

Topical Anesthesia in the Reduction of Pain Perception in Cosmetic Injections

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In 2017 in the United States, over 7.2 million treatments were performed utilizing botulinum toxin type A injections.¹ These types of procedures, whether for medical or cosmetic reasons, involve multiple needle sticks that can range in pain from mild to severe based on a patient's personal tolerance or anxiety. Treatments with botulinum toxin type A are frequently repeated at 3 to 4-month intervals to maintain any benefits that have been achieved. Patients presenting for cosmetic treatments typically demand a higher level of service that entails not only personal attention, but maximum comfort. Multiple methods have been employed to decrease patient discomfort or possible anxiety that can be associated with injections. Several pain reduction methods, such as pinching or rubbing the skin near the site of needle puncture have been used and are based on the gate theory of pain control.² In this theory, from the work of Melzack and Wall, activation of non-nociceptive fibers with non-noxious stimuli interferes with the signals to pain fibers thereby reducing pain perception.³ Other methods of pain reduction during cosmetic injections that have been utilized include the placement of cold, lidocaine-prilocaine creams or gels, and vibration topically to the skin prior to any injections. Each method has its advantages and disadvantages as well as degree of success. Patients may be happy with the end results of their treatment but can become reluctant to return for additional treatments secondary to pain experienced during the injections.⁴

PATIENTS AND METHODS

This randomized study was performed under institution review board approval and informed consent was obtained prior to enrollment. Subjects were composed of patients that presented for treatment of their lateral canthus with botulinum toxin type A. 45 subjects total were enrolled in the study in the age range from 30 to 66, including both male and female patients. None of those enrolled were naïve to cosmetic injections. Subjects were randomized into 1 of 3 anesthesia groups utilizing either cold gel packs, lidocaine-prilocaine (15/5mg) gel, or vibration. The side to receive anesthesia was also randomized and the patient was their own control with no anesthesia administered on the contralateral side. 32g TSK needles were used for all injections and immediately following injection of each side, a Visual Analog Scale was completed by the subject to assess the level of pain that was perceived. The pain scale ranged from no pain to worst possible pain experienced. A 5-day take home diary to assess any pain, bruising, or swelling that may have resulted from the treatment was also given to the subject to complete. The 5th and final day of the diary included an additional question. The subject was to answer that if the type of anesthesia received on the day of treatment was available on future visits, would they wish to receive it again.

Cold

A 6cm x 12cm gel pack from Coldstar International, Inc. (Fig. 1) was utilized for cold application as its small size conformed to the lateral eye region with ease facilitating good contact. This cold gel pack was placed directly on the skin for a contact time of 15 seconds.

Lidocaine-prilocaine gel

A compounded mixture of 15% mg/mL lidocaine with 5% mg/mL prilocaine was utilized. The skin was prepped with alcohol prior to placement and the gel remained on the skin without occlusion for 15 minutes prior to treatment.

Vibration

A handheld facial massager from Beauty Bar (Fig. 2) was utilized and placed approximately 2.5cm away from the injection sites just prior to insertion of the needle. Vibration

was discontinued upon the withdrawal of the needle from the last injection point in the treatment region.

Statistical Analysis

Statistical analysis was performed in R, version 3.3.2. Summary statistics were run for the data set with a two-way ANOVA being utilized as the method of analysis. A Kruskal-Wallis test and Tukey Multiple Comparison test were also performed.

RESULTS

The ANOVA without interaction showed a significant effect of both the anesthesia group ($p=0.007$) and treatment ($p<0.001$). The Tukey Multiple Comparison test supported that there was a difference between lidocaine-prilocaine and cold with the associated p -value= 0.023. Vibration and cold also showed similar significance. The ANOVA summary showed a strong significance difference between treatment and control. The Interaction Plot (Fig. 3) demonstrates that for each level of anesthesia group, the pain scale is higher for the control group versus the treatment group. The analysis supports the hypothesis that treatment with anesthesia significantly reduces pain with little difference between the lidocaine-prilocaine and vibration group being noted.

