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Botulinum Toxin Therapy for Rapid Pain Relief and Sensation Restoration in the Occipital Region After Hair Transplant Surgery: A Modified Technique

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ABSTRACT

Botulinum toxin traditionally has been used to manage rhytides by blocking the presynaptic acetylcholine release at the neuromuscular junction. Based on the author's experience, however, botulinum toxin may also help relieve post-operative pain when injected into the occipital donor incision after follicular unit transplantation (FUT). The technique was first written about in 2020 and is highlighted as a notable article in this issue of the *Forum*. Additionally, it has since been included in various textbooks, with updates appearing in 2022 and 2023.[1-4]

The original technique involved injecting at specific points of pain along the incision, which later evolved to include injecting along the entire suture line. The current method, however, now focuses on injecting at five key points to provide immediate pain relief. This updated technique differs significantly from previous methods outlined in earlier publications, as it not only aims to reduce post-operative pain but also includes additional goals, such as restoring sensation.

This article will recount the evolution of the technique, its successes and limitations, as well as new methodology, objectives, and results.

Keywords: botulinum toxin, hair transplant, neuroma, occipital nerve, pain

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USING BOTULINUM TOXIN FOR PAIN REDUCTION

The journey of developing this technique started nearly 20 years ago following the successful use of botulinum toxin injection to immediately alleviate intractable pain post-operatively in a face-lift patient. The pain was in the region of the great auricular nerve in the postauricular area, which must have been inadvertently ensnared with tissue-suspension sutures during the rhytidectomy procedure. A variety of interventions were tried, including lidocaine, bupivacaine, and steroid injections, but nothing worked long term and the pain returned within hours. Looking for a solution short of removing the offending face-lift sutures, I chose to inject botulinum toxin into the great auricular nerve, and the patient noted an immediate cessation of pain, which never returned.

The immediate effect was perplexing. It is widely recognized that botulinum toxin generally takes several days to become effective, as it binds to the neuromuscular junction and prevents the release of the acetylcholine neurotransmitter.[5] A thorough review of the literature failed to find an adequate explanation.

Expanding Use to Occipital Neuralgia Treatment

A few years later, I tested another potential use of botulinum toxin after encountering several patients who had undergone follicular unit transplantation (FUT) surgery at other clinics and were experiencing long-term occipital neuralgia without relief. These patients experienced significant pain even from the lightest touch or a gentle breeze near the affected nerve and had difficulty sleeping due to the sensitivity of their scalp. I administered a few units of botulinum toxin into the painful areas, and although the pain was promptly alleviated, it returned a few months later.

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The procedure was repeated with the same level of success each time. After 3-5 rounds of treatment, the pain permanently ceased, with no patient reporting any lasting neuroma-engendered pain, though patients still noted some permanent anesthesia. More recently, a patient who suffered from a long-term, incapacitating great auricular neuroma from a face lift performed elsewhere presented to the clinic. After two rounds of botulinum toxin injected into the distribution of the nerve branch, the patient experienced complete elimination of pain and full resolution of sensation to the great auricular nerve.

In cases where the nerve is truly severed, such as in the above examples of post-FUT neuromas, the pain can be extinguished, but sensation will most likely not return. For example, a patient with chronic occipital neuritis of unknown etiology came for a follicular unit excision (FUE) procedure. A day prior to the procedure, I injected the occipital nerve along its entire distribution of tenderness. Additionally, I made sure to avoid harvesting hairs located over the nerve. The patient post-operatively reported no exacerbation of his pain but also noted long-term resolution of his neuritis.

After a similar finding of immediate pain relief, I started to use this technique with my FUT patients. Fortunately, the vast majority of these patients report little pain thanks to the generous use of intra-operative tumescent fluid and very meticulous donor harvesting that avoids damaging the underlying neurovascular architecture. However, in approximately 20% of my patients, there is some level of mild achiness following a strip procedure. Even in these cases where the discomfort level is minor or negligible, patients still benefited from this treatment.

