

# Myomodulation with HA fillers: a novel non-surgical therapy for facial paralysis

## Abstract

Hyaluronic fillers are commonly used for filling static wrinkles and lines and restoring volume in specific regions of the face. In recent years, another function has been observed, namely influencing muscle balance and elasticity of facial muscles. Depending on the method of injecting the hyaluronic filler, the activity of a specific muscle group can be strengthened or weakened. Myomodulation can be considered an innovative method for treating patients with facial nerve paralysis. Currently, there is a lack of literature data on this method for treating paralysis patients, and there is scant information on myomodulation with hyaluronic fillers. For this reason, this clinical case aims to present an alternative method for treating a patient with facial nerve paralysis using the myomodulatory action of hyaluronic fillers. Following a detailed history and clinical assessment of the case, a plan was made for injecting hyaluronic fillers, considering the different anatomical zones, muscle locations, and injection depths. As a result, a more balanced and aesthetic appearance was achieved by reducing the activity of compensatory hyperactive muscles and improving the overall condition of facial muscles and structure both in motion and at rest. It can be proposed that myomodulation with hyaluronic fillers is an effective way to treat patients with facial nerve paralysis, as unlike surgical treatment methods, it has a short recovery period and provides long-lasting and satisfactory results, thus improving the quality of life for these patients. However, further studies and investigations are required to improve the quality of life of patients with facial paralysis treated with hyaluronic fillers, as well as to determine the exact mechanism of action of the technique.

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## Introduction

Facial nerve paralysis is caused by denervation of the facial muscles, including the peri-orbital and peri-oral muscles, leading to facial expression deformation, and the inability to raise the eyebrow or close the eyelids. The manifestation of facial paralysis encompasses various static and dynamic expressions of facial asymmetry. Facial paralysis can have various etiologies - congenital, idiopathic, or iatrogenic because of various conditions such as parotid gland tumor, brain tumor, neurofibromatosis, trauma, etc., with Bell's palsy being the most common cause of facial paralysis.<sup>1</sup> The cosmetic and functional consequences of facial paralysis significantly affect the quality of life of patients with facial paralysis.<sup>2</sup> Various surgical methods have been introduced for facial paralysis reconstruction. Adams performed regional muscle transfer to restore a paralyzed face,<sup>3</sup> followed by other surgeons introducing transfers of m. gracilis, segments of m. latissimus dorsi, or pectoralis minor.<sup>4</sup>

In addition to affecting motor function, these patients also experience increased asymmetry due to soft tissue relaxation on the paralyzed side, as well as their atrophy resulting in volume loss. Facial paralysis is a clinical challenge and affects the quality of life of patients. Currently, more and more studies are being conducted to improve the condition with non-operative methods due to the faster recovery period and higher patient satisfaction. Various authors report on treating patients with facial paralysis by injecting botulinum toxin,<sup>5,6</sup> using dermal threads,<sup>7,8</sup> as well as injecting hyaluronic acid. Initially, hyaluronic acid was used as a mechanical weight to treat patients with lagophthalmos.<sup>9</sup>

At present, in addition to improving volume loss and facial contouring with hyaluronic fillers, we also observe their myomodulatory action, first mentioned by Mauricio de Maio.<sup>10</sup> Mechanical myomodulation

is based on placing hyaluronic fillers under or above facial muscles to strengthen or weaken their activity.<sup>10,11</sup> The filler acts as a support point recreating the convexity and elasticity of the muscle, thereby enhancing its activity. When we want to weaken the muscle activity, we place the filler above the muscle at the subcutaneous level or inject it directly into it, thereby creating a mechanical block, after the product spreads into the muscle fibers. The application of hyaluronic fillers is a quick procedure, relatively painless, and is mainly associated with rare, self-limiting, and reversible side effects.<sup>12</sup>

Despite the large number of publications related to the application of hyaluronic fillers in aesthetics, articles on their application in patients with facial paralysis are lacking. Several authors have studied the improvement in quality of life for facial paralysis patients treated with fillers, with an average injected volume of 2.3 ml, focusing primarily on the nasolabial folds, lips, and cheeks.<sup>13,14</sup> In this article, we describe and propose a therapeutic approach using hyaluronic acid (HA) fillers aimed at myomodulation for the treatment of patients with facial paralysis. For more than 5 years, the first author has been applying myomodulation with fillers in their practice. The goal of this study is to demonstrate that applying a consistent therapeutic approach to patients with facial paralysis can achieve reproducible and predictable results. To date, we are not aware of any other multicenter study that examines the reproducibility of results with the application of a single therapeutic approach by different injectors and assesses the quality of life of patients over a 12-month period.

