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β-Adrenoceptor Blockade and Tolerance to Potassium

To the Editor:—Treatment with β-adrenoceptor antagonists is increasingly prevalent among surgical patients. Hypokalemia is a well-recognized complication of therapy with β-2-adrenoceptor agonists.[1] In addition, there is increasing evidence that the adrenergic system plays an important role in the modulation of the cellular uptake of potassium (K^+). This process is facilitated by activation and hindered by blockade of β-2-adrenergic receptors.[2] Nevertheless, recent reviews of drug interactions have not considered the potential effects of β-adrenoceptor blockade on serum K^+.[3,4]

To define the relevance of this potential interaction, we retrospectively compared the disposition of K^+ loading during cardiopulmonary bypass (CPB) by patients treated preoperatively with β-1-selective, β-nonselective, or no adrenoceptor antagonists. It has been our practice over the years to maintain serum K^+ at approximately 4.5 mEq/l during CPB. Cardioplegia solution has K^+ 20 mEq/l. Supplemental K^+ is administered if serum K^+ is less than 4.5 mEq/l, in the following manner: mEq K^+ supplement = 0.5 body weight in kg × [4.5 − serum K^+ in mEq/l]. A review of 55 consecutive anesthesia and CPB records is summarized in table 1. Significantly less K^+ was given to those patients treated preoperatively with the nonselective β-adrenoceptor antagonist propranolol. This group did not differ from the other two with respect to serum K^+ concentration, urine output, or duration of CPB. This observation is consistent with that of Petch *et al.*,[5] who reported mean serum K^+ levels during CPB of 5.22 mEq/l in ten patients receiving propranolol, compared with 4.16 mEq/l in ten patients on the selective β-1-adrenoceptor antagonist metoprolol. The patients reported here received K^+ supplement aimed at maintaining serum K^+ above 4.5 mEq/l, and we expected that serum K^+ would be similar in the three groups. However, the significantly lower amount of K^+ received by those patients receiving propranolol suggests that its preoperative use might impair extrarenal K^+ disposal during anesthesia.

In other patients receiving propranolol, this interaction deserves attention. For instance, steeper rises in serum K^+ may be expected following intravenous K^+ supplementation in patients treated with propranolol, whereas

TABLE 1. β-Adrenoceptor Blockade and Tolerance to a Potassium Load in Anesthetized Patients

Patient Category	Age (years)	CPB Time (min)	Urine Output ($ml \cdot h^{-1} \cdot m^{-2}$ body surface area)	Serum K^+ (mEq/l)			Total K^+ Load (mEq)
				Preoperative	CPB		
					Maximum	Minimum	
1. β-selective adrenoceptor blockers (n = 11)	55.4 ± 3.4	110.9 ± 11.0*	1180 ± 252*	3.75 ± 0.10	5.34 ± 0.26	3.66 ± 0.12	30.64 ± 2.12†
2. Nonselective adrenoceptor blockers (n = 12)	59.5 ± 3.8	125.2 ± 14.4‡	828 ± 167‡	4.0 ± 0.15	5.10 ± 0.16	4.0 ± 0.12	20.05 ± 2.52‡
3. No adrenoceptor blockers (n = 32)	58.8 ± 1.8	115.0 ± 7.8§	831 ± 125§	3.9 ± 0.05	5.20 ± 0.13	3.7 ± 0.08	30.10 ± 2.52¶

Results presented as mean ± SEM.
Duncan's multiple range test.[8]
* 1. *versus* 2.: No significance.
† 1. *versus* 2.: $P < 0.05$.
‡ 1. *versus* 3.: No significance.
§ 2. *versus* 3.: No significance.
¶ 2. *versus* 3.: $P < 0.05$.

anticipated[6] changes in serum K^+ in response to catecholamine release during anesthesia and surgery[7] may be modified by β-2-adrenoceptor blockade.

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Intravenous Lidocaine for Control of Coughing during Standby Cataract Surgery

To the Editor:—An occasional patient undergoing cataract surgery under retrobulbar and periorbital block will suddenly begin to cough or feel the urge to cough while the operation is underway and the eye is open.

I have used a technique in five patients that has proved efficacious in eliminating the coughing. Intravenous lidocaine in bolus doses of 0.3 to 0.4 mg/kg (usually 20 mg) not only stopped the coughing but eliminated the urge to cough. Obviously, one must be careful not to overdose the patient with lidocaine. However, I have never required more than 1.5 mg/kg throughout any single case. Patients tolerate lidocaine very well and are often amazed at the anesthesiologist's ability to take away their cough during what may be a stressful time not only for the patient, but for the entire operating room staff.

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