Medical rhinoplasty with hyaluronic acid and botulinum toxin A: a very simple and quite effective technique

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Summary

Objective The management of nasal deformities, and in particular those with “plunging” tip, has always been a typical area of interest in surgery. In the author’s experience many of these problems can be successfully approached with a new medical technique, which consists of using only hyaluronic acid for the correction of nasal angles and botulinum toxin for patients with hyperactivity of the depressor septi nasi muscle. The present study aims to illustrate this new technique and evaluates safety and results.

Materials and methods Ninety-five patients were treated between January 2006 and July 2007. The average age of the patients was 42.7 years. In 45% of the cases, botulinum toxin was employed. In all of the cases, the treatment was conducted with hyaluronic acid (24 mg/mL), the same substance used for face rejuvenation. The amount varied from 0.6 to 1.4 mL.

Results Results were evaluated using a definitive graduated score calculated by patient’s and doctor’s satisfaction score (range, 1–10) and by photographs’ score at time 0, after 30 days, and after 180 days. It ranged from 8 to 10 (average of 9.1). No significant side effects were reported.

Conclusion The medical rhinoplasty for a “plunging” nose is a simple and very effective technique with immediate results. It can be used in those cases where patients are reluctant to undergo surgery, or as primary indication in the correction of minor nose defects. Results are satisfactory and no side effects have been reported so far. Results will last for a long time.

Keywords: botulinum toxin, Dante’s nose, hyaluronic acid, medical rhinoplasty, plunging tip

Introduction

For many years, nose correction has been a typical surgical technique that improves many defects of one of the face’s most important features. Because of its central location and its connections to other areas of the face, the nose is a crucial aesthetic component. But what exactly is the ideal nose? While there is no exact answer, it is safe to claim that the ideal nose is the one that most harmoniously relates to the other facial features. Although the “beauty” of a face cannot be amenable to a standard template – it certainly also depends on various undefined elements – some standard guidelines of what is considered “beautiful” are generally accepted worldwide. A great number of surgical procedures are performed every year to correct these defects with good results. However, many patients with minor nasal defects, due to anatomical problems or aging factors, such as the reduction of bone tissues and subcutaneous aging,
do not undergo treatment for fear of surgical procedures and other personal reasons. In such cases, the simple technique we are introducing here may be applied without any major side effects. A good indication can also be the correction of nasal contour deformities after surgical interventions (secondary rhinoplasty).4,11

This procedure must be repeated in time (approximately once a year) but is very easy and requires no down time and thus, while expensive over years, is well accepted by patients who are reluctant to undergo surgery.

The best indication is for noses that are not too long and those with a plunging tip. In these patients, nasofrontal, nasodorsal, and nasolabial angles are all reduced (see Fig. 20). The success of this technique depends on a well-balanced tip projection which can be markedly improved.3,9

The technique is very easy and based on the use of botulinum toxin and nonanimal, middle-riculated hyaluronic acid (24 mg/mL), whose use renders possible the correction of all minor defects of the lateral nasal profile as well as those defects in anteroposterior view.12–14

Botulinum toxin is simply the third millennium’s most important and useful instrument of cosmetic medicine. The technique illustrated in this study replaces surgical intervention, which requires the cutting of the depressor septi nasi muscle.

In 45% of the patients, a hyperactivity of the depressor septi nasi muscle was reported. In these patients, a higher or lower contraction of the nasal tip may occur while speaking. This particular factor accentuates the defect of the plunging tip.

Over the past years, the use of hyaluronic acid has exponentially increased on account of (i) its easy management, (ii) the avoidance of any skin tests, and (iii) the quick fixing of any possible mistakes that may occur. It has been widely used in aesthetic medicine for many years, and it has proved to be easily handled and safe to use. It restores turgidity and plasticity to tissue, like that which is found in young people.12,13,15

There are many types of hyaluronic acid available in Italy. The one used in this work is a nonanimal, middle-reticulated hyaluronic acid (24 mg/mL).

This procedure is based on the author’s experience in the correction of nasal defects on 95 patients using botulinum toxin A (BtxA) and hyaluronic acid in the period from January 2006 to July 2007.