## Methods

A total of 27 patients were prospectively involved in the research from April 2021 to March 2024. All patients were followed for a period of at least 12 months after the procedure. The inclusion criteria for participants in the study are as follows: patients over

18 years of age with complete facial paralysis of varying etiology and duration. Exclusion criteria are pregnancy, breastfeeding, prior injection treatments, presence of active inflammation, or mental illness. All patients provided signed informed consent and were informed in advance about the benefits and potential side effects that may occur during and after the procedure. Microsoft Excel 365 was utilized to create descriptive statistics and summary tables. The data were processed using the statistical software package IBM SPSS for Windows, version 20.0.

Quality of life questionnaires were completed before the procedure and 4 weeks after the procedure. All side effects were recorded.

Patients were treated at three centers—two in Bulgaria and one in Poland—by different injectors. Fillers using VYCROSS™ technology with different G prime were used depending on the treated area. All patients were treated using the proposed by the main author therapeutic approach.

The proposed therapeutic approach for patients with facial paralysis aims the two sides of the face to be treated differently, with deep injections under the muscles on the paralyzed side. The goal is to create a mechanical lever to strengthen muscle activity and restore soft tissue atrophy. On the hyperkinetic side, superficial injections should be made above the muscles at the subcutaneous level to create a mechanical barrier and thus weaken muscle activity. The main steps that each injector followed are:

#### Treatment steps:

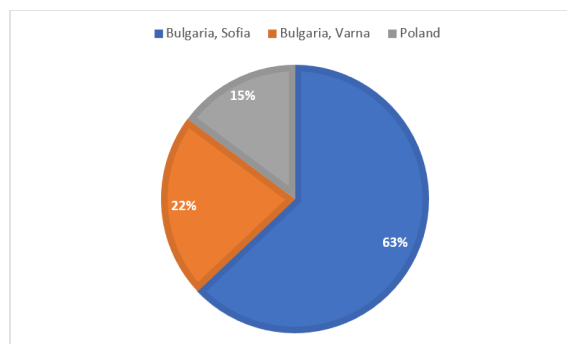
- 1) Thorough skin antisepsis
- 2) To provide structural support, at least 0.5ml of filler with high G' (Voluma™) to be injected through a 27G needle at a supraperiosteal level in the temporal area on the affected/paralytic side
- 3) On the affected/paralytic side, several boluses of high G' Ha filler (Voluma™) should be injected deep under zygomaticus major and minor muscles on the zygomatic arch at the insertion points of the muscles. The injection layer should be supraperiosteal. The total amount of volume should be at least 0.7ml
- 4) On the unaffected side, a cannula and a fanning technique to be used. A total amount of at least 0.7 ml of 20 mg/ml hyaluronic acid filler (Voluma™) should be administered superficially to zygomaticus major and minor.
- 5) With a cannula deep to levator alaeque nasi, levator labii superioris, and zygomaticus minor, a total amount of 1.0 ml of 20mg/ml filler (Voluma™) should be injected through a fanning technique to activate the muscles on the paralytic side.
- 6) On the unaffected side, 0.5ml (Volift™) should be administered with a cannula superficial to the lip levator muscles.
- 7) In the lower lateral cheek on the unaffected side of the face, 1.0 ml of filler (Voluma™) should be injected with a cannula superficial to the superficial musculoaponeurotic system to lift the skin for structural support.
- 8) On the unaffected nasolabial fold, 0.7 ml (Volift™) of filler should be injected linearly superficially with a cannula, and 0.3 ml (Voluma™) of filler should be injected deep into the piriform fossa.
- 9) A total amount of 1.0 ml of 17.5mg/ml (Volift™) hyaluronic acid filler should be injected periorally with a cannula.

