

The Use of a Computerized Anesthesia Injection System to Minimize Pain During Hair Transplant Surgery

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Disclosure:

The authors do not have any financial interest in the sale of "The Wand" and have not received any compensation from Milestone Scientific for writing this article.

Hair transplantation is generally considered a very safe procedure. However, the most common fear faced by hair transplant patients is related to the pain caused by the anesthesia injections. During pre-operative consultations, prospective patients usually ask about the amount of pain to be expected and invariably show some level of anxiety related to that.

Historically, the use of local anesthetics started in the 1800s, when William Halsted performed the first nerve block using Cocaine during a dental procedure. Since then, a number of other local anesthetic drugs were synthesized, showing better efficiency and fewer side effects than Cocaine. A number of different syringes have been developed to allow introduction of the anesthetic, but the standard hypodermic injectors used today still cause the surgeon to operate with his or her forearm, wrist, and hand in an awkward and often uncomfortable position from an ergonomic standpoint (Figure 1). With this system, the medication is injected by applying pressure with the thumb to the plunger of the syringe.

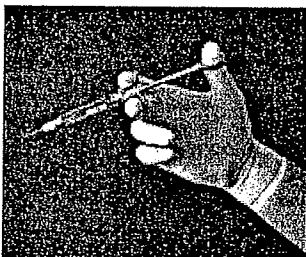


Figure 1

In local anesthesia there are two components that contribute to the pain experienced by the patient during injection: the first component is the actual puncture of the skin with the

hypodermic needle and the second is the distention of the tissue caused by the injection of the solution. When using Lidocaine or other Amide local anesthetic, the acidic pH of the solution (necessary to prolong its shelf life) causes local irritation, also promoting pain. Penetration of the needle in a previously anesthetized area, slow injection, and buffering of the anesthetic solution with Sodium Bicarbonate are techniques often used to try and minimize discomfort during local anesthesia. However, total control of the pressure on the plunger of the syringe is often difficult.

Recently, a Computerized Injection System called "The Wand Local Anesthesia System" (The Wand®) was developed and has been used mainly by dentists to minimize the anxiety and pain associated with the local oral anesthesia (Figure 2). Studies have shown that many patients have phobia of the dental injections, and in some cases it is strong enough to prevent patients from seeking dental care (Krochak et al., 1998). Based on the review of the Odontological literature about the use of The Wand® and the overall success achieved with this system, we have introduced the use of this device for infiltration of local anesthetic during hair transplantation. Our standard technique involves the



Figure 2

use of the Hypodermic injector to achieve a ring block around the scalp.

The new device employs a computerized flow-rate control that provides predictably painless injections (Krochart et al., 1998). It utilizes standard 1.8cc anesthetic cartridges Luer lock, single-ended needles versus the double-ended anesthetic needles. The needle is mounted on a pen-like handpiece, which makes the injection much more comfortable for the person performing the anesthesia. It also allows for better control of the depth of the injection and does not inflict fear on the patient (Figure 3).

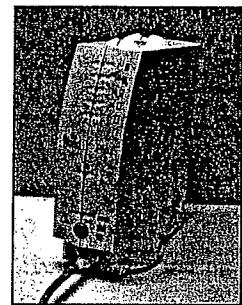


Figure 3

The system uses two flow rates: a slow rate, which injects one drop of anesthetic every two seconds, and a fast rate, which may be used after initial anesthesia has been achieved. The system used at our office also has a feature called "Cruise Control," which is a constant slow flow without the need to push the foot pedal. There is constant visual and audible monitoring of the volume of anesthetic injected, helping to prevent overdose. It also performs automatic aspiration before injection, thus preventing intravascular injections.

We have used The Wand® system on more than 50 patients, the majority of

continued on page 108

Computerized Anesthesia

continued from page 107

which were patients who have had previous hair transplants with the traditional numbing technique. We have found that there is a marked decrease in the amount of pain and discomfort associated with the injection of the local anesthetic when using The Wand®, as stated by the patients. Pre-operative anxiety level is also reduced by explaining the new system and its advantages in reducing discomfort and controlling the dose of the anesthetic.

Another important fact observed with the use of this computerized system is that there was a reduction in the total amount of anesthetic necessary to anesthetize the scalp.