Anatomy

It is important to highlight the main elements of the nasal anatomy. The nose takes origin from the neural crest cells that migrate toward the midface around the fourth week of gestation. At 10 weeks, differentiation into muscle, cartilage, and bony elements occurs.10

The paired nasal bones are attached to the frontal bone at the top where the nasofrontal junction (nasion) sits (Fig. 1). The lacrimal bones sit laterally and superiorly; the ascending process of maxilla sits below. In the middle part, nasal bones continue in the vomer. Further down is the osteo-cartilaginous junction (rhinion).

The paired upper lateral cartilages are attached to the bones. The paired lower lateral cartilage, divided in the midline by the anterior septal angle, lies below them. Lower lateral cartilages are divided into lateral, intermediate, and medial crus.

The septum consists of the quadrangular cartilage, the ethmoid plate, and the vomer attached inferiorly to the maxilla. Blood supply is very abundant and comes from the internal (upper) and external (lower) carotid arteries. It is crucial to take the muscles (Fig. 2) into account, in order to avoid problems with this technique.

The most important muscles are:
• Elevator muscles: Procerus, levator labii alaeque nasi, dilator naris anterior;
• Depressor muscles: corrugator, alar nasalis, depressor septi nasi;
• Compressor muscles: transvers nasalis, compressor narium minor; and

![Nasal skeleton](image)
Dilators muscles: the anterior and posterior dilator naris.
The last, yet very important muscle – which is also risky to treat – is the orbicularis oris, often involved in the gummy smile.

External nose and the skin
The external nose’s appearance varies greatly in the general population. For instance, the differences between a Caucasian and an African nose are well known and generally recognized by all.¹

The dermis and epidermis along the top of the nose is rather different along the sides. It is often the case that the superior and inferior regions have thicker skin, while the middorsal region presents a thinner and more delicate skin. This aspect is important to keep in mind when injecting hyaluronic acid.

Aesthetic proportions and the aesthetic nasal study
Throughout history, many artists – including Leonardo da Vinci – assessed the aesthetic correct proportions of the human face.²,³

These divine proportions are good indicators in finding the corrections to be made, and especially useful in understanding the realistic possibilities that can be achieved.

In Figure 3, it is possible to observe the most significant points of the face from a lateral view. In this figure, the author emphasizes the most aesthetically important nasal features: the nasion, the rhinion, the tip, and the nasal spine.

Medical aesthetic doctors usually divide the perfect face horizontally in three zones:
• the upper from trichion to glabella;
• the middle from glabella to nasal spine;
• the lower from nasal spine to menton.
Vertically, the face is divided in five equal segments from one ear to the other.
Thus, the ideal nose occupies the central region of the face in horizontal and vertical dimension; this explains the great importance the nose plays in the overall aesthetic facial harmony.

The most important nasal angles are (Fig. 4):

1. The **naso-frontal angle** – the intersection of the glabella-nasion line with the nasion–rhinion line is normally 115° to 130° – a little more in females and less in males.
2. The **naso-facial angle** – the intersection of the fronto-pogonion line with the rhinion tip line is normally 30° to 40°.
3. The **naso-dorsal angle** – is the angle based on mid-dorsal region going up to nasion and to tip on the other side. It allows for the calculation of the hump. Normally it is 180°.
4. The **naso-labial angle** – the intersection of the columellar–spine line with the spine–labial line is normally 90° to 110°.
5. The **naso-mental angle** – the intersection of the rhinion-tip line with the tip–pogonion line is normally 120° to 130°.

There are some minor differences between males and females.

The dorsum should be straight, but it is not uncommon to find an angle of more than 180° in the presence of a hump, and one of less than 180 in the presence of a scoop. Tip rotation is also very important and should be slightly underrotated and overprojected (nasolabial angle = 115°, nasofacial angle 35–38°, and nasodorsal angle = 180–175°).

From below, the nasal base is seen in Figures 5 and 6. Asymmetries in the nasal appearance are quite common.
Figure 18 illustrates a very interesting preoperative study, which will be the subject of further discussion.

