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The Addition of Sodium Bicarbonate to Lidocaine Significantly Reduces Injection Site Discomfort during Liver Biopsy

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Abstract Text

Background: Injection with lidocaine 1% prior to performance of a liver biopsy results in significant discomfort prior to onset of anesthesia; this is believed to be due to the acidic pH of lidocaine. Prior meta-analysis of lidocaine for subcutaneous injection found that patients preferred the use of buffered lidocaine (Cepeda MS 2010). Alkalinization of lidocaine to achieve neutral pH (7.35-7.45) is performed by adding 1 ml of 8.4% sodium bicarbonate ($NaHCO_3$) to 9 ml of 1% lidocaine. The objective of our study was to determine if the injection of buffered lidocaine would be better tolerated during liver biopsy which requires deep visceral injection of the anesthetic agent.

Methods: We conducted a randomized, double-blind, placebo controlled study of Lidocaine 1% vs. buffered lidocaine 1% for local anesthesia prior to performance of a liver biopsy. A blinded vial containing sterile water or $NaHCO_3$ was prepared by the pharmacy using a randomized block design, and stored in the endoscopy unit where vials were utilized in a consecutive manner. The total volume of anesthetic used was determined by the clinician; the mixture of lidocaine and buffering agent ($NaHCO_3$ vs. sterile water) was used in a ratio of 9:1 as above. The liver biopsies were performed as part of routine clinical care. Patients were asked to rate the variables of injection site pain and anxiety on a Visual Analog Scale (VAS). The scale use a rating from 0 to 10 on a straight line measuring 10 cm in length. The assessment was performed immediately before and after the biopsy in a blinded fashion. Patients who received sedatives were excluded from the study.

Results: 199 patients completed the study, with a mean age of 54 years, with 53% female and 74% Caucasian subjects. 28% patients reported a prior liver biopsy. There were no differences between control and treatment groups when comparing baseline demographics. The mean pre-procedure scores for injection site discomfort were similar in both groups (0.72 vs. 0.64), but post-procedure injection site pain scores were lower in the treatment group vs. the control group (1.65 vs. 2.27, p=0.037). The mean scores for anxiety before and after procedure were not different between the control and treatment groups (Table 1). Multivariate analysis showed that the use of buffered lidocaine was significantly associated with lower injection site discomfort when accounting for age, sex, race, prior biopsy experience, or NPO status.

Conclusion: Our study showed that the use of buffered lidocaine is better tolerated than standard lidocaine while achieving similar local anesthesia during a liver biopsy. We propose this simple intervention be adopted as a standard of care.

Table 1. Mean reported pain and anxiety scores in the study sample (n=199).

	Intervention		Controls		
PAIN	Mean	SD	Mean	SD	p-value
Pre Procedure	0.72	1.60	0.64	1.38	0.692
Post Procedure	1.65	1.94	2.27	2.25	0.037
Pain Change	0.93	2.00	1.63	2.24	0.021
ANXIETY					
Pre Procedure	2.56	2.71	2.87	2.93	0.442
Post Procedure	2.55	2.60	2.84	2.72	0.436
Anxiety Change	0.01	2.81	-0.03	2.91	0.921

Disclosures

Anurag Maheshwari – Abbvie Inc: Speaking and Teaching; Gilead Inc: Speaking and Teaching; Dova Pharmaceuticals Inc: Speaking and Teaching; Salix Inc: Speaking and Teaching; Merck Inc: Speaking and Teaching; Bayer Pharma: Speaking and Teaching

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