

Intraneural Catheterization of the Sciatic Nerve In Humans: A Pilot Study

Jaime Rodríguez, M.D., Ph.D., Manuel Taboada, M.D., Ph.D., Miguel Blanco, M.D., Juan Oliveira, M.D., María Bárcena, M.D., and Julián Alvarez, M.D., Ph.D.

Background and Objectives: Imaging studies in humans have shown that intraneural injection of local anesthetic may be relatively frequent. The incidence of intraneural catheterization is unknown. We speculated that early neural blockade after the injection of a small dose of local anesthetic might be a common finding produced by unintended intraneural catheterization. We investigated the clinical effect of a small dose of local anesthetic injected through a stimulating sciatic catheter, and also the placement of the tip of the catheters by computed tomography (CT) scan.

Methods: In this descriptive study, a dose of 3 to 5 mL of 1.5% mepivacaine was injected through a stimulating sciatic catheter in 45 patients undergoing hallux valgus repair. Patients with early neural blockade at the foot, within 5 minutes after injection, were suspected to have an intraneural placement of the catheter. A CT scan of the thighs was performed in 10 additional patients to assess catheter tip placement.

Results: Nine of 45 patients had early neural blockade with the small dose of local anesthetic. Seven patients underwent surgery without further supplementation. There was a statistically significant lower intensity of stimulating current through the catheter in the group of patients with early neural blockade. Of 10 CT scans, 3 showed clear intraneural placement of the catheter. No postoperative sequelae were observed.

Conclusions: Intraneural catheterization of the sciatic nerve may be a frequent finding and was not followed by nerve injury under the conditions of our small pilot study. *Reg Anesth Pain Med* 2008;33:285-290.

Key Words: Anesthesia techniques, Catheter, Nerve injury, Nerve stimulation.

The concept of unintended intraneural injection of local anesthetic (LA) has been recently challenged. Human radiological and ultrasound studies^{1,2} have shown that intraneural injection of LA may be relatively frequent, but that it is commonly associated with no adverse sequelae.² Intraneural but extrafascicular injection of LA seems not to be associated with permanent nerve injury in an experimental animal model.³ As early as 1927, Victor Pauchet reported that intraneural injection of LA

under direct vision was followed by “instantaneous” interruption of nerve conduction.⁴

Conversely, stimulating perineural catheters, which allow the confirmation of close perineural positioning of the catheter tip, are associated with low consumption of LA and better pain control than conventional catheters⁵⁻⁷ in perineural sciatic analgesia. We wondered about the possibility of intraneural catheterization of the sciatic nerve after having experienced 1 case of complete surgical anesthesia of the foot achieved within 5 minutes of injection of 5 mL plain 1.5% mepivacaine through a lateral popliteal perineural catheter inserted during the elicitation of plantar flexion at 0.3 mA, 0.1 msec and 2 Hz. A computed tomography (CT) scan of the thighs of the patient showed the tip of the catheter within the sciatic nerve. Short and long term recovery were uneventful.

We therefore became concerned about the possibility of unintentional intraneural placement of stimulating catheters, which prompted us to design

From the Departments of Anesthesiology (J.R., M.T., J.O., M.B., J.A.) and Radiology (M.B.), Complejo Hospitalario Universitario de Santiago, Santiago de Compostela, Spain.

Accepted for publication January 31, 2008.

This work was performed with no external financial support.

Reprint requests: Jaime Rodríguez, M.D., Ph.D., Dept. of Anesthesiology, Hospital Clínico Universitario de Santiago, Travesía da Choupana, s.n., 15706 Santiago de Compostela, Spain. E-mail: jaime_rodriguez_garcia@yahoo.es

© 2008 by the American Society of Regional Anesthesia and Pain Medicine.

1098-7339/08/3304-0001\$34.00/0

doi:10.1016/j.rapm.2008.01.011

an investigation with 2 main objectives. The first was to study the reproducibility of the phenomenon of early onset neural blockade after the injection of a small dose of LA. The second was to assess in an objective fashion the final placement of the tip of the stimulating catheters relative to the sciatic nerve by CT scan.

