

Title: COMPARISON OF LIDOCAINE CARBONATE TO LIDOCAINE HYDROCHLORIDE USING THE INTERSCALENE APPROACH: THE CONTINUING CONTROVERSY

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**Introduction:** Sukhani and coworkers have reported recently that carbonated lidocaine provides a clinically significant reduction in latency and an increase in spread of anesthesia as compared to lidocaine hydrochloride in an interscalene approach to the brachial plexus.<sup>1</sup> In their report the question of motor block was not elucidated. The purpose of this study was to duplicate the work of Sukhani, et al. by utilizing the interscalene model to determine the dermatomal spread and time to onset of motor block provided by lidocaine carbonate as compared to lidocaine HCl. The incidence of adverse effects was also assessed.

**Methods:** This double-blinded, randomized study was performed with fifty (50) healthy consenting adults scheduled for forearm and/or hand procedures requiring approximately one hour of surgery. This investigation was approved by our Institutional Review Board and informed consent obtained from all patients. Interscalene block was used in each patient using a volume of local anesthetic equal in milliliters to half the patient's height in inches plus five. Patients were divided into two groups of 25 each, one group receiving the carbonated form and the other the hydrochloride derivative of lidocaine, both with epinephrine 1:200,000. The time to onset and completion of sensory block was determined from dermatomes C2 through T2. Onset and completion of motor block at the shoulder, elbow, and hand was noted. Statistical analysis utilized the Chi Square and Fisher's Exact tests.

**Results:** Two patients receiving lidocaine carbonate were dropped due to technical failure. In comparing the two groups, no significant difference was seen either in time to onset of analgesia or onset of anesthesia. The number of dermatomes blocked as a function of time showed no statistical difference between groups and also had large standard deviations, as depicted in figure 1. Blocks performed with lidocaine carbonate or hydrochloride both demonstrated frequent supplementation rates (61% and 58% respectively). In regard to motor block, no significant difference was seen either in the degree or time to onset of block at the shoulder, as depicted in figure 2, and percentage change in grip strength. Horner's Syndrome incidence was significantly higher in the lidocaine hydrochloride group.

**Discussion:** The difference in results subsequent to Sukhani's work was surprising. Comparing subject populations allowed observation that our subjects showed a significant male predominance, unlike Sukhani's groups which had equal proportions of men and women. Our populations were also closer in mean age while the ages of the patients receiving lidocaine carbonate in the previous study were greater but not significantly different. In addition, premedication was more strictly controlled as compared to the

Sukhani paper. Unfortunately these items cannot explain the different results obtained in two otherwise similar investigations. Though our data did demonstrate a tendency to earlier onset of anesthesia in dermatomes C2, C3, and T2, and significantly lower incidence of Horner's Syndrome with lidocaine carbonate, there appears to be no advantage to the use of the carbonated form of lidocaine. Our study failed to support the contention of Sukhani and coworkers that carbonated lidocaine makes interscalene blocks suitable for hand surgery.

#### References:

1. Sukhani R, Yanez-Segura VM, Winnie AP. Clinical Pharmacokinetics of Carbonated Local Anesthetics II. Interscalene Block Model. *Anesth Analg* 1987;66:1245-1250.

Figure 1. Graphic Comparison of number of dermatomes blocked by each agent as a function of time

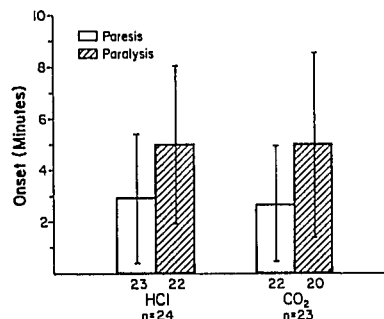
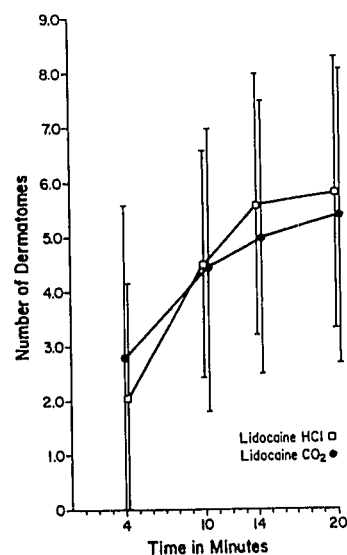


Figure 2. Onset of Motor Blockade at Shoulder