10) To affect the activity of the mentalis and depressor labii inferioris, a cannula should be used, and 20mg/ml filler (Voluma™) should be administered into the subcutaneous layer or intramuscularly.

All patients were prescribed medications for faster recovery after the procedure – 200-400 mg of bromelain.

## Results

Twenty-seven patients were included in the study. No patients dropped out, and all were followed for a period of 12 months. Eighteen of the patients were women, and nine were men. The youngest patient is 37-year-old woman and the oldest is 59 years old woman. All patients were treated according to the therapeutic plan proposed by the lead author and described. Sixty-three percent of the patients were treated in Sofia, Bulgaria, 22% in Varna, Bulgaria, and 15% in Poland (Figure 1).

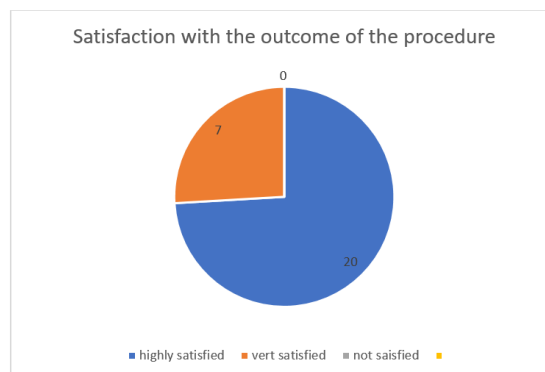


**Figure 1** Distribution of patients according to the center where they were treated.

All patients were examined one day after the procedure, and side effects were recorded on the first day and two weeks after the procedure. No long-term side effects were reported in any patient. The most common complaints were related to the injection procedure and included bruising (64%), swelling (35%), discomfort (32%), and soreness (21%), which were recorded on the first day after the procedure. These complaints decreased two weeks after the procedure, with only 4 patients reporting mild to moderate discomfort.

The patients were treated with an average amount of hyaluronic fillers per patient of 16.4 ml. 73% of the used hyaluronic fillers were high G prime fillers – Voluma™, followed by Volift™, Volbella™ and Volux™ (Juvederm, Allergan, Inc.). The main injection technique was with cannula – 92% and the rest 8% was performed with needle.

All patients reported that they were very satisfied with the outcome form the procedure and would undergo it again (Figure 2).



**Figure 2** Satisfaction rate regarding the outcome of the procedure.

All patients reported that their quality of life had significantly improved compared to before the procedure. One month after the procedure, patients noted an improvement in their self-assessment of their appearance and reported feeling more at ease in social settings and among close ones. 43% of patients reported feeling more confident in new social activities and events compared to before the procedure. 90% of patients reported feeling more at ease when meeting new people one month after the procedure.

## Case presentation

In clinical case 1, we present a patient with facial paralysis. The therapeutic plan is based on the principle proposed by the main author for treating patients with facial paralysis using hyaluronic fillers, relying on the myomodulatory effect of the fillers. By adhering to the described basic rules, predictable and repeatable results are achieved in terms of improving facial asymmetry in patients with facial paralysis.

### Clinical case 1

A 46-year-old woman from Varna, Bulgaria, underwent brain tumor surgery twice several years ago. After the first surgery, she developed facial paralysis on the right side. The only treatment applied related to facial paralysis was ocular manipulations on the anterior ocular surface to treat lagophthalmos.

