

Ultrasound Visualization vs. Electrical Nerve Stimulation for Interscalene and Axillary Nerve Block in Upper Extremity Surgery: A Prospective Randomized Trial (Poster)

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Ultrasound Visualization vs. Electrical Nerve Stimulation for Interscalene and Axillary Nerve Block in Upper Extremity Surgery: A Prospective Randomized Trial

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Introduction

Ultrasound can facilitate peripheral nerve blockade by providing visualization of nerves, surrounding structures, and the distribution of injected local anesthetic. Avoidance of electrical nerve stimulation and visualization of internal anatomy suggest that nerve blocks performed with ultrasound guidance (US) may require less time to perform and be associated with an improved patient experience. Provided that success rates are equivalent to those utilizing traditional nerve stimulation (NS), US may confer a distinct advantage for patient and provider. This randomized prospective trial compares US vs. NS with respect to block success rate, time for block completion, and patient comfort.

Methods

All patients over 18 years of age presenting for elective unilateral upper extremity surgery under isolated interscalene or axillary nerve block were screened. Patients with preexisting peripheral neuropathy, coagulopathy, local anesthetic allergy, or infection were excluded. After written informed consent was obtained, patients were randomized (1:1) to either US or NS techniques. A standardized pre-medication was used. NS was performed using a nerve stimulator attached to a 4 cm Stimuplex (B Braun) needle using twitches at a stimulus < 0.5 milliamps. US used a 13-6 MHz 25mm linear array probe and display monitor (L25e, S-Nerve, Sonosite). 40ccs of an equal mixture of 0.5% Bupivacaine/1.5% Mepivacaine with 1:200,000 of epinephrine were injected incrementally in both groups. Assessments of patient comfort were made immediately following the block, prior to surgery. Block failure was determined by the need for general anesthesia at any time during the procedure (intraoperative care team blinded to technique). Independent t tests were used to evaluate differences in mean scores between both groups.

Results

76 patients were enrolled. Overall, no statistically significant differences were seen between techniques in performance time, failure rates, block related complications, or overall patient experience (Table 1 & Table 2). However, there were statistically significant differences between groups with respect to comfort, pain, and anxiety experienced during the nerve block procedure (p=0.034, p=0.046, and p=0.027, respectively) (Table 3). Overall, patients in the NS group scored higher in pain and anxiety and lower in comfort than patients in the US group.

Table 1. Total Needle Time

Outcome: Needle Time (minutes)	Group	N	Mean	Std. Deviation	p-value
Total Needle Time	NS	32	6.19	3.14	0.096
	US	44	4.99	3.01	

Table 2. Overall Patient Experience

Outcome: Experience (1=worst, 5=best)	Group	N	Mean	Std. Deviation	p-value
Rate nerve block experience	NS	31	4.74	.51	0.737
	US	43	4.79	.68	
Overall anesthesia experience	NS	31	4.68	.60	0.367
	US	43	4.81	.66	
Rate surgical experience	NS	31	4.77	.43	0.301
	US	43	4.91	.61	

Table 3. Assessments of Patient Comfort

Outcome: Comfort (1=worst, 5=best)	Group	N	Mean	Std. Deviation	p-value
Patient Comfort Index (PCI)	NS	32	20.2	4.30	0.051
	US	44	21.8	2.15	
Were you anxious during the block procedure?*	NS	32	2.8	1.4	0.370
	US	44	3.1	1.3	
Was the block procedure uncomfortable?*	NS	32	3.2	1.1	0.034
	US	44	3.6	0.7	
Did the block procedure cause pain?*	NS	32	3.4	1.1	0.046
	US	44	3.8	0.4	
Did you experience a funny bone sensation at any time during the block?*	NS	32	3.7	0.8	0.779
	US	44	3.6	0.7	
Did the nerve stimulation or US cause anxiety or pain?*	NS	32	3.5	1.0	0.027
	US	44	4.05	0.2	
Did the injection of medicine cause anxiety or pain?*	NS	32	3.6	0.9	0.542
	US	44	3.7	0.7	

