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Original article

Chin imperfections: our experience with botulinum toxin A

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Abstract. The chin is a highly complex structure from an anatomical and functional point of view, and the imperfections that arise are difficult to treat. We propose an innovative, infiltrative technique to correct the dimpling of the chin using botulinum toxin. The outcome of this procedure produced minimal side effects and optimal aesthetic results. The study consisted of 12 patients who were photographed before and after administering the botulinum toxin, and were asked to assess their degree of satisfaction of the final results. The satisfaction score was relatively high considering 100% of the patients reported as an adverse effect the loss of expressiveness, and each knew that they would have to repeat the procedure for a continued result.

Key words: Chin, botulinum, wrinkles

Introduction

The chin is defined by the labiomental crease (upper), the oral commissures (laterally), and the submental cervical crease (lower). The contour of the chin is defined by the bony structure and the overlying soft-tissue elements including the skin, fibrofatty tissue pad and muscles[1,2].

The dimpling of the chin and the "orange peel" appearance are aesthetic alterations that are difficult to correct. These characteristics give the skin an old, tired appearance and reduce the brightness of the face. The pitted appearance of the skin on the chin is not due to structural changes of the skin itself (such as scars, comedones, etc.), but is caused by the hypertrophy of the underlying muscles.

The contraction of hyperactive muscles can cause dimples, making the chin appear bumpy. This overactivity, in most people, is due to a normal aging process. After years of repetitive movements, the skin over the chin starts to wrinkle and can develop lots of thin cross-hatched lines known as a cobblestone chin or orange peel (peau d'orange) chin. The mentalis muscle becomes even more hyperactive due to the change in the bony platform underneath (bone reabsorption) and a deep groove appears between the chin and the mouth which is called the mental crease. The muscles in the chin become increasingly hyperactive due to these changes and over time the lines become deeper and more difficult to treat.

During the aging process of the face there is a progressive thinning of the subcutaneous fat with a consequent adhesion of the deep dermis to the underlying muscles, unlike thick younger skin.

From an anatomical point of view, under the cutaneous plane, the various planes of the chin are the orbicularis oris muscle, the mentalis muscle and the depressor anguli oris muscle.

The mentalis muscle is situated under the orbicularis oris muscle. Adjacent to this muscle is the depressor anguli oris muscle, originating from the chin protuberance of the mandible and is inserted with its muscle fibers into the soft tissue of the chin. It is innervered by the mandibular branch of the facial nerve and its functions are to elevate the chin and evert the lower lip. This movement can cause surface irregularities and dimpling of the area in proximity of the depressor labii inferioris muscles.

The depressor anguli oris muscle originates in the tubercle of the mandible, it leads upwards at the center of the orbicularis oris muscle and it inserts itself in the soft tissue of the upper lip. Its function is to depress the corner of the mouth. It is innervated, like the mentalis muscle, by the mandibular branch of the facial nerve and it works with the mentalis muscle to move the lower lip in a downward direction[3].

Knowledge of the topographical anatomy of this region is essential to understand how this type of aesthetically unpleasant condition of the skin is generated, and how it can be corrected.

The treatment of the chin with botulinum toxin, also known as neuromodulators, can influence the facial shape by affecting the position of the lower lip and smoothing out the appearance of the labiomandibular sulcus[4]. Neuromodulators also improve the appearance of dimpling by reducing the muscular contraction[5].

The authors have gained a great deal of experience in the use of botulinum toxin in various fields (treatment of headache, wrinkling of the upper third of the face, trismus and sialorrhea) and would like to give their contribution in the treatment of chin wrinkling using a personal and innovative technique of infiltration of botulinum toxin type A through a scheme (grid) that facilitates a safe administration[6].

We hypothesized this treatment could improve our patients' appearance. The patients were advised of the side effects, such as 100% loss of lower lip expression and temporary aesthetic results, yet they still chose to undergo the procedure and were satisfied of the results.

Materials and Methods

We evaluated a case series of patients before and after intervention in a private plastic surgery practice from 18/01/2019 al 14/02/2022.

Because this case series was conducted in a private institution and not an academic center, no institutional review board oversight occurred. The study design, implementation, data collection and analysis were performed in accordance with the World Medical Association Declaration of Helsinki[7]. The data collection and analysis had no bearing on patient intervention or outcomes. All the patients provided written informed consent for the use of their photographs for data and research purposes before the procedure.

The inclusion criteria consisted of patients with an undesirable appearance of the chin, because of the hyperactive, high-riding mentalis muscle that contributed to a blunted chin contour. No exclusion criteria were determined. The control group included patients with an undesirable appearance of the chin, who therefore had indications for this treatment, but decided not to undergo the procedure (24/36).

All the patients included in the study also underwent other aesthetic treatments such as a facelift, injection of hyaluronic acid, injection of botulinum in the upper third of the face (dark circles, ptosis, frown wrinkles, lateral canthal rhytids) and laser treatments.

