



# Injection Rhinoplasty

Dr Simon Ravichandran offers his advice on using hyaluronic acid to treat nasal deformities

## Introduction

Rhinoplasty is a procedure for altering the structure, improving the function, and aesthetically enhancing the nose. Currently, the most common method of achieving this is with a surgical rhinoplasty. This article discusses a developing method of altering the shape of the nose non-surgically and provides anatomical advice for practitioners looking to incorporate this treatment into their clinic. Three groups of patients are suitable for consideration of injection rhinoplasty. These include those with small deformities that can easily be addressed in the clinic; patients who have defects that would benefit from formal rhinoplasty but are not ready to commit to a surgical procedure; and finally, post-rhinoplasty patients who can have an injection procedure to smooth out any residual roughness or depressions.

## Modern rhinoplasty

Rhinoplasty is usually performed in one of two ways: the closed or open approach. The closed approach involves making incisions on the inside of the nose and manipulating the bones and cartilages from within. The closed technique has the advantage of no scarring to the external skin and a shorter post-operative recovery time.<sup>1</sup> The external, open techniques involve exposing the bones and cartilage of the nose by lifting the skin through an incision in the columella. This has the advantage of creating a direct visualisation of the structures, allowing an anatomical correction of deformity, as well as allowing the use of tip-suturing techniques to restore the structure of the nasal tip with a greater degree of anatomical certainty. It has the disadvantage of creating a small external scar, and a slightly longer recovery time. Whichever method is employed, there are two main approaches to the correction of nasal deformity, and most surgeons will employ a degree of overlap between the two. The first will involve a restoration of the normal nasal anatomy, and the second will aim to camouflage the nasal defects. Camouflage involves the use of graft to fill any defects,<sup>1</sup> which could include a supratip depression, a splayed tip or a depressed bony dorsum. The graft can be autologous using cartilage or fat; or exogenous using, for example, porous polyethylene implants or, more recently, hyaluronic acids (HAs).<sup>1</sup>

## HA use in rhinoplasty

The evolution of modern injectable HAs has provided a novel material for the use in the camouflage of minor defects, either as part of a rhinoplasty procedure, or as a stand alone clinic procedure. HAs have four distinct advantages over other materials:

- The biodegradability of HAs allows them to be used as a pre-surgical treatment to enable a patient to visualise the result prior to proceeding to surgery. This is a useful tool for patients who may benefit from surgery, but are not quite ready to take the step.
- The ability of hyaluronidases to break down HAs allows for the product to be easily removed from patients who could be dissatisfied with the outcome.<sup>2</sup>
- The cost of HAs is considerably less than the cost of surgery, allowing treatment for the more budget-conscious patients.
- As HAs can be injected with either no anaesthesia, or simple topical anaesthesia, the procedures can be carried out quickly and safely in a clinic environment. As bleeding and bruising is minimal, the downtime is negligible.

Disadvantages of HAs stem mainly from the properties that make it desirable:

- The duration of action is from 12 to 18 months, whereas some patients may request longer-lasting results.
- While HAs can be used to camouflage defects, they cannot correct structural anatomical abnormalities.

## Defects addressed with injection techniques

The simplest deformities to address with injection rhinoplasty are the dorsal depressions. They may be congenital or acquired, and they may be primary, or secondary as a result of another deformity – for example, a dorsal hump giving the appearance of depression either above or below. In addition, dorsal nasal deformities are also common sequelae of previous surgical rhinoplasty.<sup>3</sup> The two areas where dorsal depressions can occur are the supratip and the nasion. Both depressions may occur as a result of the natural ageing process, i.e. loss of glabella soft tissue volume leading to a nasion depression, and an age-related laxity of the cartilaginous tip complex, resulting in dislocation of the crural cartilages from the upper lateral / bony dorsal complex.<sup>4</sup> It is important to note that a dislocation may also present with tip elongation and tip ptosis. This is a result of age-related connective tissue weakness, as well as loss of inferior support that comes with maxillary resorption. Nasal tip deformities when mild may be treated with injection techniques in experienced hands, but would preferably be treated with rhinoplasty or tipplasty. The difference between the two is that rhinoplasty concerns the nasal bones, while tipplasty concerns reshaping the delicate cartilaginous structures that give shape and structure to the nasal tip. Other deformities that can be addressed are bony complex deviations, and depressed bony fractures that may be camouflaged, some mild nasal tip deformities, such as a box tip and mild nasal tip ptosis.<sup>5,6</sup>



## Nasal Anatomy

When assessing the nasal deformity it is important to understand the underlying anatomy of the area in order to appreciate the effect the alteration may have on the function of the nose, as well as to appreciate the mechanism of potential complications.

