

# Effect of Nerve Ring Block Anesthesia on Lip Edema after Dermal Filler Injection

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## Abstract

**Background and Aim:** Due to the good intraoperative environment and its advantages such as rapid recovery, fewer side effects, long-term analgesia into the postoperative period, earlier discharge and reduced costs, regional nerve ring block is an alternative to other anesthetic techniques for procedures to be applied in the lips. In this study, we aimed to determine the effects of nerve ring block anesthesia on lip edema after dermal filler injection.

**Materials and Methods:** From January 2017 to June 2018, 72 patients who were presented to a plastic surgery clinic desiring filler treatment for lip augmentation were enrolled. Subjects were divided as group A in patients who underwent regional nerve ring block anesthesia and topical anesthetic procedure before the procedure, and group B in patients who underwent only topical anesthetic procedure without regional nerve ring block anesthesia. The severity and duration of edema and the effect of lip augmentation procedure after the different local anesthetic applications were evaluated in both groups.

**Results:** We observed that the severity of edema was less and the transient edema was resolved in a shorter time in group A where regional nerve ring block anesthesia and topical anesthetic procedure were performed as a pre-treatment.

**Conclusion:** We believe that regional nerve ring block administration before the lip filler procedure may have an impact to reduce the edema occurred in the treatment area due to local anesthetic's anti-inflammatory effects and neural therapy properties. However, further studies are needed in this respect.

**Key Words:** Nerve block, lip augmentation, edema

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## INTRODUCTION

Structures such as soft tissue, bony skeleton, fat and skin are affected by the aging process of the face. The fleshy appearance of the lip, which is one of the focal points of the beauty on the face, symbolizes youth. It is thought that the face acquires an aged appearance due to the change of these structures over time.<sup>1,2</sup>

The idealized understanding of beauty, which has come to the fore with the influence of popular culture in recent years, has led to the desire of full lips by people of all ages.<sup>3</sup> The desire for well-defined and full lips, as seen today on many celebrities, has led to the emergence of alternatives such as fillers, biomaterials, implants and different pro-

cedures for lip augmentation procedures. In this sense, choosing the right procedure is extremely important for an effective, safe and natural result.<sup>3,4</sup>

Fillers, one of the most used materials in lip augmentation procedures today, are divided into various properties such as temporary-permanent and biological-synthetic e.g. HA fillers have become increasingly popular worldwide and they are the most studied filling material to date.<sup>4,6</sup>

Lip augmentation is usually performed under local anesthesia in outpatient conditions. Different treatment modalities are used to minimize the pain experienced during the procedure. Topical anesthetic application or regional blockade of the infraorbital and mental nerves are among the most commonly used methods.<sup>7-9</sup>

Topical anesthesia is the most commonly used method to prepare the injection site and to reduce the pain to be felt during the procedure. Topical anesthetic uses in different formulations and concentrations are available in the literature and clinical practice. Some studies have shown that the use of topical anesthetics does not show a statistical difference in efficacy when compared with placebo or other methods. After the application, the waiting time is long, the risk of systemic toxicity is relatively higher, and there is a risk of the anesthetic substance spreading outside the injection site. Side effects such as erythema, ecchymosis and bleaching may also develop. Edema is quite common shortly after the treatment, due to both the material used and the anesthetic agent applied to the area. After two weeks, most patients have residual edema. Complete resolution of edema may take months.<sup>10-14</sup>

Regional nerve ring block is another alternative for procedures to be applied in the face area. We especially recommend it to be used in areas such as lips where local infiltration is not possible or where it may cause distortion. It provides a good intraoperative environment and have advantages such as rapid recovery, fewer side effects, long-term analgesia into the postoperative period, earlier discharge and reduced costs. It also requires less anesthetic drug and lower cost to produce the desired effect compared to local infiltration. It is superior to the procedures to be applied in the facial area, especially the lips and around, as they cause less tissue swelling in the surgical area compared to alternatives. They are technically easy to perform, safe and provided good intraoperative condition. The primary target for upper lip ring block is the distal portion of the inferior branch of the infraorbital nerve and the primary target of lower lip ring block is the distal mental nerve and it is quite safe and technically easy to implement.<sup>15-17</sup>

In this study, we would like to present our results of the evaluation of 72 patients who underwent lip augmentation with and without regional nerve ring block of the infraorbital and mental nerves. The severity and duration of edema and the effect of lip augmentation procedure after the different local anesthetic applications were evaluated in both groups.