Insights on FUE Procedures

In my experience, FUE does not cause any noticeable discomfort, so I have found no significant benefit in using this technique on my FUE patients. However, for the patient who may experience some discomfort following FUE, I predict that using the botulinum toxin technique would achieve a similar result of immediate pain relief in the post-operative period, especially given that there is less associated nerve disruption. I would encourage my colleagues who encounter patients with post-operative FUE pain to try botulinum toxin injections and report their experience with it. As a note, I did attempt to use botulinum toxin to treat a patient's insensate scalp, but it was ineffective.

I believe the frequency of discomfort following FUE is most likely due to the minimal use of tumescence during surgery. When there is a lack of tumescent fluid, the punch can irritate nearby nerves as it approaches the neurovascular structures. To mitigate this, I use a generous amount of tumescence at the beginning of the FUE case and then continue to inject it repeatedly as I proceed throughout the harvest.

Additionally, the surgeon may be inserting the punch too far from the base of the follicle during the harvesting process, which can lead to nerve irritation or damage. An experienced FUE surgeon knows that a noticeable loss of pressure is felt when the punch releases the dermis/arrector pili, indicating the correct depth of punch penetration. The punch should not go beyond this depth. Regardless of whether the FUT or FUE technique is used, in my experience, using botulinum toxin can instantly alleviate pain.

ENHANCING THE TECHNIQUE

In my original reporting on this technique, I described a method that involved injecting along the FUT donor incision line to eliminate pain. At first, I focused only on the specific points of pain that the patient complained of, using regular cosmetic-strength botulinum toxin and injecting approximately 0.1ml (equivalent to 2.5 units of Botox®; Allergan, Irvine, California, USA) of a 4ml initial dilution into each painful area. Occasionally, patients would report more diffuse pain along the entire suture line, leading me to use a more diluted toxin. To my surprise, I found that this approach still provided the same immediate pain relief, even at more diluted doses.

Five-Point Injection Strategy

In the past year, I have modified my technique so that the botulinum toxin is now injected into five distinct areas inferior to the incision line. I have found that this facilitates a more rapid injection and results in less pain for the patient during the injection process. The five injection areas are the following: centrally in the palpable and rounded depression inferior to the superior nuchal ridge and medial to the trapezius muscles, paramedian bilaterally in a similar dip below the nuchal ridge inferolateral to the midline depression situated between the trapezius and sternocleidomastoid muscles, and bilaterally on the central mastoid bony prominence behind both ears (Figures 1 to 3). To note, the needle is aimed slightly upward where the nuchal ridge slopes inward into the depression, that is, at the upper recess of the depression where the depression joins the prominence of the nuchal ridge.

FIGURE 1. This occipital-view schematic illustration shows the five points where dilute botulinum toxin is injected to manage post-operative discomfort: centrally in the depression below the superior nuchal ridge between the trapezius muscles, paramedian bilaterally in a similar dip below the nuchal ridge infero-laterally between the trapezius and sternocleidomastoid muscles, and bilaterally on the central mastoid prominence behind both ears. Of note, the blue boxes indicate the five major points, and the red x's indicate the multiple injection points within each region to ensure adequate injection of the affected nerve branch.

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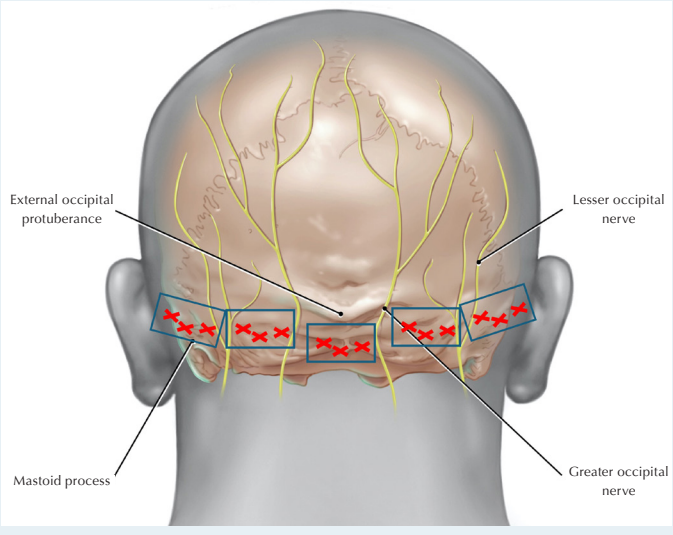

