Multiplanar Wrist Joint Proprioception: The Effect of Anesthetic Blockade of the Posterior Interosseous Nerve or Skin Envelope Surrounding the Joint

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**Purpose:** Contribution of the posterior interosseous nerve (PIN) and the surrounding skin envelope to wrist proprioception is a topic of debate and the primary focus of this research.

**Methods:** We performed a double-blinded, placebo controlled study in which subjects underwent baseline multiplanar testing of wrist proprioception. Velcro straps secured the forearm in neutral rotation and an orthoplast splint held the index finger to isolate wrist motion. From a neutral start point, subjects targeted specific hours on an analogue clock hidden from view. Each repetition was scored to the nearest minute on the clock (six degrees). They were randomized to receive either anesthetic blockade of the PIN within the fourth dorsal compartment, or circumferential topical anesthetic blockade of skin surrounding the joint. Corresponding opposite wrists received placebo intervention. Proprioceptive testing was repeated. To facilitate comparison between left and right wrists, the analog clock face was converted to degrees, with each minute representing six degrees. 90 degrees corresponded to wrist extension, 180 degrees to ulnar deviation, 270 degrees to flexion, and 360 degrees to radial deviation.

**Results:** Eighty subjects, 45 male and 35 female, mean age 33 years (range, 19 to 64 years), completed testing. Overall accuracy and precision were generally good regardless of treatment, with approximately 90% of measurements falling within ±18 degrees of the true value. This did not differ significantly between pre-treatment and post-treatment in either PIN or circumferential skin anesthesia. Similarly, there was no significant difference between pre-treatment measures and placebo control measures.

**Discussion:** Previous studies have methodological limitations, or have not been sufficiently sensitive to detect isolated contributions to wrist proprioception. A double-blind randomized study of normal volunteers, in which the joint was assessed in multiple planes at close intervals, would be most likely be of sufficient sensitivity to detect this change. Wrist proprioception is therefore likely to be a multifactorial phenomenon.

**Clinical Relevance:** Surgeons may sacrifice the PIN without concern for effect on wrist joint proprioception.