## MATERIAL AND METHODS

From January 2017 to June 2018, 72 patients who presented to a plastic surgery office desiring filler treatment for lip augmentation were enrolled in the study. Inclusion criteria consisted of healthy Caucasian women 21 years or older who had not received any previous filler injections. Subjects were excluded if they had any conditions contraindicating hyaluronic acid filler or underwent previous treatments that may impact the effect of the filler. The principles outlined in the Declaration of Helsinki have been followed and conducted in compliance with good clinical practice. All subjects gave written informed consent to participate.

Subjects were divided as group A in patients who underwent regional nerve ring block and topical anesthetic procedure before the procedure, and group B in patients who underwent only topical anesthetic procedure without regional nerve ring block. Each group included 36 patients.

The perioral area was cleansed with the same antiseptic octenidine dihydrochloride in both groups. As a topical anesthetic, eutectic mixture of local anesthetics (Emla®, Sato Pharmaceutical Co. Ltd., Tokyo, Japan) containing 5% lidocaine and prilocaine was used in both groups. Then, bilaterally infraorbital and mental nerve ring block were performed intraorally with 2 cc prilocaine hydrochloride (Citanest) to group A before filler injection (Figure 1). Only topical anesthetic was applied to group B.

Once the patients were sufficiently anesthetized, the Hyaluronic acid at a concentration of 20 mg/mL with 0.3% (3 mg/mL) lidocaine (YVOIRE Volume Plus®, LG Chem), that was approved by the Ministry of Food and Drug Safety (MFDS), was used in both groups. It was administered in the clinical setting in accordance with the standard operating procedure for the administration. All patients were received a filling application of 0.6 ml to the upper lip and 0.4 ml to the lower lip. The application was done by the same plastic surgeon with the same technique and a standard 30-gauge needle in both groups.

All patients were evaluated before the treatment, and followed up at 1st, 2nd, 3rd, 4th days, 1st and 4th weeks after the injection. Standardized AP, lateral and both oblique views were taken of each subject before and after filler injection at the initial treatment visit and at the subsequent follow-up visits. Clinical photographs were obtained using

consistent patient positioning, camera settings and room lighting. Photographs of subjects were then saved to a computer drive in random order.

The increase of volume and fullness values of the upper lips of all patients were retrospectively evaluated in both groups. The evaluation was carried out using the validated 9-grade photographic lip volume / thickness scale as first introduced in Rossi's study.<sup>18</sup> Baseline and post-treatment photographs were randomly displayed, and assessed by three independent plastic surgeons who were masked to the study protocol.

The results were scored according to the clinically designated 9 different grading levels (i.e. 5 primary grades with 4 explicit half-points in between). Mean values of their scorings were obtained and taken into consideration in the study.

The severity and duration of edema following the lip augmentation procedure using different local anesthetic applications were evaluated in both groups.

## RESULTS

Of the 72 patients enrolled in the study, 68 patients completed the study and 2 patients from each group were lost to follow-up. All patients were caucasian female, ranging in age from 21 to 45 years (mean: 27). No touch-up was performed on any patients until the 6th week.

According to Rossi's scale, in regional nerve ring block group (group A), 0.6 ml filler was applied to the upper lip in 34 patients with a mean baseline grade level of 1.3 in the upper lip thickness. Average grading levels during the next six follow-ups were determined as 1st day:2.2, 2nd day:2.3, 3rd day:2, 4th day:1.8, 1st week:1.8, 4th week:1.8 (Table 1). An average of 0.5 grading level total thickening was achieved in the upper lip at the sixth follow-up. Therefore, regarding the evaluation of transient reactive edema, it was observed that the edema was the most severe on the 2nd day, and completely disappeared on the 4th day's follow up.

In only topical anesthetic group (group B), 0.6 ml filler was applied to the upper lip in 34 patients with a mean baseline grade level of 1.5 in the upper lip thickness. Average grading levels during the next six follow-ups were determined as 1st day: 2.9, 2nd day:2.9, 3rd day:2.7 4th day:2.4 1st week:2, 4th week:2 (Table 1). An average of 0.5 grading level total thickening was achieved in the upper lip. Therefore, regarding the evaluation of transient reactive edema, it was observed that the edema average was the most severe on the 1st day, and completely disappeared in the 1st week's follow-up (Table 1).

