside (SNP) infusion has been commonly employed during general anesthesia. Since baroreceptors show adaptive characteristics, the sensitivity of the baroreflex may be altered following deliberate hypotension. This possibility was investigated in six informed patients undergoing induced hypotension under general anesthesia.

Methods. Premedication consisted of morphine and secobarbital. Anesthesia was induced with thiopental, followed by succinylcholine for intubation. Metocurine (0.3 mg/kg) was given for muscle relaxation. PaCO₂ was controlled between 25 to 30 mm Hg with mechanical ventilation. Anesthesia was maintained with morphine (0.5 mg/kg), diazepam (10 mg) and N₂O (60%) in four patients, and with halothane (0.5-1%, inspired) in N₂O (60%) for the other two. Direct arterial pressure (radial artery), EKG, and airway pressure were recorded continuously.

At the beginning of induced hypotension, SNP (approximately 200 µg) was rapidly infused to produce a modest decrease in BP (about 30 mm Hg systolic). This period of rapid infusion of SNP served as a control test of the sensitivity of baroreflex. The infusion of SNP was then adjusted to a rate sufficient to lower the mean BP to a level between 50 and 55 mm Hg. The duration of hypotension ranged from 10 to 140 min (75.5 ± 24.5 min, Mean ± SEM) in accordance to surgical need. Blood loss was replaced with whole blood or albumin solution. At the conclusion of the hypotension procedure, SNP infusion was discontinued and BP was allowed to return spontaneously to the pre-hypotension level (usually in 2-3 min). The sensitivity of the baroreflex was then tested once more with a rapid infusion of SNP (approx. 200 µg) to produce about 30 mm Hg fall in BP.

Sensitivity of baroreflex was assessed by evaluating the quantitative relationship between systolic BP and the succeeding pulse interval (R-R on EKG) on a beat to beat basis during the phase of decreasing BP. R-R intervals during inspiration were excluded in order to avoid any possible effect of sinus arrhythmia.

Results. There is a linear relationship between systolic BP and the succeeding R-R interval, as shown in Figure 1. The slope of the regression line is an index for the sensitivity of baroreflex control of heart rate.

Similar results were obtained during halothane-N₂O or morphine-N₂O anesthesia. These are summarized in the Table:

	Before SNP Tests			
	Syst.BP (mmHg)	Diast.BP (mmHg)	R-R Int. (msec)	Slope (msec/mmHg)
Control	115.8±5.8	74.0±4.4	849±61	3.33±1.19
̄ SNP	115.7±5.4	70.0±4.4	998±64*	7.80±1.97*

Values are Mean ± SEM.

*Paired student t test between control and post-SNP: P < 0.05.

Discussion. As shown in the Table, when BP has recovered to control level after the termination of SNP-induced hypotension at 50-55 mm Hg, the heart rate was substantially lower (60/min, or R-R=998 msec) than that in the control state (70/min, or R-R=849 msec). The sensitivity of baroreflex was significantly increased. The slope rose from 3.33 to 7.80 msec/mm Hg following induced hypotension. These changes may have significant implications in hemodynamic adjustments following induced hypotension in patients under general anesthesia.

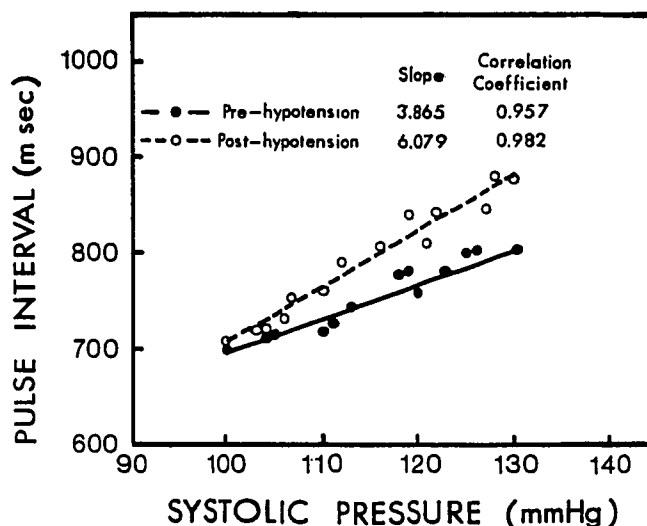


Fig. 1 Systolic BP and succeeding R-R interval relationship in one patient during morphine-N₂O anesthesia.