Patient Diaries

41 of 45 subject diaries were returned with cold representing 86.6%, lidocaine-prilocaine gel 86.6% and vibration 100% of data returned. Subject response to future use of anesthesia utilized in each randomization group represented a total of 66.7% positive response. This favorability represented 66.7% for cold anesthesia, 53.3% for lidocaine-prilocaine and 80% for vibration. No severe response for bruising, swelling or pain was reported for either treatment or control group. Mild bruising for both treatment and control were reported with the average amount of duration equating to 2.5 days.

DISCUSSION

This study examined the utilization of topical anesthesia for pain reduction during cosmetic injections. Three methods are most commonly used in practice to date; however, the method chosen by a practitioner is on personal preference rather than a method that has been more closely examined for efficacy. Topical anesthesia has been reviewed in the past with one or two methods being examined at a time. This study compared three methods that included cold anesthesia with gel packs, topical anesthesia with a lidocaine-prilocaine gel and vibration with a handheld facial massager.

In aesthetic treatments the comfort of the patient is paramount. In recent years to decrease any discomfort associated with botulinum toxin type A injections, the use of smaller needles such as 32g or even 33g have replaced 30g needles that were common practice. To increase comfort while decreasing any possible ecchymosis cold application has been a common preferred method. To achieve good anesthesia however, one must determine the length of application time that is appropriate. Reported times in the literature have varied from 20 seconds to 5 minutes prior to injections.^{5, 6, 7} Types of cold anesthesia have included ice, cold gel packs, as well as vapocoolant sprays. Ice and cold gel packs are quick and easy to utilize with ice being the easiest and cheapest material.⁸ Ice, however, can be difficult to use as it can melt quickly and requires placement in gauze, gloves or bags prior to use. Cold gel packs while more convenient are more of a financial investment. Their appeal is that they are easy to use and can be recycled. A further appeal is that it can also function as advertising material when practice logos and

information is imprinted on the gel pack and taken by the patients. Vapocoolant sprays have been effectively used in orthopedic procedures and with children but are more difficult to use when cosmetic injections of the face are involved as care must be taken to avoid irritation of the eyes.^{9, 10} Topical anesthesia such as those that use topical lidocaine, or lidocaine combinations such as betacaine-lidocaine-tetracaine (BLT) or lidocaine-prilocaine creams and gels have long been popular. Eutectic mixture of local anesthetics (EMLA), a 5% mixture composed of 2.5% mg/mL lidocaine and 2.5% mg/mL prilocaine, is an oil-in-water emulsion cream has been effective in providing dermal anesthesia for various procedures such as venipuncture and lasers.¹¹ The disadvantage of EMLA however is its need for occlusion and long contact time of up to 1 hour for desired effect. This time constraint makes it less than ideal for use in a busy practice. Prolonged contact of topical lidocaine-based gels and creams also has the potential of causing blanching, erythema, or pruritus which is less than ideal for those patients that are seeking “lunchtime treatments” and require minimal to no evidence of having had a procedure performed. 4% lidocaine has been utilized and studied for its use in injections with success and the benefit of contact time of ½ hour for efficacy.¹² Vibration which has been used as a distraction mechanism to reduce pain in many procedures such as dental injections, laser treatments and facial injections, has been reported on.¹³⁻¹⁴ Vibration devices for injections have the benefit of easy use, quick application resulting in less wait time for both the patient and provider. These devices are relatively inexpensive and thereby can decrease any disposable costs in cosmetic treatments.¹⁵

CONCLUSIONS

Patients seeking cosmetic treatment with botulinum toxin type A have many choices of providers and facilities today. Treating needle phobia and anxiety as well as providing a warm and comforting environment is essential to establish a loyal and happy patient. Utilizing topical anesthesia is an effective method that can help achieve this goal. Cold application, while not as effective in reducing pain perception in this study, does have the benefit of potentially reducing any resultant ecchymosis and is quick and convenient to use. Topical numbing gel consisting of lidocaine and prilocaine, which tested with great favor, does increase appointment contact time as well as possible treatment costs. Higher strength lidocaine and prilocaine dosing, as used in this study, can significantly shorten wait times to treatment yet provide satisfactory pain reduction. Vibration, which also scored high with patients on pain scales and on diaries, is a quick effective method to increase comfort during treatments. The combining of therapies, if not all three that were examined, may create the happiest patients and warrants further investigation.