FIGURE 2: Patient one day following FUT surgery with the donor incision visible running horizontally above the injection site just at and above the nuchal ridge. The three fingers (middle and flanking fingers) are shown pressed into the three depressions (described in Figure 1) with an injection of botulinum toxin being performed in the central depression. Of note, the injection is being performed at the inner lip of the upper edge of the depression before it arches outward toward the superior nuchal ridge protuberance. Several injections of small doses of botulinum toxin are injected into the superior aspect of each circular depression.

What do these points anatomically signify? It is hypothesized that these points align with the origin of the occipital nerves. If the main nerve branches can be blocked, it may be possible to achieve more significant results with fewer injections. This approach could lead to quicker procedures for the physician, reduced patient discomfort during the injections, and a lower amount of botulinum toxin needed to achieve the same, if not better, results.

Of note, the injection process may cause a greater degree of neurological discomfort at the injection site during the procedure, possibly due to the irritation of the neurovascular bundles; however, this discomfort does not linger after the injection. This experience is greater than what would typically be expected from the needle's penetration of the skin alone.

FIGURE 3: Injection of botulinum toxin into the left mastoid bony prominence immediately behind the postauricular sulcus. The height of the bony prominence is situated approximately 2-3cm behind the postauricular sulcus and correlates with a palpable mound of bone. This point corresponds with the lateral points described in Figure 1.

The amount of botulinum toxin can be very dilute, and the results are the same no matter which brand is used. I prefer Xeomin® (Merz, Frankfurt, Germany) only because it is more cost-effective compared with other brands. To start, I dilute the vial with 4ml of saline (the same dilution I use for cosmetic purposes). Next, I fill a 1ml syringe with 0.1ml of that mixture and fill the remainder with 0.9ml of plain saline. This final dose translates into a total of 2.5 units per 1 milliliter of fluid: of note, Xeomin and Botox have equivalent unit dosing. Usually, this 1ml mixture is sufficient to treat the entire occipital area. I use a 32g, ¼-inch needle outfitted on a 1ml syringe. I use only 0.05ml (about 0.1 units of toxin) per injection site, with several injections (approximately 3-4) of these small doses placed into each of the five points shown in the figures. In Figure 1, the blue boxes represent the five key points, and the red x's indicate the individual injections. Typically, targeting these five areas is sufficient to manage the pain effectively.

There is, on rare occasions, some residual discomfort in specific areas of the incision. To resolve any remaining pain, including pain that does not fall along the donor incision line but superior or inferior to it, additional small doses can be injected in the exact location that the patient is indicating. Typically, a little bit of the 1ml mixture is held in reserve for this; if not, a second 1ml syringe can be created.

With this five-point method, needing a third syringe of diluted toxin is incredibly rare. The remarkable aspect of this treatment is that not only does the patient experience immediate results, but the treatment is usually permanent so no further sessions will be needed. In rare cases, when residual areas reveal discomfort a day or so later—even up to a week later, they can be easily injected again. As exemplified in the patients who had long-term neuromas present at the clinic, I have found this treatment beneficial in any patient with sensory/pain issues, even years or decades after the inciting event. It is important to note that botulinum toxin injections given during the surgery were made to see if the same outcomes as those achieved with post-operative injections could be obtained. These attempts, however, were unsuccessful.

DISCUSSION

In the past, only a small number of FUT strip patients received treatment at the clinic, as most experienced little discomfort. In one case, a patient reported some mild discomfort on one side, so we decided to administer the remaining 1ml of botulinum toxin to the painless side. When asked about his condition bilaterally, the patient noted an interesting change: despite having no initial complaints, he experienced increased sensation with less numbness and tension on the treated side. Since then, I have made it a standard practice to inject all patients bilaterally—in all five targeted areas—following FUT surgery. I have consistently observed improvements in numbness and sensations of tightness; patients often report that the occipital region feels "healthier," a somewhat vague but positive descriptor. Many have indicated they feel better overall, experiencing less tightness, less aching, reduced pain, increased sensation, and diminished numbness. In contrast, my FUE patients have not shown any measurable improvement, likely due to factors related to the FUE harvesting techniques discussed earlier.

