

**“THE USE OF VEINVIEWER® FOR BOTULINUM TOXIN INJECTION  
IN FACIAL WRINKLES – CASE REPORT”**

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***ABSTRACT***

Botulinum toxin injection is usually performed on an ambulatory basis and is rarely associated with complications. However, incidence of hematomas is frequent and sometimes uncomfortable for the patient, who is seeking an inherently aesthetic procedure. A new device designed for small superficial vessel identification, VeinViewer® by Christie Medical Holdings (VV), was used in this study to locate these vessels. It could be observed that hematoma is avoided when injection was done far from the center of the vessel shown by VV. In conclusion, the VV has significant value in improving the quality of botulinum toxin injection, and its use in plastic surgery appears promising.

## **BACKGROUND**

Treatment of facial wrinkles with botulinum toxin injection is a common cosmetic procedure, usually performed in dermatology and plastic surgery clinics. The physiological and pharmacological aspects of purified botulinum toxin administration have been extensively studied, allowing a safe and standardized procedure<sup>1,2,3</sup>. The incidence of complications associated with the application of botulinum toxin is rare. The most common complication is headache, which occurs in about 5-11% of patients<sup>4,5,6</sup>. A less frequent, but more serious complication is ptosis of the upper lids<sup>5,6,7,8,9</sup>. Authors report rare catastrophic events, such as necrotizing fasciitis and death<sup>10,11</sup>. However, other events, not considered complications, are frequently observed, and may cause considerable discomfort for the patient. Hematoma, caused by trauma of the injection needle to a small vessel, is one of these events<sup>1,3,4</sup>. Usually the blood that infiltrated the subcutaneous tissue totally and spontaneously drains away in seven to ten days, and the patient is strongly recommended to avoid sun exposition during this period.

For a botulinum toxin treatment, a small amount (0.05-0.1 ml) of the product is injected into the muscles responsible for wrinkle formation. If a minimal quantity of the product is injected into a vessel, systemic effects do not occur due to the insignificant amount of toxin. However, this amount of toxin which has been carried away by the blood in the vessel, is not applied to the muscle being treated, leading to a diminished effectiveness of the procedure.

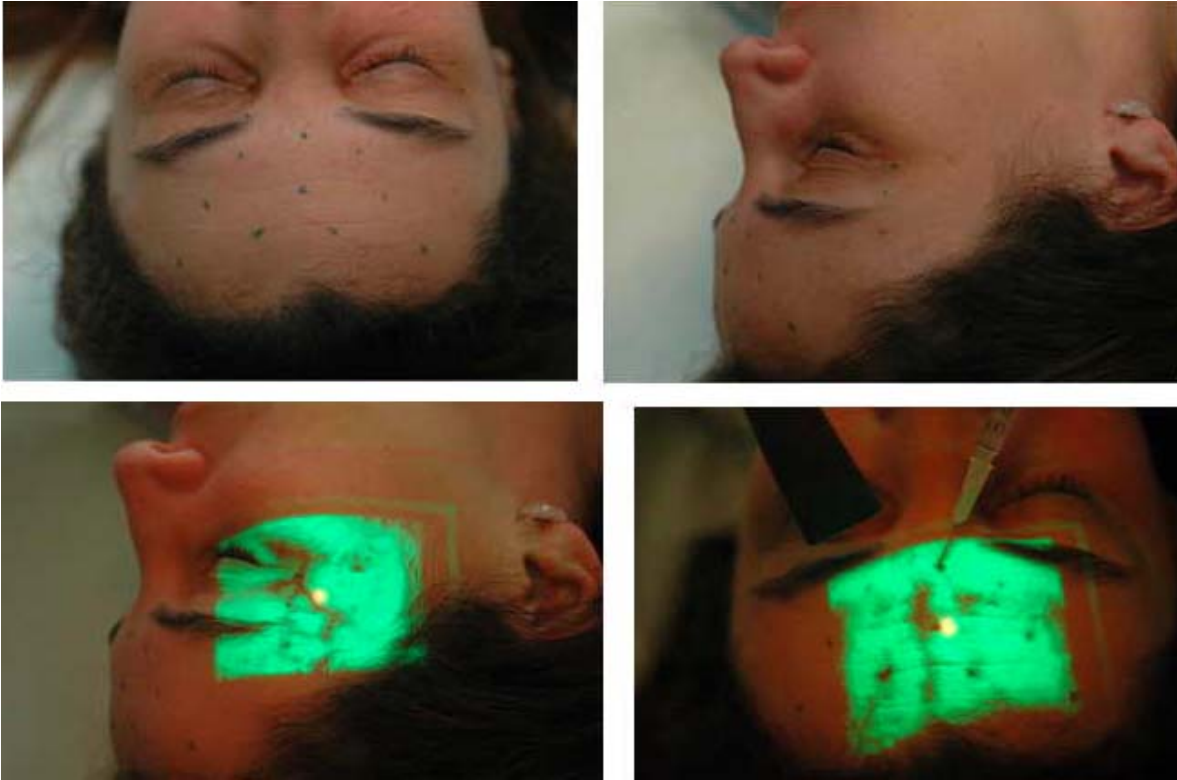
To attempt to avoid hematoma during botulinum treatment, a prototype subcutaneous vein imaging device called VeinViewer (VV) was tested<sup>12</sup> (Figure 1). The VV operates by illuminating the subject's skin with, near infrared (NIR) light. This NIR light penetrates skin and subcutaneous fat