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Figure 1



Figure 2

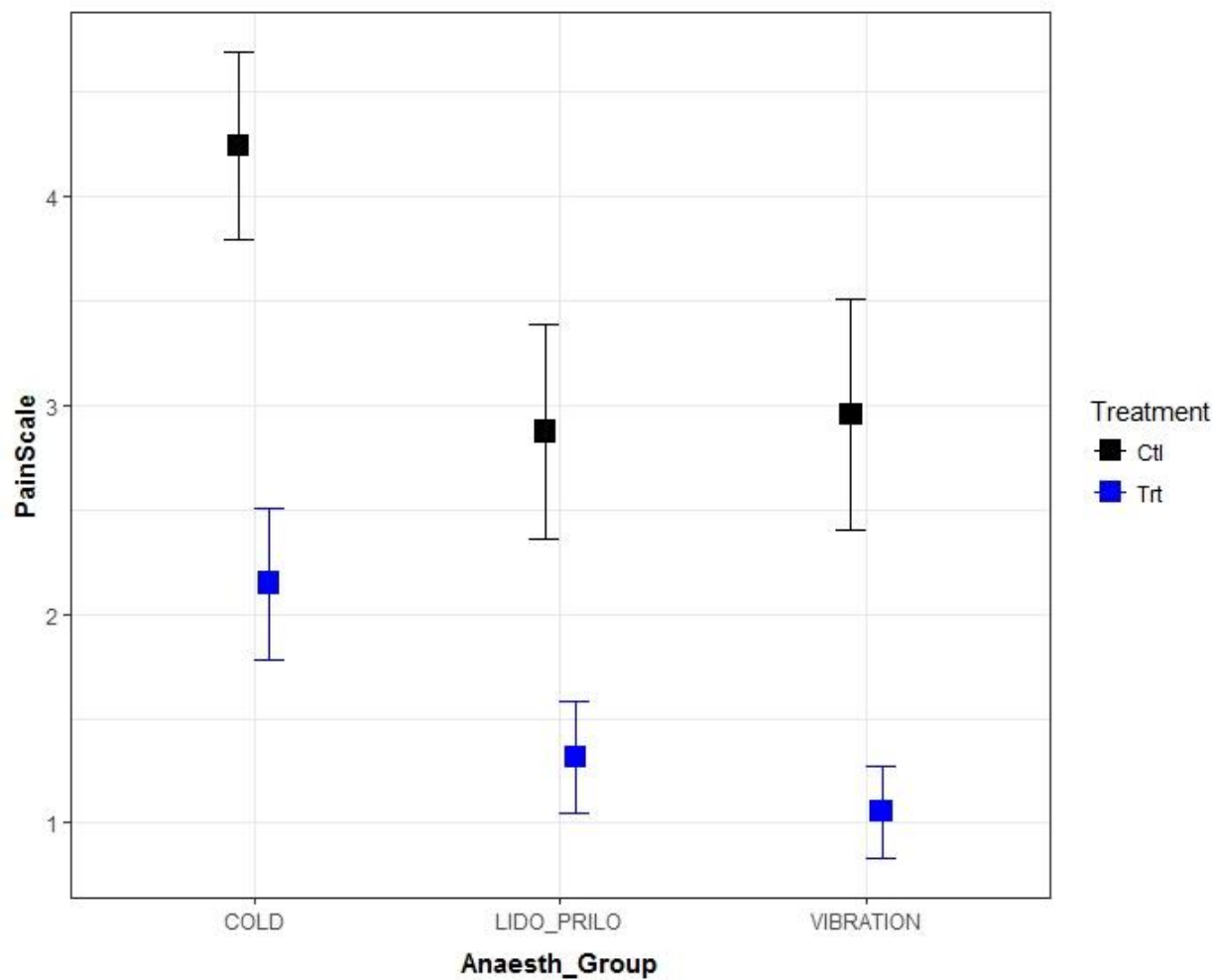


Figure 3