The learning curve for the use of this system is minimal, and its operation is remarkably simple. After the learning curve was passed there was very little variability among users in regard to the total volume

of anesthetic used and the level of discomfort inflicted on the patient.

The Wand® system clearly represents a much needed evolution in terms of technology for local anesthetic delivery, and in our hands it has contributed to make the overall procedure of hair transplantation much less painful for the patient and more comfortable for the person performing the injections.

We are conducting a formal and more extensive study involving a large number of patients to further document the advantages of this system. Results should be available soon. ✧

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Commentaries on

Barusco's Use of a Computerized Anesthesia Injection System to Minimize Pain During Hair Transplant Surgery

Commentary # 1 by Jeffrey S. Epstein, MD *Miami, Florida*

Achieving Painless Hair Transplant Surgery

One of the greatest fears, although largely unfounded, that patients have about their hair transplant is the pain of the procedure. Once achieved at the onset of the procedure, effective local anesthesia completely prevents the patient from having any sensation during, and for several hours after the procedure. However, achieving that local anesthesia can be somewhat uncomfortable, even painful at times.

A variety of techniques can be utilized to minimize the pain of the anesthesia injection. Buffering of the anesthetic agent, through the addition of sodium bicarbonate to the lidocaine, helps to minimize the stinging from the acidity of the agent. Oral sedation, and even intravenous sedation with such agents as midazolam, causes relaxation, and some amnesia, during the period of injection. Finally, blockage of pain fibers through massage techniques can help reduce pain as well.

In my practice, we have used a combination of the above, relying on sedation combined with gentle injection

technique and massaging, to allow the injection of buffered anesthetic agent with as little discomfort as possible. Most recently, however, we have been using a new device, The Wand®.

The Wand® is a computer controlled anesthetic agent delivery system. By depressing an attached foot pedal, a gentle steady flow of anesthetic agent can be delivered at a rate below the threshold of sensation. No manual force is required, but rather the device delivers the agent through a tubing attached to a handpiece and through a 27 or 30 gauge needle. By guiding the needle along a superficial plane, slowly advancing it, the anesthesia can be placed where it is most effective, along the skin surface. A deluxe version, The Wand Plus®, has an added feature, where after several seconds the foot can be released from the foot pedal and the agent will continue to be delivered at the same constant rate set initially.

Initially upon receiving the device, I started a side-by-side comparison study using the traditional buffered anesthetic agent delivered by a hand-held syringe.

However, the superiority of The Wand® dictated that I stop the comparison and rely exclusively on it for anesthesia injection. Patients report that it is virtually pain-free, and have been very happy with its use. I also welcome its use, for it removes the strain placed upon my wrist that is incurred with traditional injection. In addition, because the injection is placed more superficial, less agent needs to be injected, thus potentially limiting post-procedure edema. This edema can be further exacerbated by the use of buffered agents, which are not necessary with the device. Finally, while intravenous sedation is still offered to my patients, I welcome the opportunity to provide my patients a pain-free procedure under oral sedation alone to help provide relaxation.

The only downsides of the device are the additional time needed for injection and the cost of purchasing the device. However, these costs are more than compensated for with happier patients and the reduction of risk of injury to my wrist. ♦

**Dr. Epstein has no proprietary interest in The Wand®.*

Commentary # 2 by Paul M. Straub, MD *Torrance, California*

I agree with almost everything in Dr. Barusco's article. The circumferential ring block is the most suitable anesthesia for hair transplantation. There are many patients who would like to do hair transplantation but forgo the procedure for fear of pain. The pain associated with the local anesthesia injection comes from three sources: 1) the immediate insertion of the needle through the skin, 2) the distension of

the tissue when the fluid is injected, and 3) the acidic pH, which can be eliminated by buffering with bicarbonate solution. As stated in the article, the pain of insertion can be eliminated by always inserting the needle through a previously anesthetized area. This leaves only the pain of distention to be dealt with. I inject very, very slowly while gently sliding the #30 needle back and forth. It works well and results in

painless injection, but requires a great deal of time and patience. There is no chance of getting carpal tunnel syndrome because the pressure is so slight. I would welcome The Wand® Local Anesthesia System but I would prefer that there was no noise involved. In my own experience, when the manual technique is done slowly enough, patients do not know that they are being injected. ♦