

Patient Satisfaction During the Administration Of Local Anesthesia Using a Computer Controlled Local Anesthetic Delivery System

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Patients undergoing a surgical procedure first must be properly anesthetized prior to the procedure to minimize discomfort. The effectiveness of a Computer Controlled Local Anesthetic Delivery System (CCLADS) known as the "wand," was evaluated. Patient anxiety and pain associated with the injection of anesthesia both decreased using this method.

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Local anesthesia is required for all surgical procedures to minimize discomfort during cutaneous surgery. Local anesthetics provide a fast, safe, and effective protection from otherwise intolerable minor surgical procedures. Many patients become fearful of the administration of the anesthetic due to previous injections that were uncomfortable or painful. Most patients are afraid of the actual needlestick they feel, rather than the administration of the local anesthetic. Whereas a "skilled" practitioner can make the needle insertion less painful, the administration of the anesthetic will cause a burning sensation due to the change or variation of the pH factor, as well as hydrostatic pressure caused by inserting the medication at a fast rate. Many factors have been adapted in medical offices to decrease the burning sensation such as buffering the local anesthetic with sodium bicarbonate, or administering the medication at a slow rate; however, it is almost virtually impossible to keep a "controlled" rate of anesthetic using the standard equipment.

In 1997, Milestone Scientific introduced a Computer Controlled Local Anesthetic Delivery System (CCLADS known as the "wand"). This device was designed to deliver a "virtually painless" injection of local anesthetic (Friedman & Hochman, 1997; Hochman, Chiarello, Hochman, Lopatkin, & Pergola, 1997). The clinician uses a wand-like device that is similar to the shape of a pen for ultimate ergonomic control (see Figure 1). Clinicians can rotate the wand at a

180-degree angle to provide complete anesthesia to the surgical area, without having to remove the needle for further needle penetrations (Hochman & Friedman, 2000; Hochman & Friedman, 2001). Local anesthesia is administered via a computer-controlled module that delivers exact amounts of anesthetic at a controlled rate. The rate of injection by the device is currently set at one drop every other second. The clinician can use the foot pedal to set the control rate at various settings including cruise control. Whereas the patient will still experience the sensation of the needle insertion, the actual administering of the medication will be controlled and virtually painless.

Methods

A phase IV single center study was conducted on 40 subjects (one subject was a minor and informed consent and assent was later obtained) who were candidates for Mohs' microscopic surgery for treatment of skin cancer removal or patients who underwent a skin biopsy procedure to determine a positive skin cancer for Mohs' surgery. Twenty patients were randomly selected to use the wand device, while the other 20 subjects (the control group) had their injections with the hypodermic needle and syringe. All patients within the control group had their injections administered by nursing staff who demonstrated slow administration using the traditional "plunger" technique with the hypodermic syringe and needle. Informed consent was obtained by all subjects,