Methods

After our Ethics Committee's approval and patients' written informed consent, we initiated a descriptive study on the clinical effect of a small volume of LA injected through a stimulating catheter for sciatic nerve block. A dose of 3 to 5 mL of 1.5% mepivacaine was injected through a perineural stimulating catheter in 45 consecutive surgical patients undergoing hallux valgus repair. Patients were assigned to either group A (those subjects that did not have early symptoms or signs of neural blockade at the foot within 5 minutes after the injection of a small dose of LA), or group B (those that presented symptoms or signs). Patients in group A were not given any more LA through the catheter. Patients in group B were given a full dose of LA before surgery. Characteristics of block placement, dosing of LA, and intraoperative supplementation with general anesthesia were noted.

In a second phase of the study, 10 patients were included after our Ethics Committee's approval and patients' written informed consent. A CT scan of the thighs was performed 3 to 5 hours postoperatively in these 10 patients, to assess the position of the tip of the catheter relative to the sciatic nerve, using the posterior popliteal approach. After monitoring and sedation with 1 to 3 mg midazolam intravenously, all patients had a stimulating perineural catheter (Stimulong Plus, Pajunk, Geisingen, Germany) inserted. The technique of nerve location and catheter insertion was as follows: Nerve location was performed with a 19.5-gauge insulated, long bevel needle. The catheter and the needle were assembled in such a way that the electrical current delivered by the catheter passed through the inner aspect of the shaft of the needle to its tip. This maneuver has been described elsewhere.⁵ The stimulating catheter, connected to the nerve stimulator, was advanced through the needle until a small resistance was felt in coincidence with the exit of the tip of the catheter through the hole of the needle. At this moment, 2 to 3 mL of 5% dextrose was injected through the catheter to facilitate catheter advancement^{8,9} without dissipating the electrical current in the surrounding tissue. Satisfactory catheter placement was considered when a distal muscular response at the calf or the foot was

elicited. The minimum intensity of current to leave the catheter in place was deliberately set between 0.7 and 1 mA in 5 patients, and between 0.2 and 0.5 mA in the other 5, with an impulse duration of 0.1 ms (Multistim, Pajunk, Geisingen, Germany). A dose of 3 to 5 mL of 1.5% mepivacaine was injected via the catheter and it was followed by a 5-minute period of observation for symptoms or signs of nerve blockade. In the case of positive findings, no more LA was given through the catheter. When symptoms or signs of early neural blockade at 5 minutes did not progress to an adequate surgical anesthesia after an additional 10 minutes, the anesthesiologist was allowed to inject a variable dose of 1.5% mepivacaine according to clinical judgment. No postoperative infusion through the catheter was started before doing the CT scan. Intra-neural placement of the catheter tip was considered by a blinded radiologist when the end of the electrode was within the edges of the sciatic nerve in the CT scan, after examining conventional cross section imaging, and transversal and coronal maximum intensity projection reconstructions. In this second phase of the study, patients were also assigned to 1 of 2 groups, according to the presentation of early signs of neural blockade (group CTB), or not (group CTA).

Normal distribution of quantitative data was first verified with Kolmogorov-Smirnov test followed by the Lilliefors correction. Student *t* test or Mann-Whitney *U* test was used for quantitative data, according to data distribution. These data are expressed as mean \pm SD or median with its range, when indicated. Dichotomous variables were assessed by means of χ^2 test or bilateral Fisher exact test when appropriate.

Results

In the first phase of the study, 36 patients were included in group A, and 9 patients were included in group B. Both groups were similar in demographic characteristics (Table 1). Approaches to sciatic nerve block are displayed in Table 1. Nine of 45 patients had early signs or symptoms of neural blockade. Characteristics of nerve block placement and catheter insertion are shown in Table 2. A statistically significant lower intensity of the stimulating current during catheter insertion was found in group B. The total dose of LA given was significantly lower in group B. It was not possible to provide surgical anesthesia with only the initial small dose of LA in 2 patients in group B. These 2 patients had the highest intensities of stimulation through the catheter (0.8 and 0.9 mA) in group B. No pain during the insertion of the catheter or the

Download English Version:

<https://daneshyari.com/en/article/2766788>

Download Persian Version:

<https://daneshyari.com/article/2766788>

[Daneshyari.com](https://daneshyari.com)