### Bones and cartilage

The nasal skeleton is divided into subunits; there is a bony upper-third consisting of the frontal processes of the maxilla laterally, and the left and right nasal bones medially. Both frontal processes of maxilla and the nasal bones articulate with the frontal bone superiorly.<sup>7</sup> The lower two-thirds of the nose have dorsal projection provided by the septal cartilage and lateral support provided superiorly by the upper lateral cartilages. Lateral support and tip shape is provided by the lower lateral cartilages, which are further subdivided into medial, intermediate and lateral crura.<sup>7</sup>

### Skin

The skin on the nose is also divided into three vertical subunits. Superiorly the skin is thick, rapidly thinning towards skin overlying the dorsum of the nose in the middle-third, and thickening at the lower-third over the tip as the skin becomes sebaceous.<sup>7</sup>

### Muscles

The nasal muscle lies deep to the skin and comprises the procerus muscle, which arises from the fascia overlying the inferior part of the nasal bones, and inserts to the skin between the eyebrows. The procerus muscle assists in pulling the eyebrows downwards in the frown or anger gesture. Prolonged use of procerus is causative of a

horizontal rhytid forming over the upper-third of the nose.<sup>8</sup> Levator labii superioris alaeque nasi runs laterally along the nose, attaching to the frontal process of the maxilla superiorly, and inserting into the skin of the nostril inferiorly. It is responsible for flaring of the nostrils as well as assisting with lip elevation. The other muscles are depressor septi nasi, the transverse nasalis and the dilator nares. Depressor septi nasi inserts into the skin in the upper lip, and is responsible for the 'dancing' nasal tip that is occasionally an aesthetic concern. Transverse nasalis compresses the nares and dilator nares, which dilates the nares. The muscles are all contained within the submucosal musculoaponeurotic system.

### Blood supply and venous drainage

The blood supply of the external nose stems from the facial artery. This divides near the angle of the mouth to give a superficial labial branch that gives rise to the columella branch, which runs under the skin of the columella in the body of depressor septi nasi. At the angle of the mouth, the main facial artery continues superiorly medially to the alar sulcus, where it runs up along the lateral wall of the nose to become the angular artery at the medial canthus. The venous drainage follows the arterial supply.<sup>9</sup>

### Sensory nerve supply to the nose

The ophthalmic and maxillary divisions of the trigeminal nerve supply the external part of the nose. Anaesthesia can therefore easily be achieved by a blockade of these nerves as they exit the skull from the infraorbital and supraorbital foramina. It is also very easy to achieve sufficient anaesthesia using topical anaesthetic creams, such as EMLA or LMX 4.<sup>9</sup>

## Special considerations

### The nasal valve

The nasal valve area is the angle subtended by the cartilaginous septum and the upper lateral cartilage at the osteocartilaginous junction. A reduction in the angle of the nasal valve area will result in decreased nasal airflow.<sup>9</sup> Any procedure that narrows the nasal valve has the potential to reduce nasal airflow and increase the sensation of nasal obstruction.<sup>10</sup>

### The soft nasal cartilage

The upper lateral and lower lateral cartilages of the nose provide the structural rigidity to the non-bony caudal two thirds of the external nose. They also provide resistance to in-drawing on nasal inspiration. The upper lateral cartilages are responsible for the rigidity of the nasal walls, and the lower lateral cartilages provide structure to the nasal tip and nostrils.<sup>9</sup> The cartilages are paper thin and potentially susceptible to damage due to pressure necrosis from inappropriately placed implants.<sup>11</sup>

### The skin

The skin of the nose has three distinct subunits. The skin is thicker over the nasion and superior bony dorsum, and thins over the bony pyramid of the middle-third of the nose and becomes thicker again over the tip.<sup>9</sup> Injections under the thin skin of the middle-third can easily result in lumpiness or discolouration if placed too superficially. This is of specific concern when attempting to camouflage a deviation of the bony pyramid with contralateral lateral nasal wall volumisation.<sup>11</sup>

