TITLE: INFLUENCE OF ANESTHETICS ON BUPIVACAINE TOXICITY IN RATS.

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Introduction: Bupivacaine (B) toxicity may be altered by other drugs. We compared the effect of pentobarbital (P) versus urethane (U) anesthesia on B toxicity in rats.

Methods: 16 Sprague-Dawley rats (360-521 g) received either pentobarbital (P) 50 mg/kg (n=8, group P) IP or U 1.2 g/kg (n=8, group U) IP, and breathed O_2-enriched air spontaneously, had tracheostomy, IV access via EJV, and retrograde catheterization of a carotid artery with a transducer-tipped catheter after taking a blood sample for ABG, to obtain aortic (Ao) systolic (SBP) and diastolic (DBP) blood pressures and peak Ao dP/dt. HR, PR and QRS durations were obtained from the EKG, and breathing rate (RR) and amplitude (RA) via transthoracic impedance pneumography. Data was recorded before (C) and after 5-min-spaced IV bolus doses of 1 (B_1), 2 (B_2), and 4 (B_4) mg/kg of B. Significance was tested with (ANOVA), unpaired t- and Newman-Keuls tests.

Results: 6/8 U rats vs 1/8 P rats survived ($p < 0.025$, Fisher's exact test). In both groups, PR lengthening was the first apparent sign of toxicity (B_1). With P, HR (B_2), SBP (B_4), DBP (B_4), peak Ao dP/dt (C,B_1,B_2) and RA (B_2,B_4) were lower, while DBP at C was higher than with U.

Discussion: Compared to U, P anesthesia enhanced toxicity of B in rats. The overall lower peak Ao dP/dt with P may signify a lower cardiac contractility,[1] and may be one reason why the interaction of B with P is more cardiotoxic and lethal than of B with U.

References:

1. George M. et al: Med Res Engineering 6:21, 1967.

		C	B_1	B_2	B_4
HR (bpm)	U	343±16	333±14	323±13	305±20[C,B]
	P	390±21	341±15[C,b]	286±16[C,B,b]	131±21[C,B]
SBP (mm Hg)	U	109±7	110±5	122±6	126±10
	P	120±10	124±9	116±6	79±6[C,B,u]
DBP (mm Hg)	U	59±7	59±6	71±6	78±8[C]
	P	106±6[u]	76±10[u]	85±5	34±6[C,B,u]
peak Ao dP/dt (mmHg.sec^{-1})	U	543±33	535±26	476±32[C]	273±31[C,B]
	P	240±20[u]	272±30[u]	260±20[u]	202±34
RR (rpm)	U	123±8	110±7	80±7	73±16[C]
	P	60±7	74±11	65±6	0±0[C,B]
RA (fraction of C)	U	1.0±0	1.4±.1	1.0±.2[C]	.7±.3[B]
	P	1.0±0	1.1±.3	.7±.2[u]	0±0[C,B,u]
PR (msec) (n=6)	U	50±2	57±2[C]	67±2[C,B]	
(n=5)	P	44±2	54±2[u]	59±3[C]	69±2[C,B]
QRS (msec)	U	19±1	23±2	36±2[C,B]	48±5[C,b]
	P	19±.8	24±1	35±3[C,b]	46±6[C,b]

Mean values and SEM

C,C statistically significant difference (HSD) from baseline at $p < 0.05$ and $p < 0.01$ by Newman-Keuls test.

b,B HSD from previous event at $p < 0.05$ and $p < 0.01$ by Newman-Keuls test.

u,U HSD between groups U and P at $p < 0.05$ and $p < 0.01$ by unpaired t-test.

TITLE: EVALUATION OF A 22G COMPATIBLE (28G) CONTINUOUS SPINAL CATHETER

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Introduction: Continuous spinal anesthesia (CSA) has failed to gain widespread popularity because of the anticipated high incidence of post dural-puncture headache (PDPH). The use of smaller gauge needles and catheters has been shown to reduce the incidence of PDPH. The purpose of this study was to assess the clinical use characteristics of a 22 gauge compatible (28 gauge) catheter for CSA.

Methods: Institutionally approved written informed consent was obtained from 33 males (21-79 yrs) scheduled for elective surgery. A 22G X 3.5" spinal needle was placed using a midline or paramedian lumbar approach. The CSA catheter was advanced 4 cm into the subarachnoid space and the needle removed. Time to aspiration of CSF through the catheter was noted (considered negative if >120 sec). Lidocaine (5% in 7.5% dextrose) was injected over 1.5 min and the dermatomal level of diminished sensitivity to pinprick was determined at 5 and 10 min. Finally, the times from the last injection of lidocaine to first movement (flexion of the knees and toes) were recorded. Patients were interviewed 1 and 2 days post-op to determine the incidence of PDPH or complications and their satisfaction with the anesthetic technique.

Results: All patients were extremely satisfied with the anesthetic and no patient complained of a PDPH. While 8 of 33 catheters had a negative aspirate, the longest time necessary to aspirate CSF through the remaining 25 was 50 sec. Anesthesia was inadequate in three cases, two with a negative aspirate and one with a positive aspirate. The 10 min dermatomal levels for lidocaine (35-40 mg, N=21) ranged from T_4 to T_{12}. Fourteen of 28 patients were able to move within 1 hr of receiving their last dose of lidocaine. The only postoperative complication was a persistent neurologic deficit of $S_{3,4,5}$ (bowel and bladder dysfunction) in one patient. The low tensile strength catheter was difficult to remove in two patients (paramedian approach).

Discussion: Our incidence of PDPH (0/33, 28G catheter) compared favorably with that of Hurley and Lambert[1] (2/58, 32G catheter) and Denny et al.[2] (1/117, 20G catheter). Decreased catheter size makes CSF aspiration more difficult; 76% through the 28G catheter compared to 98% through a 20G catheter[2]. An acceptable incidence of PDPH combined with the advantages of prolonged anesthesia and rapid recovery make CSA and attractive technique.

References:

1. Hurley RJ and Lambert DH. Anesth Analg 70:97-102, 1990.
2. Denny N, Masters R, et al. Anesth Analg 66:791-4, 1987.