TITLE: ALKALINIZATION OF MEPIVACAINE FOR AXILLARY BLOCK

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Introduction: Two previous studies of the effect of alkalinization of local anesthetics in brachial plexus block gave conflicting results[1,2]. We examined the onset and distribution of analgesia, anesthesia, paresis and paralysis after axillary block with 1.25% mepivacaine to which saline or bicarbonate had been added.

Methods: This study was approved by the IRB. Ten healthy patients between the ages of 18 and 70 and 50 and 100 kg made up each group. Axillary block employed a 22 ga. short bevel needle, with 25 cc of local anesthetic behind the artery and 25 cc in front. Solutions were 1.25% mepivacaine with 10% by volume of 7.5% sodium bicarbonate or 0.9% NaCl. A blinded observer tested the onset of sensory block every 2 minutes for 30 minutes in each of the terminal nerves of the brachial plexus according to the method of Vester-Anderson[3]. Analgesia was defined as dullness to pinprick, and anesthesia as complete loss of touch. Proximal motor block was evaluated at the elbow: paresis was the first sensation of weakness, paralysis the inability to extend against gravity. Distal motor block was evaluated by measuring the pressure generated in a pedatric BP cuff wrapped around the hand[4]. Inability to achieve control pressures constituted paresis, inability to move the fingers, paralysis. Statistical analyses employed Student's t-test or Chi-square.

Results: The pH of the 1.25% mepivacaine with saline was 5.55; with bicarbonate, 7.30. The saline and bicarbonate groups were similar with respect to age, height and weight. Alkalinization produced no significant alteration in time to onset or distribution of analgesia. The figure shows the mean onset time of anesthesia for each of the terminal nerves of the brachial plexus. Alkalinization significantly shortened the time for onset of anesthesia in the medial cutaneous nerve of the forearm, the median nerve and ulnar nerve. As shown in the table, alkalinization significantly shortened the time to onset of distal paralysis.

Discussion: Okamura, et al. demonstrated in vitro that alkalinization speeds onset of block just as does carbonation.[5] Clinical studies using alkalinized agents in epidural blockade confirmed these findings. However, in the two previous studies of alkalinization in brachial plexus block, Hilgier noted faster onset of analgesia, while Bedder et al found no difference in onset of sensory or motor block. The present study differs in employing axillary instead of subclavian blocks and examines the distribution of anesthesia at more frequent intervals. Our data indicate that alkalinization has little effect on early development of block (analgesia), but does provide prompter complete anesthesia. The faster onset of distal motor paralysis fits with Winnie's model for the onset of block.[4] Alkalinization may allow the local anesthetic to penetrate faster to the core fibers, resulting in faster onset of distal motor block. Better penetration would not be an important factor in the mantle fibers; alkalinization would confer no advantage in the onset of proximal motor block. We conclude that alkalinization of mepivacaine results in faster development of more profound axillary block and may offer significant clinical advantages.

References: 1. Hilgier M: Reg Anesthesia 10: 59-61, 1985. 2. Bedder MD, Kozody R, Craig DB: Anesth Analg 67: 48-52, 1988. 3. Vester-Anderson T, Christiansen C, Sorenson M, Eriksen C: Acta Anesth Scand 26: 519-523, 1982. 4. Winnie AP, Tay C, Patel K, Ramamurthy S, Durrani Z: Anesth Analg 56: 852-861, 1977. 5. Okamura RK, Reisner LS Kalichman MW: Anesthesiology 67: A281, 1987.

TIME TO ONSET OF MOTOR BLOCK (Min)

	PROXIMAL		DISTAL	
	PARESIS	PARALYSIS	PARESIS	PARALYSIS
BICARB				
Mean	4	8	5	8
Std Dev	2	6	3	2
Count	9	8	9	6
SALINE				
Mean	3	11	3	20
Std Dev	1	5	2	6
Count	8	8	8	5