The average grading level change of groups A and B from maximum to minimum during follow ups are 0.5 and 0.9, respectively.

Permanent volume increase and fullness values of upper lips obtained in both groups did not show any significant difference at the 4th week, where transient reactive edema was assumed to be completely resolved. But it was also revealed that the reactive edema was less severe and disappeared in a shorter time in patients who undergone regional nerve ring block and topical anesthetics before injection (group A) than in patients who undergone only topical anesthetics (group B).

## DISCUSSION

Topical anesthetics are often used with dermal filler procedures due to their ease of application. Even if they are used topically for facial procedures such as EMLA solution, they also may be performed with employing regional blocks to avoid from pain-related discomfort.<sup>7</sup>

Nerve blocks have been successfully utilized for a variety of applications. With this method, lips can be profoundly anesthetized by using minimal anesthetic agent with minimal or no distortion of the treatment area. Traditionally, nerve blocks, such as the infraorbital nerve ring block and mental nerve ring block, have been used to anesthetize lips for dermal filler treatments.<sup>7,15-17</sup>

Not only there may have immediate and early-onset complications due to dermal filler applications on lips but there also could be delayed adverse effects at the injection site.

Some transient swelling in the immediate post-procedural period is normal and occurs with all dermal fillers, but may vary in timing and severity depending on the various factors. Besides injection volume and technique, patient factors such as dermatographism, may also influence the amount of swelling. Thereby some authors suggest prophylaxis and treatment upon delayed swelling/edema cases after the injection. These include anti-inflammatory drug and enzyme therapy, NSAIDs, gels and lymphatic massage on mild or moderate cases and steroid treatments on severe cases.<sup>11</sup>

Local anesthetics are potent inhibitors of inflammation induced edema formation in a variety of conditions. Decreased histamine release from macrophages, inhibition of LTB<sub>4</sub>, cytokines and oxidant release from activated gran-

ulocytes, increased prostacyclin synthesis and inhibition of endothelial cytoskeleton can be counted among the effects of local anesthetics on inflammation-induced capillary hyperpermeability.<sup>19</sup>

Neural therapy, is a term for the diagnostic and therapeutic use of local anesthetics.<sup>20</sup>

Since the discovery of LA, for over a century, it is a well-known fact that local anesthetics have variety of therapeutic properties along with its perioperative effects. Even if neural therapy generally aims to chronic pain or disorder management, it is also used for acute or subacute conditions in some circumstances. It is considered to be a regulatory therapy in which local anesthetics are injected in defined regions of the body.<sup>21,22</sup> Anti-inflammatory and autonomous system resetting properties, restoration of lymphatic flow in order to reduce the localized edema and pain-relieving effects of neural therapy practiced for over a century are frequently mentioned in the literature. Neural therapy extinguishes peripheral irritational stimuli, thus reducing stresses in various tissues, and facilitates the successful application of other treatment techniques.<sup>20,22,23</sup>

There may have some complications and adverse reactions due to the local anesthetic usage, though. These are mostly rare, but include failure to effectivity, allergy and hypersensitivity reactions, methemoglobinemia, tissue injury, systemic toxicity reactions such as neurotoxicity, cardiac toxicity generally due to excessive local anesthetic dose along with other secondary reactions related to the adjuvants as epinephrine used during the administration.<sup>9,24,25</sup>

## CONCLUSION

In this study, we observed that the severity of edema was less and the transient edema was resolved in a shorter time in group A where regional nerve ring block anesthesia were performed as a pretreatment. In conclusion, based on our observations and the results of this study along with the literature, we believe that regional nerve ring block administration before the procedure may have an impact to reduce the edema occurred in the treatment area due to local anesthetic's anti-inflammatory effects and neural therapy properties. However, further studies are needed in this respect.

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## TABLES

Table 1. Baseline and follow-up mean grading levels of the patients

	Mean grading levels of Group A (n:34)	Mean grading levels of Group B (n:34)
Baseline	1.3	1.5
1st day follow-up	2.2	2.9
2nd day follow-up	2.3	2.9
3rd day follow-up	2	2.7
4th day follow-up	1.8	2.4
1st week follow-up	1.8	2
4th week follow-up	1.8	2

FIGURES

**Figure 1.** Intraoral injection sites of ring block anesthesia for distal portions of infraorbital (a) and mental (b) nerve innervations .