effectively because of the low absorption of these tissues in the NIR wavelength range. NIR light is absorbed or scattered in the forward direction by blood while it is scattered in all directions in skin and subcutaneous fat. Hence, blood reproduces as dark, while skin and fat appear lighter. The image reflected back from the subject is detected with a video camera. An IR filter prevents any visible light from reaching the video camera. The resulting NIR image is processed by a computer, and then projected back onto the subject's skin with a projector using green light

## ***METHOD***

A 38 year old female patient was selected for this study. 18 pen marks were made on her face to indicate where the botulinum toxin should be injected to have the desired therapeutic effect. For the botulinum toxin study, the VV image was projected onto those parts of the patient's face where the botulinum injections were to occur to see if any of the injection locations were on top of any veins. Each mark was examined with the VV to see if it overlay a subcutaneous vein and there might be a danger of hematoma (figure 4). Of the 18 marks, 7 (39%) did not overlay any vein, 3 (17%) appeared to be near a vein, and 8 (44%) overlay the VV image of a vein. Using a 30G1/2 needle, the product was injected, avoiding vessels shown by the VV. (Figure 5). The patient was photographed before and 2 days after the procedure, and incidence of hematoma was analyzed. An air forced cooling device (Cryo 5) was used during the procedure in order to reduce injection pain<sup>13</sup>. This effect is obtained by a flow of air cooled up to -20 degrees Celsius directly on the skin.

FIGURE 6 – 2 days after injection, showing hematoma



## **RESULTS**

The VV vein image is generally somewhat wider than the actual vein due to light scatter in the patient's skin and subcutaneous fat. Hence, a mark that overlays the VV image might still lead to an injection that misses the actual vein. However, if the mark is exactly in the middle of the VV vein image, then the likelihood of the injection hitting a vein is high. For this study, only one of the marks was clearly right in the middle of the VV vein image. Since the 18 pen marks had been made to ensure a symmetrical result, all injections were made exactly in the middle of the each mark. Only

the mark that was seen to be exactly in the middle of a VV vein image lead to a hematoma upon injection. This hematoma was completely and spontaneously absorbed four days after the injection. The other 7 marks that were over a VV vein image but not exactly in the middle of the image did not lead to a hematoma upon injection. (figure 6).

## ***DISCUSSION***

Botulinum toxin injection is one of the most common aesthetic procedures, often performed on an ambulatory basis, and incidence of complications is rare. However, when an event such as hematoma occurs, the aesthetic aspect of the procedure is somewhat impaired. Similarly, due to the small amount of the product that is injected, if one of the injections is done in a vessel, the effect of the toxin is lost on that point, though systemic effects do not occur. Considering maximum effectiveness and minimum risk of hematomas, the VV enhances the accuracy of the procedure, by generating clear images of the superficial vessels of the face. The points of injection can be adapted in order to avoid vessels, and increase effectiveness and safety.

In plastic surgery, the knowledge of the location of these small vessels, mainly on the face, could reduce some common problems during surgery. For instance, for local anesthesia of the eyelids, sometimes a small vessel is injured, and hematoma occurs. In these cases, hemostasia becomes more difficult, and precision of surgery is impaired, because of the hematoma itself. The VV could be used to avoid hematoma during local anesthesia for eyelids, maybe improving immediate results of the surgery.

Other cosmetic procedures, such as hyaluronic acid and polymethylmethacrylate (PMMA) implants can be improved on the same way by using the VV.

## **CONCLUSIONS**

The VV is an adjunctive method for increasing the safety of the application of botulinum toxin to the face, probably reducing the incidence of hematomas, and enhancing the effectiveness of the procedure, avoiding the waste of any botulinum toxin to a vessel. Ambulatory aesthetic procedures should be safe and effective, and become an alternative, even temporary, to a conventional plastic surgery. Considering that, technological improvements like the VV and Cryo 5 can reduce patient discomfort, and enhance safety and precision of the procedures. Other uses for VeinViewer in plastic surgery should be studied.

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