## Techniques

Injection of HAs into the nasion area can correct volume depletion and camouflage a pseudo-depression caused by an osteocartilagenous dorsal hump. By increasing the profile and volume of the nasion area the base can appear narrowed, as loose deflated skin gets re-draped. It can also affect the horizontal rhytids caused by contraction of the procerus, as well as the nasal scrunch lines caused by contraction of nasalis and the medial fibres of obicularis oculi. I tend to use topical anaesthetic or no anaesthetic at all, depending on patient preference. Local infiltrations make the correction harder to judge as a result of their own volumising effect. In addition, the combination of supratrochlear and infraorbital nerve blocks can provide good regional anaesthesia, however, they can be uncomfortable for many patients.

I use either EMLA or LMX 4 on skin cleaned with chlorhexidine. The patient should be sitting upright or semi-reclined. I prefer to inject from above the patient with the needle pointing towards the nasal tip as it is the easiest place to view the brow-tip aesthetic line. Injections can be performed using either needle or blunt cannula. Pinching loose skin between thumb and forefinger of my left hand, I hold the syringe in my right hand and inject into the midline with the needle entering slightly superior to the nasion at an angle, aimed towards the area of greatest volume deficiency. The needle is advanced until contact is made with the nasal bone. I inject a single depot injection of anywhere between 0.05 and 0.3cc, depending on the volume correction required. To prevent migration of the product during injection, it is important to inject slowly, and I also apply concurrent pressure laterally to the



Female in her early 30s with a congenital osteocartilaginous hump. She was treated with 0.3cc Belotero Intense at the nasion, 0.1cc Intense at the supratip, 0.05cc at the nasal tip, 0.1cc at the columella and 0.2cc at the maxillary crest. The outcome is reduced appearance to the hump, together with an increase tip projection and the appearance of a slightly elevated tip.

injection site with my left finger and thumb. After initial injection the product can be moulded and the nose re-assessed. Further injections can be performed if the initial treatment is sub-optimal.

### Supratip depression

Several techniques of supratip augmentation have been described. Injections can be performed via a needle directly through the skin at the point of deficiency, or via a cannula entering the skin from a distal point, either the nasion or the tip. I prefer to use a blunt cannula for augmentation of the supratip for two reasons. Firstly, supratip depressions may require larger volumes of product to be injected, and having a distally-based injection point may potentially reduce the risk of implant infection. Secondly, as the supratip area is made-up entirely of soft tissues, a blunt cannula inserted distally into the correct plane is less likely to cause perforations through the various tissue planes, through which product can bleed. In the absence of a significant dorsal hump, I prefer to inject from the nasion down. I place my cannula in the superperiosteal or deep subcutaneous plane and slide the tip down to the defect. The tip of the cannula should be in the deep soft tissue in the midline, superior to the dorsal septal cartilage and superior medial to the upper laterals. It is important to note that inadvertent trauma to the upper lateral cartilages can have long-term implications in both nasal valve function and nasal cosmesis. Using the same technique as described for the nasion augmentation, namely, injecting small volumes slowly with pressure applied laterally to prevent product migration, the defect is filled. After injection, I withdraw the cannula and apply pressure to the tissues with a gauze swab soaked in saline. Pressure is kept on for at least three minutes as haematoma in this area can be catastrophic for the soft cartilage and result in cosmetic and functional deficit.<sup>12</sup>

### Nasal tip augmentation

The simplest nasal tip technique involves the placement of an implant vertically through the columellar. This single technique can provide subtle alteration to the shape of the tip through more than one mechanism. Firstly, provision of columellar support can reduce mild tip ptosis and lift the tip. Secondly, it can lengthen the appearance of a short columellar and increase tip projection. Thirdly, with a mild box-tip deformity, the soft tissue at the mid-portion of the nasal tip between the intermediate and superior parts of the two medial crura can be filled, which provides a more rounded and aesthetically pleasing appearance. The improvement occurs as a result of the primary filling of defect, but also due to the skin re-draping over an increased projection, which exerts a small medialising force on the splayed cartilages.