Materials and methods

Patients

From January 2006 to July 2007, 95 patients (80 female and 15 male) were treated. Patients’ age ranged from 22 to 67 years (average age, 39.9 years). The average age of male patients was 38.8 years (range, 29–45 years), while that of female patients was 40.1 years (range, 22–67 years).

Forty-three patients (45%) underwent a preliminary BtxA session to paralyze the depressor septi nasi muscle. One hundred percent of patients were then treated with nonanimal middle-reticulated hyaluronic acid: 74 patients (78%) in just one session, while 21 patients (22%) were treated in two sessions.

Photographs were taken before treatment, immediately after the hyaluronic acid session, and every 3 months. Max follow-up was conducted in eight patients after 18 months. Sixteen patients (17%) were treated exclusively for nose correction. The remaining patients (79 patients, 83%) were also treated for nasolabial folds, malar restoration, or treatment of lips. All these treatments were performed in the same session. Only 3% of the patients presented a correlated gummy smile, which was treated in the BtxA session.

The technique

In the first session, patients were assessed, the defects to be corrected were discussed, and the informed consent was signed. All patients were photographed in antero posterior, 45° and 90° (profile) position from both the right and left sides. Photographs were taken both before the procedure, immediately after, and every three months (when possible). In some patients, videos were also made in order to better understand nasal movements before and after procedure. For the patients who required it, BtxA was administered in the first session. In the following sessions, the nasal defects were corrected with hyaluronic acid.

Botulinum toxin

Only patients presenting a hyperactivity of the depressor septi nasi muscle, which moves down their nasal tip during some nasal activities (while speaking, for instance), must undergo treatment with BtxA during the first session. This is why it is crucial to carefully assess the nasal movements during session one, in order to treat only patients with the correct indications.12–14,16

In Italy, 50 U air-free bottles of BtxA are available for cosmetic use. These units were always diluted with 1 mL of saline solution to achieve a ratio of 1 U of BtxA per 0.02 mL. In the author’s experience, this is the best dilution in terms of potency and diffusion.

A 0.3-mL insulin syringe with a fixed needle was used. The 1-mL syringe for diabetes is not capable of showing the right units to be injected. All patients received anesthesia with a lidocaine 25 mg and prilocaine 25 mg cream, for at least 30 min. Injections in this area are very painful, and this step is mandatory.

The muscle to be injected is the depressor septi nasi. The injections were made just under the tip, at the beginning of the columella, one per side (Fig. 7). The amount injected was 1.5 U of Vistabex (Botulinum toxin type A, Allergan, Irvine, California, USA) (0.03 mL with our dilution) per side. In all cases, this amount was sufficient to obtain a good result: the nasal tip no longer droops while speaking; in some cases, it even upturns. This detail is already well known by surgeons who usually cut this small muscle for a definitive result. As is always the case with BtxA, appreciable results are only visible after 7 or 10 days. Figures 8 and 9 illustrate the result after the first session with BtxA, in a dynamic phase.

Hyaluronic acid

The author used nonanimal, middle-reticulated hyaluronic acid (24 mg/mL) in the dosage of 0.6 to 1.5 mL. The correction of the volumetric defect is carried out in two steps: the increase of the nasofrontal angle and the infiltration of the tip and, when needed, of the nasal
spine. This will lead to a slight underrotation and overprojection of the tip.

The nasal spine is corrected only when the nasolabial angle is inferior to 90°, to open this angle and improve the underrotation of the tip. The first step is the injection in the nasofrontal angle directly upon the procerus muscle with an injection parallel to the bone, starting from below (Fig. 10). Normally, 0.3–0.4 mL are enough. A slight digital pressure with cotton wool is useful to distribute...
the material and to reduce swelling and bleeding. This improves the naso-frontal angle, and often, with this first simple maneuver the nasal profile improves immediately. Then, if the tip droops, two puffs of hyaluronic acid are made in the subcutaneous tissue just upon the tip defining points. If the tip is fine, one injection in the middle may suffice (Fig. 11). The tip immediately comes up. The author always avoids injections under the subcutaneous tissue, in the cartilage, or deeper. It is mandatory to inject only the subcutaneous tissue.