We measured and collected discomfort levels by asking the patients what grade of pain was felt during the procedure using a visual analogue scale. We also measured the grade of satisfaction using a FACE-Q questionnaire[8–11].

The candidates were advised of surgical (chin implantation, metaplastic surgery) and nonsurgical treatment options and were specifically informed that the injection of botulinum toxin A is an off-label procedure[12]. The patients who chose to receive the botulinum toxin A injection were asked if they would be willing to participate in the study and those who agreed (12/36) provided appropriate consent prior to the injection.

Pre-injection photographs were taken at the start of the procedure. Patients were injected with a total of 15 UI of botulinum toxin A using a 0,5 ml syringe with a 30 G needle; each infiltration had 2,5 UI (that corresponds at 0,0125 ml) botulinum toxin A. A botulinum toxin A that is currently commonly used for aesthetic facial treatments was used.

The chin surface was divided into twelve areas by drawing a series of horizontal and vertical lines prior to the injection. Three parallel lines were drawn horizontally, noting that the first line should never go through the upper limit of the chin, and subsequently five perpendicular lines to the already drawn horizontal lines beginning from left to right, dividing the area in twelve cells of equal dimensions (Figure 1). The administration was done in a staggered manner

Figure 1. Left, side view of preoperative marking; Right, frontal view of preoperative marking.

for each cell; first on the top lefthand of the quadrant, then the next cell at the bottom righthand and so on[13].

A topical lidocaine-based anesthetic was applied on the treatment area one hour prior to the procedure and cleansed before the administration of the procedure with a non-alcoholic disinfectant. After the initial numbing of the face, the area was marked and the botulinum toxin A, that was refrigerated until its use, was prepared. The injected solution contained 50 UI of botulinum toxin A which was diluted with 1,1 ml of a physiological solution. The solution was injected with a 0,5 ml syringe using a 30 G needle. It is important to note that the solution administered was injected in proximity of the marked area, not directly on the marked area, to avoid tattooing the skin. Upon completion of the treatment an antibiotic cream (gentamicin) was applied and left to rest on the treated area for 10 minutes. After ten minutes the patient was able wipe the antibiotic cream off with a gauze and be dismissed. The only recommendation given to the patient was to not expose the treated area to sources of heat for 48 hours. The first results were seen 72h after administration and optimal results were noted after 9 days. The treatment lasted approximately 90-120 days. Three follow-up visits with the patients were done after 10 days, 2 weeks, and 4 weeks from administration. Post-injection photographs were taken at these follow-up visits, and the patients were asked to complete a survey on their degree of satisfaction, and were asked if they experienced any functional complications with the procedure.

Results

Of the 36 patients who were asked to participate, 12 (33%) enrolled. After each enrolled patient was interviewed, their written informed consent was documented. The patients who declined did so for several reasons such as: a lack of interest, discomfort with being photographed, or simply because they weren't able to return for any follow-ups.

The twelve patients included in this study were all women, with an average age of 42 years (range 32-51) with a body mass index (BMI) of 25,4 kg/m^2. Concerning their medical history: one patient had diabetes, 2 patients had hypertension and the others (83%) had no relevant medical history. Moreover, the patient with diabetes was treated with oral hypoglycemic agents, and the patients with hypertension were treated with beta-blockers. It was also noted that 58% of our patients regularly took vitamins and other food supplements such as zinc, iron, and other holistic medications.

All the patients included in the study had previously received other aesthetic treatments. One had a thread lift, another had rhinoplasty surgery, two had lip filler injections and, all of them had injections of botulinum in the upper third of the face (dark circles, ptosis, frown wrinkles, lateral canthal rhytids) and laser treatments.

Figure 2a-b. Before and after injection at 40 days view

Patients demonstrated an improved appearance of the chin contour on profile, with an overall more rounded, not blunted contour (Figure 2a-b).

Dimpling and bunching were also significantly reduced on frontal view (Figure 3a-b).

The effects faded after approximately three and a half months in all patients.

All the patients (100%) reported the loss of expressiveness of the lower lip, which was noticed on the fourth day after administration and was at its peak on the eighth day post injection. This adverse effect began to diminish after the eighth day. No other adverse effects such as pain, bruising, redness, swelling, weakness of the lower lip or functional complications were recorded. Six patients returned for a second administration of the full-face treatment, and one patient just for the chin. No patients returned for a third administration and the main reason given was due to their economic inability to continue with more treatments. Other reasons focused on personal matters or logistics (relocating).

Discussion and Conclusions

The aesthetic appearance of the chin is multifactorial and related to the bony and soft tissue anatomy. Traditionally, chin dimples and contour have been

Figure 3a-b. Before and after injection at 40 days view

modified by altering the bony projection with surgical procedures and with the use of fillers.

A subset of patients who display a hyperactive, high-riding mentalis muscle and feel unsatisfied with their appearance have benefitted from Botulinum toxin A injections. This treatment has been used safely and effectively in the chin for multiple indications, alone or in combination with dermal fillers (chin rhytids, rejuvenation of the chin and lower face and in neurologic conditions such as lower hemifacial spasm and hereditary essential chin myoclonus)[14–16].