Fig. 1. Comparing Needle Time by Group

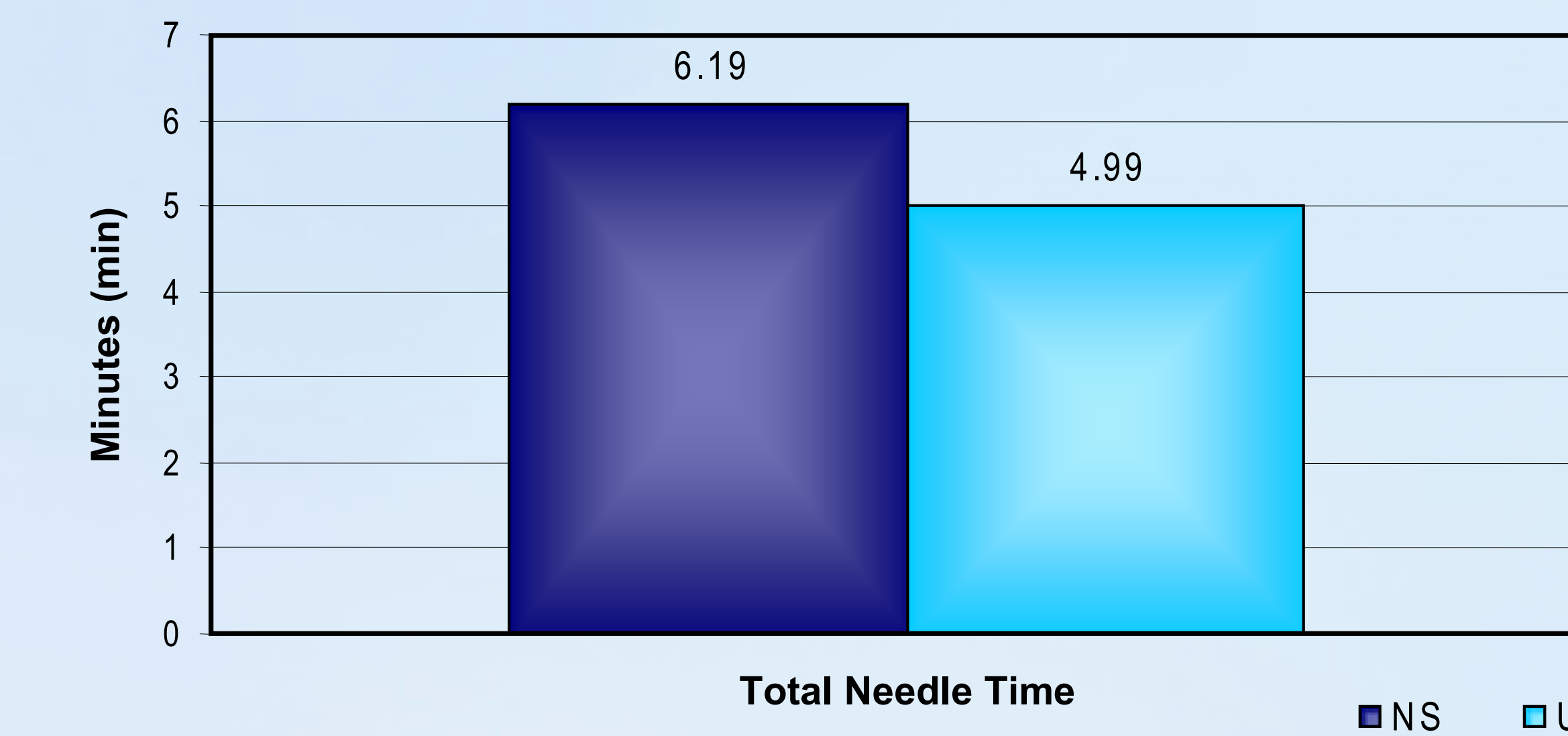


Fig. 2. Comparing Experience by Group

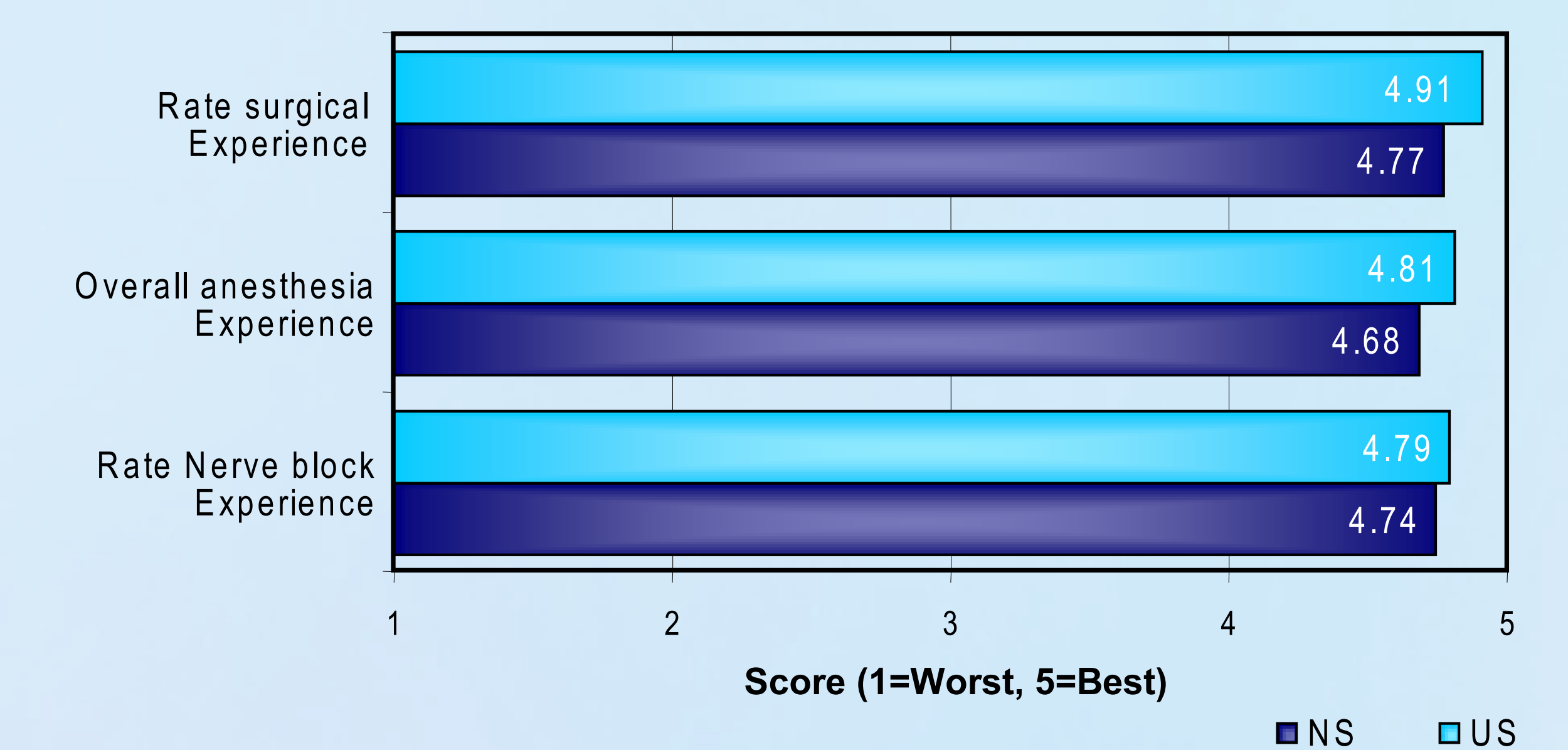


Fig. 3. Comparing Overall Comfort by Group