In cases where the drooping nose is more significant, a third step is required: the nasal spine is injected with just 0.4 mL of hyaluronic acid, superficially, to open the nasolabial angle. This will improve the underrotation of the tip (Fig. 12). The injection must be given at a perpendicular angle to the skin (Figs 14, 15 and 18, 19). The additional correction of the nasolabial folds near the base of the nose can help improve the result.

It is very important to press firmly with cotton wool after each injection, particularly if bleeding occurs, and to wait the necessary time. This will reduce side effects, particularly hematomas. It is also important to observe the result from both sides of the nose. A difference in the two sides is not uncommon.

Finally, a cream activated with K vitamin and nanosomes is spread on the skin, and a slight compression is applied for at least 10 min. Patients thus treated can immediately return to their jobs without any other medication. During the same session, many patients (83%) were treated in other areas: the correction of nasolabial folds, the malar region, and the lips.

**Results and discussion**

First of all, it was very easy to find patients to be treated, as these minor nasal defects are extremely common. The ideal result is a nose that each patient is happy with.
nose that doctors like, and a nose that others find pleasing as well. While this is not always possible, improvements are consistently reported.

Photographs were taken both before and immediately after the procedure (0°–45°–90°). Patients were then photographed every 3 months. As for the evaluation of results, a patient’s satisfaction score (PSS) and a physician’s satisfaction score (PhSS) were calculated.

A definitive graduated score (DGS) was calculated for each patient, from the scores of the pictures taken and the average PSS and PhSS (range, 1–10). All patients showed immediate very good results, always higher than 8. The average result at the end was 9.1 (8.2–10 max). Follow-up varied between 3 months (51 patients/53.7%) and 18 months (8 patients/8.42%; Fig. 13).

After 6 months, results were still good (average DGS = 8.8) in the 40 patients seen at the follow-up (see Fig. 24). We need more time to evaluate later results, but the first impression is that it is possible to have long-lasting results, specifically with regards to the absence of noticeable nasal movements.

No major side effects have been reported. Minor side effects were reported in very few cases: swelling and slight hematomas were common, but lasted only for few days. In only one case, nose tip redness occurred and lasted for about 1 month. It happened in the second session of retouching with hyaluronic acid.

The BTxA treatment has always been well tolerated and no side effects were experienced. All treated patients had good results.

In performing the technique, it is important to evaluate the nose from both sides because there is always an important difference between them.

In a few cases where patients had a very significant defect, a defect that would traditionally be treated with surgery, the improvement after this medical technique has been satisfactory for the patients, although a complete result is impossible to achieve (Figs 14 and 15). In all these patients, the first indication remains the surgical one.
The result over time is good probably because the nose does not engage in significant movements, and after 1 year, the results were still clearly visible in 10 patients. In Figure 16, it is possible to see the percentage of patients seen on follow-up and the DGS trend. The author’s impression is that results are still very good after 1 year. In eight patients, there has been follow-up after 18 months and still the average DGS was 6.6. In six patients, it was necessary to redo the treatment at 6-month follow-up due to the defect’s reappearance. When follow-up in all patients is completed, it will be possible to have the statistical figures necessary in understanding the technique’s durability.

Without a doubt, patients greatly appreciated the possibility of having a correction performed in few minutes and, in some cases, with remarkably long-lasting results, without any down time. Figures 17–24, illustrate
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some of the preoperative and postoperative studies, and the pre- and post-photographs.

Conclusions

The reshaping of nasal defects remains a widely used surgical technique, with very good results. But many patients are hesitant to undergo surgery for a variety of reasons: fear of the procedure or of the final result, because their defects are too minor to justify surgery, and fear of the permanency of surgical intervention. This new very simple and absolutely safe technique is applicable to all these patients. Despite the technique’s necessity of being repeated over the years, this particular “drawback” is well accepted by patients and actually follows the current trend of a medical approach to aesthetic problems. In the author’s opinion, the best indication is for those patients with minor defects and can be combined with other treatments using hyaluronic acid in the same session. The combined use of BTXA can lead to better results without major side effects. It can be administered immediately, without any preparation, as is the norm when working with these substances. Results are visible in a few minutes, and patients can return immediately to their daily lives. On average, the result can be satisfactory if performed once a year, but a full follow-up will give more concrete results.

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