In this case series, we proposed an innovative infiltrative technique to correct the dimples of the chin using botulinum toxin, that minimized side effects and provided optimal results. A photographic analysis showed significant improvement of the chin surface and contour. Each patient was asked for their grade of satisfaction by a FACE-Q questionnaire and the results scored high. They all perceived improvements in facial appearance, post-injection patients reported a 34% increase in symmetry, 39% increase in freshness, 11% increase in appearance of profile, 30% increase in appearance in photos and 16% increase in appearance when waking up.

Injection with botulinum toxin A into the mentalis had the expected result of relaxing the muscle, and improving the rounded contour seen at a frontal view. This technique can be used in combination with filler injections or botulinum toxin injections in the upper third of the face, as the procedures complement each other.

Botulinum toxin A is effective at improving chin aesthetics by influencing the shape, the position of the lower lip, smoothing the labiomandibular sulcus and removing wrinkles. All the patients were highly satisfied, although none underwent a third administration. All the patients experienced the same adverse effects, consisting in the loss of expressiveness of the lower lip which diminished with time.

This report is, to our knowledge, the first analysis of treating the dimpling caused by the contraction of the mentalis muscle using the botulinum toxin A injection and the scheme of administration as reported above.

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References

1. Chen B, Ma L, Wang J. Chin Augmentation With Hyaluronic Acid: An Injection Technique Based on Anatomical Morphology. Dermatol Surg. 2022; 48(7):747-751.
2. D'Souza A, Chew Lip Ng. Applied Anatomy for Botulinum Toxin Injection in Cosmetic Interventions. Current Otorhinolaryngology Reports. 2020; 8:336-343.
3. Schuenke, M. S. E. S. U. Prometheus: Atlante di Anatomia. (2019).
4. Hsu AK, Frankel AS. Modification of Chin Projection and Aesthetics With OnabotulinumtoxinA Injection. JAMA Facial Plast Surg. 2017; 19(6):522–527.
5. Gart MS, Gutowski KA. Aesthetic Uses of Neuromodulators. Plastic Reconstr Surg. 2015; 136(5 Suppl):62S-71S.
6. Corradino B, Di Lorenzo S, Mossuto C, Costa RP, Moschella F. Botulinum toxin in preparation of oral cavity for microsurgical reconstruction. Acta Otolaryngol. 2010; 130(1):156-160.
7. World Medical Association. World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. JAMA. 2013; 310(20):2191–2194.
8. Klassen AF, Cano SJ, Scott A, Snell L, Pusic AL. Measuring patient-reported outcomes in facial aesthetic patients: development of the FACE-Q. Facial Plast Surg. 2010; 26(24):303–9.
9. Ascher B, Rzany B, Kestemont P, et al. Significantly Increased Patient Satisfaction Following Liquid Formulation AbobotulinumtoxinA Treatment in Glabellar Lines: FACE-Q Outcomes From a Phase 3 Clinical Trial. Aesthet Surg J. 2020; 40(9):1000-1008.
10. Chang BL, Wilson AJ, Taglienti AJ, Chang CS, Folsom N, Percec I. Patient Perceived Benefit in Facial Aesthetic Procedures: FACE-Q as a Tool to Study Botulinum Toxin Injection Outcomes. Aesthet Surg J. 2016; 36(7):810–20.
11. Klassen AF, Cano SJ, Schwitzer JA, Scott AM, Pusic AL. FACE-Q scales for health-related quality of life, early life impact, satisfaction with outcomes, and decision to have treatment: development and validation. Plast Reconstr Surg. 2015; 135(2):375–386.
12. Ascher B, Talarico S, Cassuto D, et al. International consensus recommendations on the aesthetic usage of botulinum toxin type A (Speywood Unit) - part II: wrinkles on the middle and lower face, neck and chest. J Eur Acad Dermatol Venereol. 2010; 24(11):1285–1295.
13. de Maio M, Wu WTL, Goodman GJ, Monheit G, Alliance for the Future of Aesthetics Consensus Committee.

Facial Assessment and Injection Guide for Botulinum Toxin and Injectable Hyaluronic Acid Fillers: Focus on the Lower Face. Plast Reconstr Surg. 2017; 140(3):393e–404e.
14. Beer K, Yohn M, Closter J. A double-blinded, placebo-controlled study of Botox for the treatment of subjects with chin rhytids. J Drugs Dermatol. 2005; 4(4):417–22.
15. Lorentz I. Treatment of hemifacial spasm with botulinum toxin. J Clin Neurosci. 1995; 2(2):132–135.
16. Devetag Chalaupka F, Bartholini F, Mandich G, Turro M. Two new families with hereditary essential chin myoclonus: clinical features, neurophysiological findings and treatment. Neurol Sci. 2006; 27(2):97–103.

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