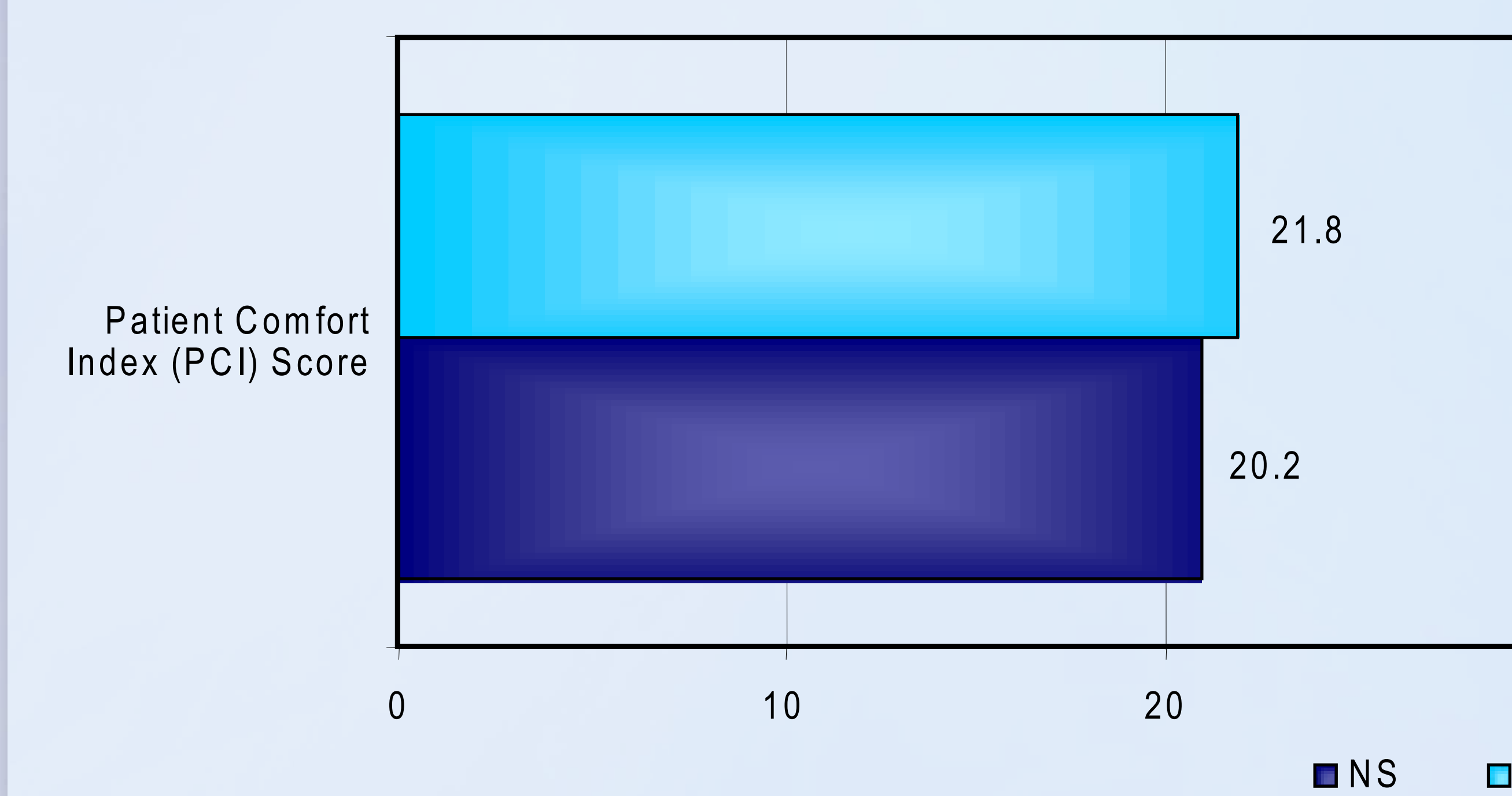
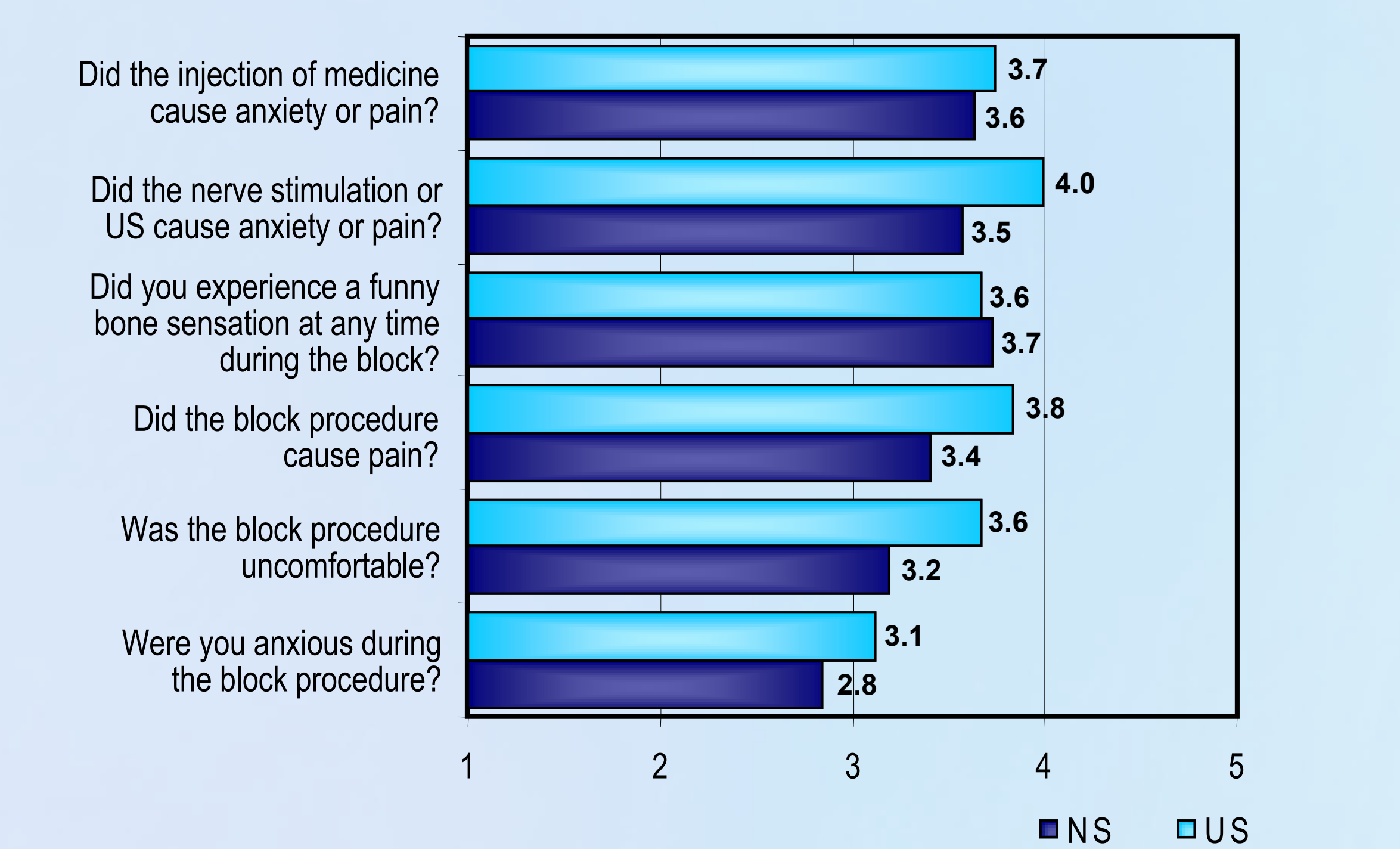


Fig. 4. PCI Domain Scores by Group



Discussion

Practitioners are awaiting outcome data prior to investing in new techniques. Although effectiveness and safety are the primary endpoints of any nerve block, patient experience and provider time warrant evaluation. Procedure related discomfort creates a lasting impression and may affect patients' future acceptance of regional anesthesia. Our data suggests that in comparison to NS, US is associated with less pain, anxiety, and improved patient comfort.