This is also useful in the management of the bifid tip deformity caused by splayed intermediate crura. Finally, the effects of columellar lengthening and increased tip projection will pull the entire tip structure forward from the face. This results in a medial pull on the soft tissue of the lateral alar region, resulting in an apparent alar base reduction. In my practice, I use a topical anaesthetic cream to numb the skin after thorough cleansing with chlorhexidine. I identify the landmarks of the alar cartilage, specifically the domes, medial crura and the medial footplates. I make a preliminary stab incision through the skin of the nasal tip in the midline and then insert a blunt cannula directly downwards to the maxillary crest, taking great care to remain in the midline and avoid the cartilages. Injecting slowly, I carefully withdraw the cannula, leaving a ribbon of implant in the midline. Whilst injecting, I keep a thumb and forefinger on either side of the columellar skin and also the anterior vertical septal cartilage to prevent accidental bleeding of product. I observe for signs of blanching of the nasal tip that may indicate pressure on or transection of the columellar nasal artery. If volume is required in the nasal tip, a small depot can be placed superiorly on the column. Gentle pressure is applied for a minimum of three minutes.

### Summary

The techniques described allow correction of a wide range of nasal deformities without the cost, complications and downtime of surgery, providing an attractive alternative for patients. With appropriate experience of using injectable fillers, and a thorough appreciation of nasal anatomy, complications are unlikely. Dissatisfaction with cosmesis is easily addressed with the use of hyaluronidase. Injection rhinoplasty is a new technique that surgeons can utilise to compliment their practice and increase patient satisfaction.



**Dr Simon Ravichandran** is an ear, nose and throat surgeon, specialising in rhinology. He trained in aesthetic medicine in 2007 and co-founded Clinetix Medispa in 2010. Dr Ravichandran has established the Scottish Advanced Aesthetic Training Programme with Glasgow University, and is the founder and chairman of the Association of Scottish Aesthetic Practitioners.

### REFERENCES

1. H Berholm, ME Tardy, *Essentials of septorhinoplasty: Philosophy - approaches - techniques*, (New York: Thieme, 2004)
2. DW Kim, ES Yoon, YH Ji, SH Pasrk, ES Lee Bi Dhong, 'Vascular complications of hyaluronic acid fillers and the role of hyaluronidase in management', *J Plast Reconstr Aesthet Surg*, 64(12) (2011), pp. 1590-5
3. Koen JAO Ingles and Rene MJ Middelweerd, 'Nasal Dorsal Management', *Facial Plastic and Reconstructive Surgery*, ed. by Hade Vuyk (Florida: CRC Press, 2012), pp. 231-246.
4. Manavpreet Kaur, Rakesh K. Garg, Sanjeev Singla, 'Analysis of facial soft tissue changes with aging and their effect on facial morphology: A forensic perspective', *Egyptian Journal of Forensic Sciences*, 5(2) (2015), pp. 46-56
5. C Chestnut, J Hsiao, J Kim, D Beynet, 'New uses for Fillers', *Cosmetic Dermatology*, 25(4) (2012)
6. D Bray, C Hopkins, DN Roberts, 'Injection rhinoplasty: non-surgical nasal augmentation and correction of post-rhinoplasty contour asymmetries with hyaluronic acid: how we do it' *Clin Otol*, 35 (2010), pp. 220-237
7. ME Tardy and RJ Brown, *Surgical anatomy of the nose*, (New York: Raven Press, 1990)
8. MR MacDonald, Jeffrey H. Spiegel, Raymond B. Raven, Shledon S. Kabaker, Corey S Maas, 'An Anatomical Approach to Glabellar Rhytids', *Arch Otolaryngol Head Neck Surg*, 124(12) (1998), pp. 1315-1320
9. WF Larrabee, KH Makielski, JL Henderson, *Surgical Anatomy of the Face*, (Philadelphia: Lippincott Williams and Wilkins, 2004)
10. Balaji N, Ravichandran S 'Assessment of Nasal Valve Obstruction: a new nasal 'wall' sub-unit concept', *ENT and Audiology News*, 21 (2012), pp. 411-113
11. Clinton D. Hymphrey, John P Arkins, Steven Dayan, 'Soft Tissue Fillers in the Nose', *Aesthetic Surgery Journal*, 29(6) (2009), pp. 478-84
12. MA Leon MA, L Cardenas-Camarena, 'Deforming posttraumatic hematoma of the nasal tip: an infrequent lesion', *Plastic and Reconstructive Surgery*, 113(2) (2004), pp. 641-4