Figure 1.
Computer Controlled Local
Anesthetic Delivery System

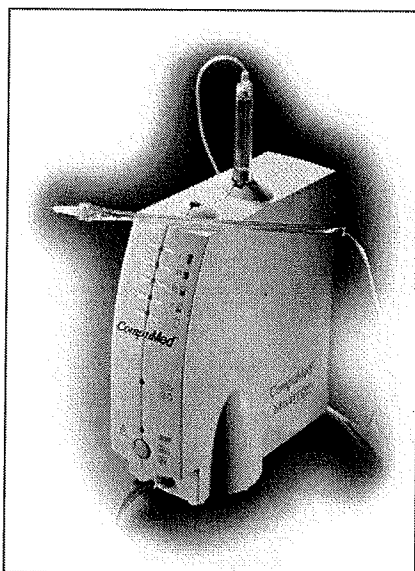


Figure 2.
Ratings of Pain Scale 0-9

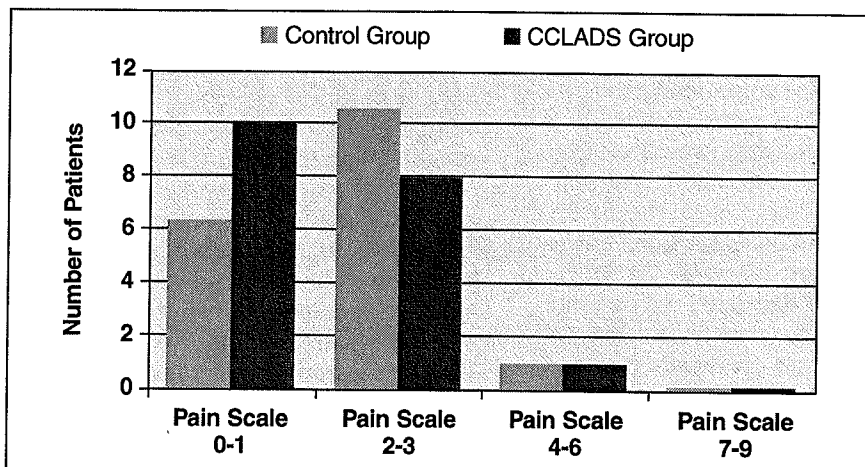
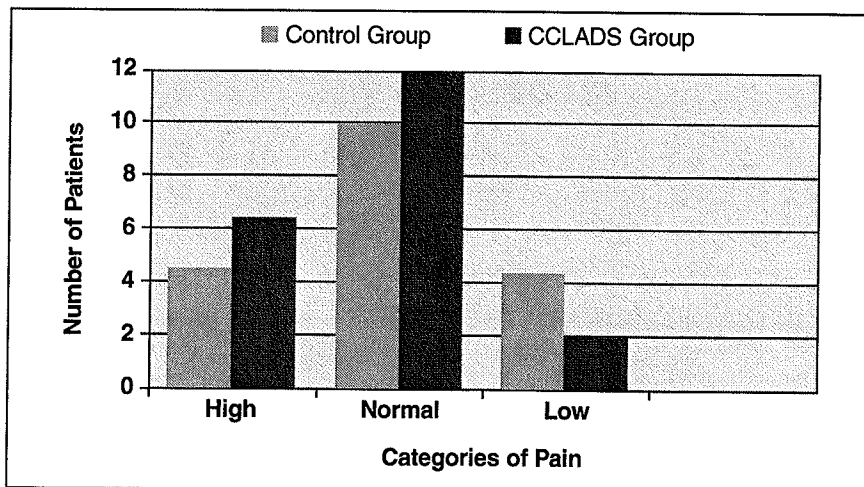


Figure 3.
Patient Tolerance to Pain



and the study was discussed in detail with each subject.

Two percent lidocaine was used on all patients (study and control groups). Two percent lidocaine was the anesthetic of choice in this study; however, any local injectable anesthetic may be used with the device. Since the device has a controlled rate of flow, it is not necessary to buffer the lidocaine to decrease patient pain. Lidocaine carp jets are required for use with the CCLADS, so buffering the anesthetic with sodium bicarbonate is impossible with the device. All injections were administered by investigators and qualified nursing staff.

Subjects were asked to complete an evaluation of their prior injections, their level of anxiety regarding the needlestick, along with pain management scales rated 0 to 9 to grade the discomfort and sensation experienced throughout the injection. Data were collected and analyzed to measure patient satisfaction and levels of discomfort associated with the injection. Patients who experienced discomfort during the procedure were administered additional injections of 2% lidocaine either through the CCLADS or hypodermic syringe based on what group they were in during their first injection. In addition

to patient tolerance and experience, clinician satisfaction ratings were collected to measure ease and usage of the equipment.

Results

Over 50% of the subjects who were randomly selected to use the CCLADS rated the pain they associated with the injection, including administering the anesthesia, at a 0 to 1 range; versus 35% in the control group. Forty percent of subjects in the study group rated their pain between 2 to 3, compared to 55% in the control group. Less than 10% of the subjects rated their pain at a 6 or below in both the study and control groups. Subjects who were surveyed

before their injection with the CCLADS device rated their tolerance to pain into three different categories: 60% stated a "normal" tolerance to pain, 30% stated a "high" tolerance to pain, and 10% of subjects surveyed stated they had a "low" tolerance to pain. Subjects who stated they had a low tolerance to pain rated the CCLADS between 2 to 3 on a 0 to 9 scale. The control group who used the standard hypodermic needle and syringe rated their pain tolerance as 25% high, 50% normal, and 25% low (see Figures 2 & 3).

Clinician satisfaction was also measured during the study. All injecting practitioners were surveyed to measure clinician satisfaction and

ease of the equipment. Three out of four practitioners rated the equipment as good. All four practitioners noted that the CCLADS was an easy tool to use while rotating the device at a 180-degree angle, along with the ease of the foot pedal. Practitioners also noted that they would use this device again to provide "painless" injections to patients in the future. Disadvantages noted included longer injection times; however, the longer injection was associated with a more rapid onset of anesthetic at the site of injection. Other comments included more delays in moving the equipment if multiple operating rooms are used at once.

Conclusion

These data reveal that patients with a normal to low tolerance to pain rated their pain far less using the CCLADS than what was experienced with prior injections or the control group using hypodermic syringes. Using the CCLADS equipment reduces patient fear and anxiety of future needlesticks and the pain associated with the injection. Based on our experience, the CCLADS equipment can benefit both the patient and the practice. This new method of controlling pain may increase patient satisfaction and generate referrals to the practice. ❏

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