The clinical assessment of the patient before the placement of hyaluronic fillers (Figure 3) shows a classic picture of facial paralysis on the right side:



**Figure 3** Patient with facial paralysis before treatment.

What was observed before the treatment was a flat forehead with no wrinkles in the affected area and inability to raise the eyebrow. In the peri-orbital zone a lagophthalmos, laxity of the lower eyelid, asymmetry or downward orientation of the marginal arcus, disappearance of wrinkles in the area, as well as ocular manifestations such as conjunctivitis, exposure keratopathy, and tearing, for which she underwent treatment with amniotic membrane suturing on the anterior ocular surface and therapeutic contact lens placement several times. Involvement of the activity of *m. orbicularis oris* was observed, leading to oral incompetence and deviation of the oral commissure towards the hyperkinetic side. Relaxation of the soft tissues on the paralyzed side and more pronounced nasolabial fold on the left. Atrophy of the soft tissues on the affected side and looseness of the skin was noticeable before the treatment.

After a detailed analysis of the activity of the facial muscles, a detailed therapeutic plan was developed strictly following the main principle of action for patients with facial paralysis as proposed by the main author. The two sides of the face were treated differently, with deep injections under the muscles on the paralyzed right side. The goal

was to create a mechanical lever to strengthen muscle activity and restore soft tissue atrophy. On the hyperkinetic left side, superficial injections were made above the muscles at the subcutaneous level to create a mechanical barrier and thus weaken muscle activity. Hyaluronic fillers with a concentration of 20 mg/ml were used.

Following the injections, the patient experienced a noticeable improvement in facial symmetry and function (Figure 4). The hyaluronic fillers helped to restore volume, reduce asymmetry, and improve the overall aesthetic appearance of the face. Additionally, the myomodulatory effect of the fillers led to enhanced muscle balance and function.



**Figure 4** Patient with facial paralysis before and 1 month after treatment.

### Clinical case 2



**Figure 5** Patient with facial paralysis before and immediately after treatment with HA fillers.

### Clinical case 3



**Figure 6** Patient with facial paralysis before and 1 month after treatment with HA fillers.

### Discussion

The consequences that patients with facial paralysis experience are clinically debilitating. Their quality of life is significantly impaired and worsened. Surgical treatment methods are difficult and expensive. Hyaluronic acid fillers are widely used for rejuvenation and beautification and have a high safety profile.<sup>15</sup> Patients recover quickly and see immediate results in their facial structure, both in dynamic and static states, along with an improvement in facial asymmetry. They report a significant improvement in their quality of life. These are results that have also been observed in studies by other authors. Lui et al. reported measurable improvements in multiple psychosocial domains in patients with facial paralysis treated with fillers,<sup>14</sup> conclusions that we have also observed.

In 2018, Mauricio de Maio published a thesis on myomodulation with hyaluronic acid fillers, which is based on placing the filler beneath or above a muscle group, thereby enhancing or weakening the activity of a particular muscle group.<sup>11</sup> Based on this thesis and his experience, the lead author proposes a method for treating patients with facial paralysis.

The results of the study demonstrated that myomodulation with hyaluronic fillers can effectively improve muscle balance and function in patients with facial paralysis. By strategically injecting fillers to strengthen or weaken specific muscle groups, a more balanced and aesthetic appearance was achieved, highlighting the potential of this technique as a treatment option for facial nerve paralysis.

The high satisfaction rates reported by patients in terms of aesthetic outcomes and improved quality of life following the procedure underscore the positive impact of myomodulation with hyaluronic fillers. Patients noted improvements in self-assessment, social interactions, and confidence levels, indicating the significant psychological benefits of this treatment approach.

One of the key advantages of myomodulation with hyaluronic fillers is its minimally invasive nature, which results in a short recovery

period for patients. Unlike surgical interventions, this technique offers a quicker recovery time and minimal side effects, making it a desirable option for individuals seeking facial paralysis treatment.

While the results of the study are promising, further research and investigations are necessary to validate the long-term efficacy and safety of myomodulation with hyaluronic fillers for facial paralysis. Additional studies can help refine the treatment approach, optimize injection techniques, and enhance patient outcomes.

The successful application of myomodulation with hyaluronic fillers in treating facial paralysis opens new possibilities for non-operative methods in facial reconstruction. This technique has the potential to revolutionize the field of facial aesthetics and provide innovative solutions for patients with facial nerve paralysis. Future research should focus on expanding the use of hyaluronic fillers in facial paralysis treatment and exploring its broader applications in facial rejuvenation. Further investigations including electromyograms to have a measurable and scientific explanation to what we observe and clinically reproduce.