How does botulinum toxin not block a nerve or muscle but instead heal and release a nerve to function better? The exact mechanism is not well understood. However, it has been reported in the literature that some migraine sufferers can experience immediate improvement in symptoms following botulinum toxin therapy. Although the proposed

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mechanism remains speculative, it has been surmised that "onabotulinum toxin A also reduces the number of ion channel receptors in sensory nerve membranes; these include transient receptor potential cation channel subfamily V member 1, transient receptor potential cation channel subfamily A member 1, and P2X3—receptors that are unregulated due to sensory afferent neuron activation that characterize migraine."[6,7] Additionally, botulinum toxin has been reported to be effective for treating neuropathic pain,[8,9] and has recently been explored for its potential in neural,[10,11] motor,[12] and tissue[13] regeneration. Despite these preliminary studies—many of which are based on animal models—to my knowledge there is currently no published evidence to suggest that botulinum toxin can improve nerve sensation or significantly improve neural integrity with immediate results.

I hope that by sharing my findings, readers will consider implementing this novel treatment in all of their FUT patients, and in select FUE patients when necessary, to further refine and enhance this technique. The goal is to make the post-operative experience of hair transplantation nearly, if not entirely, painless for every patient, while also promoting improved neural regeneration in FUT patients. This includes improved sensation and reduced tension that may rival—but so far not equal—the benefits seen in FUE. It is also speculated that these treatments could improve wound healing and, ultimately, FUT donor-scar cosmesis. However, any improvement in FUE scar pigmentation remains unlikely due to the inherent differences in techniques. Ultimately, further studies and clinical observations are needed to validate this hypothesis.

References

1. Lam SM, Botulinum toxin therapy for acute and chronic pain in hair transplant surgery. *Hair Transplant Forum Int'l.* 2020;30(2):50-51.
2. Carman T. The Notable Articles Project. *Hair Transplant Forum Int'l.* 2025;35(2):46-48.
3. Lam SM, Williams KW, eds. FUE, 2nd Edition. Jaypee Medical Publishers, New Delhi, India, 2022.
4. Lam SM. Hair Transplant 101. Quality Medical Publishing: St. Louis, MO, 2023.
5. Alouf E, Murphy T, Alouf G. Botulinum toxin type A: evaluation of onset and satisfaction. *Plast Surg Nurs.* 2019;39(4):148-156.
6. Turkel CC, et al. Treatment of chronic migraine with Botox (onabotulinumtoxinA): development, insights, and impact. *Medicine.* 2023;102(S1):S59.
7. Brin MF, Burstein R. Botox (onabotulinumtoxinA) mechanism of action. *Medicine.* 2023;102(S1):e32372.
8. Park JH, Park HJ. Botulinum toxin for the treatment of neuropathic pain. *Toxins* (Basel). 2017; 24:9(9):260.
9. Matak I, et al. Mechanisms of botulinum toxin type A action on pain. *Toxins* (Basel). 2019;11(8):459.
10. Hwang S, et al. Comparison of the effects of botulinum toxin doses on nerve regeneration in rats with experimentally induced sciatic nerve injury. *Toxins* 2023;15(12):691.
11. Luvisetto S. Botulinum toxin and neuronal regeneration after traumatic injury of central and peripheral nervous system. *Toxins* (Basel). 2020;12(7):434.
12. Franz CK, et al. Botulinum toxin conditioning enhances motor axon regeneration in mouse and human preclinical models. *Neurorehabil Neural Repair.* 2018;32(8):735-745.
13. Guo XZ, et al. Application of botulinum toxin A in tissue repair and regeneration. *Toxicon.* 2024;252:108172. ■