### Conclusion

Treatment with hyaluronic acid fillers presents a promising alternative method for treating patients with facial nerve paralysis. The myomodulatory action of hyaluronic fillers has been shown to improve muscle balance and function, leading to enhanced aesthetic outcomes and overall quality of life for patients with facial paralysis. The clinical case presented in the article demonstrated reproducible and predictable results in improving facial asymmetry and restoring soft tissue volume. Additionally, the short recovery period and high patient satisfaction rates further support the effectiveness of myomodulation with hyaluronic fillers as a minimally invasive treatment option for facial paralysis. However, further research and studies are needed to fully understand the mechanism of action and optimize the treatment approach for patients with facial nerve paralysis. Overall, myomodulation with hyaluronic fillers holds promise as an innovative and effective method for addressing the cosmetic and functional consequences of facial paralysis.

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### Conflict of interest

All authors are trainers and speakers for Allergan.

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### References

- Hohman MH, Hadlock TA. Etiology, diagnosis, and management of facial palsy: 2000 patients at a facial nerve center. *Laryngoscope*. 2014;124(7):E283–E293.
- Tavares-Brito J, van Veen MM, Dusseldorp JR, et al. Facial palsy-specific quality of life in 920 patients: correlation with clinician-graded severity and predicting factors. *Laryngoscope*. 2019;129(1):100–104.
- ADAMS WM. The use of the masseter, temporalis and frontalis muscles in the correction of facial paralysis. *Plast Reconstr Surg (1946)*. 1946;1:216–228.
- Chen S, Chen HC, Tang YB. Integrated approaches for reconstruction of facial paralysis. *Ann Plast Surg*. 2023;90(5S Suppl 2):S165–S171.

5. de Maio M, Bento RF. Botulinum toxin in facial palsy: an effective treatment for contralateral hyperkinesis. *Plast Reconstr Surg.* 2007;120(4):917–927.
6. Cooper L, Lui M, Nduka C. Botulinum toxin treatment for facial palsy: a systematic review. *J Plast Reconstr Aesthet Surg.* 2017;70(6):833–841.
7. Choe WJ, Kim HD, Han BH, et al. Thread lifting: a minimally invasive surgical technique for long-standing facial paralysis. *HNO.* 2017;65(11):910–915.
8. Costan VV, Popescu E, Sulea D, et al. A new indication for barbed threads: static reanimation of the paralyzed face. *J Oral Maxillofac Surg.* 2018;76(3):639–645.
9. Mancini R, Taban M, Lowinger A, et al. Use of hyaluronic Acid gel in the management of paralytic lagophthalmos: the hyaluronic Acid gel “gold weight”. *Ophthalmic Plast Reconstr Surg.* 2009 Jan-Feb;25(1):23–26.
10. de Maio M. Myomodulation with injectable fillers: an update. *Aesthetic Plast Surg.* 2020;44(4):1317–1319.
11. de Maio M. Myomodulation with injectable fillers: an innovative approach to addressing facial muscle movement. *Aesthetic Plast Surg.* 2018;42(3):798–814.
12. Colon J, Mirkin S, Hardigan P, et al. Adverse events reported from hyaluronic acid dermal filler injections to the facial region: a systematic review and meta-analysis. *Cureus.* 2023;15(4):e38286.
13. Occhiogrosso J, Derakhshan A, Hadlock TA, et al. Dermal filler treatment improves psychosocial well-being in facial paralysis patients. *Facial Plast Surg Aesthet Med.* 2020.
14. Liu RH, Yau J, Derakhshan A, et al. Facial filler in facial paralysis: a prospective case study and multidimensional assessment. *Facial Plast Surg Aesthet Med.* 2024;26(4):426–430.
15. Goodman GJ, Liew S, Callan P, et al. Facial aesthetic injections in clinical practice: Pretreatment and posttreatment consensus recommendations to minimise adverse outcomes. *Australas J Dermatol.* 2020;61(3):217–225.